Marine Management Organisation

South Marine Plan
Habitat Regulations Assessment:
Appropriate Assessment Information Report
Draft for consultation

November 2016

Page intentionally left blank.

Marine Management Organisation

MMO1112: South Marine Plan Habitat Regulations Assessment:

Appropriate Assessment Information Report

October 2015

Report prepared by: ABP Marine Environmental Research Ltd

Version	Author	Note
0.1	PSW	First draft
0.2	PSW	Final
0.3	PSW	Final - Policy Codes Included

Information about this publication and further copies are available from:

Marine Management Organisation
Lancaster House
Hampshire Court
Newcastle upon Tyne
NE4 7YH

Tel: 0300 123 1032
Email: info@marinemanagement.org.uk
Website: www.gov.uk/mmo

If referencing this document, please cite it as: [MMO1112South Marine Plan Habitat Regulations Assessment: Appropriate Assessment Information Report, October 2015

Contents

Diagrams

Tables

Executive summary

This report has been prepared by ABP Marine Environmental Research Ltd (ABPmer) on behalf of the Marine Management Organisation (MMO). It presents the information required by the MMO, as competent authority, to undertake an Appropriate Assessment (AA) for the South Inshore and Offshore Marine Plans (hereafter referred to as the South Marine Plan). The locations of the south marine plan areas are shown in Figure 1 (in Annex 1).

A Habitats Regulations Assessment (HRA) of the South Marine Plan has been undertaken in order to assess its effects on protected nature conservation sites (European/Ramsar sites). The HRA process has followed the standard iterative process for undertaking plan-level HRAs as set out in the available guidance (David Tyldesley Associates, 2009 and 2012).

This Appropriate Assessment Information Report (AAIR) is the third and final in a series of three reports that have been prepared for this assessment process, covering Stages 8 to 10 of the HRA guidance. Following the preceding screening stages it was concluded that the draft South Marine Plan policies that related to future potential aquaculture initiatives and future opportunities for the 'beneficial re-use' of (dredged) sediment might have an effect on a European/Ramsar site and therefore these policies warranted further consideration.

The assessment has been undertaken following a series of 5 steps as described below.

Step 1: Impact pathways review
This step involved identifying and understanding the generic impact pathways by which the 'screened in' policies for future potential aquaculture and beneficial re-use of sediment might have an effect on European/Ramsar sites and their associated interest features. A total of 20 generic impact pathways were identified which are presented in Table 1 in Annex 2.

Step 2: Identify activities to which features are sensitive
The individual activities associated with the aquaculture and beneficial re-use sector that might result in a likely significant effect (LSE) on European/Ramsar sites and their interest features were reviewed for each of the 20 generic impact pathways identified in step 1. The outcomes of step 2 are presented in Table 2 in Annex 2.

Step 3: Activity-based screening of European/Ramsar sites
Based on a greater understanding of the environmental changes that might be brought about by aquaculture and beneficial re-use activities, the original screening process was revisited to confirm the potentially affected European/Ramsar sites and their interest features.

There are no significant above water structures associated with either of these sectors that would interact with the flight behaviour of bats and therefore there is no longer considered to be any potential ecological connectivity between these features and the South Marine Plan. Bat interest features were therefore screened out of the

assessment at this stage resulting in a revised total of 179 European/Ramsar sites 'screened in' for consideration at the assessment stage.

The potential for a likely significant effect (LSE) to occur as a result of the South Marine Plan (or the potential for a LSE cannot be excluded) still remains for all other European/Ramsar sites and interest features which were identified at the screening phase. The revised list of European/Ramsar sites and interest features that have been screened in and out of the assessment is provided in Table 3 in Annex 2. Summary screening schedules that present the specific interest features that could potentially be affected by either and/or both aquaculture and beneficial re-use activities are presented in Table 4 in Annex 2.

Step 4: Detailed pathway-feature sensitivity review
This step involved a more detailed review of the sensitivities and potential vulnerabilities of the interest feature habitats and species to the activities associated with the 'screened in' sectors. The outcomes were presented in a series of 'pathway-sensitivity' tables for each broad category of habitat or species interest feature group in Sections 3.4 to 3.8 of the report.

Step 5: Assessment of effects on European/Ramsar sites
The final step was to assess the impacts that will or could occur via each of the 20 generic impact pathways against the conservation objectives of European/Ramsar sites. An initial view was then taken about the effect on site integrity of the South Marine Plan both alone and in-combination with other extant plans or projects. This was made in advance of the formal judgment that is to be made by the MMO, in consultation with the key stakeholders for the AA in Stage 12 of the HRA.

The assessment has concluded that it is not possible to be certain of no adverse effect on integrity (NAEOI). This is because of the uncertainties that exist about the South Marine Plan and other plans and projects. There is also the lack of a guarantee that there will be no evidence/analysis gap in the future.

Based on lessons learnt and approaches followed in past plan-level HRAs, two key mitigation measures are proposed to provide the necessary assurances that the South Marine Plan as a whole will have NAEOI on European/Ramsar sites either alone or in-combination with other plans or project. These are as follows:

1. An Iterative plan review (IPR) process
This process would involve a phased and iterative approach to plan-implementation which is linked to ongoing project developments and their associated monitoring work and with the findings from such project-level work feeding back into the next phases of plan-implementation. This is done so that results from monitoring data from consented projects and on-going research programmes can be fed into subsequent developments in order for lessons to be learnt and evidence gaps filled, thus reducing potential impacts to European/Ramsar sites.

2. Project-level HRA
Further assurances that there will be NAEOI on European/Ramsar sites is provided by the fact that each individual development that is undertaken within the South Marine Plan Area will be legally required to undergo an HRA process in its own right.

It is recognised that a range of non-statutory mitigation measures also exist and have been identified for previous aquaculture and beneficial re-use projects. Such measures were therefore identified as part of the assessment to assist with future project developments and associated licensing. This list of generic mitigation measures is set out in Table 21 of the report.

1 Introduction

1.1 Report background

This report has been prepared by ABP Marine Environmental Research Ltd (ABPmer) on behalf of the Marine Management Organisation (MMO). It presents the information required by the MMO to undertake an Appropriate Assessment (AA) of the South Inshore and Offshore Marine Plans (hereafter referred to as the South Marine Plan). It is the third and final report in a sequence of reviews that provide the information needed for the Habitats Regulations Appraisal (HRA) which is being carried out to accompany the development of the South Marine Plan. The locations of the inshore and offshore marine plan areas are shown in Figure 1 (in Annex 1) and a single HRA process is being undertaken to cover both south marine plan areas together.

The HRA process has been undertaken according to the standard iterative process for undertaking plan-level HRAs as set out in the available guidance (David Tyldesley Associates, 2009 and 2012). This guidance identifies the steps and processes to be followed and these are shown in Diagram 1. This work has been undertaken alongside the process of finalising the draft objectives and policies for the South Marine Plan.

The reports that comprise the HRA record for the South Marine Plan and the stages of the HRA process that they cover are as follows:

- Report 1 **Pre-screening Review** (HRA Stages 1 to 3) - (MMO, 2014a and update provided in Annex 2 of the Screening Report, MMO, 2015a).
- Report 2 **Screening Report** (HRA Stages 4 to 7) – (MMO, 2015a).
- Report 3 **Appropriate Assessment Information Report (AAIR)** (HRA Stages 8 to 11) – (this report).

The final Appropriate Assessment (Stages 12 and 13) will be prepared separately by the MMO.

To address the particular challenges associated with undertaking an HRA for marine planning, and drawing on the lessons learned from the East Marine Plans HRA (MMO, 2013a), a policy screening and assessment framework has been adopted. This framework is presented as a flow diagram in Diagram 2. It provides a mechanism for reviewing marine planning policies and identifying those that need to be assessed. Further details about the rationale and content of this report in the context of the full HRA process is presented in the following section.

Diagram 1: Stages of the HRA process for marine plans in England (adapted from David Tyldesley Associates, 2012).

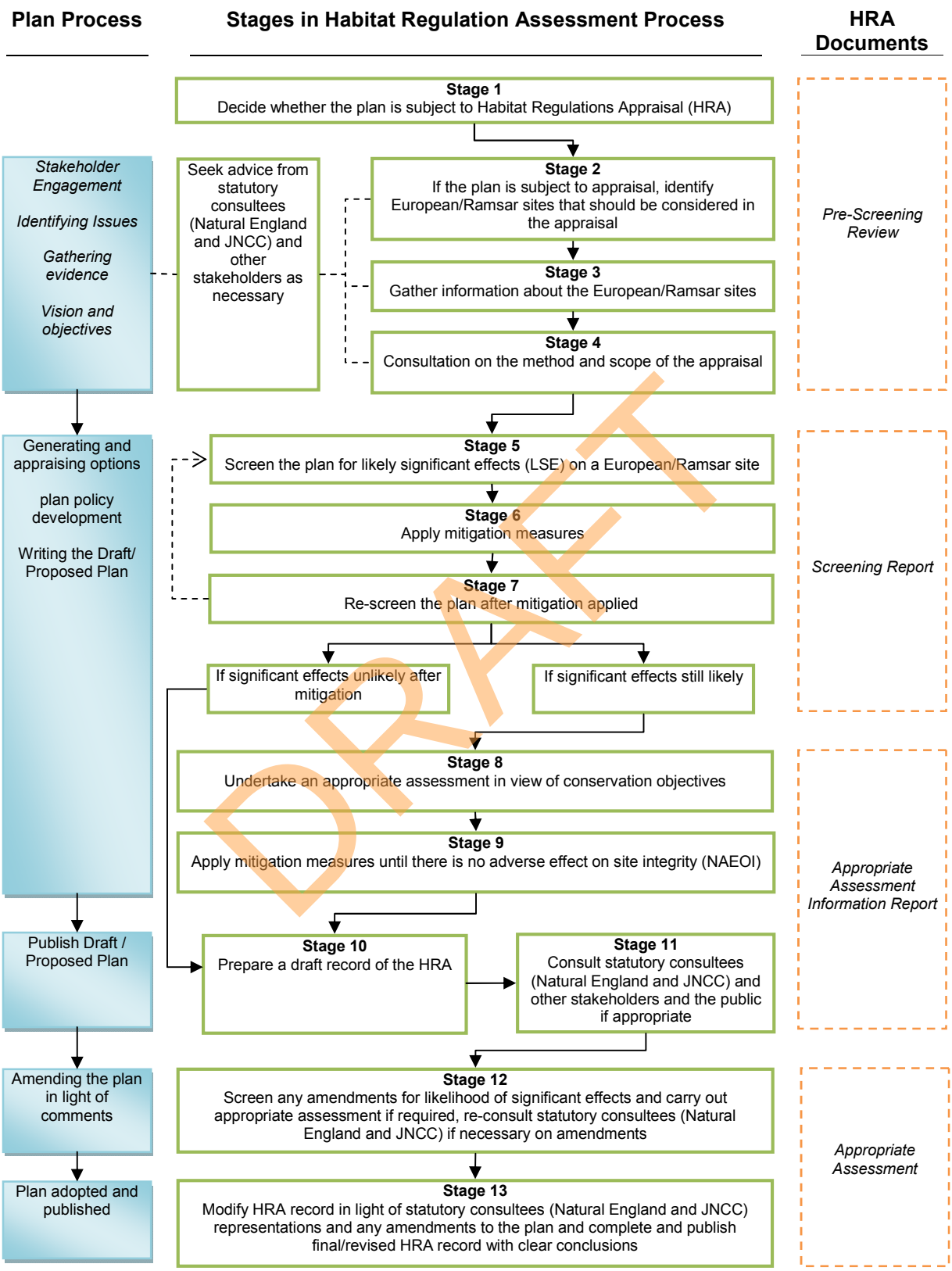
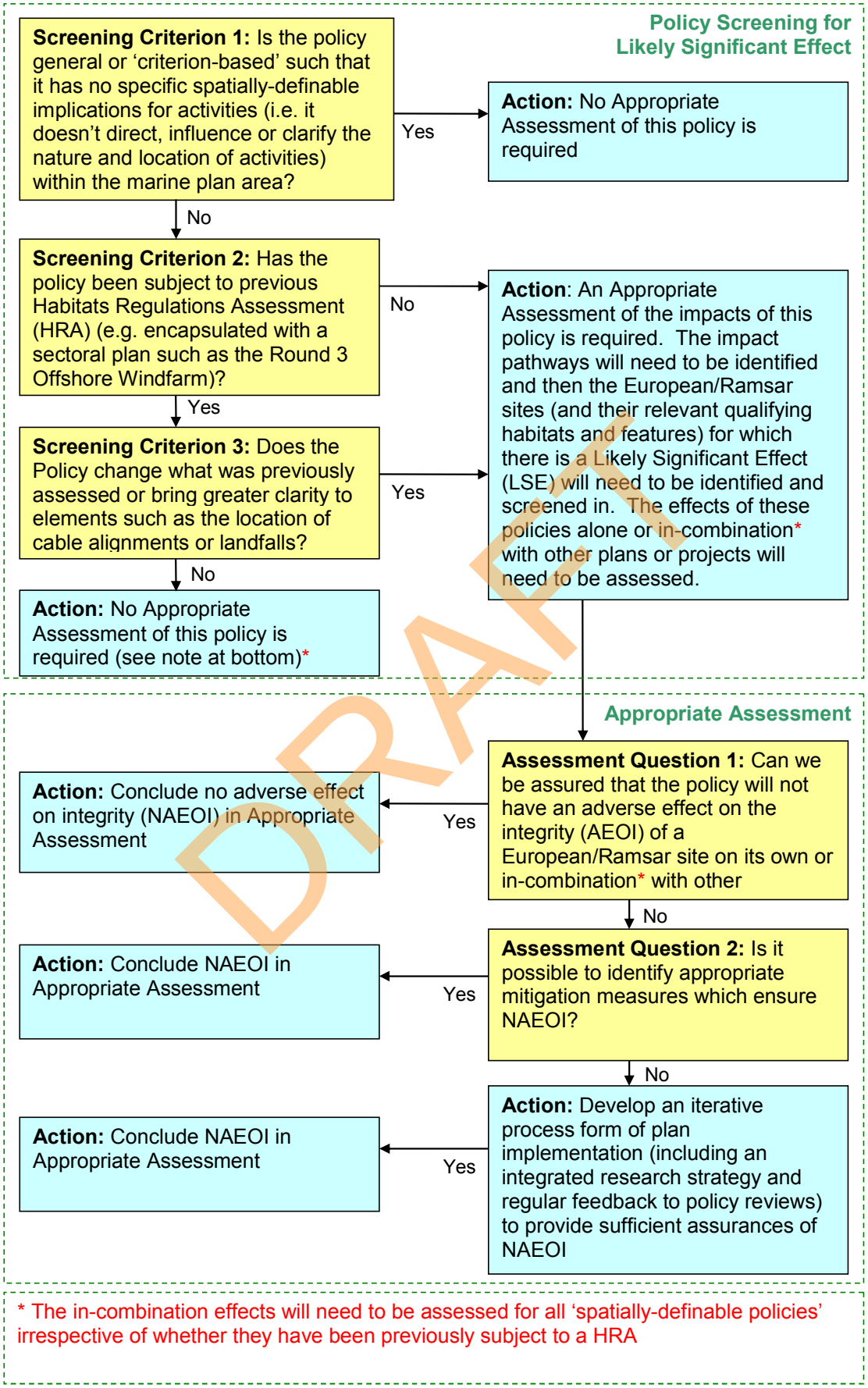


Diagram 2: Policy screening and assessment process.



1.2 South Marine Plan HRA process

This AAIR represents the third major step in the overall HRA process. The two preceding stages were reported separately and involved an initial pre-screening followed by a more detailed screening review. The scope and results of these studies are summarised in the following sections.

1.2.1 Pre-screening review

The initial pre-screening review covering Stages 1 to 4 of the HRA guidance (Diagram 1) was published in July 2014 (MMO, 2014a). This set out, in very broad terms, the European/Ramsar sites and interest features that may need to be considered in this HRA as well as the proposed methods for screening and assessment.

A draft version of this pre-screening review was circulated to Statutory Nature Conservation Bodies (SNCBs, namely Natural England and the Joint Nature Conservation Committee (JNCC)) in 2014 to seek their views. The comments received informed the final published version of the pre-screening review.

An updated version of the pre-screening review was undertaken in 2015 and included in the ensuing Screening Report (see Section 1.2.2). This updated version reviewed advances in scientific understanding of interest features and their interactions, and lessons learnt from more recent plan-level HRAs (since the publication of the pre-screening review). It also took account of the advice provided by the Sustainability Appraisal Advisory Group (SA-AG), which included the SNCBs, Natural England and JNCC.

In light of this, the screening methodologies for bottlenose dolphin and bats were updated accordingly. The ecological screening methodology proposed for bottlenose dolphin now takes into account the final Management Units (MUs) which have been recently published by the UK Inter-Agency Marine Mammal Working Group (2015). The updated ecological screening methodology for bats takes account of new evidence on their potential foraging and migratory behaviour in coastal regions (BSG Ecology, 2014).

In addition, the updated pre-screening review identified any new designated or proposed European/Ramsar sites upon which the South Marine Plan could have a likely significant effect (LSE). Two candidate SACs (cSACs) have been upgraded to Sites of Community Importance (SCI) status since the original publication of the pre-screening review. As a result a total of 295 European/Ramsar sites were identified at pre-screening for consideration at the next screening stage. These included 188 SACs/cSACs/SCIs, 66 SPAs, 33 Ramsar sites and 8 compensatory sites.

1.2.2 Screening review

The screening review that covered Stages 5 to 7 of the HRA guidance (Diagram 1) was undertaken in August 2015 (MMO, 2015a). This identified the European/Ramsar sites and interest features for which there is a LSE from the draft South Marine Plan, or where a LSE cannot be excluded, and need further consideration in the HRA.

The screening process essentially involved the following two-stage process:

1. A policy screening process in which the policies of the South Marine Plan were reviewed to identify those that need to be assessed (based on agreed pre-determined criteria that are explained further below). This resulted in a final list of those policies which are not 'criteria-based' and which result in a material change to existing activities and for which there may be a LSE.
2. An ecological screening process which identified European/Ramsar sites and interest features for which there is a potential for a LSE (or where such a LSE cannot be excluded) from the areas of the marine and coastal environment where activities will occur as a result of the 'screened in' policies.

The relevant policies for which a LSE could occur were those which fulfil Screening Criteria 1 to 3 (as shown in Diagram 2), because they identify discrete areas where activities will, or may, take place as a consequence of the South Marine Plan but for which no previous HRA has been undertaken. The results of the policy screening reported in MMO (2015a) were based on a review the marine plan policies provided in the first draft version of the South Marine Plan. The second draft version of the South Marine Plan has since been made available. Following a review of the updated marine plan policies, the two policies that can be screened into the assessment remain the same as before and are presented in Table 1.

Policy S-AQ-1 is designed to enable aquaculture to continue, and to realise new opportunities subject to meeting legislative requirements (MMO, 2015b). This policy was screened into the HRA on the basis that areas of potential aquaculture production have not previously been subject to HRA and are spatially explicit (MMO, 2015a). Areas of potential aquaculture production are shown on Figure 2a in Annex 1. These areas are based mostly on the biophysical envelop of species and specific consideration of other activities known to be incompatible (MMO, 2015b).

Policy S-DD-2 encourages the re-use of dredged material in an alternative way, whilst aiming to reduce the number of new disposal sites being created, along with existing sites currently being used (MMO, 2015b). Although a map is not provided in the draft South Marine Plan, spatial information on the shoreline stretches which could benefit from future beneficial re-use is available from the MMO1073 study (MMO, 2014b). This spatial information is limited to areas which could benefit from beach nourishment and mud recharge and these are shown in Figure 2b in Annex 1. Although policy S-DD-2 includes other types of beneficial re-use (e.g. subtidal deposition and land claim/raising), these are not included in the scope of this HRA given the lack of spatial information as to where these might occur in the future.

It is important to note that these plan policies were draft (second version) at the time of undertaking the policy screening. They have now been finalised and no changes have affected the outcome of the policy screening review. This review will be reported in the final version of the AAIR (this report).

Table 1: 'Screened in' draft South Marine Plan policies

Plan objective	Policy	Description	Inshore/ Offshore Plan Areas
Objective 1: Co-existence	**S-AQ-1**	Sites of existing aquaculture production will be protected and proposals for aquaculture in identified locations of potential aquaculture production will be supported. Other proposals within these areas must demonstrate consideration of and compatibility with aquaculture production. Where compatibility is not possible, proposals will demonstrate in order of preference: • That they will avoid adverse impacts on the areas identified for aquaculture • How, if there are adverse impacts that cannot be avoided they will minimise these impacts on aquaculture industry growth • How, if adverse impacts cannot be minimised they will be mitigated • If mitigation is not possible they should state the case for proceeding.	Inshore and Offshore
Objective 12: Space for nature	**S-DD-2***	Proposals must identify where use of disposal sites can be minimised by pursuing re-use opportunities through matching of spoil to suitable sites	Inshore and Offshore

* The marine plan policy for re-use opportunities was S-DD-1 in the first draft version of the South Marine Plan (as reported in the screening report; MMO, 2015a). This policy was modified to S-DD-2 in the second draft version of the South Marine Plan.

Following the ecological screening process, a final list of European/Ramsar sites and interest features was identified for which a LSE could occur from relevant draft South Marine Plan policies. From the original 295 European/Ramsar sites identified at pre-screening, a revised total of 196 European/Ramsar sites were screened in for consideration at the assessment stage. These include 105 SACs/cSACs/SCIs, 53 SPAs, 30 Ramsar sites and 8 compensatory sites. The location of these sites in relation to the South Marine Plan area is shown on Figures 2a to 2d (in Annex 1). Individual screening maps for each of the interest features groups and 'screened in' policies are included in Annex 1.

1.2.3 Appropriate Assessment information review

This report now presents the information required by the MMO, as competent authority, to undertake an AA, covering Stages 8 to 11 of the HRA process (Diagram 1). These stages of the HRA and the sequential decision making process that will be followed is shown in the bottom half of the flow diagram in Diagram 2.

In outline, it includes the following information:

- An overview of activities and changes that will arise from the 'screened in' policies that could have an impact on the key habitat and species interest feature groups.
- A review of the sensitivities to impact of the key habitat and species interest feature groups.
- An assessment of the potential impacts of the 'screened in' policies both on their own and in-combination with each other and with all spatially-definable policies irrespective of whether they have been previously subject to an HRA.
- An assessment of the in-combination impacts of the South Marine Plan with other plans, projects and activities.
- The identification of mitigation measures which will ensure that the South Marine Plan will have no adverse effect on integrity (NAEOI) of any European/Ramsar sites either alone or in-combination with other plans or projects.

Following the screening review a large number of European/Ramsar sites were identified that will need to be taken forward within the assessment phase. This is typical for plan-level marine HRAs and arises through the application of appropriate ecological screening methods that were agreed in advance of the completion of the draft plans policies and were based on principles established during multiple, and multi-sectoral, past plan-level HRAs (MMO, 2014a). These standardised principles were applied in order to ensure that there is full auditability of the assessment process.

It is recognised, however, that the application of some of the broader ecological screening principles has resulted in a number of European/Ramsar sites being screened into the assessment in a potentially 'over precautionary' manner when compared against the sectors that were identified as requiring assessment (following screening of the draft plan policies as issued). In other words, the environmental changes brought about by activities under the 'screened in' sectors (aquaculture and beneficial re-use) are relatively localised in scale (e.g. compared to noise generated during the construction of offshore wind farms) and have less uncertainty regarding the sensitivities of features (e.g. compared with collision risk of marine fauna with marine renewables).

In recognition of this aspect, the first stages of the next assessment phase will include an analysis of the impact pathways for the specific sectors associated with the 'screened in' policies (see Sections 2.2.2 to 2.2.4). The extent to which further screening for LSE is appropriate in the light of scientific evidence will be considered in consultation with the SNCBs.

1.3 Report structure

The AAIR has been structured as follows:

- **Section 1** provides an introduction to this report and sets out the HRA process that has been followed.
- **Section 2**.provides a review of the methods that were applied in the assessment.
- **Section 3** presents results of the assessment process.
- **Section 4** provides a review of in-combination effects.
- **Section 5** presents the mitigation measures that will be required to be assured of NAEOI.
- **Section 6** provides an overall conclusion of the assessment.
- **Annex 1** presents the figures that accompany this HRA, including the screening maps.
- **Annex 2** presents the tabular results of step 1 to 3 of the assessment process.

2 Assessment Approach

2.1 Assessment scope key considerations

Where strategic plans are prepared for the marine environment there is often limited information on the precise location and scale of development or about the relevant construction methods and associated activities. This applies across the two policy sectors that have been screened into the HRA and need to be assessed for the South Marine Plan.

The broad areas in which aquaculture and beneficial re-use activities could occur have been identified (see Figures 2a and 2b in Annex 1). However, further details are lacking at this early stage about the specific locations that will be selected for inshore and offshore developments or for any associated coastal and terrestrial activities (e.g. movements of bulldozers used to redistribute beach recharge material). This uncertainty about the details of the work at a project level has been recognised throughout the HRA.

The assessment has, therefore, taken account of the broad spatial scope of sectoral activities and the long-term ongoing nature of the marine planning process. Given this broad scope and the range of uncertainties that exist, it has been essential that the assessment not make any specific assumptions about project-level activities. Instead, the potential impacts that have been identified encompass the full envelope of potential change (through the application of a precautionary approach).

The full envelope of potential change from the two 'screened in' sectors have therefore been determined to identify the potential effects on interest features and any requirements for restrictions on development or for mitigation measures. Documentation of these constraints has been undertaken and the requirements for additional mitigation measures have been highlighted. These are viewed as being very important in providing the audit trail as the plan is implemented. In particular, this approach provides transparency in the process and ensures that developers are fully aware of any European/Ramsar constraints associated with particular locations or activities and also provides confidence in delivering the requirements of the Habitats Regulations.

The screening tables (which are reproduced and updated within Annex 2 of this report) have identified where features within individual sites are at risk of LSE (or where the risk of LSE cannot be excluded). The detailed assessment presented in this report has built on this screening process by considering the particular environmental pressures and changes that give rise to a LSE of an interest feature and then providing a generic assessment of the impact having regard to the site's conservation objectives.

2.2 Key stages of the assessment process

2.2.1 Introduction

To prepare the information that is needed for the AA, a step-wise process has been followed and, where relevant, tabular and mapped outputs were produced which

clearly summarise the findings. The information is presented according to the relevant qualifying features and sub-features that are affected. Following the approach adopted during screening, the interest features[1] have been divided into the following six categories:

- Coastal, intertidal and subtidal habitats and associated species.
- Birds.
- Marine mammals (cetaceans and seals).
- Migratory anadromous fish and freshwater pearl mussel.
- Otters.
- Bats[2].

The specific interest features (species and habitat types) comprising these groups are considered in more detail in the following sections. To assess the impacts to each of these interest feature groups, a standardised iterative assessment process has been undertaken. The individual steps in this process, as also described in the pre-screening review (MMO, 2014a) and Annex 2 of the screening report (MMO, 2015a), are as follows:

- **Step 1: Impact pathways review** - Identification of the impact pathways that are relevant for each of the relevant 'screened in' sectors.
- **Step 2: Identify activities to which features are sensitive**[3] - A review of the activities undertaken in each of the relevant sectors, and the environmental changes arising, which could have an impact on European/Ramsar sites or interest features via the identified impact pathways.
- **Step 3: Activity-based screening of European/Ramsar Sites** - Identification (screening) of those European/Ramsar sites and their relevant interest features for which there is a LSE, or for which a LSE cannot be excluded, from the relevant sector activities and impact pathways.
- **Step 4: Detailed pathway-feature sensitivity review** - A review of the sensitivities of the relevant interest features to the identified impact pathways and sector activities.

[1] This assessment will focus on addressing qualifying interest features of European/Ramsar sites but it should also be noted that it is also an offence to deliberately capture, injure, kill or disturb any wild animal of a European Protected Species (EPS) such as Harbour Porpoise and other cetaceans under Regulations 41(1)(a) and (b) in The Conservation of Habitats and Species Regulations 2010 and 39(1)(a) and (b) in The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (amended in 2009 and 2010). This is not part of the HRA process but it is noted that guidance on the protection of marine EPS in their natural range from injury and disturbance has been developed by JNCC et al. (2010) as required by Article 12 of the Habitats Directive.

[2] Bats have been screened out of the assessment on the basis that there is no ecological connectivity with the activities associated with the screened in sectors (aquaculture and beneficial re-use, see Section 3.3).

[3] Vulnerability is a function of an interest feature's sensitivity to impact pathway and its exposure to a given impact via a source-impact pathway. Where there is sufficient understanding regarding the magnitude and likelihood of change associated with a policy then it may be possible to assess vulnerability. However, where this is unknown, it will only be possible to determine the interest feature's sensitivity.

- **Step 5: Assessment of the potential effects on European/Ramsar sites** - Assessment of impacts via each of the activities across the relevant sectors that are influenced by the 'screened in' draft policies in the South Marine Plan both alone and in-combination with other extant plans or projects. This is followed by the identification of available mitigation measures for each identified impact pathway and the identification, where required, of additional mitigation measures which ensure that these activities have NAEOI.

Based on the approaches adopted for previous plan-level HRA work, the results of this phased assessment work are presented in a series of tables/matrices within the main body of the report and in Annex 2.

In keeping with the approach adopted for other plan-level HRAs, no European/Ramsar sites or features have been removed/deleted from the screening tables. Instead, a distinction has been made between the sites which are screened in or out at the assessment stage. This ensures that the approach and conclusions of this impact assessment process are fully auditable in the future.

2.2.2 Step 1: Impact pathways review

Typically the first stage of any HRA involves identifying and understanding the pathways by which a proposed activity might have an effect on European/Ramsar sites and their associated interest features. This applies to project-level and single sector plan-level HRAs. In the case of marine planning, however, it is the potential impacts of the plan's policies that need to be considered first before the potential activities can be identified. The screening report (MMO, 2015a) has already reviewed the policies and identified those activities for which there could be a LSE and for which an AA is required.

As described above, these 'screened in' policies related to two different sectors, aquaculture and the beneficial re-use of sediment. Having identified these sectors, it was a necessary first step in the assessment process, to clarify the specific activity-based impact pathways that are relevant. This was done by reviewing the following key literature sources which were used as the basis for preparing the impact pathway table (Table 2):

Aquaculture

- Tools for Appropriate Assessment of fishing and aquaculture activities in marine and coastal Natura 2000 sites (ABPmer, 2013a-h).
- Spatial trends in aquaculture potential in the South and East Inshore and Offshore Marine Plan Areas (MMO, 2013a).

Beneficial re-use of sediment

- Use of beneficial dredged material in the South Inshore and South Offshore Marine Plan Areas (MMO, 2014b).
- Site analysis for potential beneficial dredge spoil use for restoration and recharge of intertidal soft sediment resources within the Solent. Scoping Study (Williams *et al*., 2010).
- Beach nourishment: A review of the biological and physical impacts (Atlantic States Marine Fisheries Commission, 2002).

A tabulated list of relevant generic impact pathways was produced. This followed the format, and where relevant the content, of the impact matrices which were created for previous plan-level HRAs (for example, ABPmer, 2013a; MMO, 2013a). According to these previously applied methods, the pathways were separated into the standard 'categories of operations which may cause deterioration or disturbance'. These categories were derived from the list identified by the UK Marine SAC Project (2001) and are based on those applied within 'Regulation 35' advice documents:

- **Physical Loss (of habitats)** from removal or smothering.
- **Physical Damage (of habitats and species)** from siltation, erosion or physical injury/death.
- **Non-Physical (indirect) Disturbance** from noise or visual presence and reduced availability or displacement of species (including prey).
- **Toxic Contamination** from the introduction of synthetic compounds, introduction of non-synthetic contaminants.
- **Non-Toxic Contamination** from nutrient enrichment, organic enrichment, changes in suspended sediment and turbidity, changes in salinity or changes to the thermal regime.
- **Biological Disturbance** from introduction of microbial pathogens, the introduction of invasive non-native species and translocation, or from selective extraction of selected species.

2.2.3 Step 2: Identify activities to which features are sensitive

Having identified the relevant generic impact pathways in Step 1, the next stage in the analysis was to review the individual activities that might affect designated sites and their interest features. The activities and the relevant environmental changes arising from them across each of the two sectors were reviewed, and relevant interest feature groups that are sensitive to these changes were indicated. The results were presented again in a single tabular/matrix format in which the generic pathways were highlighted and grouped under the relevant standard 'categories of operations which may cause deterioration or disturbance' listed in Section 2.2.2.

2.2.4 Step 3: Activity-based screening of European/Ramsar sites

The preceding screening stage of the HRA described in Section 1.2.2 identified the full list of European/Ramsar sites that could potentially be affected by the South Marine Plan. This screening process was based on the application of some broad ecological screening principles and was undertaken in advance of a review of the specific activities that need to be assessed. European/Ramsar sites may have therefore been screened into the assessment in a potentially 'over precautionary' manner.

For Step 3 of this assessment, there was a need to consider which of these sites will be affected by activities associated with the 'screened in' aquaculture and beneficial re-use sectors. At this stage in the assessment, further detail is available about the potential effects of these sector activities. The original screening process was therefore revisited to identify the potentially affected European/Ramsar sites and their interest features.

As a first stage of this analysis, an updated review of the status of European/Ramsar sites was undertaken to identify any new sites that had been identified since the completion of the screening review.

An updated list of 'screened in' sites and features was then created to identify those for which there was a LSE from the activities within each 'screened in' sector. The site and feature lists from the screening report were reproduced and notes made on each about whether there was a LSE from either the aquaculture or beneficial re-use sectors.

No sites or features were removed from these tables because it is important that they continue to provide a full and transparent audit of this screening and assessment process. In addition to presenting these comprehensive lists of all the sites and their features, a final overall summary screening schedule was created which focuses on illustrating only those European/Ramsar sites, and their relevant interest features, which could potentially be affected (i.e. subject to a possible LSE) by the South Marine Plan.

For this work, as with all other elements of this plan-level assessment, a precautionary approach was adopted and sites were only screened out where there is certainty that there will be no LSE.

2.2.5 Step 4: Detailed pathway-feature sensitivity review

Step 4 involved a more detailed review of the sensitivities of the qualifying habitats and species (i.e. their intolerance to the pressure) to the relevant project-level activities. This review also identified in greater detail the external factors or environmental changes which influence these sensitivities and presented initial details about the aquaculture and beneficial re-use activities that will, or might, cause these changes.

The results were presented in a series of 'pathway-sensitivity' tables for each broad category of habitat or species interest feature group. In each of these tables a judgment was made about the interest feature's level of sensitivity to each impact pathway (i.e. whether low, medium or high potential vulnerability). This assessment was based on expert judgement and sensitivity assessments available for relevant interest features (e.g. Marine Life Information Network (MarLIN) website[4]; Defra, 2010; ABPmer, 2013a-h). Once again, in these tables the standard Natura 2000 sensitivity categories (as listed in the preceding section) were identified.

The judgments that were made here about potential vulnerability were based on the ecology of qualifying habitats and species, as well as on details about the activities and changes arising from each of the two 'screened in' sectors. The levels of sensitivities of habitats and species to the impact pathways associated with aquaculture and beneficial re-use are well understood and based on past studies and available literature (see Section 2.2.2). When future aquaculture and/or beneficial re-use projects are taken forward, then the exposure levels and hence the risks rather just the potential vulnerabilities will be understood.

[4] http://www.marlin.ac.uk

The ‘pathway-sensitivity’ tables also provided an indication of the project implementation phase at which the impact pathways are relevant (i.e. survey, construction, operation or decommissioning). The sensitivity levels associated with each of these phases were also indicated in these tables.

Within each impact assessment and feature sensitivity table, the impact pathway reference number (from 1 to 20) relating to the generic impact pathways that were identified in Step 1 of the analysis (Table 2) was included. As noted above, this number is included in order to facilitate comparisons within and between tables and enable any party interrogating these details (e.g. regulator, stakeholder or developer) to readily cross-refer between tabular outputs.

2.2.6 Step 5: Assessment of effects on European/Ramsar sites

The final step was to assess the impacts that will or could occur via each of the identified pathways against the conservation objectives. The conservation objectives were identified from online sources such as the Natural England, JNCC and EU websites. It was not possible to identify and review the individual and specific conservation objectives for each European/Ramsar site given the large number of sites that have been screened into this assessment. Therefore, a series of typical and generic objectives were identified which could be applied across all European/Ramsar sites. Based on these objectives, the potential effects on each European/Ramsar site via each of the relevant impact pathways was reviewed. An initial view was then taken about the effect on site integrity of the South Marine Plan both alone and in combination with other extant plans or projects. This methodology is considered appropriate and has been used on numerous occasions for previous plan level HRAs (e.g. ABPmer, 2011b; 2013a; 2013b; 2014; MMO, 2013a; Aecom and ABPmer, 2015).

Based on these generic conservation objectives, the potential effects on the designated sites via each of the relevant impact pathways were reviewed. An initial view was then taken about the effect on site integrity of the South Marine Plan both alone and in-combination with other extant plans or projects. This was made in advance of the formal judgment that is to be made by the MMO, in consultation with the key stakeholders for the AA in Stage 12 of the HRA (see Diagram 1).

The views expressed about the effects on site integrity were based on current scientific understanding and the proposed manner in which the South Marine Plan are to be implemented. Typically, this judgement usually needs to be made in the context of the available (called ‘initial’) mitigation measures that exist within the South Marine Plan to avoid or reduce impacts. However, no formal ‘initial' mitigation measures have been proposed for the South Marine Plan. The assessment of impacts has therefore been based on there being no such statutory measures available[5].

[5] This also meant that Stages 6 and 7 of the HRA (see Diagram 1) were not separately addressed during the Screening Report (MMO, 2015).

Although no formal mitigation measures have been included within the South Marine Plan, there are several environmental policies that support the conservation objectives of European/Ramsar sites (e.g. Policy S-NIS-1[6]). These environmental policies are aimed at reducing human pressures and/or protecting biodiversity. The South Marine Plan has to be applied in its entirety and therefore these environmental policies will help to avoid and/or minimise pressures. However, they are not considered robust enough to completely eliminate a potential LSE on interest features as is necessary under the Habitats Regulations.

It is recognised that non-statutory mitigation measures exist and have been identified for previous projects and associated licensing. Such measures were therefore identified as part of the assessment to assist with future project developments in the 'screened in' sectors and also to provide an initial framework for further developing these measures over time.

Where the information indicates that there could be an adverse effect on site integrity (AEOI), or where the possibility of such effects cannot be excluded, then typically additional mitigation measures are applied to avoid such an effect (Stage 9 of the HRA, see Diagram 1). In this case, given the absence of initial mitigation measures, such additional mitigation measures were the sole and primary measures to be adopted. These mitigation measures were applied and the plan re-assessed to seek to avoid any AEOI. This report, with these measures included, provides a draft record of the HRA assessment (Stage 10 of the HRA, see Diagram 1) to inform subsequent consultations and the preparation of a final AA (Stages 11 to 13 of the HRA).

[6] Proposals must put in place appropriate measures to avoid or minimise adverse impacts on the marine area that would arise through the introduction and transport of non-indigenous species, particularly when moving equipment, boats or live stock (eg. fish and shellfish) from one water body to another or introducing structures suitable for settlement of non-indigenous species, or the spread of invasive non-indigenous species known to exist in the area.

3 Assessment Results

3.1 Step 1: Impact pathways review

A high level description of the activities associated with each of the 'screened in' sectors is provided in the sub-sections below. Aquaculture and the beneficial re-use of sediment are established sectors. Therefore the impacts from activities associated with these sectors, and the spatial extent of their effect, are considered to be well understood.

A total of 20 generic impact pathways were identified. This list is presented in Table 2 below and also in Table 1 in Annex 2. To ensure full auditability throughout the assessment process a distinct 'pathway reference number' is identified from 1 to 20. This pathway reference number is then cited throughout the assessment and within, particularly, the feature sensitivity and assessment matrices.

3.1.1 Aquaculture

Aquaculture covers the cultivation of algae, shellfish, finfish and the restocking of wild populations e.g. lobster using hatcheries (MMO, 2015b). The key types of aquaculture and activities associated with these are described below.

Substrate on-growing

This type of aquaculture involves the bottom cultivation of shellfish species (e.g. mussels, scallops and oysters) and the transplantation of spat into richer shallower waters (grow out sites).

Bottom culture of mussels (*Mytilus edulis*) involves the location, collection and transplantation of wild mussel spat into richer, shallower waters using a dredger. Successful ongrowing of re-laid spat requires sandy shallow beds. When the mussels reach commercial size (9-18 months later), they are harvested by dredger.

Lantern nets are usually used for growing scallops (*Pecten maximus*) at the juvenile stage. Once spat reach 35-40mm, scallops may be relayed to selected areas of the seabed for 'ongrowing' until they reach market size. There is only a 50% survival rate using this method which involves maintenance of the seabed with regular brushing to remove predatory starfish (Heffernan, 1999).

Oyster cultivation for 'ongrowing' involves the collection of wild spat and relaying in a more productive area. The material on which the oyster larvae will settle is called cultch. This cultch (usually shells of oysters or other bivalves species such as mussel) is laid down on the seabed in spring. A layer of algae grows on the cultch, making it a suitable surface for the oyster larvae to settle on. The spat are then collected by dredging and relaid in a more productive area. Oyster fisheries may require some maintenance which involves removal of predators (e.g. crabs and starfish).

Suspended production

There are two types of suspended aquaculture production: trestle cultivation and production on lines.

Trestle cultivation involves the cultivation of oysters on racks (off-bottom culture) in the intertidal zone, where the oysters are placed in plastic bags and tied to metal trestles. Trestles are steel supporting structures which are normally a height of 0.5 m above the seabed (the height varies depending on exposure time). They typically have 3-4 supporting bars, 4 legs and a capacity to hold 6 bags each. Their function is to keep the oysters off the sea bottom and to prevent grit getting inside the animal. The mesh bag facilitates ease of handling and also reduces predation by crabs, starfish and birds. The mesh size of the bags is increased as the oyster grows.

Aquaculture production on lines involves the cultivation of shellfish (e.g. mussels) or algae on suspended ropes. Mussel spat is collected either directly from the water by larval settlement on spat ropes/collectors, or is scraped from the rocks during spring or early summer. These mussel culture support structures are suspended in the water from either longlines or rafts. Mussel rafts are usually based around a catamaran design. They consist of a set of beams strung across two flotation hulls. Attached to these beams are the mussel ropes which hang down into the water. Longlines consist of flotation barrels which are used to support a stout double headrope from which the mussel ropes (or stockings) are suspended.

Cage production
This type of aquaculture involves the cultivation of finfish species (e.g. Atlantic salmon) in floating cages or pens at sea. Larvae or 'fry' of finfish species are produced in hatcheries and then transferred to 'grow-out' facilities, such as cages and pens, at sea. Cages can be either inshore or offshore and either floating, fixed or submerged.

3.1.2 Beneficial re-use of sediment
There are a large number of different ways in which sediments can be beneficially used. Their use will depend upon aspects such as sediment grain size and volumes of the dredge arising and the relative location and needs of the potential receptor site (MMO, 2014b).

In simple terms, coarser sediments (sand and gravel/shingle) can be used for coastal protection and beach nourishment while finer silt can be used for habitat enhancement and protection. As explained in Section 1.2.2, spatial information is only available for areas that could potentially benefit from beach nourishment (sand/shingle) and intertidal recharge (mud). Other types of beneficial re-use (e.g. subtidal deposition and land claim/raising) therefore fall outside the scope of this assessment.

Beach nourishment
Beach nourishment (also known as beach recharging) involves the importing of sand or gravel onto beaches to compensate for losses due to erosion (MMO, 2014b). Hydraulic methods are generally used for material derived from navigational dredging. The beneficial use material can be:

- Pumped via a pipeline from the dredge area to the site (only where the source area is close to the recharge site).

- Transported by hopper between the extraction area and the beach, and then:
    - Pumped ashore through a pipeline (sinker or floating).
    - Directly discharged onto the beach by spraying from the bow of the vessel ('rainbowing').
    - Discharged onto the lower beach at high water via barges, including side dumper, flat top and split barges (following discharge from original dredging vessel).

Bulldozers are then generally used on the beach to redistribute sediment and produce the desired beach profile.

Intertidal recharge

Intertidal recharge is a process by which dredged sediments are placed over intertidal mudflats and saltmarshes to either create or restore them or to protect them from ongoing erosion (MMO, 2014b).

Beneficial re-use projects involving intertidal recharge can vary greatly in scale, in terms of the area of deposition or the volume of sediment used, and also on the basis of the number and type of structures (e.g. bunds), if any, that might be put in place to retain sediments once they are deposited. Materials are generally pumped onto the intertidal area using pipelines but can also be bottom dumped from barges in the low intertidal or placed with back-hoe excavators. Sediments are often allowed to integrate benignly into the local environment with the expectation being that the deposited sediment will eventually dissipate over time and contribute to the local sediment supply.

Table 2: Generic impact pathways associated with aquaculture and beneficial re-use

Pathway Ref No.	Potential sensitivity category		Impact pathway description	Sector	
	Categories of deterioration or disturbance*	Code		Aquaculture	Beneficial re-use
1	Physical Loss/Gain of Habitat (loss of habitat in development footprint)	PLG	Loss of coastal and offshore habitat under the footprint of cultivation sites, cage fixtures, any sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works.	✓	✓
2	Physical Damage (direct and temporary damage to habitat)	PD	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.	✓	✓
3	Physical Damage (indirect change to habitat)	PLG	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).	✓	✓
4	Physical Damage (indirect and temporary damage to habitat)	PD	Changes to coastal and offshore habitat as a result of alterations to the hydrodynamic (wave and tide) and sediment transport regime from the presence of structures (e.g. shellfish trestles, finfish cages) or altered morphology (e.g. steepened beach profile).	✓	✓
5	Physical Damage (direct damage to seal haul out habitat)	PD	Damage to seal haul out locations from equipment use causing abrasion, damage or smothering during construction/decommissioning and operation.	✓	✓
6	Physical Damage (direct damage to species from collision risk)	PD	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	✓	✓

Pathway Ref No.	Potential sensitivity category		Impact pathway description	Sector	
	Categories of deterioration or disturbance*	Code		Aquaculture	Beneficial re-use
7	Physical Damage (direct damage to species from marine litter)	PD	Damage to marine species through ingestion, entanglement and smothering of marine litter.	✓	
8	Non-Physical Disturbance (barrier to species movement)	NPD	Presence of sub-surface structures and disturbance (visual) associated with suspended or cage production may present a barrier to movement and block migratory pathways or access to feeding grounds depending on design.	✓	
9	Non-Physical Disturbance (disturbance to species)	NPD	Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	✓	✓
10	Non-Physical Disturbance (disturbance to species)	NPD	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	✓	✓
11	Toxic Contamination (reduction in water quality)	TC	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	✓	✓
12	Toxic Contamination (reduction in water quality)	TC	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	✓	✓
13	Toxic Contamination (reduction in water quality)	TC	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).	✓	
14	Toxic Contamination (reduction in water quality)	TC	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.	✓	✓

Pathway Ref No.	Potential sensitivity category		Impact pathway description	Sector	
	Categories of deterioration or disturbance*	Code		Aquaculture	Beneficial re-use
15	Non-Toxic Contamination (elevated turbidity)	NTC	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	✓	✓
16	Biological Disturbance (direct introduction of non-native species)	BD	Introduction of non-native species as a result of the cultivation of these species (e.g. slipper limpet and Pacific oyster).	✓	
17	Biological Disturbance (translocation of native species)	BD	Translocation of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.	✓	
18	Biological Disturbance (indirect introduction of non-native species)	BD	Introduction of new structures (e.g. cages, trestles) on the seabed facilitating the colonisation and ingress of invasive non-native species.	✓	✓
19	Biological Disturbance (introduction of non-native species)	BD	Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	✓	✓
20	Biological Disturbance (introduction/transfer of parasites/ pathogens)	BD	Introduction/transfer of parasites/pathogens as a result of aquaculture activities.	✓	

* As derived from the standard 'categories of operations which may cause deterioration or disturbance' (UK Marine SAC project, 2001).

3.2 Step 2: Identify activities to which features are sensitive

The results of the activity impact review are presented in Table 2 in Annex 2. In this table, the relevant activities (and the environmental changes that result from them) are initially presented alongside the full generic impact pathway category that applies. The relevant sectors in which these activities take place are shown and these activities are separated according to project phase (survey, construction/decommissioning and operation). The interest feature groups (habitats, birds, marine mammals, fish and freshwater pearl mussels and otters) that could be affected are also highlighted in this table.

The resulting 'activity-impact-sensitivity' table is a key element of the impact assessment process because it allows clear linkages to be drawn between the activities influenced by the plan and the full range of potential effects. In doing so, this table can be used as the basis for a final auditing of the assessment conclusions and, particularly, for ensuring that appropriate mitigation measures are in place for all pathway-feature impacts.

3.3 Step 3: Activity-based screening of European/Ramsar sites

During the screening stage of the South Marine Plan (MMO, 2015), a large number of European/Ramsar sites were identified for which a LSE could occur from relevant draft South Marine Plan policies. A total of 196 European/Ramsar sites were screened in as shown in Table 3. The locations of these sites are shown on Figures 3a to 3d (in Annex 1) and individual screening maps for each of the interest features groups and 'screened in' policies are included in Annex 1.

The environmental changes brought about by activities involved in the 'screened in' aquaculture and beneficial re-use sectors are relatively localised in scale (e.g. compared to noise generated during the construction of offshore wind farms). Furthermore, there is a greater level of certainty about the sensitivity of features to these changes (e.g. compared with collision risk of marine fauna with marine renewables). Therefore, the connectivity between the changes brought about by these sectors and mobile interest features from very distant European/Ramsar sites (e.g. harbour porpoise SACs in Denmark) is considered to be highly unlikely and *de minimus*. Despite this, uncertainties remain about the migration routes of mobile interest features and the value of areas used for foraging. Therefore, although overly precautionary, the large screening buffers that have been applied in this HRA remain appropriate as they are objective, transparent, and in keeping with past plan-level HRA approaches.

Bats are not considered to be sensitive to the changes resulting from activities associated with aquaculture and beneficial re-use. Although there is recent evidence that indicates that they migrate across large areas of sea (BSG Ecology, 2014), there is unlikely to be any ecological connectivity between the activities associated with the 'screened in' sectors and this feature. This is because there are no significant above water structures involved in aquaculture or beneficial re-use that would interact with the flight behaviour of bats. On this basis, bats are the only interest features that have been screened out of the assessment at this stage.

The original list of 'screened in' sites and features that was presented in the screening report was updated to confirm the sites for which there is the potential for a LSE from sector activities. This updated list is included in Table 3 in Annex 2. Sites with bat interest features that were screened out at this stage were highlighted but not removed from the original tables in order to provide a full and transparent audit of the screening and assessment process. Following the 'screening out' of bat interest features, the total number of sites screened into the assessment has reduced to 182, comprising 54 SPAs, 90 SACs/cSACs/SCIs, 30 Ramsar sites and 8 compensatory sites (Table 3).

Table 3: Number of European/Ramsar sites added and removed during pre-screening and screening of the South Marine Plan

Sites	Sites selected at pre-screening stage	Sites selected at screening stage	Final list screened into assessment
SACs/cSACs/SCIs	188	105	90
SPAs	66	53	54
Ramsar sites	33	30	30
Compensatory sites	8	8	8
Total	**295**	**196**	**182**

Summary screening schedules are provided in Table 4 in Annex 2. These schedules present the specific interest features of SACs/cSACs/SCIs/Ramsar sites (Table 4a) and SPAs (Table 4b) which could potentially be affected (i.e. subject to a possible LSE) by the South Marine Plan. Compensatory sites are not included in these screening schedules given that the relevant interest features for these sites are not known.

It is recognised that the list of sites screened into this plan-level HRA is more extensive than would typically be screened into an individual project-level HRA. When screening at a project level, the use of large buffers may not be necessary and it may be more appropriate to begin the screening of sites and interest features according to informed parameters and in the light of the more detailed information that is available at a project level (and, if applicable, using the screening schedules within this report).

3.4 Step 4(1): Habitat sensitivities

3.4.1 Designated sites with habitat features

Following the activity-based screening process (Section 3.3), a total of 182 European/Ramsar sites were identified for which there is a LSE (or the potential for a LSE cannot be excluded). Of these sites, there are 20 SACs/SCIs/cSACs and a further 11 Ramsar Sites which have qualifying habitat interest features.

The relevant qualifying habitat features within these sites includes a range of coastal, intertidal and sublittoral interests and these interests are summarised and grouped into categories in Section 3.4.2. The habitats within designated SPAs also warrant consideration and they are addressed separately within Section 3.5 (dealing with the impacts to bird qualifying features).

3.4.2 Interest features summary list

For the purposes of this review, the range of Annex 1 qualifying habitat features within the screened in sites have been divided into five broad categories as follows:

1) **Morphological features encompassing a range of habitats:**
    - Estuaries (1130) which will encompass sub-feature habitats such as saltmarsh, eelgrass, reefs as well as many of the other Annex 1 habitats that are cited separately below.
2) **Subtidal habitats with typically soft-sediment habitat:**
    - Subtidal sandbanks (i.e. 'Sandbanks which are slightly covered by seawater at all time') (1110).
3) **Subtidal habitats with typically hard-substratum habitat**:
    - Reefs (1170).
    - Submerged or partially submerged sea caves (8330).
4) **Intertidal habitats (including saltmarshes):**
    - Intertidal mudflats and sandflats (i.e. 'Mudflats and sandflats not covered by seawater at low tide') (1140).
    - Annual vegetation of drift lines (1210).
    - Salicornia and other annuals colonising mud and sand (1310);
    - Spartina swards (1320).
    - Atlantic salt meadows (1330).
    - Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) (1420).
5) **Supralittoral habitats**
    - Coastal lagoons (1150).
    - Supralittoral dune habitats, encompassing the following:
        i. Fixed dunes with herbaceous vegetation ('grey dunes') (2130).
        ii. Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) (2150).
        iii. Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') (2120).
    - Perennial vegetation of stony banks (1220).
    - Vegetated sea cliffs (1230).
    - Petalwort (*Petalophyllum ralfsii*) (1395).

In addition to these habitats, there will also be individual habitats that are identified within Ramsar citations (e.g. "sand and shingle spit"), although these individual features are not listed. There will also be sub-features of SACs which will include a range of habitats such as rocky shore or mussel bed communities. The impact pathways for these supporting features are considered to be the same as for the qualifying habitat interest features, with particular distinctions being possible between soft sediment, hard substratum, intertidal and supralittoral categories as identified above. Therefore, the impacts to these specific habitats have not been considered separately as part of this assessment.

To assess whether there is any AEOI of the European/Ramsar sites that were identified, Sections 3.4.3 to 3.4.9 review the sensitivities of these habitat features. Section 3.9.2 then identifies the conservation objectives for these features and assesses, in tabular format, the effects arising in the context of the proposed additional plan-level mitigation measures.

3.4.3 Sensitivities of habitats to plan activities

This section reviews the sensitivities that are relevant for the habitat interest features. A generic review of the sensitivities is presented under each of the following impact pathways identified during the screening phase:

- Physical Loss/Gain of Habitat (loss of habitat in development footprint; impact pathway 1) (Section 3.4.4).
- Physical Damage (direct, indirect and temporary damage to habitat; impact pathways 2 and 4) (Section 3.4.5).
- Toxic Contamination (reduction in water quality; impact pathways 11 to 14) (Section 3.4.6).
- Non-Toxic Contamination (elevated turbidity; impact pathway 15) (Section 3.4.7).
- Biological Disturbance (direct and indirect introduction of non-native species, translocation of native species, and introduction/transfer of parasites/pathogens; impact pathways 16 to 20) (Section 3.4.8).

An effect can only occur if an interest feature is exposed to a change to which it is sensitive. Sensitivity can be described as the intolerance of an interest feature to readily accept the levels of predicted environmental change to which they are exposed and essentially considers the response characteristics of the feature. The assessment of sensitivity therefore considers the adaptability of the receptor to its former state following exposure to the impact. Vulnerability is based on the sensitivity of a feature and their exposure to a given impact.

Following this review, the general characteristics and potential vulnerability of habitat interest features are presented and reviewed against the relevant aquaculture and beneficial use activities that could cause a LSE. This interest feature review is set out in Section 3.4.9.

3.4.4 Physical loss/gain of habitat (loss of habitat in development footprint; impact pathway 1)

Subtidal, intertidal and supralittoral interest feature habitats are sensitive to a physical loss or gain at locations where new structures are introduced to or removed from the seabed or coastal habitats (i.e. within the development 'footprint' of these structures). Thus, the key activities that are relevant are those which introduce permanent or temporary structures that lie on or protrude from the seabed and cause a direct loss (whether permanent or temporary) of habitat.

For the South Marine Plan, the main activities causing habitat loss or gain will be during the installation and presence of the cultivation sites, cage fixtures or sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works where these are located within the area of an interest feature habitat. However the extent to which such direct effects could occur is not known at this stage given the broad area that could be affected by this pathway. Areas identified for potential aquaculture production, for example occur throughout much of the Inshore Marine Plan area, including the coastal regions between Brixham to Exmouth, and Southampton Water and the Solent (Figure 2a in Annex 1). In addition, large sections of the coastline of the Inshore Marine Plan area have been identified as potentially benefitting (i.e. resulting in increased habitat area

or decreased loss of existing habitat) from either mud or sand/shingle recharge (Figure 2b in Annex 1).

It is recognised that direct loss of habitat can be mitigated by avoiding habitat interest features within a European/Ramsar site at the project planning and design phase. There are, however, no mitigation measures which formally state this in the South Marine Plan although Policy S-MPA-1 recognises that "*Proposals must take account of any adverse impacts on the objectives of Marine Protected Areas and the coherence of the overall Marine Protected Area network, with due regard given to any current agreed advice on an ecologically coherent network*".

In addition to the consideration about whether the Plan activities will occur within the European/Ramsar site itself, the sensitivity of the habitats from direct effects (from the placement of material and/or structures) and the magnitude of any effects arising are also dependent on a range of factors such as the habitat type, the extent of habitat affected, the nature of activities and whether they are temporary or permanent. It is also recognised that there is potential for any aquaculture fixtures or sediment retaining structures used in intertidal recharge schemes to themselves become surfaces for the settlement of reef forming species and thus there could be impacts from both the initial installation and at the removal phase.

A further consideration is the fact that although intertidal recharge projects involve the placement of dredged material over or around intertidal mudflats and saltmarsh and therefore the temporary smothering and loss of underlying habitat, the ultimate aim of recharging is to restore or protect these habitats from ongoing erosion (MMO, 2014b). This approach is especially valuable for protecting habitats that are perhaps sediment starved and where the introduction of dredge arisings will allow the habitat to cope with, or respond to, sea level rise. Intertidal habitat also fulfils a flood risk management function, as they are very effective at dissipating or absorbing wave and tidal energy.

3.4.5 Physical damage (direct, indirect and temporary damage to habitat; impact pathways 2 and 4)

In addition to the direct impacts within the footprint of the development outlined in the preceding section, subtidal, intertidal and supralittoral interest feature habitats are sensitive to direct and indirect physical damage from a range of activities associated with aquaculture and beneficial re-use activities.

Damage can occur during baseline surveys where these occur in the vicinity of European/Ramsar habitat interest features and where they involve the physical retrieval of samples or bed materials, including ecological trawling or grab sampling.

Construction/decommissioning activities associated with the installation and/or removal of structures as well as the placement of material for beneficial reuse schemes will cause damage to the seabed outwith the direct losses/gains caused within the footprint described in Section 3.4.4. Such activities will involve abrasion and/or smothering from equipment use (e.g. excavators, pipelines) and vessels mooring/anchoring.

During the operational phase, the harvesting of cultivated species at aquaculture sites (namely substrate on-growing aquaculture) by a dredger result in the removal of surface substratum and associated seabed benthos leading to damage or smothering. This is followed by a process of re-colonisation and recovery, the rate of which is dependent on many factors including sediment type and hydrodynamics. In addition, maintenance activities at aquaculture sites can result in equipment or vessels mooring/anchoring causing abrasion or smothering of habitats. The magnitude of the changes will be dependent upon the level of equipment or vessel use with the risk being dependent upon the distance of such activities from the habitat interest features (which will determine the extent of exposure to any change).

During operation, the actual presence of the any structures themselves (e.g. finfish cage fixtures, shellfish trestle tables) or changes to the seabed bathymetry as a result of the placement of recharge material can result in changes to the local hydrodynamic (wave and tide) and sediment transport (erosion/accretion) regimes. The magnitude of the scour effects will depend on the size of the structures and the associated risk will depend upon the composition of the seabed substratum, the hydrodynamic conditions, and the distance of the structures from habitat interest features.

In relation to indirect near field effects outside the development footprint, a distance of one tidal ellipse away from potential aquaculture sites and possible mud and sand/shingle recharge areas was used to identify (and screen) the potential zone of indirect influence of activities associated with each of the sectors (MMO, 2015). This was based on evidence from plume studies that even fine particles mobilised from the seabed settle out again to a large extent within the distance of one tidal excursion. While a plume may be visible beyond this point the concentrations of suspended solids are usually within the range of natural variation and much of the visible plume is due to lipids from damaged benthic animals (Coastline Surveys Ltd, 1998; Clay *et al*., 2008).

For all of the above activities, the rate at which habitats recover from damage will also be a key factor influencing the significance of any impact. This will be strongly related to the ecology of the habitats, with diverse reef features and mudflat habitats for instance likely to be more susceptible and take longer to recover than sandflats.

3.4.6 Toxic contamination (reduction in water quality; impact pathways 11 to 14)

Subtidal, intertidal and supralittoral interest feature habitats are sensitive to toxic contamination (where concentrations of contaminants exceed sensitivity thresholds). These can occur as a result of the spillage of fluids, fuels or construction materials from vessels and machinery into the marine environment during survey/maintenance, construction/decommissioning or operation of aquaculture and beneficial re-use projects.

In addition, the operation of finfish cages in aquaculture can result in the introduction of non-synthetic and synthetic compounds as a result of the use of feed pellets, medicines and sea lice treatments, and the release of faecal particles. *Zostera* beds are particularly sensitive to water quality conditions and hence the introduction of chemicals (Ragot, 2009; Huntington *et al*., 2006). Similarly, mud habitats, mussel

beds and reefs have low tolerance and resistance to some synthetic compounds used in aquaculture (Huntington *et al*., 2006; Wilding and Hughes, 2010; Crowe *et al*., 2011; European Commission, 2012).

Toxic contamination can also occur as a result of the release of contaminants associated with the dispersion of suspended sediments during the operation of aquaculture sites (e.g. harvesting by dredging), and the placement of dredged material during the construction phase of beach nourishment works and intertidal recharge projects and the disturbance of any deposited material (e.g. by storms) during operation. The release of sediments during these activities can in turn result in the breakdown of organic matter and the organic enrichment of sediments and the water column. Fish farming also generates large amounts of particulate organic waste products, and surrounding sediments are affected by this surplus of organic matter (European Commission, 2012). The likelihood of mobilising sediments and contaminated sediments and the magnitude of any effect is dependent upon the level of contamination; the proximity of the Plan activity to the European/Ramsar site(s); the type of activity occurring; the manner in which that activity is pursued (including the extent and duration); the particle size of the disturbed sediments and the hydrodynamic conditions.

Sediment contamination is only likely to be evident in areas close to the coastline of industrial locations or in coastal areas where water and sediments have been subject to historical contamination. For activities taking place outside areas of sediment contamination then there is unlikely to be a LSE on relevant interest features. Furthermore, the sand/shingle substrates used in beach nourishment contain/adsorb relatively low concentrations of contaminants compared to finer sediments. Settlement of coarse material is most likely to occur within 20 to 200m (BERR, 2008), but contaminants are almost always associated with fine sediments and could travel further than this in some areas where there is a large tidal excursion and strong tidal flows. However, over the greater distances, concentrations will often not be significant.

3.4.7 Non-toxic contamination (elevated turbidity; impact pathway 15)

The increases in suspended sediments during the operation of aquaculture sites (e.g. harvesting by dredging), and the deposition of dredged material during the construction phase of beach nourishment works and intertidal recharge projects are typically expected to result in short-term, localised changes to the marine environment. In the event of a substantial resuspension, then the potential exists from the settlement of materials to cause a smothering of the seabed to which any nearby reef habitats may be particularly sensitive. Settlement of coarse material is most likely to occur within 20 to 200m (BERR, 2008) and, thus, there is unlikely to be a significant smothering from aquaculture dredging and beneficial re-use deposition activities at distances of greater than 200m.

Increase in turbidity (and possibly reduced dissolved oxygen) is also associated with the release of particular waste (e.g. fish faeces) during the operation of finfish aquaculture sites. Cage culture can lead to increased sedimentation of particulate organic waste beneath the cages. Mussel and/or polychaete reefs, seagrass beds, sand and mudflats, maerl beds and seaweed beds may be potentially affected by sedimentation from poorly sited cage farms (European Commission, 2012). The

scale of environmental impact is dependent on the size of the operation and the physical, chemical and biological characteristics of the receiving water (Gowen e*t al.*,1990).

3.4.8 Biological disturbance (direct and indirect introduction of non-native species, translocation of native species, and introduction/transfer of parasites/pathogens ; impact pathways 16 to 20)

Aquaculture activities can result in the direct introduction of non-native species, either as food for edible species, for direct human consumption, for the pet and aquarium trade, as bait for use by anglers or as biocontrol organisms for pest control (Eno and Sanderson, 1997). The possible impact from the introduction of alien species for their use in aquaculture is regulated by EU Regulation 708/2007 which establishes a legal framework in the form of obtaining a special permit to limit the environmental risks related to the introduction and translocation of non-native species in aquaculture. The Marine Strategy Framework Directive (MSFD) also has an indicator for non-native species. In addition, the South Marine Plan has included a policy for non indigenous species (Policy S-NIS-1).

Direct introduction of non-natives can also occur as a result of biofouling species on the surfaces of vessels or construction plant. All craft have some biofouling, even if recently cleaned or anti-fouled (Davidson *et al.*, 2010). Thousands of marine species can be carried in ships' ballast water. These include bacteria and other microbes, small invertebrates, eggs, cysts and larvae of various species. It is estimated that 4,500 different species are carried around the world at any one time in ballast tanks. During the last three decades, a significant number of introduced, non-indigenous species have been transported through ships' ballast tanks (IMO, 2014).

The introduction of new surfaces in the form of finfish cages or trestles in aquaculture or sediment retaining structures for intertidal recharge projects also has the potential to facilitate the encroachment of invasive non-native species. This is because they will be initially barren with no competition from indigenous species which could allow invasive non-native species to potentially colonise these surfaces. This is based on the assumption that the current spread of such species is limited by the prevailing physical regime and lack of new colonising substrata. Therefore, any development which causes a change in physical processes or provides new colonising space (especially large expanses of such space) could create a potential sensitivity to this impact. The species composition and the rate of colonisation will depend upon the location of the structure, time of year and the availability of larval/juvenile stages.

Biological disturbance can also occur as a result of aquaculture activities due the translocation of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations. Species introduced as mariculture species or in association with mariculture species (e.g. in with shellfish seed) can cause habitat modification and trophic competition with commercial species (UKMMAS, 2010). The escape of fish from cages may cause undesirable genetic effects in wild populations through interbreeding, and ecological effects through predation, competition and the possible transfer of diseases to wild fish. An issue of particular concern is that of interbreeding

of Atlantic salmon as this may lead to loss of fitness in river-specific sub-populations (Naylor *et al.*, 2005; European Commission, 2012).

Aquaculture activities can also result in the introduction or transfer of pathogens from cultured to wild populations although high pathogen loads from bottom culture are considered unlikely (OSPAR, 2009; European Commission, 2012). Aquaculture can also result in the introduction or transfer of parasites. Parasites and diseases are part of the natural biology and functioning of ecosystems, but if fish are raised under crowded and stressful conditions they can be more prone to disease. Disease can move in both directions between farmed and wild fish. Cage farms may cause ecological effects stemming from the release of parasites and pathogens (UKMMAS, 2010).

3.4.9 Habitat interest features

The individual characteristics and potential vulnerabilities for each of the relevant habitat interest features are presented and reviewed against the relevant Plan activities that could cause a LSE. Although it is recognised that there are no initial mitigation measures included specifically within the South Marine Plan (Section 2.2.6), it should be noted that there is a policy that will act to reduce the potential exposure and thus vulnerability of habitat interest features to non-native species (Policy S-NIS-1). These interest feature reviews are set out in the following five tables, which are representative of the broad categories identified in Section 3.4.1 above and have been used to understand the impact pathways and potential vulnerabilities that are pertinent to the full list of habitats that have been screened into this assessment.

Estuaries

Estuaries are defined as the downstream part of a river valley, subject to the tide and extending from the limit of brackish waters (EC, 2007). River estuaries are coastal inlets where, unlike 'large shallow inlets and bays' there is generally a substantial freshwater influence. The mixing of freshwater and seawater and the relatively reduced current flows in the shelter of the estuary lead to deposition of fine sediments, often forming extensive intertidal sand and mudflats. The character of sediment deposition will also be a function of the tidal character of the estuary with flood dominant systems tending to act as net importers of sediment while ebb dominant systems act as sources of sediment to the coast. The patterns of flood and ebb dominance are often complex and operate in a dynamic equilibrium that is influenced by anthropogenic and natural factors. Together, these factors can result in complex spatial and temporal patterns of sedimentation.

The potential vulnerability of this Annex 1 habitat to the relevant South Marine Plan activities that might affect it are not presented separately in this section. Instead potential vulnerability is considered to be reflected in the component habitats (subtidal sandbanks; reefs and sea caves; intertidal mudflats, sandflats and saltmarshes; and supralittoral habitats) and these are presented in the following sections.

Subtidal sandbanks

Sandbanks are defined as elevated, elongated, rounded or irregular topographic features, permanently submerged and predominantly surrounded by deeper water

(EC, 2007). They consist mainly of sandy sediments, but larger grain sizes, including boulders and cobbles, or smaller grain sizes including mud may also be present on a sandbank. Banks where sandy sediments occur in a layer over hard substrata are classed as sandbanks if the associated biota are dependent on the sand rather than on the underlying hard substrata. “Slightly covered by sea water all the time” means that above a sandbank the water depth is seldom more than 20m below chart datum. Sandbanks can, however, extend beneath 20m below chart datum. It can, therefore, be appropriate to include in designations such areas where they are part of the feature and host its biological assemblages.

The potential vulnerability of this Annex 1 habitat to the Plan activities that might affect it is shown in Table 4. These are very much the same as for reef and sea cave features below although there is recognition that soft sediment habitats will have a lower sensitivity to sediment smothering events during construction work.

Table 4: Potential vulnerability of subtidal sandbank features to the South Marine Plan

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Impact Pathway Description)	Survey	Construction	Operation
PLG	Physical Loss/Gain of Habitat (loss of habitat in development footprint)	1	Loss of coastal and offshore habitat under the footprint of cultivation sites, cage fixtures, any sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works.	AQU	AQU	AQU
				BEN	BEN	BEN
PD	Physical Damage (direct and temporary damage to habitat)	2	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.	AQU	AQU	AQU
				BEN	BEN	BEN
PD	Physical Damage (indirect and temporary damage to habitat)	4	Changes to coastal and offshore habitat as a result of alterations to the hydrodynamic (wave and tide) and sediment transport regime from the presence of structures (e.g. shellfish trestles, finfish cages) or altered morphology (e.g. steepened beach profile).	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	11	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	12	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	13	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	14	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.	AQU	AQU	AQU
				BEN	BEN	BEN
NTC	Non-Toxic Contamination (elevated turbidity)	15	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	AQU	AQU	AQU
				BEN	BEN	BEN
BD	Biological Disturbance (direct introduction of non-native species)	16	Introduction of non-native species as a result of the cultivation of these species (e.g. slipper limpet and Pacific oyster).	AQU	AQU	AQU
				BEN	BEN	BEN

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Impact Pathway Description)	Survey	Construction	Operation
BD	Biological Disturbance (translocation of native species)	17	Translocation of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.	AQU	AQU	AQU
				BEN	BEN	BEN
BD	Biological Disturbance (indirect introduction of non-native species)	18	Introduction of new structures (e.g. cages, trestles) on the seabed facilitating the colonisation and ingress of invasive non-native species.	AQU	AQU	AQU
				BEN	BEN	BEN
BD	Biological Disturbance (introduction of non-native species)	19	Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	AQU	AQU	AQU
				BEN	BEN	BEN
BD	Biological Disturbance (introduction/transfer of parasites/ pathogens)	20	Introduction/transfer of parasites/pathogens as a result of aquaculture activities.	AQU	AQU	AQU
				BEN	BEN	BEN
In this table, only the estimated potential vulnerability levels are shown. The level of risk will be dependent upon exposure. For instance there would be a high degree of exposure for habitats were a development to occur within or near a European/Ramsar site. However, at the present time, there is very little information about exposure within the south marine plan areas.						
No Impact						
Low Potential Vulnerability						
Low to Medium Potential Vulnerability						
Medium Potential Vulnerability						
High Potential Vulnerability						

Reefs and sea caves

Reefs can be either biogenic concretions or of geogenic origin (EC, 2007). They are hard, compact substrata on solid and soft bottoms, which arise from the sea floor in the sublittoral and littoral zone. Reefs may support a zonation of benthic algal communities of algae and animal species, as well as concretions of corallogenic organisms.

The potential vulnerability of this Annex 1 habitat to the relevant South Marine Plan activities that might affect it is shown in Table 5. The highest potential vulnerability relates to direct habitat loss in instances where aquaculture structures are placed on qualifying reef feature habitats. There is also recognition that reef and sea cave features will have a higher sensitivity to sediment smothering events than soft sediment habitats.

Table 5: Potential vulnerability of reef and sea cave features to the South Marine Plan

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Impact Pathway Description)	Survey	Construction	Operation
PLG	Physical Loss/Gain of Habitat (loss of habitat in development footprint)	1	Loss of coastal and offshore habitat under the footprint of cultivation sites, cage fixtures, any sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works.		AQU	AQU
PD	Physical Damage (direct and temporary damage to habitat)	2	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.		AQU	AQU
					BEN	

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Impact Pathway Description)	Survey	Construction	Operation
PD	Physical Damage (indirect and temporary damage to habitat)	4	Changes to coastal and offshore habitat as a result of alterations to the hydrodynamic (wave and tide) and sediment transport regime from the presence of structures (e.g. shellfish trestles, finfish cages) or altered morphology (e.g. steepened beach profile).			AQU
						BEN
TC	Toxic Contamination (reduction in water quality)	11	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	12	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		BEN	AQU
TC	Toxic Contamination (reduction in water quality)	13	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).			AQU
TC	Toxic Contamination (reduction in water quality)	14	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
NTC	Non-Toxic Contamination (elevated turbidity)	15	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
BD	Biological Disturbance (direct introduction of non-native species)	16	Introduction of non-native species as a result of the cultivation of these species (e.g. slipper limpet and Pacific oyster).			AQU
BD	Biological Disturbance (translocation of native species)	17	Translocation of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.			AQU
BD	Biological Disturbance (indirect introduction of non-native species)	18	Introduction of new structures (e.g. cages, trestles) on the seabed facilitating the colonisation and ingress of invasive non-native species.			AQU
BD	Biological Disturbance (introduction of non-native species)	19	Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	AQU	AQU	AQU
				BEN	BEN	BEN
BD	Biological Disturbance (introduction/transfer of parasites/ pathogens)	20	Introduction/transfer of parasites/pathogens as a result of aquaculture activities.			AQU
In this table, only the estimated potential vulnerability levels are shown. The level of risk will be dependent upon exposure. For instance there would be a high degree of exposure for habitats were a development to occur within or near a European/Ramsar site. However, at the present time, there is very little information about exposure within the south marine plan areas.						
No Impact						
Low Potential Vulnerability						
Low to Medium Potential Vulnerability						
Medium Potential Vulnerability						
High Potential Vulnerability						

Intertidal habitats (including saltmarshes)

Intertidal mudflats and sandflats are defined as the sands and muds of the coasts of the oceans, their connected seas and associated lagoons, not covered by sea water at low tide, devoid of vascular plants, usually coated by blue-green algae and diatoms (EC, 2007). They are of particular importance as feeding grounds for wildfowl and waders. Saltmarshes occur in stable intertidal environments typically with fine sediment above the mean high water neap level where vascular plants can survive and can further stabilise the habitat (Boorman, 2003). Once a cover of vegetation has become established the rate of sedimentation (accretion) often

increases as more of the incoming sediment is intercepted and trapped by the increased surface roughness. In addition, the vegetation also reduces the resuspension of deposited material and, at the same time, organic matter is added to the marsh surface.

There is a range of Annex 1 saltmarsh habitats depending upon the tidal height and vegetation type, as listed in Section 3.4.2. The potential vulnerability of these habitats to Plan activities is included in Table 6. The highest potential vulnerability relates to direct habitat loss/gain because, in instances where new structures or material are placed on intertidal habitat features, then an effect must occur. Intertidal habitats are considered to be more vulnerable to biological disturbance given that they are more sensitive to the introduction of cultivated non-native species

Table 6: Potential vulnerability of intertidal features to the South Marine Plan

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Impact Pathway Description)	Survey	Construction	Operation
PLG	Physical Loss/Gain of Habitat (loss of habitat in development footprint)	1	Loss of coastal and offshore habitat under the footprint of cultivation sites, cage fixtures, any sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works.		AQU	AQU
					BEN	BEN
PD	Physical Damage (direct and temporary damage to habitat)	2	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.	AQU	AQU	AQU
				BEN	BEN	
PD	Physical Damage (indirect and temporary damage to habitat)	4	Changes to coastal and offshore habitat as a result of alterations to the hydrodynamic (wave and tide) and sediment transport regime from the presence of structures (e.g. shellfish trestles, finfish cages) or altered morphology (e.g. steepened beach profile).			AQU
						BEN
TC	Toxic Contamination (reduction in water quality)	11	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	12	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		BEN	AQU
TC	Toxic Contamination (reduction in water quality)	13	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).			AQU
TC	Toxic Contamination (reduction in water quality)	14	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
NTC	Non-Toxic Contamination (elevated turbidity)	15	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
BD	Biological Disturbance (direct introduction of non-native species)	16	Introduction of non-native species as a result of the cultivation of these species (e.g. slipper limpet and Pacific oyster).			AQU
BD	Biological Disturbance (translocation of native species)	17	Translocation of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.			AQU

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Impact Pathway Description)	Survey	Construction	Operation
BD	Biological Disturbance (indirect introduction of non-native species)	18	Introduction of new structures (e.g. cages, trestles) on the seabed facilitating the colonisation and ingress of invasive non-native species.			AQU
						BEN
BD	Biological Disturbance (introduction of non-native species)	19	Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	AQU	AQU	AQU
				BEN	BEN	BEN
BD	Biological Disturbance (introduction/transfer of parasites/ pathogens)	20	Introduction/transfer of parasites/pathogens as a result of aquaculture activities.			AQU
In this table, only the estimated potential vulnerability levels are shown. The level of risk will be dependent upon exposure. For instance there would be a high degree of exposure for habitats were a development to occur within or near a European/Ramsar site. However, at the present time, there is very little information about exposure within the south marine plan areas.						
No Impact						
Low Potential Vulnerability						
Low to Medium Potential Vulnerability						
Medium Potential Vulnerability						
High Potential Vulnerability						

Supralittoral habitats

A range of coastal habitat interest features were scoped into this assessment because they could be directly or indirectly affected by Plan activities. The relevant qualifying habitat features include dune habitats, vegetated cliffs and coastal lagoons.

The potential vulnerability of these habitats to Plan activities is included in Table 7. The greatest vulnerability is related to the potential direct habitat loss from beach nourishment operations.

Table 7: Potential vulnerability of supralittoral features to the South Marine Plan

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Impact Pathway Description)	Survey	Construction	Operation
PLG	Physical Loss/Gain of Habitat (loss of habitat in development footprint)	1	Loss of coastal and offshore habitat under the footprint of cultivation sites, cage fixtures, any sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works.		BEN	BEN
PD	Physical Damage (direct and temporary damage to habitat)	2	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.	BEN	BEN	
PD	Physical Damage (indirect and temporary damage to habitat)	4	Changes to coastal and offshore habitat as a result of alterations to the hydrodynamic (wave and tide) and sediment transport regime from the presence of structures (e.g. shellfish trestles, finfish cages) or altered morphology (e.g. steepened beach profile).			AQU
						BEN
TC	Toxic Contamination (reduction in water quality)	11	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	AQU	AQU	AQU
				BEN	BEN	BEN

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Impact Pathway Description)	Survey	Construction	Operation
TC	Toxic Contamination (reduction in water quality)	12	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		BEN	AQU
TC	Toxic Contamination (reduction in water quality)	13	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).			AQU
TC	Toxic Contamination (reduction in water quality)	14	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.		BEN	AQU
NTC	Non-Toxic Contamination (elevated turbidity)	15	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
In this table, only the estimated potential vulnerability levels are shown. The level of risk will be dependent upon exposure. For instance there would be a high degree of exposure for habitats were a development to occur within or near a European/Ramsar site. However, at the present time, there is very little information about exposure within the south marine plan areas.						
No Impact						
Low Potential Vulnerability						
Low to Medium Potential Vulnerability						
Medium Potential Vulnerability						
High Potential Vulnerability						

3.5 Step 4(2): Bird sensitivities

3.5.1 Designated sites with bird features

Following the activity-based screening process (Section 3.3), a total of 182 European/Ramsar sites were identified for which there is a LSE (or the potential for a LSE cannot be excluded). Of these sites, there are 54 SPAs and a further 30 Ramsar Sites which have qualifying bird interest features.

These SPA and Ramsar sites also contain other interest features within them that are an important component of the functionality of the designated sites (e.g. because they provide foraging ground for bird species) and therefore have assigned conservation objectives. The effects on these other features are reviewed separately under the relevant section(s) of the AAIR that deal with these other habitat/species groups.

3.5.2 Interest features summary list

Given the large number of sites screened into this assessment, the individual sites and the qualifying bird interest features that they support have not been reviewed in detail within this report. However, the screening tables in Annex 2 (Tables 3 and 4) present a list about the key species that have been included in the scope of this assessment[7].

[7] The lists of bird interest features as presented throughout this HRA process have been derived from the standard Natura 2000 data forms that are available online. This is because these represent the legally binding numbers and species lists and based on advice from JNCC. It is recognised that the JNNC designated site websites contain more up to date information being based on the SPA review conducted more recently and these can identify different key species.

To assess whether there is any AEOI of relevant European/Ramsar sites, Sections 3.5.3 to 3.5.10 review the sensitivities of the associated bird features via the identified impact pathways. Section 3.9.3 then identifies the conservation objectives and assesses, in tabular format, the effects arising in the context of the proposed additional plan-level mitigation measures.

3.5.3 Sensitivities of birds to plan activities

This section reviews the sensitivities that are relevant for the qualifying seabird interest features. A generic review of the sensitivities of relevant bird features is presented under the following impact pathways identified during the screening phase:

- Physical Damage to Habitat (indirect change to habitat; impact pathway 3) (Section 3.5.4).
- Physical Damage to Species (direct damage to species from collision risk; impact pathway 6) (Section 3.5.5).
- Physical Damage to Species (direct damage to species from marine litter; impact pathway 7) (Section 3.5.6).
- Non-Physical Disturbance to Species (visual/noise disturbance; impact pathways 9 and 10) (Section 3.5.7).
- Toxic Contamination (spillage and contamination causing a reduction in water quality; impact pathways 11 to 14) (Section 3.5.8).
- Non-Toxic Contamination (increased turbidity; impact pathway 15) (Section 3.5.9).

An effect can only occur if an interest feature is exposed to a change to which it is sensitive. Sensitivity can be described as the intolerance of an interest feature to readily accept the levels of predicted environmental change to which they are exposed and essentially considers the response characteristics of the feature. The assessment of sensitivity therefore considers the adaptability of the receptor to its former state following exposure to the impact. Vulnerability is based on the sensitivity of a feature and their exposure to a given impact.

Following this review, the general characteristics and potential vulnerability of bird interest features are presented and reviewed against the relevant aquaculture and beneficial use activities that could cause a LSE. This interest feature review is set out in Section 3.5.10.

It should be noted throughout this section that different seabird species will have different sensitivities to effects according to a number of factors including:

- Whether they forage by diving or at the surface.
- Whether they forage nocturnally/crepuscularly or diurnally.
- Whether they are ground/burrow/crevice-nesting species or cliff-nesters.

This categorisation of species is summarised in Table 8. However, it should be noted that these categories are not mutually exclusive.

Table 8: Breeding/Foraging Parameters of Seabird Which Influence Sensitivities

Breeding Receptors	Foraging Mode	Nocturnal Activity (Flight/Diving)	Nesting Location
Red-Throated Diver	Pursuit-diver	No	Ground
Black-Throated Diver	Pursuit Diver	No	Ground
Great Crested Grebe	Pursuit Diver	No	Floating nest[8]
Horned Grebe	Pursuit Diver	No	Floating nest[7]
Little Grebe	Surface feeder	No	Floating nest[7]
Fulmar	Surface feeder	Yes	Cliff
Manx Shearwater	Surface/Pursuit-diver	Yes	Burrow/crevice
Storm Petrel	Surface feeder	Yes	Burrow/crevice
Leach's Petrel	Surface feeder	Yes	Burrow/crevice
Gannet	Plunge/Pursuit-diver	No	Ground/cliff
Cormorant	Pursuit-diver	No	Cliff/above ground
Shag Common Scoter	Pursuit-diver Diver/Pursuit-diver	No No	Cliff Ground
Arctic Skua Great Skua	Surface feeder Surface feeder	No No	Ground Ground
Herring Gull	Surface feeder	Yes	Ground
Great Black-Backed Gull	Surface feeder	Yes	Ground
Lesser Black-Backed Gull	Surface feeder	Yes	Ground
Common Gull	Surface feeder	Yes	Ground/Cliff
Black–Headed Gull	Surface feeder	Yes	Ground
Mediterranean Gull Kittiwake	Surface feeder Surface feeder	Yes Yes	Ground Cliff
Arctic Tern Sandwich Tern	Surface feeder Surface feeder	No No	Ground Ground
Common Tern	Surface feeder	No	Ground
Roseate Tern	Surface feeder	No	Ground
Guillemot	Pursuit-diver	No	Cliff
Razorbill	Pursuit-diver	No	Cliff
Puffin	Pursuit-diver	No	Burrow/crevice

3.5.4 Physical damage to habitat (Indirect change to habitat; impact pathway 3)

Seabed habitat is important for foraging seabirds. The construction of infrastructure on the seabed (such as the laying of a clutch or cages for aquaculture sites as well as the presence of plant material required during the construction phase of a beneficial use project) could generate localised new habitat for fish and benthic communities (i.e. Fish Aggregation Devices (FADs) or artificial reefs). This in turn

[8] The nest is a platform of aquatic vegetation either floating or anchored to emergent vegetation, built from the lake bottom (where water is shallow) or built on rocks at water level.

could affect the prey availability in the immediate vicinity of such structures and create new foraging opportunities for diving bird species. Such an effect could occur, especially, around larger aquaculture sites. Smaller and discrete intertidal structures acting as FADs could include trestle tables.

There is also potential for the scouring of seabed habitats during construction, operation and maintenance of both activities. In areas of sandy sediment which may be important for seabirds as a proportion of the species that have been screened into the assessment rely heavily on sandeels for feeding both themselves and their young (Winslade, 1974). The risk and magnitude of such effects on the seabed habitats will be dependent on a range of factors such as the habitat type, the extent of habitat affected, the location and the nature of activities and whether they are temporary or permanent. In advance of any details about the exposure levels the sensitivities of seabirds are considered to be low to such effects and during the construction and decommissioning and operation and maintenance phases of aquaculture and beneficial use activities.

The extent of this effect is unknown though it is likely to be small for all species. Furthermore, additional above-surface structures may provide habitat for seabirds such as gulls and terns to perch or rest on, or even potential breeding locations themselves. Overall, species are considered to have a low sensitivity to the change of habitat in this manner.

3.5.5 Physical damage to species (direct damage to species from collision risk; impact pathway 6)

Seabirds could potentially collide with structures both above and, especially, below the sea-surface during surveying, construction (and decommissioning, where applied) and operation of any aquaculture and/or beneficial use activity. Collision risk and mortality will depend on a range of factors related to bird species, abundance, foraging modes (e.g. locations and methods), foraging timings (e.g. day or night), topography, weather conditions the value of the area as a feeding ground, the consistency with which it is used for foraging and the nature of the structures themselves including the use of lighting for above-surface components (DECC, 2009). The issues associated with collision risk are all similar through each of the key stages of individual projects within the Plan are described below.

Collisions could occur due to vessels/dredgers travelling to and from the site. While birds are manoeuvrable, they are nonetheless at risk, especially during the night. Although many breeding birds remain at their nest sites on land at night, some may roost at sea (Gaston, 2004). However, the collision risk with vessels is thought to be minimal, and operational construction vessels pose less threat than commercial shipping due to slow travelling speeds. There is also potential for entanglement with sub surface structures such as mooring lines or anti-predator nets.

Collision risk throughout all stages of the activities being assessed within the South Marine Plan would be expected to be low given the highly mobile nature of such bird species. It is also likely that any visual and noise disturbance caused by the vessel movements themselves would limit the potential for collision incidents.

3.5.6 Physical damage to species (direct damage to species from marine litter; impact pathway 7)

Physical damage to birds could arise from abandoned, lost, broken or discarded aquaculture gear which could cause damage to the bird species through ingestion and entanglement (UKMMAS, 2010). It is not expected that any marine litter will be presence as a result of beneficial use activities.

Ingestion of marine litter usually happens when an animal mistakes it for food, or by secondary ingestion with prey (Fanshawe and Everard, 2002). In some seabirds species ingested items can also be transferred between parent to chick by regurgitation (Fry *et al*., 1987). If marine litter is ingested it is possible that the bird could experience physical damage and potential mechanical blockage of the oesophagus and digestive system which in turn could lead to internal infections or death.

A study by Hinojosa and Thiel (2009) considered the composition of floating marine debris (FMD). The majority of which (80%) were composed of Styrofoam (expanded polystyrene), plastic bags and plastic fragments (Hinojosa and Thiel, 2009). Styrofoam is commonly used as a flotation device by mussel farms. It is possible that plastics such as these are ingested by bird species. Other sources of marine litter likely to be present at the site include abandoned or broken nets or cultivation bags, whereby the likelihood of ingestion is small.

If a bird were to become entangled in an abandoned or broken net or cultivation bag it would experience reduced movement potentially resulting in serious injury or death by starvation (UKMMAS, 2010). If entanglement occurred underwater, the bird would drown.

Physical damage during the operational phase of aquaculture activities due to marine litter within the South Marine Plan would be expected to be low to medium given the relatively small scale of the potential impacts and the mobile nature of such bird species.

3.5.7 Non-physical disturbance to species (visual/noise disturbance; impact pathways 9 and 10)

Noise and visual disturbance may occur during the pre-construction survey work (as a result of the presence of dredgers, bulldozers and other vessels), construction/decommissioning (installation/removal of cages, vessel movements and the placement of sediment). The extent to which birds are affected by sources of noise and visual disturbance has been the subject of a lot of previous research and monitoring work. Disturbance to birds can stop feeding and roosting behaviour, with possible long-term effects of repeated disturbance including loss of weight, condition and a reduction in reproductive success. The effect of such disturbance is linked to the amount of times it occurs and the status of the conditions that are prevalent.

Studies generally show that birds are disturbed by a sudden large noise but have the ability to habituate (become accustomed) to regular noises. For instance, with respect to piling specifically, it has been concluded that although piling has the potential to create most noise during construction, it often consists of rhythmic “bangs”, which, after a short period, birds are likely to become accustomed to (ABP

Research, 2001). More recently, IECS (2009) has suggested that birds will habituate to regular noise, typically below 70dB, but that they will be startled by sudden noises exceeding 50dB. Noise from construction (under 70dB(A)) and regular port vehicle or vessel movements are often tolerated more by birds than sporadic visits to a roost area (e.g. maintenance workers). In general, birds appear to habituate to continuous noises as long as there is no large amplitude 'startling' component (Hockin *et al*., 1992).

As part of the construction work for ABB Power Generation Ltd (Pyewipe), winter bird monitoring showed that there was no large-scale disturbance due to construction work on the site (ERM, 1996). Although some localised disturbance was recorded in response to two sudden events, this was not considered to have a major effect on surrounding bird populations and was found to be no greater than the effect arising from third party disturbance, including walkers and stopped cyclists, which were unrelated to the work carried out by ABB (ERM, 1996). Observations suggested that it was the initial sudden bang during piling activities, which caused the disturbance, and that subsequent bangs typically resulted in reduced disturbance, demonstrating habituation.

These findings were supported by the studies carried out for the Humber International Terminal development, which again indicated that the key factor in triggering disturbance was human presence (ABP Research, 2000). Over 12 separate visits, disturbance by construction activities (which involved piling and reclamation of part of the foreshore) was observed on 3 occasions and in each case birds were disturbed over a small area and then rapidly resettled within the zone of disturbance (i.e. they did not leave the area). More recently, surveys of the birds around the Immingham Outer Harbour in the Humber (using the same methods) have also indicated that such disturbance events are limited and are often attributable to non-Port related activities such as the presence of Peregrine Falcons or walkers on the mudflat (ABPmer, 2010a).

The ABP Teignmouth Quay Development estimated an approximate zone within which birds may be affected by disturbance from construction works (piling and dredging) to be typically about 200m (ABPmer, 2002). The startling effects of sudden noise were quantified, based on published research, by the Environment Agency for the Humber Estuary Tidal Defences scheme. It was concluded that a sudden noise in the region of 80dB appears to elicit a flight response in waders up to 250m from the source, with levels below this of approximately 70dB causing flight or anxiety behaviour in some species.

Birds could also be indirectly affected by any potential noise disturbance to prey (e.g. fish and invertebrates) resulting in their subsequent exclusion from foraging areas. The vulnerability of fish and invertebrates to noise and vibration disturbance is reviewed in more detail in Section 3.7.

As a result of disturbance, avoidance of areas of habitat by birds may occur during the pre-construction survey, construction, operation and decommissioning phases the Plan. Exclusion from habitats essentially prevents access to prey sources. Such exclusion could reduce other effects, notably collision mortality. However, reductions in the availability of habitat and access to prey could lead to many changes in the

way individuals forage, including increased individual stress levels and alterations to individual time budgets owing to travelling further to find food (Scottish Executive, 2007).

Although alternative foraging areas may exist, the quality of the foraging habitat that species are forced to use may be lower, as well as more distant, thus increasing searching and foraging time needed to meet energetic needs. Species may have little flexibility to alter their time budgets to encompass extra foraging/travel to destinations. Species may also be reliant on a particular prey source at a location and may have less ability to switch to a different prey source. Effects at the colony and nest sites would be experienced through a reduced attendance time (due to lower feeding rates of chicks and longer foraging trips), possibly with increased neglect of chicks increasing predation risk or attacks from conspecifics. Furthermore, reduction in available habitat can generate increased competition to find food with knock-on implications for neighbouring areas (i.e. not included in the assessment). These disturbances may, therefore, cause a reduction in foraging success, decreases in breeding success, and effects on individual fitness. The effects will be very localised and temporary during initial survey phases, construction, operation and decommissioning causing minimal disruption.

The vulnerability of birds to these changes will depend on how tolerant the species are at coping with changes. Those species that tend to feed on very specific habitat features will be the most sensitive. For instance, Garthe and Hüppop (2004), and more recently Marine Scotland (2012), evaluated the sensitivity of species to offshore wind farms, and their score for flexibility in habitat use provides a useful measure to the sensitivity of species to this effect. Red-throated Diver and Common Scoter (both diving species) were found to be particularly sensitive to disturbance and the effects of indirect habitat loss. The breeding success of some surface-feeding species, such as Terns and Kittiwakes, is negatively affected by changes in food availability due to reliance of prey brought to the sea surface (Furness and Tasker, 2000). This indirect effect was identified by Perrow *et al*. (2011) which found that Little Tern breeding success in a colony in Norfolk may have been reduced by a shortage of young herring around Scroby Sands offshore wind farm as a result of the monopole installation affecting local fish reproduction. Species with higher burdens to energy costs of flight and foraging (such as auks) may find it harder to increase foraging ranges to more distant prey resources (if such a change were to occur), than for instance Gannets that are generally less sensitive to natural changes in the availability of food, and can forage over a much wider area. Diving species with high wing loading have high energetic cost during flight, thought to be linked with adaptation of wings for underwater locomotion (Gaston and Jones, 1998; Thaxter *et al.,* 2010). Thus, while they have the potential to forage far from colonies, their typical ranges may be smaller than those of other species, i.e. 20-40 km (Thaxter *et al*., 2009; 2010), and may be less flexible in making changes in the event of reduced prey availability (Enstipp *et al.,* 2006). For the Plan diving and surface feeding species are considered to have a low sensitivity to this effect.

Overall the footprint and level of exposure from the South Marine Plan are small. Therefore, taking account of the sensitivity of bird species, the potential vulnerability is considered to be low.

3.5.8 Toxic Contamination (spillage and contamination; impact pathways 11 to 14)

Spillage of oils and fluids from construction vessels and machinery into the marine environment could adversely affect sediment or water quality during all phases of the Plan, for both aquaculture and beneficial use activities, for instance, through vessel collision, or improper construction or maintenance activities.

Seabirds may also be vulnerable to contaminated sediments that are released into the water column during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge. There is also the potential for the water quality to be reduced due to the introduction of non-synthetic compounds and synthetic compounds as a result of cage production and due to the organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.

The magnitude of the effect is dependent upon the level of contamination; the proximity of the activity area to a European site and species foraging areas; the type of activity occurring; the manner in which that activity is pursued (including the extent and duration); the particle size of the disturbed sediments and the hydrodynamic conditions. It has been indicated that settlement of sediment is most likely to occur within 20-200m of a cable for a wind farm (BERR, 2008) but contaminants are almost always associated with fine sediments and could travel further than this in some areas, up to one tidal ellipse.

Marine birds are particularly sensitive to contamination by oil (Votier *et al.,* 2008), as the oil can cause considerable damage to waterproofing and flight (Wernham *et al*., 1997), as well as additional physiological damage of birds ingesting oil. The sensitivity of species to oil contamination is considered to be low during survey, construction, operation, and decommissioning. This is dependent on the general behaviour and distribution of species (e.g. the proportion of time spent on the sea surface relative to flying or feeding locations). Auks, in particular, may spend a considerable amount of time on the sea surface or foraging (Thaxter *et al*., 2010), and thus have a higher risk of being adversely affected by 'at sea' spillages of contamination events (e.g. Votier *et al.,* 2008). By contrast waders would only be affected by contamination events that affect their intertidal foraging zones.

Ingestion of contaminated sediments either through direct poisoning or bio-magnification of pollutants as a result of ingestion of contaminated prey would increase the probability of mortality of all species being considered. The precise risk would again depend on the use of the area by foraging seabirds. All species are sensitive to this effect, however the potential vulnerability of species is considered low during all phases of the Plans as only very small areas have the potential to be affected.

3.5.9 Non-toxic contamination (increased turbidity; impact pathway 15)

Activities involved during the construction phase associated with beneficial use projects and the operational phase of aquaculture activities may result in an increase of suspended sediments and turbidity, potentially leading to effects on (diving) seabird foraging success and predator-prey interactions. The extent of any effect will

be determined by the environment itself, i.e. by the strength of currents dispersing the sediment and background suspended sediment levels. The nature, scale and location of the structures will be the key determinants of the risk and magnitude of the effect.

Species diving underwater are most sensitive to having foraging activity disrupted by sediment mobilisation and suspension. Diving species such as Auks, Shags and Cormorants use much of the water column thus are considered to have a medium sensitivity to this effect, whereas surface-feeding seabirds are considered to have a low sensitivity. All species, however, are at risk of disruption due to likely prey avoidance of areas that have been disturbed. All species are considered to have a low level of vulnerability to changes to prey distribution areas associated with changes in hydrodynamics as the changes associated with the Plans will be very small and localised.

3.5.10 Bird interest features

Table 9 shows the potential vulnerability of qualifying bird interest features to activities associated with the South Marine Plan. The highest potential vulnerabilities are associated with physical damage as a result of marine litter and disturbance. The levels of potential vulnerability will be different depending upon the life history and foraging behaviour of the species in question. Diving seabirds (such as those listed in Table 8) for instance will have a greater vulnerability to collision risk than those which feed on intertidal habitats.

Table 9: Potential vulnerability of bird features to the South Marine Plan

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Summary Impact Pathway Description)	Survey	Construction	Operation
PLG	Physical Damage (indirect change to habitat)	3	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).		AQU	AQU
					BEN	BEN
PD	Physical Damage (direct damage to species from collision risk)	6	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	AQU	AQU	AQU
				BEN	BEN	BEN
PD	Physical Damage (direct damage to species from marine litter)	7	Damage to marine species through ingestion, entanglement and smothering of marine litter.		AQU	
NPD	Non-Physical Disturbance (disturbance to species)	9	Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	AQU	AQU	AQU
				BEN	BEN	BEN
NPD	Non-Physical Disturbance (disturbance to species)	10	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	11	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	12	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		BEN	AQU

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Summary Impact Pathway Description)	Survey	Construction	Operation
TC	Toxic Contamination (reduction in water quality)	13	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).			AQU
TC	Toxic Contamination (reduction in water quality)	14	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
NTC	Non-Toxic Contamination (elevated turbidity)	15	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
In this table, only the estimated potential vulnerability levels are shown. The level of risk will be dependent upon exposure. For instance there would be a high degree of exposure for bird species were a development to occur within or near a designated site. However, at the present time, there is very little information about exposure within the south marine plan areas.						
No Impact						
Low Potential Vulnerability						
Low to Medium Potential Vulnerability						
Medium Potential Vulnerability						
High Potential Vulnerability						

3.6 Step 4(3): Marine mammal sensitivities

3.6.1 Designated sites with marine mammal features

Following the activity-based screening process (Section 3.3), a total of 182 European/Ramsar sites were identified for which there is a LSE (or the potential for a LSE cannot be excluded). Of these sites, there are 51 SACs/SCIs/cSACs which have qualifying marine mammal interest features.

These SACs/SCIs/cSACs also contain other interest features for which it could not be concluded that there is no LSE (e.g. subtidal sandbanks) and these are reviewed separately under the relevant section(s) of the report that deal with these habitat/species groups.

3.6.2 Interest features summary list

In summary, the screening phase concluded that there was a possibility of a LSE (or that it was not possible to conclude no LSE) for the following marine mammal features:

- Common (Harbour) seal (*Phoca vitulina*) (1365).
- Grey seal (*Halichoerus grypus*) (1364).
- Bottlenose dolphin (*Tursiops truncates*) (1349).
- Harbour porpoise (*Phocoena phocoena*) (1351).

To assess whether there is any AEOI of the European/Ramsar sites that were identified, Sections 3.6.3 to 3.6.11 review the sensitivities of these marine mammal features. Section 3.9.4 then identifies the conservation objectives for these features and assesses, in tabular format, the effects arising in the context of the proposed additional plan-level mitigation measures.

3.6.3 Sensitivities of marine mammals to plan activities

This section reviews the sensitivity that are relevant for marine mammal interest features. A generic review of the sensitivities is presented under the following impact pathways identified during the screening phase:

- Physical Damage (indirect change to habitat; impact pathway 3) (Section 3.6.4).
- Physical Damage to Species (damage to seal haul-outs; impact pathway 5) (Section 3.6.5).
- Physical Damage to Species (direct damage to species from collision risk; impact pathway 6) (Section 3.6.6).
- Physical Damage (direct damage to species from marine litter; impact pathway 7) (Section 3.6.7).
- Non-Physical Disturbance (barrier and disturbance to species; impact pathways 8 to 10) (Section 3.6.8).
- Toxic Contamination (reduction in water quality; impact pathways 11 to 14) (Section 3.6.9).
- Non-Toxic Contamination (elevated turbidity; impact pathway 15) (Section 3.6.10).

An effect can only occur if an interest feature is exposed to a change to which it is sensitive. Sensitivity can be described as the intolerance of an interest feature to readily accept the levels of predicted environmental change to which they are exposed and essentially considers the response characteristics of the feature. The assessment of sensitivity therefore considers the adaptability of the receptor to its former state following exposure to the impact. Vulnerability is based on the sensitivity of a feature and their exposure to a given impact.

Following this review, the general characteristics and potential vulnerability of marine mammal interest features are presented and reviewed against the relevant aquaculture and beneficial use activities that could cause a LSE. This interest feature review is set out in Section 3.6.11.

3.6.4 Physical Damage (indirect change to habitat; impact pathway 3)

Damage to offshore seals or cetacean foraging grounds could occur from a wide range of activities associated with aquaculture and mud recharge activities. These include changes to the sediment transport regime (erosion/accretion) as a result of the presence of any structures (e.g. finfish cage fixtures, shellfish trestle tables) or from the placement of recharge material.

Marine mammals have extensive ranges and cover very large distances to forage in the pelagic environment. While marine mammals typically utilise very large ranges they can often be aggregated in patches (critical habitats) where prey resources are found in the highest densities (Anderwald *et al*., 2012; Hazen *et al*., 2009; Mikkelsen *et al*., 2013). Critical (key) habitats for marine mammals are those that are essential for day-to-day well-being and survival, as well as for maintaining a healthy population growth rate. Areas that are regularly used for feeding, breeding, raising calves and socialising, as well as, sometimes, migrating, are the key components of critical habitat (WDCS, 2010). In addition to these areas, locations where associated and supporting activities such as hunting, courtship, singing, calving, nursing, resting,

playing and communication take place are important to consider. Consideration of critical habitat should also extend to the critical habitat of marine mammal prey and areas where important ecosystem processes occur such as productive upwelling and fish spawning grounds. These critical habitat areas will be the most sensitive parts of a marine mammal's range to any developments that cause loss (or gain) of habitat. For example, important foraging habitat for harbour porpoises includes areas of strong tidal currents, usually near islands or headlands, where the currents combine with the seafloor topography and seem to create conditions where a higher abundance of prey are recorded (Pierpoint, 2008; Marubini *et al*., 2009; DECC, 2009). Spawning and nursery sites for prey species will be particularly sensitive to any environmental change.

3.6.5 Physical Damage to Species (damage to seal haul-outs; impact pathway 5)

Impacts to intertidal areas from equipment use during construction/decommissioning and operation of aquaculture and beneficial recharge sites could affect established seal haul out locations. Seals use haul-outs for resting between foraging trips, giving birth (pupping) in the moulting season and also as a nursery for pups (SCOS, 2012). In the UK, grey seals typically breed on remote uninhabited islands or coasts and in small numbers in caves (Stringell *et al*., 2013). Common seals come ashore in sheltered waters, typically on sandbanks and in estuaries, but also in rocky areas, and haul out on land in a pattern that is often related to the tidal cycle. In general both grey and common seals are highly sensitive to disturbance by humans hence their preference often for remote breeding sites (SCOS, 2012).

No known grey seal haul out sites occur within the south marine plan areas, with haul out sites located adjacent to the plan boundaries around Start Point in Devon and South Foreland in Kent (Chesworth *et al*., 2010; South Devon AONB, 2015).

The only resident population of common seal on the English side of the Channel is in the Solent. This small but regionally important population was estimated at 23-25 individuals in 2009. Two haul-out sites are regularly used by this seal population, one in Langstone Harbour and one in Chichester Harbour (Chesworth *et al*., 2010). Common seals give birth to their pups in June and July and moult in August. At these times of the year seals will be the most susceptible to human disturbance at haul out sites.

3.6.6 Physical Damage to Species (direct damage to species from collision risk; impact pathway 6)

The main collision risks are posed by increased vessel activity associated predominantly with the survey and construction of both mud recharge and aquaculture activities. Vessel activity associated with the operation and maintenance of the aquaculture sites, alongside the presence of the mooring and antipredator nets associated with aquaculture may also cause a potential collision risk.

Marine mammals have quick reflexes, good sensory capabilities and fast swimming speeds (over 6m/s for harbour porpoise). These species can also be very agile (Carter, 2007; Hoelzel, 2002). These are all attributes which increase the chance of close range evasion with an object that could cause a collision risk. It is well documented, however, that marine mammals have collided with anthropogenic

structures such as fishing gear and ships (WDCS, 2009; Pace *et al*., 2006; Zollett and Rosenberg, 2005). Reduced perception levels of a collision threat through distraction, whilst undertaking other activities such as foraging and social interactions, are possible reasons why collisions are recorded in marine mammals (Wilson *et al*., 2007).

Seals with characteristic spiral injuries consistent of a single smooth edged cut that started at the head and spiral around the body have been reported on the UK east coast and in Northern Ireland (Thompson *et al*., 2010). These were thought to be caused by ducted propellers and azimuth thrusters (used for dynamic positioning of vessels). However, there is now evidence that these 'corkscrew injuries' can be caused by grey seal predation on weaned grey seal pups (Thompson *et al*., 2015). Furthermore there have been recent observations of an adult male grey seal killing and eating young harbour seals in Germany. As yet there is no direct evidence of grey seals predating adult harbour seals although it is reasonable to consider that this is possible.

At the same time, however, it would be premature to completely discount the possibility that some of the corkscrew injuries are caused by interactions with propellers. The model trials carried out by SMRU showed that similar injury patterns could be caused by ducted propellers. Further research is underway to try to resolve these issues.

Interim advice on the risk of seal corkscrew injuries has been produced by SNH in February 2015. This advice concludes that based on the latest information it is considered very likely that the use of vessels with ducted propellers may not pose any increased risk to seals over and above normal shipping activities and therefore mitigation and monitoring may not be necessary in this regard, although all possible care should be taken in the vicinity of major seal breeding and haul-out sites to avoid collisions.

In the context of construction or maintenance vessels for both aquaculture and beneficial recharge, species are most susceptible to collision where vessels display erratic behaviour and/or operate at high speeds (Hazel *et al*., 2007; Scottish Executive, 2007). Construction vessels will operate in limited spatial areas and at low speeds. Ships travelling at 14 knots (~7m/s) or faster are most likely to cause lethal or serious injuries if there is a collision (Scottish Executive, 2007). These factors are likely to mitigate against any potential collision risks. Furthermore, vessels traveling to/from a site during construction and maintenance tend to transit along pre-determined routes.

Marine mammals can also be very curious of new foreign objects placed in their environment and so curiosity around aquaculture sites could increase the risk of collision. This risk is heightened by the attraction of marine mammals to the associated aggregations of fish. This can lead to an increased risk of entanglement in structures, predator nets or non-biological wastes from farm production. An increased risk of entanglement occurs when farms are poorly designed, installed or maintained (Clement *et al*., 2013). Entanglement can cause decreased swimming ability, disruption in feeding, life-threatening injuries, and death.

3.6.7 Physical Damage (direct damage to species from marine litter; impact pathway 7)

Entanglement of marine mammals in pieces of abandoned, lost, broken or discarded netting is a very major problem for some species in some parts of the world (Wilson, undated). As mentioned above, entanglement can cause decreased swimming ability, disruption in feeding, life-threatening injuries, and death.

There is also the potential for marine mammals to ingest broken aquaculture gear, mistaken as food. Starvation or malnutrition occurs when the marine debris collects in the animal's stomach causing the animal to feel full or prevents vital nutrients from being absorbed. Ingestion also causes internal injuries and infections, as some marine debris contain toxic substances that can cause death or reproductive failure (EPA, 2012).

There is no overlap of this potential impact pathway on marine mammals associated with beneficial recharge activities.

3.6.8 Non-Physical Disturbance (noise/vibration and visual disturbance causing barrier and exclusion effects; impact pathways 8 to10)

Disturbance to marine mammals could come from a variety of sources, including construction activities and vessel movements across both sectors. Most activities could have a temporary disturbance effect and could create a possible barrier or exclusion zone. However, aquaculture has the potential to present a significant physical obstruction, through the use of antipredator deterrents, that might act as a barrier or create exclusion effects. The potential sensitivities of marine mammals to barriers to movement and visual and noise disturbances are presented below.

Barrier effects

Cetaceans are highly mobile, pelagic species which can undergo large seasonal movements and migrations (Reid *et al*., 2003; Learmonth *et al*., 2006). They can therefore be particularly vulnerable to any structures which could act as a barrier, preventing movement to these key foraging or nursery grounds. The presence of sub-surface aquaculture structures may, therefore, present a barrier to movement and migratory pathways. Their sensitivity will depend on the size and extent of the aquaculture site in relation to the surrounding area (e.g. the sensitivity of marine mammals to barriers will be higher in confined channels or estuaries with restricted alternative routes, compared with the open sea).

Visual disturbance

Disturbance caused by an external visual influence, such as vessel movements, can cause marine mammals to stop feeding, resting, travelling and/or socialising, with possible long term effects of repeated disturbance including loss of weight, condition and a reduction in reproductive success (ABPmer, 2009; JNCC, 2008). The group which are most at risk from visual disturbance are seals (when they are on land resting or breeding) (Hoover-Miller *et al*., 2013).

In the UK, there are currently no good-practice guidelines for minimising disturbance by shipping or commercial vessels (JNCC, 2008). However, the Scottish Marine Wildlife Watching Code that was designed for recreational water users advises that the minimum approach distance for vessels to avoid visual and noise disturbance to

dolphins and porpoises is 50 m (200-400 m for mothers and calves, or for animals that are clearly actively feeding or in transit). The code, however, is not necessarily appropriate for repeated commercial activities.

Noise disturbance

Marine mammals (particularly cetaceans) are considered to be the most sensitive receptors in relation to acoustic disturbance in the marine environment, due to their use of echolocation and vocal communication (DECC, 2009). In comparison to fish (Section 3.7.7), marine mammal species are sensitive to a very broad bandwidth of sound (being responsive at frequencies from 100 Hz to 170 kHz and possessing sensitive hearing over the frequency range from 20 kHz to 150 kHz).

Despite this, the impacts of noise on marine mammals can broadly be split into lethal and physical injury, auditory injury and behavioural response. Chronic stress related disorders can also occur with long-term, repeated exposure to a noise source. These responses are discussed in more detail below based on available evidence.

Marine mammals could also be indirectly affected by any potential noise disturbance to prey (e.g. fish) resulting in their subsequent exclusion from foraging areas. The sensitivity of fish to noise and vibration disturbance is reviewed in more detail in Section 3.7.7.

Lethality and physical injury

At very high exposure levels, such as those typically close to underwater explosive operations or offshore impact piling (pile driving) operations, fatality may occur in species of marine mammal where the incident peak to peak sound level exceeds 240 dB re 1µPa. The likelihood of fatality increases with levels above 240 dB re 1µPa. As the time period of the exposure increases (represented by the impulse), there is also an increase in likelihood of fatality.

Auditory injury

At sound levels (taken to be in excess of 180 dB re 1µPa for marine life generally), and particularly where there are repeated high level exposures from activities such as impact pile driving, seismic operations, or for continuous wave sound such as sonar, underwater sound has the potential to cause hearing impairment in marine species (Nedwell *et al*., 2007a). This can take the form of a temporary loss in hearing sensitivity, known as a Temporary Threshold Shift (TTS), or a permanent loss of hearing sensitivity, known as a Permanent Threshold Shift (PTS) (Nedwell *et al*., 2007a). These values will depend on the hearing sensitivity of marine mammals at different frequencies and the overall tolerance of their auditory systems to intense noise. Lucke *et al*. (2009), for example, undertook an auditory study to derive data on TTS induced by single impulses for harbour porpoise after exposure to seismic airgun stimuli. At 4 kHz the predefined TTS criterion was exceeded at a received sound pressure level of 199.7 dB peak-peak re 1 µPa and a sound exposure level (SEL) of 164.3 dB re 1 μPa^2s.

Southall *et al*. (2007) proposed a set of criteria for preventing auditory/physiological injuries to marine mammals. These criteria are based on both peak sound levels and SEL. The SEL criteria can be applied either to a single transient pulse or the cumulative energy from multiple pulses. The study by Southall *et al*. (2007)

recommended a peak noise criterion of 218 dB re1µPa for pinnipeds (seals) and 230 dB re1µPa (peak broadband level) for cetaceans (e.g. harbour porpoise), to prevent physiological auditory injury and the onset of PTS. The onset of TTS was defined as a peak noise criterion of 212 dB re1µPa and 224 dB re 1 µPa (peak broadband level) in pinnipeds and cetaceans respectively.

Behavioural response
At lower Sound Pressure Levels (SPLs) it has been observed that a behavioural response in marine mammals may occur. These reactions may include the animals leaving the area for a period of time, or a startle reaction.

Southall *et al*. (2007) proposed a set of SPL criteria for behavioural disturbance. For harbour porpoise, criteria of 155 dB re 1 µPa and 90 dB re 1 µPa are proposed as major and minor disturbance thresholds respectively. For seals, 200 dB re 1 µPa and 160 dB re 1 µPa are proposed as major and minor behavioural thresholds respectively. It is important to recognise, however, that behavioural disturbance is difficult to quantify as reactions are highly variable and context specific making them less predictable (Southall *et al*., 2007).

Behavioural response from underwater sound can also be assessed by comparing the received sound level with the auditory threshold of marine mammals. For example, Richardson *et al*. (1995) used critical bands, normally octave or third octave band received levels of noise in comparison with the corresponding marine mammal hearing threshold in order to estimate the range of audibility and zones of influence from underwater sound sources.

This form of analysis has been taken a stage further by Nedwell *et al*. (2007b), where the underwater noise is compared with receptor hearing threshold across the entire receptor auditory bandwidth in the same manner that the dB(A) is used to assess noise source in air for humans. In their dB_{ht} (Species) scale a frequency dependent filter is used to weight the sound. The suffix 'ht' relates to the fact that the sound is weighted by the hearing threshold of the species. A set of criteria based on the use of the dB_{ht} (species) was proposed by Nedwell *et al*. (2007b) that allows the likelihood of behavioural effects and damage to hearing to be assessed for a wide range of species (Table 10). Of significance for this assessment, is the conclusion that at 90 dB_{ht} (species) and above there will be a strong avoidance reaction by all individuals of that species, and that below 50 dB_{ht} (species) there will be a mild reaction by a minority of individuals. The dBht metric has been applied in a number of offshore renewables EIAs and its value has been recognised in a recently published peer-reviewed paper (Thompson *et al*., 2013). The dB_{ht} metric is therefore considered to be a valuable tool to inform impact assessments.

It should be noted that these criteria reflect the initial response and do not reflect the complexity of behavioural, physiological and auditory impacts over the short and long-term. Furthermore, this criterion has not been validated by experimental study and behavioural responses are likely to be context specific (Ellison *et al*., 2012). The potential effects of anthropogenic underwater noise on the behaviour of marine mammals are difficult to determine as they are context dependent, and must be statistically based.

Table 10: Criteria suggested for the effects of underwater noise on marine fauna

Levels in dBht (Species)	Effect
Less than 0	None
0 to 50	Mild reaction by minority of individuals
50 to 90	Stronger reaction by majority of individuals but habituation at lower levels may limit effect
90 and above	Strong avoidance reaction by all individuals
Above 110	Tolerance limit of sound; unbearably loud
Above 130	Possibility of traumatic hearing damage from single event

(Source: Nedwell *et al*., 2007b)

Chronic stress

Long-term, repeated exposure to a noise source can cause chronic stress in marine mammals. A range of issues may arise from the extended stress response including accelerated ageing, slow disintegration of body condition, sickness symptoms and suppression of reproduction (physiologically and behaviourally) (Wright *et al*., 2007a; Wright *et al*., 2007b). Wright *et al*. (2007b) found that young animals may be particularly sensitive to stressors for a number of reasons including the sensitivity of their still-developing brains.

Overview

Disturbance to marine mammals and their displacement from a site can also arise from the noise and light during management activities of aquaculture sites during operation although the effects of these are considered to be small. Similarly, underwater noise disturbance to marine mammals from the placement of material during construction of beneficial recharge projects are considered to be very small.

The main potential impacts on marine mammals from beneficial recharge projects include increased noise due to vessel movements during construction, whilst for aquaculture sites underwater noise is associated with vessel movements during construction and operation and acoustic deterrents used during the operation of aquaculture sites. These are discussed further below.

Acoustic deterrents

One of the few alternative methods for the non-lethal removal of marine mammals around aquaculture sites is underwater acoustic devices, which produce loud sounds, and are used with the aim of deterring seals from the vicinity of the device. These devices are known as acoustic deterrent devices (ADDs), acoustic harassment devices (AHDs), or seal scarers, although the names are synonymous and the term acoustic device has been used here to refer to all three devices.

Acoustic devices have been used as anti-predator controls at marine salmon farms since the 1970s, but they often differ vastly on the source levels, frequencies, and sound patterns deployed (Coram *et al*., 2014). Table 11 summarises the acoustic characteristics of the devices most frequently used in Scottish fish farms, but it should be noted that a variety of devices have existed, many of which have had ephemeral usage. In some cases, field measurements of source levels differ substantially from those stated by the manufacturers, indicating considerable

uncertainty about the actual source levels of the devices. However, the typical frequency range of acoustic devices is 2-40 kHz (Coram *et al*., 2014; Lepper *et al*., 2014; Graham *et al*., 2009).

No studies have directly investigated the effect of acoustic deterrent signals on the auditory systems of marine mammals, although peak pressures generated by acoustic devices used in aquaculture are not high enough to directly cause lethal injury (Lepper *et al*., 2014).

Table 11: Acoustic Characteristics of Acoustic Devices used at Scottish Aquaculture Sites

Manufacturer	Device	Source Level (dB)		Frequency (kHz)	Reference
		Scientific Literature	According to Manufacturer		
Airmar	dB Plus II	192 (RMS)	198 (RMS)	10 (tonal – with harmonics)	Lepper *et al*. (2004)
Lofitech	Universal Scarer	193 (RMS)	189 (Unknown)	14 (tonal – with harmonics)	Shapiro *et al*. (2009)
Ace Aquatec	Universal Scrammer 3	193 (RMS)	194 (Unknown)	10-65 (broadband)	Lepper *et al*. (2004)
Terecos	DSMS-4	179 (RMS)	None given	2-70 (broadband)	Lepper *et al*. (2004)
Ferranti-Thomson	4X	166 (Unknown)	200 (Unknown)	7-95 (broadband)	Terhune *et al*. (2002)

A number of studies have investigated behavioural responses of marine mammals to acoustic deterrents, although most data has been collected for harbour porpoises (Lepper *et al*., 2014). Research by Olesiuk *et al.* (2002) in British Columbia, Canada close to a fish farm site revealed that during periods when the acoustic device was active, porpoises were completely excluded within 400m of the device and densities between 2,500 and 3,500m were less than 1/10th of those observed in the same areas during periods when the acoustic device was not active. Research in Scotland using passive acoustic porpoise logging devices (PODs) to measure porpoise presence and relative abundance around operating fish farms has generally supported this evidence. For example, at a monitoring site 4km from a fish farm, porpoise detection rates were nine times higher when ADDs were inactive at the farm site than when they were active (Northridge *et al*., 2010). For a different acoustic device monitored in Scotland, Northridge *et al*. (2013) suggested a weak or minimal response by porpoises out to around 1.2km from the site.

A study by Graham *et al*. (2009) assessing the effectiveness of acoustic deterrents for excluding seals from Atlantic salmon rivers in Scotland showed that the acoustic devices studied had no significant effect on the absolute abundance of seals in the survey area in either river, but it did reduce seal movement upstream significantly, by approximately 50% in both rivers. Trials by Harris *et al*. (2013) undertaken in Scotland in 2009 and 2010, identified that in both years the acoustic device tested significantly reduced the sightings of seals (although seal sightings were only analysed up to 80 m from the acoustic device).

Based on the findings from these studies it is apparent that, although hearing injuries from acoustic deterrents are unlikely to occur, strong avoidance responses could occur several kilometres from the source of the acoustic device. However, the level at which an animal at a given range will receive the sound from an acoustic device depends on both the source characteristics of the device and propagation loss. Propagation conditions will vary between sites, being affected by parameters such as bathymetry and bottom type. Seasonal changes in variables such as water temperature profiles will also have an effect.

Many studies on the effects of acoustic devices on marine mammals have also reported a reduction in responsiveness over time, referred to as habituation (Coram *et al*., 2014; Graham *et al*., 2009; Northridge *et al*., 2010; Harris *et al*., 2013). Habituation can be defined as a decrease in a behavioural response to a recurring stimulus and may occur at fish farms, as a result of animals learning strategies to avoid responding to these signals, or to reduce their effects (Coram *et al*., 2014).

Vessel movements

The effect on marine mammals from vessel noise is not clear, with both attraction and avoidance reactions having been observed (Nedwell and Howell, 2004). Noise levels from the ship's echo-sounder or acoustic emissions from a dynamic positioning system would not be expected to cause widespread disturbance to marine mammals (Scottish Executive, 2007). For harbour porpoises, the zone of audibility of shipping noise ranges from 1-3km depending on the frequency of noise emitted by the ship (Thomsen *et al*., 2006). The Scottish Marine Wildlife Watching Code advises that the minimum approach distance for vessels to avoid visual and noise disturbance to dolphins and porpoises is 50m (200-400m for mothers and calves, or for animals that are clearly actively feeding or in transit).

3.6.9 Toxic Contamination (reduction in water quality; impact pathways 11 to 14)

Spillage of oils and fluids from construction vessels and plant machinery into the marine environment could adversely affect sediment or water quality during all phases of the South Marine Plan, for instance, through vessel collision, or improper construction or maintenance. There is also the potential that some of the aquaculture sites will use antifouling coatings, and whilst organotins are now banned, the use of copper is still permitted (UK Marine SAC website). Seals and cetaceans in the study area generally have a low sensitivity to contamination, although the sensitivity rises to medium around seal breeding sites (Scottish Executive, 2007).

Marine mammals are also exposed to a variety of anthropogenic contaminants, through the consumption of prey. As top predators, they are at particular risk from contaminants which biomagnify through the food chain (i.e. are found at increasing concentrations at higher trophic levels). Most research has focused on two main groups of contaminants: the persistent organic pollutants (POPs) and the heavy metals. However, there is some information on other contaminants including polyaromatic hydrocarbons (PAHs), butyl tins and perfluorinated chemicals (DECC, 2009).

POPs accumulate in fatty tissues, are persistent and commonly resistant to metabolic degradation; they are often found in high concentrations in marine mammal blubber. They may affect the reproductive, immune and hormonal systems which can eventually lead to mortality. For example, Jepson *et al*. (2009) suggested a possible link between high levels of PCB (polychlorinated biphenyls) recorded in the blubber of stranded dead bottlenose dolphins in the UK with the decline in bottlenose dolphins observed in this region between the 1960s and 1990s. A strong association has also been found between poor health status (mortality due to infectious disease) and PCB chemical contamination for a large sample of UK-stranded harbour porpoises collected since 1990 (Jepson *et al*., 2009).

Cadmium, lead, zinc and mercury are the heavy metals of greatest risk to marine mammals. They are frequently present in the highest concentrations in the liver, kidney and bone, with levels varying considerably with the geographic location of the species. Marine mammals are able to produce certain proteins (metallothioneins) which can sequester certain metal ions into less toxic complexes; this enables many species to cope with relatively high dietary exposures to certain metals. Whilst there are few studies that show major impacts of heavy metals, it is possible that they may have combined effects as they often co-occur with the persistent organic contaminants (DECC, 2009).

3.6.10 Non-Toxic Contamination (elevated turbidity; impact pathway 15)

Increased turbidity could affect foraging, social and predator/prey interactions of marine mammals. However, marine mammals are known to have acute hearing capabilities which allow them to function as predators in low visibility, turbid conditions. Seals just use passive listening while harbour porpoise and bottlenose dolphins are known to use both passive and active listening when navigating and foraging (echolocation). Marine mammals also have well developed vision which also helps them operate in low light levels (Scottish Executive, 2007). Seals hunting in poor visibility waters also use fish-generated water movements for locating prey, which they can detect using their highly sensitive mystacial vibrissae (Schulte-Pelkum *et al*., 2007). Marine mammals are therefore well adapted to living in areas with a high suspended sediment load and are regularly recorded in such environments in the UK e.g. estuaries and tidal steams.

3.6.11 Marine mammal interest features

The individual characteristics and potential vulnerabilities for each of the relevant marine mammal interest features are presented and reviewed against the relevant Plan activities that could cause a LSE. Although it is recognised that there are no initial mitigation measures included specifically within the South Marine Plan (Section 2.2.6), it should be noted that there are a number of policies that will act to

reduce the potential exposure and thus vulnerability of marine mammal interest features to disturbance and displacement (Policy S-DIST-1), noise (Policy S-UWN-2) and marine litter (S-ML2). These interest feature reviews are set out in the following two sections, which are representative of the broad categories of marine mammals (pinnipeds and cetaceans).

Grey and Common Seal (Pinnipeds)

The potential vulnerability of seals to the Plan activities is included in Table 12. The highest vulnerability is associated with the disturbance of seal scarers used in finfish aquaculture and also potential collision risk and damage from marine litter.

Table 12: Potential vulnerabilities of seal features to the South Marine Plan

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Summary Impact Pathway Description)	Survey	Construction	Operation
PLG	Physical Damage (indirect change to habitat)	3	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).		AQU	AQU
					BEN	
PD	Physical Damage (direct damage to seal haul out habitat)	5	Damage to seal haul out locations from equipment use causing abrasion, damage or smothering during construction/decommissioning and operation.		AQU	AQU
					BEN	
PD	Physical Damage (direct damage to species from collision risk)	6	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	AQU	AQU	AQU
				BEN	BEN	
PD	Physical Damage (direct damage to species from marine litter)	7	Damage to marine species through ingestion, entanglement and smothering of marine litter.			AQU
NPD	Non-Physical Disturbance (barrier to species movement)	8	Presence of sub-surface structures and disturbance (visual) associated with suspended or cage production may present a barrier to movement and block migratory pathways or access to feeding grounds depending on design.			AQU
NPD	Non-Physical Disturbance (disturbance to species)	9	Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	AQU	AQU	AQU
				BEN	BEN	BEN
NPD	Non-Physical Disturbance (disturbance to species)	10	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	11	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	12	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
TC	Toxic Contamination (reduction in water quality)	13	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).			AQU
TC	Toxic Contamination (reduction in water quality)	14	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.			AQU
					BEN	BEN

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Summary Impact Pathway Description)	Survey	Construction	Operation
NTC	Non-Toxic Contamination (elevated turbidity)	15	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
In this table, only the estimated vulnerability levels are shown. The level of risk will be dependent upon exposure. For instance there would be a high degree of exposure for otter species were a development to occur within or near a designated site. However, at the present time, there is very little information about exposure within the south marine plan areas.						
No Impact						
Low Vulnerability						
Low to Medium Vulnerability						
Medium Vulnerability						
High Vulnerability						

Bottlenose Dolphin and Harbour Porpoise (Cetaceans)

The potential vulnerability of cetaceans to the Plan activities is reviewed in Table 13. The vulnerability of cetaceans is similar to seals apart from a slightly greater vulnerability to toxic contamination from release of sediment bound contaminants in the water column.

Table 13: Potential vulnerabilities of cetacean features to the South Marine Plan

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Summary Impact Pathway Description)	Survey	Construction	Operation
PLG	Physical Damage (indirect change to habitat)	3	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).		AQU	AQU
					BEN	
PD	Physical Damage (direct damage to species from collision risk)	6	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	AQU	AQU	AQU
				BEN	BEN	
PD	Physical Damage (direct damage to species from marine litter)	7	Damage to marine species through ingestion, entanglement and smothering of marine litter.			AQU
NPD	Non-Physical Disturbance (barrier to species movement)	8	Presence of sub-surface structures and disturbance (visual) associated with suspended or cage production may present a barrier to movement and block migratory pathways or access to feeding grounds depending on design.			AQU
NPD	Non-Physical Disturbance (disturbance to species)	9	Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	AQU	AQU	AQU
				BEN	BEN	BEN
NPD	Non-Physical Disturbance (disturbance to species)	10	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	11	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	AQU	AQU	AQU
				BEN	BEN	BEN

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Summary Impact Pathway Description)	Survey	Construction	Operation
TC	Toxic Contamination (reduction in water quality)	12	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
TC	Toxic Contamination (reduction in water quality)	13	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).			AQU
TC	Toxic Contamination (reduction in water quality)	14	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
NTC	Non-Toxic Contamination (elevated turbidity)	15	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
In this table, only the estimated Vulnerability levels are shown. The level of risk will be dependent upon exposure. For instance there would be a high degree of exposure for otter species were a development to occur within or near a designated site. However, at the present time, there is very little information about exposure within the south marine plan areas.						
No Impact						
Low Vulnerability						
Low to Medium Vulnerability						
Medium Vulnerability						
High Vulnerability						

3.7 Step 4(4): Fish and freshwater pearl mussel sensitivities

3.7.1 Designated sites with fish and freshwater pearl mussel features

Following the activity-based screening process (Section 3.3), a total of 182 European/Ramsar sites were identified for which there is a LSE (or the potential for a LSE cannot be excluded). Of these sites, there are 19 SACs and one Ramsar site which have qualifying fish interest features.

3.7.2 Interest features summary list

In summary, the screening phase concluded that there is a possibility of a LSE (or that it was not possible to conclude no LSE) for the following fish and freshwater pearl mussel features:

- Atlantic salmon *Salmo salar* (1106).
- Sea lamprey *Petromyzon marinus* (1095).
- River lamprey *Lampetra fluviatilis* (1099).
- Allis shad *Alosa alosa* (1102).
- Twaite shad *Alosa fallax* (1103).
- Freshwater pearl mussel *Margaritifera margaritifera* (1029).

To assess whether there is any AEOI of the European/Ramsar sites that were identified, Sections 3.7.3 to 3.7.11 review the sensitivities of these fish and freshwater pearl mussel features. These sections focus on the fish species because any effect on freshwater pearl mussel will only arise as an indirect consequence of effects on Atlantic salmon. Section 3.9.5 then identifies the conservation objectives for these features and assesses, in tabular format, the effects arising in the context of the proposed additional plan- level mitigation measures.

3.7.3 Sensitivities of fish and freshwater pearl mussels to plan activities

This section reviews the sensitivities that are relevant for fish interest features. A generic review of the sensitivities is presented under the following impact pathways identified during the screening phase:

- Physical Damage (indirect change to habitat; impact pathway 3) (Section 3.7.4).
- Physical Damage (direct damage to species from collision risk; impact pathway 6) (Section 3.7.5).
- Physical Damage (direct damage to species from marine litter; impact pathway 7) (Section 3.7.6).
- Non-Physical Disturbance (barrier and disturbance to species; impact pathways 8 and 10) (Section 3.7.7).
- Toxic Contamination (reduction in water quality; impact pathways 11 to 14) (Section 3.7.8).
- Non-toxic Contamination (elevated turbidity; impact pathway 15) (Section 3.7.9).
- Biological Disturbance (introduction of non-native species and the transfer of parasite and pathogens; impact pathways 17 and 20) (Section 3.7.10).

An effect can only occur if an interest feature is exposed to a change to which it is sensitive. Sensitivity can be described as the intolerance of an interest feature to readily accept the levels of predicted environmental change to which they are exposed and essentially considers the response characteristics of the feature. The assessment of sensitivity therefore considers the adaptability of the receptor to its former state following exposure to the impact. Vulnerability is based on the sensitivity of a feature and their exposure to a given impact.

Following this review, the general characteristics and potential vulnerability of fish interest features are presented and reviewed against the relevant aquaculture and beneficial use activities that could cause a LSE. This interest feature review is set out in Section 3.7.11.

3.7.4 Physical damage (indirect change to habitat; impact pathway 3)

Where there is a need for the placement of structures on the sediments whether that be trestle tables used in the cultivation of oysters or the laying of cultch (material, usually mussel shells, is laid down on the seabed) for the cultivation of oyster spat, or a change in the sediment transport regime as a result of beach nourishment or intertidal recharge, then the potential exists to have an effect on the habitat. This habitat may be designated for migratory fish qualifying features (in which case there would be the highest risk of an effect) or it could be located along the migratory routes, which in turn could have an indirect effect on the fish species present within the vicinity of the activity.

The presence of these structures or a change in hydrodynamic and/or sediment transport regime could change the quality of foraging areas from the equipment causing abrasion, damage or smothering. The structures could also act as Fish Aggregating Devices (FADs), artificial reefs or a bird roost which would result in changes to prey and species behaviour.

Changes to offshore habitats at any point during the activity lifecycle may influence foraging areas for migratory species. Fish occupy many trophic levels of the estuarine food chain, feeding on phytoplankton, zooplankton, algae, invertebrates or other fish. In order to forage for these food items, their feeding habits comprise grazers, plankton filter feeders (e.g. shad, smelt), suckers and parasites (e.g. sea lamprey) and predators (e.g. gobies). Many demersal fish are opportunistic predators and their prey choice reflects the species that are available in the area (Elliott *et al.,* 1998). Fish generally feed on a range of food items and, therefore, their sensitivity to the temporary change in a particular food resource is considered to be low. Furthermore, the high mobility of fish enables them to move freely to avoid areas of adverse conditions and to use other food sources.

Fish are often attracted to solid man-made structures placed on the seabed (in this case cages, trestle tables or moorings to which the suspension lines are attached) and artificial reefs are often deployed to enhance fisheries (Sayer *et al.,* 2005). Structures constructed for other purposes such as oil platforms and breakwaters (Helvey, 2002) can also serve as new habitats for fish. Structures can change local abiotic conditions allowing species assemblages to form that are different from natural communities present. The monopiles of turbines, for example, become encrusted with epibiota such as mussels and barnacles (Linley *et al.,* 2007). These modify the habitat and provide food and shelter for fish and invertebrate species leading to increased fish abundance and enhancement of the local seabed habitat (Wilhelmsson *et al*., 2006).

Fish aggregations have been observed around net cages used for aquaculture (Oakes and Pondella, 2009) as well as numerous other objects including; vessels (Røstad *et al.,* 2006); structures associated with marinas and pontoons in urban areas (Clynick, 2008); sunken vessels (Arena *et al.,* 2007); and underwater depuration systems (Cattaneo-Vietti *et al*., 2003). As reported by Dempster *et al*. (2009), who considered salmon farms as FADs in Norway, wild fish were 1 to 3 orders of magnitude more abundant at farms than at the control sites. However, the species aggregating were predominantly Gadoid fish (*Pollachius virens, Gadus morhua* and *Melanogrammus aeglefinus*), (Dempster *et al*., 2009) not wild salmon.

However, the literature on this subject is dominated by studies of Fish Aggregating Devices (FADs) and artificial reefs. Fish Aggregating Devices are floating or moored devices placed in the water that attract fish (Dempster and Kingsford, 2004), such as the suspended long lines and rafts used for the cultivation of shellfish. To determine the degree to which objects act as FADs it is useful to identify the factors that attract fish to aggregate around devices. Freon and Dagorn (2000) identified a number of hypotheses to explain the association with floating objects, these include:

- Shelter from predators.
- Concentration of food supply.
- Spatial reference in otherwise featureless environments.
- Resting.
- Indicators of other characteristics, such as productive areas.
- Meeting points.

Whenever water flows past a structure, velocity gradients are created which form vortices. Depending on hydrodynamic conditions, fish can be attracted to or repelled by the turbulence (Liao, 2007). Extremely high levels of shear stress can damage fish (Odeh *et al.,* 2002) and turbulence can increase the energy costs of swimming (Enders *et al.,* 2003). Alternatively, altered flows that remain steady, or maintain an aspect of predictability, can be exploited by swimming fish to reduce locomotion cost. Fish can seek refuge from main currents by 'flow refuging' behind structures. In tidally swept locations bentho-pelagic fish such as cod, have been found to use sand ripples as flow refuges to hold station, reducing energetic costs (Gerstner, 1998).

3.7.5 Physical damage (direct damage to species from collision risk; impact pathway 6

The main collision risk to fish is posed by increased vessel activity associated with the survey and construction of both beneficial use and aquaculture activities. The operation and maintenance of the aquaculture sites alongside the presence of the mooring and antipredator nets associated with aquaculture will also cause a potential collision risk. The ability for fish to avoid a potential collision with an object is dependent on sensory capabilities (such as vision and hearing), perception levels and swimming speeds of the species. As lamprey could be attached to a range of different pelagic and demersal species while undertaking the marine phase of the lifecycle, general information on fish sensitivity to collisions has been included.

Marine animals in high latitude coastal areas have to contend with variable and often poor visual conditions, resulting from fluctuations in ambient light levels and in the light transmission properties of the water. Fish have well developed eyes and the variety of colour patterns and specific movements that they display invites comparisons between the most visually orientated species among birds and mammals (Guthrie and Muntz, 1993; Brawn, 1969).

Fish have been recorded colliding or becoming entrapped within a range of anthropogenic structures such as fishing nets and power station intakes (Johnson *et al*., 1976; Wardle, 1986). The level of light and clarity of water are important on the extent a fish might collide with an object. In poor visibility conditions, fish have been observed only just avoiding collision with an obstacle, whereas in good visibility conditions, fish react further away from trawl otter boards and swim over/under/around trawls (Wardle, 1986). More recent experiments quantified the light level thresholds for the visual reactions of mackerel to monofilament netting were -1 log lux and - 4 log lux (1-0.001 lux) for multifilament (Cui *et al*., 1991). At light levels below these thresholds, fish were unaware of the netting barriers and swam straight through them.

Fish may avoid collisions with an object through "startle" (or "C-start") responses. The C-start response can be initiated by transient sound, visual or touch stimuli. For example, herring escape behaviour is a reflex response stimulated by transient sound stimuli, detected in the labyrinth (inner ear) (Blaxter *et al*., 1981). 'Visually looming' objects will also trigger evasion behaviour in most if not all species, with a greater response rate to edges moving horizontally rather than vertically (Wilson *et al*., 2007). The behavioural response to an approaching net is to turn and swim in the direction of the moving net, using the minimum swimming speed to avoid the object (resulting in them 'holding position' at the mouth of the net) whilst reserving energy

for an escape response. However, on exhaustion, the fish turn and allow the net mouth to overtake them (Wilson *et al.*, 2007).

3.7.6 Physical damage (direct damage to species from marine litter; impact pathway 7)

Physical damage to fish could arise from abandoned, lost, broken or discarded aquaculture gear which could cause damage to the fish species through ingestion, entanglement and smothering (UKMMAS, 2010).

If a fish were to become entangled in an abandoned or broken net or cultivation bag it would experience reduced movement potentially resulting in serious injury or death by starvation. There is also potential for fish species to ingest broken aquaculture gear causing physical damage and potential mechanical blockage of the oesophagus and digestive system which in turn could lead to internal infections or death.

3.7.7 Non-physical disturbance (barrier and disturbance to species; impact pathways 8 and 10)

Disturbance to fish could come from a variety of sources, namely construction activities and vessel movements associated with both sectors and from the use of seal scarers during the operation of finfish aquaculture sites. Most activities could have a temporary disturbance effect and could create a possible barrier. The potential sensitivities of fish to barriers to movement and visual and noise stimuli are reviewed below.

Barrier effects

Salmon, lamprey and shad are highly mobile species that undergo large seasonal movements and migrations to forage and breed (DECC, 2009; Hendry and Cragg-Hine, 2003; Maitland, 2003). They can, therefore, be particularly vulnerable to any structures which could act as a barrier, preventing movement to key foraging or nursery grounds. Their sensitivity will depend on their ability to move and avoid barrier structures e.g. structures placed in a highly confined estuary will be more of an issue than in the open coast.

Noise disturbance

Fish typically respond strongly to lower frequencies of noise as opposed to marine mammals that are sensitive to a broader bandwidth of sound (see Section 3.6.8). Fish that have specialist structures (e.g. Weberian ossicles, swimbladder diverticulae and gas filled bullae) that enhance hearing have been referred to as hearing “specialists”, whereas fish that do not have such specialisation’s are referred to as hearing “generalists”.

Salmon can detect and respond to underwater noise and their audiograms have been well documented (Nedwell *et al.*, 2004). Salmon are considered to be hearing generalists that are able to hear frequencies in the low to infrasound ranges at threshold levels of around 95 to 130dB re 1µPa in the region of 10Hz to 380Hz. Small fish (i.e. smolts and exceptionally small grilse) are generally considered to be most vulnerable to noise impacts (Hastings and Popper, 2005).

There are no reported audiograms of lamprey. However, given that they both lack any specialist hearing structures, they are considered to be hearing generalists. It has been suggested that for a fish species with no swim bladder such as flatfish (and lamprey) tissue damage may occur at a high impulse level of 180dB re 1 µPa.

There is potential however that lamprey may be able to hear infrasound. The hearing of lamprey is complicated by the fact that they do not have otolith organs and no known work has been undertaken on the response of lamprey to sound in relation to their statoliths or labyrinth organs. Work has been undertaken on cephalopods however, which also have statolith organs for the detection of linear accelerations including gravity (Packard *et al*., 1990). This investigation confirmed that cephalopods could detect the kinetic component of low frequency sounds and it is believed that the statoliths are the sensory organs involved (Packard *et al.,* 1990). It was stated within this article that 'gross acceleration of the whole animal, as occurs in an underwater sound field, is an ideal stimulus for the statolith organ'. On this basis, it is considered likely that lamprey will be sensitive to infrasound. Nonetheless, studies have shown that sea lamprey respond to frequencies between 20 and 100Hz (Lenhardt and Sismour, 1995).

Shad are from the clupeid family (e.g. herring) which have been shown to be highly sensitive to acoustic noise and are considered hearing specialists. These species are also sensitive to ultrasonic frequency noise (70-300 kHz) which can prove a complete barrier to migration, with shad adopting a flee response.

Those species at greatest risk of being affected by sound sources are likely to be hearing specialists which have a threshold over a wide spectrum of frequencies. Of the hearing specialists it will be those that have a threshold at relatively low sound levels which will be at greatest risk.

Similar to marine mammals, the impacts of noise on fish can broadly be split into lethal and physical injury, auditory injury and behavioural response. Richardson e*t al.* (1995) defined four zones of noise influences, depending on the distance between source and receiver. These are as follows:

- Zone of hearing loss, discomfort or injury, the zone within which hearing or other severe damage results.
- Zone of masking, the region within which noise is strong enough to interfere with detection of other sounds, such as communication or echolocation clicks.
- Zone of responsiveness, the region in which the animal reacts.
- Zone of audibility, the area within which the animal is able to detect the sound.

At very high exposure levels, such as those close to typical underwater explosive operations or offshore impact piling (pile driving) operations, fatality may occur in species of fish. The likelihood of fatality increases with levels above 240dB re 1 µPa. As the time period of the exposure increases (represented by the impulse), there is also an increase in likelihood of fatality.

With respect to auditory injury (rather than lethality), at sound levels in excess of 180dB re 1µPa, and particularly where there are repeated high level exposures from activities such as impact pile driving underwater sound has the potential to cause

hearing impairment in marine species. This can take the form of a temporary loss in hearing sensitivity, known as TTS, or a permanent loss of hearing sensitivity, known as PTS.

In terms of their behavioural response, at lower sound levels it has been observed that a behavioural response in fish may occur. These reactions may include the animals leaving the area for a period of time or a startle reaction.

Nedwell *et al*. (2007b) have developed a generic decibel (dB) scale, which enables better estimates of the effects of sound on marine species to be made (Section 3.6.8). A set of criteria based on the use of the dB_{ht} (species) was proposed by Nedwell *et al*. (2007b) that allows the likelihood of behavioural effects and damage to hearing to be assessed for a wide range of species, including fish (Table 11). Of significance for this assessment, is the conclusion that at $90dB_{ht}$ (species) and above there will be a strong avoidance reaction by all individuals of that species, and that below $50dB_{ht}$ (species) there will be a mild reaction by a minority of individuals.

Overview
Increased noise from vessel movements associated with beneficial re-use projects and aquaculture sites is considered to be very small and unlikely to have a significant barrier or disturbance effect on fish. The levels of noise generated by construction activities associated with both sectors (e.g. use of excavators, material dumping/pumping, moorings/anchoring) are also considered to be very low and any potential displacement or disturbance effects would be very localised and minor.

A review of acoustic deterrents commonly used in finfish aquaculture is provided in Section 3.6.8. These devices are aimed at scaring seals and are outside of the predominantly low frequency hearing range of the majority of fish (including lamprey and Atlantic salmon). It is possible that shad, which exhibit some hearing sensitivity at higher frequencies, may exhibit some avoidance reactions and be displaced by these deterrents. However, these devices typically operate at frequency ranges of 2-40 kHz which are also outside the ultrasonic frequency hearing range of shad (70-300Hz) and therefore an avoidance reaction is considered unlikely.

3.7.8 Toxic contamination (reduction in water quality; impact pathways 11 to 14)

There is potential for toxic contamination due to leaching of antifouling paints of structures or vessel fuel spillages. There is also the risk of re-suspending contaminants locked within the sediment when harvesting shellfish using dredging techniques, during beach nourishment works and intertidal recharge. In addition for finfish there is potential for the introduction of non-synthetic compounds and synthetic compounds as a result of cage production from the feed pellets, faecal particles, medicines and sea lice treatments.

There is a risk that some of these contaminants may be temporarily bioaccumulated in the tissues of certain fish prey, such as polychaete worms and marine bivalves, and made available for uptake by feeding fish. The accumulation of moderate or high levels of contaminants in fish can cause or contribute to a range of lethal and sub-lethal effects, including genetic, reproductive and growth changes. There is less information available on the effects of low levels of contaminants. Pelagic fish,

including Atlantic salmon, would experience a lower exposure to contaminated sediments than demersal fish species which remain close to the seabed and feed mainly on benthic organisms. Lampreys attach onto a variety of pelagic and demersal fish species in the marine phase of their lifecycle and so their movements and distribution are largely dictated by their host.

3.7.9 Non-toxic contamination (elevated turbidity; impact pathway 15)

There is potential for the increased suspended sediment concentration (which in turn could decrease the oxygen concentration of the water) during the release of particulate waste from fish faeces during aquaculture cultivation and the release of sediments during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.

Suspended sediment levels, and resulting increased turbidity, are reported to affect salmonids, although estuarine fish generally show tolerance to variations in suspended sediment loadings and turbidity as a result of natural adaptation to living in a dynamic and environmentally variable habitat such as an estuary (ABPmer, 2005). In general, the mobile nature of fish species allows avoidance of areas of adverse conditions which will be unlikely to significantly affect a population provided such conditions are temporary. In the case of migratory fish species, however, the significance of such occurrences is potentially heightened as a result of the potential for such conditions to constitute a barrier to the movement of fish should such occur on a migration route. The occurrence of such conditions would, however, only be significant should the conditions extend across the entire width of the water body comprising the migration route at any given point, otherwise fish would be expected to be able to move around the adverse condition area, avoiding impacts, and thus not inhibiting migration up (or down) stream. Some delay in migration may result from such avoidance, and this is of note as delays have been reported as being potentially associated with reduced survival rates. It is also important to note that suspended sediment levels also affect the level of dissolved oxygen (DO), higher suspended sediment levels can lead to depleting DO concentrations.

The effects of suspended sediment levels on fish have been considered in a number of studies, including that undertaken by the European Inland Fisheries Advisory Commission (FARL, 1995). Lethal effects were seldom observed, with Pacific salmon and trout juveniles surviving for 3-4 weeks in suspended sediment concentrations of 300-750mg/l, which were increased to 2300-6500mg/l for short periods. Sub lethal pathological effects included increased mucus production over the body and gills, and at very high suspended sediments, evidence of abrasion and damage to the gill filaments was noted (FARL, 1995).

There are a wide range of background suspended sediment concentrations in UK estuaries through which salmon runs occur. For example, salmon and lamprey successfully pass through estuaries with extremely high suspended sediments such as the Severn and its sub estuaries the Wye, Usk and Parrett, which naturally contain up to several thousand milligrams per litre (FARL, 1995), concentrations as high as 9,000mg/l have been recorded in the path of runs in the Usk Estuary (Alabaster, 1993).

3.7.10 Biological disturbance (introduction of non-native species and the transfer of parasite and pathogens; impact pathways 17 and 20)

There is potential for the translocation of indigenous species, for example the native oyster or Atlantic salmon, which could result in the genetic modification and changes to the community structure and distribution of natural populations. There is also the potential for the introduction or transfer of parasites or pathogens as a result of aquaculture activities.

Farmed salmon are different to wild salmon both morphologically and in physical condition (Thorstad, *et al*., 2008). At the juvenile stage, farmed salmon compete with the wild salmon for the same food and habitat. Farmed or hybrid (where a wild and farmed salmon have successfully bred) juveniles have been documented as being more aggressive and grow faster than the wild fish (Thorstad *et al*., 2008).

Successful breeding, or hybridisation, can potentially alter the genetics of the native populations, reduce local adaptation and negatively affect population viability and character (Thorstad *et al*., 2008). However, the distribution and success of escapes farmed salmon is highly dependent upon the life-stage and the time of the year when the salmon escapes.

The spread of non-native species as a result of the farmed shellfish such as the Pacific Oyster (*Crassostrea gigas*) have the potential to change ecological processes and the food web dynamics (Ruesink, *et al*., 2005). This is because they are ecosystem engineers.

The spread of parasites and pathogens can occur directly via escapees or indirectly via pathogens in the water (Peeler, 2010). The open design of the most aquaculture (both fin fish and shellfish) means that diseases are able to spread, a particular threat is the spread of salmon lice (Johansen, *et al*., 2011). The threat of disease spreading as a consequence of aquaculture is heightened if persistent, substantial aggregations of wild fishes at farms (See Section 3.7.4) are present. This is because there is an increased potential for the transfer of pathogens from salmon farms to wild fish and among adjacent salmon farms. (Dempster *et al*., 2009). In addition, non-native oysters are known vectors for the presence of other non-native species such as disease-causing organisms (Ruesink, *et al*., 2005). The sensitivity of native populations to this potential impact is high, however, due to the relatively low numbers of escapees exposure to this impact is low. Therefore there is a low to medium level of vulnerability.

3.7.11 Fish and freshwater pearl mussel interest features

Table 14 shows the potential vulnerability of fish features (and freshwater pearl mussel by association) to activities associated with the South Marine Plan. The highest potential vulnerabilities are associated with changes in water quality and biological disturbance.

Table 14: Potential vulnerability of fish features from the South Marine Plan

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Summary Impact Pathway Description)	Survey	Construction	Operation
PLG	Physical Damage (indirect change to habitat)	3	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).		AQU	AQU
PD	Physical Damage (direct damage to species from collision risk)	6	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	AQU BEN	AQU BEN	AQU BEN
PD	Physical Damage (direct damage to species from marine litter)	7	Damage to marine species through ingestion, entanglement and smothering of marine litter.		AQU	
NPD	Non-Physical Disturbance (barrier to species movement)	8	Presence of sub-surface structures and disturbance (visual) associated with suspended or cage production may present a barrier to movement and block migratory pathways or access to feeding grounds depending on design.		AQU	
NPD	Non-Physical Disturbance (disturbance to species)	10	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	AQU BEN	AQU BEN	AQU BEN
TC	Toxic Contamination (reduction in water quality)	11	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	AQU BEN	AQU BEN	AQU BEN
TC	Toxic Contamination (reduction in water quality)	12	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		BEN	AQU
TC	Toxic Contamination (reduction in water quality)	13	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).			AQU
TC	Toxic Contamination (reduction in water quality)	14	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.		 BEN	AQU BEN
NTC	Non-Toxic Contamination (elevated turbidity)	15	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	 	 BEN	AQU BEN
BD	Biological Disturbance (translocation of native species)	17	Translocation and escape of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.			AQU
BD	Biological Disturbance (introduction/transfer of parasites/ pathogens)	20	Introduction/transfer of parasites/pathogens as a result of aquaculture activities.			AQU

In this table, only the estimated potential vulnerability levels are shown. The level of risk will be dependent upon exposure. For instance there would be a high degree of exposure for fish species were a development to occur within or near a designated site. However, at the present time, there is very little information about exposure within the south marine plan areas.

No Impact
Low Potential Vulnerability
Low to Medium Potential Vulnerability
Medium Potential Vulnerability
High Potential Vulnerability
Low Sensitivity

3.8 Step 4(5): Otter sensitivities

3.8.1 Designated sites with otter features

Following the activity-based screening process (Section 3.3), a total of 182 European/Ramsar sites were identified for which there is a LSE (or the potential for a LSE cannot be excluded). Of these sites, one European/Ramsar site (River Itchen SAC) was identified at which it was not possible to conclude that there would be no LSE for qualifying otter interest features.

Although there is no direct overlap, the River Itchen SAC was specifically screened in as it is located within 10km of areas of potential aquaculture production and areas of potential mud recharge. No European/Ramsar sites with otter interest features are located within 10km of areas of potential sand/shingle recharge.

River Itchen SAC also contains other interest features for which it could not be concluded that there was no LSE (e.g. Atlantic salmon) and these are reviewed separately under the relevant section of the report that deals with fish interest features (Section 3.7).

3.8.2 Interest features summary list

In summary, the screening phase concluded that there is a possibility of a LSE (or that it was not possible to conclude no LSE) for the following feature:

- Otter *Lutra lutra* (1355).

To assess whether there is any AEOI of the European/Ramsar sites that were identified, Sections 3.8.3 to 3.8.10 review the sensitivities of this interest feature. Section 3.9.6 then identifies the conservation objectives for this feature and assesses, in tabular format, the effects arising in the context of the proposed additional plan- level mitigation measures.

3.8.3 Sensitivities of otters to plan activities

This section reviews the sensitivities that are relevant for the otter interest feature. A generic review of the sensitivities is presented under the following impact pathways identified during the screening phase:

- Physical Damage (indirect change to habitat; impact pathway 3) (Section 3.8.4).
- Physical Damage (direct damage to species from collision risk; impact pathway 6) (Section 3.8.5).
- Physical Damage (direct damage to species from marine litter; impact pathway 7) (Section 3.8.6).
- Non-Physical Disturbance (barrier and disturbance to species; impact pathway 9 and 10) (Section 3.8.7).
- Toxic Contamination (reduction in water quality; impact pathways 11 to 14) (Section 3.8.8).
- Non-toxic Contamination (elevated turbidity; impact pathway 15) (Section 3.8.9).

An effect can only occur if an interest feature is exposed to a change to which it is sensitive. Sensitivity can be described as the intolerance of an interest feature to readily accept the levels of predicted environmental change to which they are exposed and essentially considers the response characteristics of the feature. The assessment of sensitivity therefore considers the adaptability of the receptor to its former state following exposure to the impact. Vulnerability is based on the sensitivity of a feature and their exposure to a given impact.

Following this review, the general characteristics and potential vulnerability of the otter interest feature are presented and reviewed against the relevant aquaculture and beneficial use activities that could cause a LSE. This interest feature review is set out in Section 3.8.10.

3.8.4 Physical damage (indirect change to habitat; impact pathway 3)

The loss of onshore otter holts or foraging areas could occur indirectly from a wide range of activities associated with aquaculture and mud recharge activities. These include changes to the sediment transport regime (erosion/accretion) as a result of the presence of any structures (e.g. finfish cage fixtures, shellfish trestle tables) or from the placement of recharge material (see also Section 3.4.5).

Otter are vulnerable to the loss of their shelters (including those on the shoreline) and to the loss of habitat which, in turn, can leave them more exposed to disturbance effects and reduce the quality of foraging areas available to them.

When assessing the impacts of indirect changes to habitat the sensitivities of otter to damage are gauged by the presence or absence of otter activity (e.g. spraints or otter shelters). The scale of the potential indirect change to habitats, allied to the level of otter activity dictates the potential risks that exist.

3.8.5 Physical damage (direct damage to species from collision risk; impact pathway 6)

The main collision risks are posed by increased vessel activity associated predominantly with the survey and construction of both mud recharge and aquaculture activities. Vessel activity associated with the operation and maintenance of the aquaculture sites, alongside the presence of the mooring and antipredator nets associated with aquaculture may also cause a potential collision risk.

There is no available evidence to suggest whether otters have collided with anthropogenic structures, such as vessels. However, otters are highly mobile which indicates that they have an increased chance of close range evasion with an object that could cause a collision risk. The collision risk impact review on marine mammals has provided some further understanding of this impact pathway (Section 3.6.6). The risk of any effects will also be dependent upon the location, especially the distance of any vessels from a holt or foraging ground.

Otters are often attracted to aquaculture pens to feed on farmed species, especially when there are dead fish left in the cages, resulting in some deaths as a consequence of collision and accidental net entanglements (Sanchez-Jerez, 2010). This would result in reduced movement, potentially resulting in serious injury or death.

3.8.6 Physical damage (direct damage to species from marine litter; impact pathway 7)

Physical damage to otters could arise from abandoned, lost, broken or discarded aquaculture gear which could cause damage to the otter through ingestion, entanglement and smothering (Roos *et al*., 2015).

As mentioned above, otters are often attracted to aquaculture pens to feed on farmed species, especially when there are dead fish left in the cages, resulting in some deaths as a consequence of accidental net entanglements (Sanchez-Jerez, 2010). If an otter were to become entangled in an abandoned or broken net or cultivation bag it would experience reduced movement potentially resulting in serious injury or death. There is also the potential for otters to ingest broken aquaculture gear mistaken as food, causing physical damage and potential mechanical blockage of the oesophagus and digestive system which in turn could lead to internal infections or death.

There is no overlap of this potential impact pathway on otters associated with mud recharge activities.

3.8.7 Non-physical disturbance (noise/vibration and visual disturbance causing barrier and exclusion effects; impact pathways 9 and 10)

Disturbance to otter could come from a variety of sources. Most activities could have a temporary disturbance effect and could create a possible barrier or exclusion zone.

Disturbance to otter can often arise from dogs which they are intolerant of, or, where suitable cover is absent, from locations with intense human disturbance such as recreational areas (SNH, 2010). The main kinds of activity that can cause disturbance to otter populations associated with aquaculture and mud recharge activities include:

- Pumping/spraying of sediment recharge material.
- Use of seal scarers in finfish aquaculture sites.
- Associated human and vessel movements during survey, construction, operation and decommissioning.

As otters also move along established paths between open-water habitats, including freshwater sites near the coast, they are also sensitive to any proposals that cause obstruction to these traditional routes. However, a number of studies have shown that otters habituate readily to many forms of human disturbance (Chanin *et al*., 2003; Pillay, 2004). In relation to aquaculture, it has been shown that otters are not scared by human activity and that the growth of fish farming has benefitted otter populations by providing a source of food (Pillay, 2004).

Unpublished observations indicate that otters will rest under roads, in industrial buildings, close to quarries, and at other sites close to high levels of human activity. These observations clearly indicate that otters are very flexible in their use of resting sites and do not necessarily avoid ‘disturbance’ in terms of noise or proximity to human activity. In Shetland, where the otter population is considered to be healthy,

otters regularly breed under the islands' ferry terminals and under the jetties of the oil terminal at Sullom Voe (Chanin *et al*., 2003).

A study of radio-tracked otters also observed that a common response of otters to the sound of anglers or walkers with dogs was to move to a position where they can see the origin of the disturbance, then dive and swim underwater for 50m or so before surfacing and resting on the bank for five to 30 minutes. The otters were then observed resuming their previous activity (Durbin, 1993; cited in Chanin *et al*., 2003).

3.8.8 Toxic contamination (reduction in water quality; impact pathways 11 to 14)

There is potential for toxic contamination as a result of the spillage of fluids, fuels or construction materials from vessels and machinery into the marine environment during survey/maintenance, construction/decommissioning or operation of aquaculture and intertidal recharge projects. Toxic contamination can also occur as a result of the release of contaminants associated with the dispersion of suspended sediments during the operation of aquaculture sites (e.g. harvesting by dredging), and the placement of dredged material during the construction phase of intertidal recharge projects. The release of sediments during these activities can in turn result in the breakdown of organic matter and the organic enrichment of sediments and the water column. In addition, the operation of finfish cages in aquaculture can result in the introduction of non-synthetic and synthetic compounds as a result of the use of feed pellets, medicines and sea lice treatments, and the release of faecal particles.

Pollution may influence otters either indirectly or directly. Indirect effects include damage to the food supply or habitat of otters, thus lowering the carrying capacity of an affected area. Direct effects impact on the animal itself, resulting either in rapid death (acute toxicity) or in a lowered fitness (sub-lethal toxicity), reducing the animal's ability to reproduce successfully or to survive in inclement conditions (Mason and Macdonald, 1986).

Indirect effects are most significant when they destroy the fish stocks or other prey forming the main food supply of otters. Where pollution sources are small and adequately treated, toxic contamination will do little damage, however, large and poorly treated discharges can wipe out fish populations for long distances.

Of those compounds which cause direct effects on otters, most concern has been expressed over oil, organochlorines, polychlorinated biphenyls (PCBs) and the heavy metal mercury (Roos *et al*., 2015). Oil is known to have killed coastal-dwelling Eurasian otters and sea otters (*Enhydra lutris*) and acts by contaminating the fur, increasing heat loss, and reducing buoyancy of the animal (Costa and Kooyman, 1982; cited in Mason and Macdonald, 1986). Oil may also be ingested and prove toxic during grooming (Baker *et al*., 1981).

3.8.9 Non-toxic contamination (elevated turbidity; impact pathway 15)

The increases in suspended sediments during the deposition of dredged material during the construction phase of intertidal recharge projects and the operation of aquaculture sites (e.g. harvesting by dredging), are typically expected to result in short-term, localised changes to the marine environment. Increases in turbidity (and

possibly reduced dissolved oxygen) are also associated with the release of particular waste (e.g. fish faeces) during the operation of finfish aquaculture sites.

There is limited evidence available on the potential effects of increased turbidity on otters. As otters are visual predators any increase in turbidity may hinder their ability to pursue and capture food. However, otters are highly mobile, have a varied diet and are considered to feed opportunistically (Roos *et al*., 2015). Therefore, when the profitability of prey falls below a critical threshold they will switch to alternative prey (Remonti *et al*., 2010).

3.8.10 Otter interest features

Table 15 shows the potential vulnerability of the otter interest feature to activities associated with the South Marine Plan. The highest potential vulnerabilities are associated with physical damage as a result of marine litter. It should be noted that there is a policy within the South Marine Plan that will act to reduce the potential exposure and thus vulnerability of otter interest features to marine litter.

Table 15: Potential vulnerability of the otter feature to the South Marine Plan

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Summary Impact Pathway Description)	Survey	Construction	Operation
PLG	Physical Damage (indirect change to habitat)	3	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).		AQU	AQU
					BEN	
PD	Physical Damage (direct damage to species from collision risk)	6	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	AQU	AQU	AQU
				BEN	BEN	
PD	Physical Damage (direct damage to species from marine litter)	7	Damage to marine species through ingestion, entanglement and smothering of marine litter.			AQU
NPD	Non-Physical Disturbance (disturbance to species)	9	Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	AQU	AQU	AQU
				BEN	BEN	BEN
NPD	Non-Physical Disturbance (disturbance to species)	10	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	11	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	AQU	AQU	AQU
				BEN	BEN	BEN
TC	Toxic Contamination (reduction in water quality)	12	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		BEN	AQU
TC	Toxic Contamination (reduction in water quality)	13	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).			AQU
TC	Toxic Contamination (reduction in water quality)	14	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.			AQU
					BEN	BEN

Sensitivity Category	Sensitivities	Pathway Ref. No	Impact Pathway from South Marine Plan across Beneficial and Aquaculture Activities (Summary Impact Pathway Description)	Survey	Construction	Operation
NTC	Non-Toxic Contamination (elevated turbidity)	15	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.			AQU
					BEN	BEN
In this table, only the estimated potential vulnerability levels are shown. The level of risk will be dependent upon exposure. For instance there would be a high degree of exposure for otter species were a development to occur within or near a designated site. However, at the present time, there is very little information about exposure within the south marine plan areas.						
No Impact						
Low Potential Vulnerability						
Low to Medium Potential Vulnerability						
Medium Potential Vulnerability						
High Potential Vulnerability						

3.9 Step 5: Assessment of effects on European/Ramsar sites

3.9.1 Introduction

On the basis of the potential vulnerabilities of the relevant interest features as reviewed in the preceding sections, the following sections review the conservation objectives for these features and assess the potential effects arising on European/Ramsar sites.

3.9.2 Potential effects on habitat features

The conservation objectives for the qualifying habitats that are relevant to this HRA will be very similar and in many instances identical for all European/Ramsar sites that have been screened in. The relevant objectives seek to avoid deterioration of the qualifying habitats, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features. As discussed in Section 2.2.6, it is appropriate to apply generic objectives for this plan-level HRA.

The conservation objectives for the qualifying habitats are to ensure that the following are maintained in the long term:

- Extent of the habitat with the site.
- Distribution of the habitat within the site.
- Structure and function of the habitat.
- Processes supporting the habitat.
- Distribution of typical species of the habitat.
- Viability of typical species as components of the habitat.
- No significant disturbance of typical species of the habitat.

Taking account of these conservation objectives and the Plan activities to which the habitat interest features are potentially vulnerable, the effects of the South Marine Plan on the integrity of the European/Ramsar sites with habitat interest features is reviewed in Table 16.

Table 16: Assessment of the potential effects of the South Marine Plan on habitat features

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2					
Qualifying and Supporting Feature (See also Section 3.4)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**	**Is There an Adverse Effect on Integrity With Initial Mitigation Measures?**	**Is There an Adverse Effect on Integrity With Additional Mitigation Measures?**
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat. • Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes). • Supralittoral habitats.	**Physical Loss/Gain of Habitat (loss of habitat in development footprint)** Loss of coastal and offshore habitat under the footprint of cultivation sites, cage fixtures, any sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works.	1	Potential vulnerability maximum considered to be high (see Tables 4-7 for detail and colour code) **Commentary/Review** (see Section 3.4.4) The amount of habitat that is lost will clearly be influenced by the size and type of the structures (e.g. cage fixtures, trestles and sediment retaining structures), as well as their location. It is expected that during the early stages in the design of any development, a primary consideration will be to try and avoid habitats within European/Ramsar sites and minimise exposure and risk. There will also be a short term loss of underlying habitats during beach nourishment and mud recharge works although there are potential benefits in terms of restoring and protecting these habitats from ongoing erosion and fulfilling a flood risk management function. **Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives listed, the majority are considered to be relevant to impacts from the loss/gain during the operational phase of the project with only the objective relating to the processes affecting habitats being less pertinent. Therefore, the following 6 objectives all need to be considered: • Extent of the habitat on site. • Distribution of the habitat within site. • Structure and function of the habitat. • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat.	**Physical Damage (direct and temporary damage to habitat)** Changes to coastal and offshore habitat as a result of damage from	2	Potential vulnerability maximum considered to be low to medium (see Tables 4-7 for detail and colour code) **Commentary/Review** (see Section 3.4.5) The extent of the effects arising will be greatly influenced by the location of structures and/or placement of material. It is expected that benthic communities of wave-exposed and tide-swept sand environments are well adapted to high levels of disturbance. The largest impacts will be at locations that have a lower energy condition or are on stable/exposed substrata with an epifauna-dominated assemblage (e.g. reefs).	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.4)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
• Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes). • Supralittoral habitats.	baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/ anchoring.		**Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives listed, the following 4 are most pertinent because they relate to the composition and distribution of the habitats and species present rather than the broader extent, structure, function of the habitats and the processes affecting them: • Distribution of the habitat within site. • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat. • Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes). ▪ Supralittoral habitats.	**Physical Damage (indirect and temporary damage to habitat)** Changes to coastal and offshore habitat as a result of alterations to the hydrodynamic (wave and tide) and sediment transport regime from the presence of structures (e.g. shellfish trestles, finfish cages) or altered morphology (e.g. steepened beach profile).	4	Potential vulnerability maximum considered to be low (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.5) The extent of the effects arising during operation will be greatly influenced by location and nature of the aquaculture site and/or beneficial re-use project. It is expected that any changes to the hydrodynamics and sediment transport regime will be small and thus the potential vulnerability will be low. **Relevant Conservation Objectives** (see Section 3.9.2) All 7 objectives are considered to be relevant to impacts from hydrodynamic changes during the operational phase of the project because the potential exists to alter the balance extent and functionality of habitats and species. Therefore the full list of objectives is set out below: • Extent of the habitat on site. • Distribution of the habitat within site. • Structure and function of the habitat. • Processes supporting the habitat. • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.4)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat. • Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes). ▪ Supralittoral habitats.	**Toxic Contamination (reduction in water quality)** Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	11	Potential vulnerability maximum considered to be low (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.6) For all stages of the project from the survey, construction/decommissioning and operational/maintenance works, there is the potential for accidental discharges/spillages from machinery and vessels although the likelihood is comparatively low. In particular the probability of spillage is low because a range of standard safety and control measures are employed in both the marine and coastal environment. The consequence for subtidal and coastal benthic communities if it happened is also likely to be limited in scale (due to small quantities of material and slight acute toxicity). **Relevant Conservation Objectives** (see Section 3.9.2) The conservation objectives are broad-ranging and generic in their scope, and therefore most activities have the potential to lead to a failure of most, if not all, objectives. However, of the 7 objectives listed, the following are considered to be most relevant to impacts from toxic contamination/spillage events because they relate to the composition and distribution of the species present rather than the broader extent, distribution and functionality of habitats and the processes affecting them: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat.	**Toxic Contamination (reduction in water quality)** Release of contaminants associated with the dispersion of suspended sediments during aquaculture	12	Potential vulnerability maximum considered to be low (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.6) There is the potential for contaminated sediments to occur across the south marine plan areas. This is likely to be greater close to the coast and in areas that are in proximity to industry. Further offshore, the strong flows and limited amount of depositional conditions are likely to limit contamination levels. However, only small amounts of sediments are likely to be disturbed as a result of aquaculture activities. Furthermore, the sediments used for beneficial re-use projects are tested in advance for contamination levels. Overall, therefore the potential vulnerability of benthic habitats to toxic contamination is considered to be low.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.4)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
• Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes). • Supralittoral habitats.	harvesting (dredging), beach nourishment works and intertidal recharge.		**Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives, the following are considered to be most relevant to impacts from contaminated sediments because they relate to the composition and distribution of the species present rather than the broader extent, distribution and functionality of habitats and the processes affecting them: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat. • Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes). ▪ Supralittoral habitats.	**Toxic Contamination (reduction in water quality)** Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).	13	Potential vulnerability maximum considered to be low to medium (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.6) The introduction of toxic compounds as a result of aquaculture finfish production has the potential to impact offshore and coastal habitats. However, only small amounts of these compounds are likely to be released and these will be quickly dispersed in the water column the rate of which will depend on local flow conditions. The most potentially vulnerable benthic features to this toxic contamination due to the higher level of sensitivity and potential exposure are subtidal sandbanks, reefs and sea caves, and intertidal habitats. **Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives, the following are considered to be most relevant to impacts from synthetic and non-synthetic compounds because they relate to the composition and distribution of the species present rather than the broader extent, distribution and functionality of habitats and the processes affecting them: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.4)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat. • Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes). • Supralittoral habitats.	**Toxic Contamination (reduction in water quality)** Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.	14	Potential vulnerability maximum considered to be low (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.6) Any dredging involved in aquaculture activities or placement of beneficial re-use material has the potential (depending on the sediment type and organic content of the spoil material) to cause redistribution of sediment and in turn the organic enrichment of surrounding habitats. Aquaculture (namely fish farming) also generates large amounts of particulate organic waste products, and surrounding sediments may be affected by this surplus of organic matter. The greatest impacts will be at locations that have a lower energy condition or are on stable subtidal substrata. **Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives, the following are considered to be most relevant to impacts from synthetic and non-synthetic compounds because they relate to the composition and distribution of the species present rather than the broader extent, distribution and functionality of habitats and the processes affecting them: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat.	**Non-Toxic Contamination (elevated turbidity)** Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of	15	Potential vulnerability maximum considered to be low to medium (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.7) Any dredging involved in aquaculture activities or placement of beneficial re-use material has the potential to cause redistribution of sediment. The distribution of smaller sized particles (e.g. mud used for intertidal recharge projects) is likely to be dispersed further than larger sized particles (e.g. sand and shingle used in beach nourishment projects). Aquaculture (namely fish farming) also generates large amounts of particulate material waste products which will increase the turbidity of the surrounding water column and has the potential to affect benthic communities. The greatest impacts will be at locations that have a lower energy condition or are on stable subtidal substrata.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.4)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
• Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes). • Supralittoral habitats.	particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		**Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives, the following are considered to be most relevant to impacts from synthetic and non-synthetic compounds because they relate to the composition and distribution of the species present rather than the broader extent, distribution and functionality of habitats and the processes affecting them: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat. • Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes).	**Biological Disturbance (direct introduction of non-native species)** Introduction of non-native species as a result of the cultivation of these species (e.g. slipper limpet and Pacific oyster).	16	Potential vulnerability maximum considered to be low to medium (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.8) Aquaculture activities can result in the direct introduction of non-native species. The possible impact from the introduction of alien species used in aquaculture is regulated by EU Regulation 708/2007 which establishes a legal framework in the form of obtaining a special permit. Overall, the potential vulnerability of existing benthic communities to these potential introductions is considered to be low to medium. Intertidal habitats will be slightly more vulnerable (given the greater sensitivity to cultivated non-natives e.g. slipper limpet and Pacific Oyster specifically) than subtidal sandbanks and reefs and sea caves. **Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives listed, the following 3 are considered to be most relevant to impacts from invasive species introductions because they have the potential to affect the balance of species within the habitats: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.4)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat. • Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes).	**Biological Disturbance (translocation of native species)** Translocation of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.	17	Potential vulnerability maximum considered to be low to medium (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.8) Species introduced as mariculture species or in association with mariculture species (e.g. in with shellfish seed) can cause habitat modification and trophic competition with commercial species (UKMMAS, 2010). Overall, the potential vulnerability of existing benthic communities to these potential introductions is considered to be low to medium. Intertidal habitats will be slightly more vulnerable (given the fact that the cultivated species are found to occur naturally in these habitats). **Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives listed, the following 3 are considered to be most relevant to impacts from the translocation of indigenous species because they have the potential to affect the balance of species within the habitats: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat.	**Biological Disturbance (indirect introduction of non-native species)** Introduction of new structures (e.g. cages, trestles) on the seabed	18	Potential vulnerability maximum considered to be medium (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.8) The placement of structures underwater in the form of finfish cages or trestles in aquaculture or sediment retaining structures for intertidal recharge projects introduces new and initially barren surfaces which have the potential to facilitate the spread of invasive non-native species where, in the absence of competition from indigenous species they are able to colonise. It is difficult to quantify the risk of introduction of invasive non-native species. On the assumption that the current spread of such species is limited by the prevailing physical regime and the lack of new colonizing substrate, activities which cause the greatest change in physical processes and provide the greatest colonizing space would be expected to pose the greatest risk to potential	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.4)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
• Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes).	facilitating the colonisation and ingress of invasive non-native species.		vulnerability. Existing hard-substratum habitat (reefs and sea caves) will be slightly more vulnerable to this impact than soft-sediment habitat. **Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives listed, the following 3 are considered to be most relevant to impacts from invasive species introductions because they have the potential to affect the balance of species within the habitats: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat. • Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes).	**Biological Disturbance (introduction of non-native species)** Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	19	Potential vulnerability maximum considered to be low (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.8) The possibility also exists that invasive non-native species could be introduced on the vessels and equipment that are used during all phases of the aquaculture and beneficial re-use projects. The likelihood of this occurrence is considered to be low because of the low levels of vessel activity involved in these sectors. However, the level of risk will be dependent upon the provenance of the vessels and equipment being used. **Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives listed, the following 3 are considered to be most relevant to impacts from invasive species introductions because they have the potential to affect the balance of species within the habitats: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.4)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
• Morphological features encompassing a range of habitats. • Subtidal habitats with typically soft-sediment habitat. • Subtidal habitats with typically hard-substratum habitat (reefs and submerged or partially submerged sea caves). • Intertidal habitats (including saltmarshes).	**Biological Disturbance (introduction/transfer of parasites/ pathogens)** Introduction/transfer of parasites/pathogens as a result of aquaculture activities.	20	Potential vulnerability maximum considered to be low (see Tables 4-7 for detail and colour code) **Commentary/ Review** (see Section 3.4.8) Aquaculture activities can result in the introduction or transfer of pathogens or parasites from cultured to wild populations which consequent ecosystem effects. The potential vulnerability of benthic communities to this impact is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.2) Of the 7 objectives listed, the following 3 are considered to be most relevant to impacts from the introduction or transfer of pathogens/parasites because they have the potential to affect the balance of species within the habitats: • Distribution of typical species of the habitat. • Viability of typical species as components of the habitat. • No significant disturbance of typical species of the habitat.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

3.9.3 Potential effects on bird features

The conservation objectives for the qualifying bird interest features seek to avoid deterioration of the supporting habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring the integrity of the site. The conservation objectives are to ensure that the following are maintained in the long term:

- Population of the species as a viable component of the site.
- Distribution of the species within site.
- Distribution and extent of habitats supporting the species.
- Structure, function and supporting processes of habitats supporting the species.
- No significant disturbance of the species.

Taking account of these conservation objectives and the Plan activities to which the bird interest features are potentially vulnerable, the effects of the South Marine Plan on the integrity of the European/Ramsar sites with bird interest features is reviewed in
Table 17.

Table 17: Assessment of the potential effects of the South Marine Plan on bird features

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.4)	**Summary Impact Pathway (See also Table 2 above and Table 1 in Annex 2)**	**Pathway Ref. No.**	**Potential Vulnerability, Commentary, and Relevant Conservation Objectives**		
▪ All bird species	**Physical damage (indirect change to habitat)** Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).	3	Potential vulnerability considered to be low (see Table 9 for detail and colour code) **Commentary/ Review** (See Section 3.5.4) Underwater structures may provide new foraging opportunities for diving species. The construction of any structures above water that have a stable platform may serve as additional resting and/or breeding habitat especially for gulls and terns. The extent of this (positive) effect and the degree to which it then has consequences for increased risk through collision etc. is unknown, though sensitivity likely to be low. The exposure of the bird species to this change is likely to be low or medium, leading to a low potential vulnerability. **Relevant Conservation Objectives** (see Section 3.9.3) All of the 5 objectives are pertinent of which the following are considered to be most relevant: • Distribution and extent of habitats supporting the species. • Structure, function and supporting processes of habitats supporting the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ All bird species	**Physical damage to species** Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of	6	Potential vulnerability considered to be low (see Table 9 for detail and colour code) **Commentary/ Review** (see Section 3.5.5) During baseline surveys and installation there is the potential for bird species to collide with vessels/dredgers. The only potential for above surface structures associated with the Plan are from aquaculture activities. These are static with a low profile and so, the likelihood of above water collision will be small in most cases. Below sea-surface structures represent a collision risk which will be greater in areas with moderate to high turbidity where visibility is reduced. Those	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.4)	**Summary Impact Pathway (See also Table 2 above and Table 1 in Annex 2)**	**Pathway Ref. No.**	**Potential Vulnerability, Commentary, and Relevant Conservation Objectives**		
	entanglement following a collision with mooring elements or anti-predator nets..		bird species that forage during periods of low-light availability and diurnal feeders are considered to be more sensitive, however it has been concluded that for all stages, overall sensitivity of seabirds is considered to be low. The level of exposure to the risk of collision is low due to the small number of vessels required during the survey, installation, maintenance and decommissioning of the Plan activities. The combination of low sensitivity and exposure results in the potential vulnerability being considered as low. **Relevant Conservation Objectives** (see Section 3.9.3) For the purposes of this assessment, the overarching conservation objective for all the SPAs and Ramsar sites reviewed and all the impact pathways/activities assessed is to "maintain specific reference populations for feature species, as provided in the relevant citations". This has been applied because it covers impacts to both the species and the habitats that support them and it encompasses all of the five 5 conservation objectives that are common to all SPAs.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ All bird species	**Physical Damage (direct damage to species from marine litter)** Damage to marine species through ingestion, entanglement and smothering of marine litter	7	Potential vulnerability considered to be low - medium (see Table 9 for detail and colour code) **Commentary/ Review** (see Section 3.5.6) If a bird were to become entangled in an abandoned or broken net or cultivation bag it would experience reduced movement potentially resulting in serious injury or death by starvation. There is also potential for bird species to ingest broken aquaculture gear causing physical damage and potential mechanical blockage of the oesophagus and digestive system which in turn could lead to internal infections or death. Overall the sensitivity of birds to this impact pathway is medium. Due to the scale of the plan area, the risk of exposure to this impact pathway is also low. **Relevant Conservation Objectives** (see Section 3.9.3) All of the 5 objectives are pertinent of which the following are considered to be most relevant: • Distribution of the species within site. • No significant disturbance of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.4)	**Summary Impact Pathway (See also Table 2 above and Table 1 in Annex 2)**	**Pathway Ref. No.**	**Potential Vulnerability, Commentary, and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
▪ All bird species	**Non-physical disturbance** Visual disturbance and exclusion from areas as a results of surveying; construction/decommissioning and operational activities (including vessel movements) .	9	Potential vulnerability considered to be low (see Table 9 for detail and colour code) **Commentary/ Review** (see Section 3.5.7) Visual disturbance could have potential effects on bird species which can affect feeding and roosting behaviour with possible long term effects. There is the potential to affect birds throughout all phases of both aquaculture and beneficial use activities, however their sensitivity will be dependent upon the nature of the disturbance and how tolerant the species are at coping with changes. Evidence suggests that birds are able to habituate to levels of disturbance, therefore for the plan, diving and surface feeding species are considered to have a low sensitivity. The exact location of the activities are currently unknown so the level of exposure is not known, however, given the expected small footprint of the activities, potential vulnerability is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.3) All of the 5 objectives are pertinent of which the following are considered to be most relevant: • Distribution of the species within site. • No significant disturbance of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ All bird species	**Non-physical disturbance** Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels	10	Potential vulnerability considered to be low (see Table 9 for detail and colour code) **Commentary/ Review** (see Section 5.2.5.2) There are potential effects during all phases of development. The sensitivity of birds to airborne noise during construction is considered to be low given their ability to habituate to continual noises. The sensitivity of species to underwater marine noise is unknown, but likely to be greater for diving species and sea surface foragers. Evidence suggests that birds are able to habituate to levels of disturbance, therefore for the plan, diving and surface feeding species are	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.4)	**Summary Impact Pathway (See also Table 2 above and Table 1 in Annex 2)**	**Pathway Ref. No.**	**Potential Vulnerability, Commentary, and Relevant Conservation Objectives**		
	and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture		considered to have a low sensitivity. The exact location of the activities are currently unknown so the level of exposure is not known, however, given the expected small footprint of the activities, potential vulnerability is considered to be low. **Relevant Conservation Objectives** (see Section 5.3.2) All of the 5 objectives are pertinent of which the following are considered to be most relevant: • Distribution of the species within site. • No significant disturbance of the species.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ All bird species	**Toxic Contamination (reduction in water quality)** Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation..	11	Potential vulnerability considered to be low(see Table 9 for detail and colour code) **Commentary/ Review** (see Section 3.5.8) The quantities and toxicities associated with antifouling coatings are generally expected to be extremely small and, therefore, it is considered that this potential effect will be of negligible significance. It is not possible to make any realistic estimate of the geographical extent of this impact due to the large numbers of variables involved (quantities leaked, metocean conditions, etc.) (Scottish Executive, 2007). In the unlikely event of an incident, any oil entering the environment would be dispersed and degraded very quickly by the hydrodynamic conditions found within the south marine plan areas, ensuring the exposure to birds remains low. **Relevant Conservation Objectives** (see Section 3.9.3) All of the 5 objectives are pertinent of which the following are considered to be most relevant: • Distribution of the species within site. • No significant disturbance of the species. • Structure, function and supporting processes of habitats supporting the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.4)	**Summary Impact Pathway (See also Table 2 above and Table 1 in Annex 2)**	**Pathway Ref. No.**	**Potential Vulnerability, Commentary, and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
▪ All bird species	**Toxic Contamination (reduction in water quality)** Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	12	Potential vulnerability considered to be low(see Table 9 for detail and colour code) **Commentary/ Review** (see Section 3.5.8) There is a risk to birds from the release of contaminants during the mobilisation of sediment during aquaculture harvesting, beach nourishment and intertidal recharge works. Sediments are likely to be low in contaminant levels within the south marine plan areas, given the characteristically higher energy environments within the study area. This will assist in the dispersion of any localised contamination, thus minimising any impacts on water quality. **Relevant Conservation Objectives** (see Section 3.9.3) All of the 5 objectives are pertinent of which the following are considered to be most relevant: • Distribution of the species within site. • No significant disturbance of the species. • Structure, function and supporting processes of habitats supporting the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ All bird species	**Toxic Contamination (reduction in water quality)** Introduction of non-synthetic compounds and synthetic compounds as a	13	Potential vulnerability considered to be low(see Table 9 for detail and colour code) **Commentary/ Review** (see Section 3.5.8) During the operational phase of an aquaculture activity there is potential for the introduction of non-synthetic compounds from feed pellets, faecal particles, medicines and sea lice treatment. However, only small amounts of these compounds are likely to be released and these will be quickly dispersed in the water column the rate of which will depend on local flow conditions. All species are sensitive to this effect, however the potential vulnerability of species is	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.4)	**Summary Impact Pathway (See also Table 2 above and Table 1 in Annex 2)**	**Pathway Ref. No.**	**Potential Vulnerability, Commentary, and Relevant Conservation Objectives**		
	result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).		considered low during all phases of the Plans as only very small areas have the potential to be affected. All species are sensitive to this effect, however the potential vulnerability of species is considered low during all phases of the Plans as only very small areas have the potential to be affected. **Relevant Conservation Objectives** (see Section 3.9.3) All of the 5 objectives are pertinent of which the following are considered to be most relevant: • Distribution of the species within site. • No significant disturbance of the species. • Structure, function and supporting processes of habitats supporting the species.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ All bird species	**Toxic Contamination (reduction in water quality)** Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.	14	Potential vulnerability considered to be low(see Table 9 for detail and colour code) **Commentary/ Review** (see Section 3.5.8) During the construction phase of beneficial use activities and operational phase of aquaculture activities there is potential for organic enrichment caused by beach nourishment works and intertidal recharge and any organic matter released during aquaculture activities. However, only small amounts of these compounds are likely to be released and these will be quickly dispersed in the water column the rate of which will depend on local flow conditions. All species are sensitive to this effect, however the potential vulnerability of species is considered low during all phases of the Plans as only very small areas have the potential to be affected. **Relevant Conservation Objectives** (see Section 3.9.3) All of the 5 objectives are pertinent of which the following are considered to be most relevant: • Distribution of the species within site. • No significant disturbance of the species. • Structure, function and supporting processes of habitats supporting the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at which these qualifying features are present and are considered for the South Marine Plan are reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.4)	**Summary Impact Pathway (See also Table 2 above and Table 1 in Annex 2)**	**Pathway Ref. No.**	**Potential Vulnerability, Commentary, and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
▪ All bird species	**Non-toxic Contamination (Increased turbidity)** Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	15	Potential vulnerability considered to be low(see Table 9 for detail and colour code) **Commentary/ Review** (see Section 3.5.9) An increase of suspended sediment may disrupt foraging and predator-prey interactions. The exposure of birds to contamination effects from sediments disturbed during beach nourishment, intertidal recharge and aquaculture activities is low and therefore the potential vulnerability is low. Diving species are considered to have the highest sensitivity to this risk, other species of low sensitivity. .However, exposure is considered to be low as any changes in turbidity will be very small and short-lived. Therefore potential vulnerability is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.3) All of the 5 objectives are pertinent of which the following are considered to be most relevant: • Distribution of the species within site. • No significant disturbance of the species. • Structure, function and supporting processes of habitats supporting the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

3.9.4 Potential effects on marine mammal features

The conservation objectives for the qualifying marine mammal features are typically the same across different European sites. The UK objectives seek to avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features.

The conservation objectives are to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site.
- Distribution of the species within site.
- Distribution and extent of habitats supporting the species.
- Structure, function and supporting processes of habitats supporting the species.
- No significant disturbance of the species.

Taking account of these conservation objectives and the Plan activities to which the marine mammal interest features are potentially vulnerable, the effects of the South Marine Plan on the integrity of the European/Ramsar sites with marine mammal interest features are reviewed below in
Table 18.

Table 18: Assessment of the potential effects of the South Marine Plan on marine mammal interest features

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Physical Damage (indirect change to habitat)** Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).	3	Potential vulnerability maximum considered to be low (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.4) Marine mammals are highly mobile and have large foraging ranges. Any indirect loss of habitat is likely to only constitute a very small fraction of the total area used by a species for foraging. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives, the following are considered to be particularly relevant to impacts from physical damage to habitat during the construction and operational phase of the Plan: • Distribution and extent of habitats supporting the species. • Structure, function and supporting processes of habitats supporting the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Physical Damage (direct damage to seal haul out habitat)**	5	Potential vulnerability maximum considered to be low – to medium (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.5) Seals generally choose remote areas to haul-out and are generally highly sensitive to damage and disturbance (particularly in the breeding season). Although, the presence of haul out sites within the South Plan Area is low and thus levels of exposure to this impact pathway are considered to be	Possibility of an adverse effect on integrity (AEOI).	No adverse effect on integrity (NAEOI).

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	Damage to seal haul out locations from equipment use causing abrasion, damage or smothering during construction/decommissioning and operation.		low, the sensitivity of seals to this impact is considered to be high, resulting in a medium potential vulnerability. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 2 are considered to be particularly relevant to impacts from physical damage of haul-out habitat: • Distribution and extent of habitats supporting the species. • Structure, function and supporting processes of habitats supporting the species.	Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Physical Damage (direct damage to species from collision risk)** Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a	6	Potential vulnerability maximum considered to be low to medium (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.6) Seals and cetaceans can potentially collide with construction vessel propellers and machinery, possibly leading to physical injury and, in worst case scenarios, fatality. Juvenile grey seal pups, which are inexperienced in the water, are likely to be particularly vulnerable to collision risk. Ships travelling at 14 knots (~7 m/s) or faster are most likely to cause lethal or serious injuries if there is a collision (Scottish Executive, 2007). Vessels involved in the construction phase of aquaculture or beneficial recharge sites are either likely to be stationary or travelling at much slower speeds than this; therefore, risk of injury by collision would be considerably lower. However, there could be impacts from vessel movements during all phases of the work and in recent years particular concerns have emerged in respect of the use of ducted propellers on vessels using dynamic positioning. However many of the occurrences of perceived damage to seals have been attributed to predation rather than to propeller damage so the risk of impacts from vessels is considered to be	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	collision with mooring elements or anti-predator nets.		small. Marine mammals can also be very curious of new foreign objects placed in their environment and so curiosity around aquaculture sites could increase the risk of collision. This risk is heightened by the attraction of marine mammals to the associated aggregations of fish. This can lead to an increased risk of entanglement in structures, predator nets or non-biological wastes from farm production. Entanglement can cause decreased swimming ability, disruption in feeding, life-threatening injuries, and death. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 3 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases: • Population of the species as a viable component of the site. • Distribution of the species within site. • No significant disturbance of the species.	location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Physical Damage (direct damage to species from marine litter)** Damage to marine species through ingestion, entanglement and smothering of marine litter.	7	Potential vulnerability maximum considered to be low to medium (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.7) Seals and cetaceans are often attracted to aquaculture pens to feed on farmed species, therefore, there is the potential for accidental entanglement, smothering or ingestion of aquaculture gear. The potential vulnerability of this species is therefore, considered to be medium. There is no overlap with mud recharge activities. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 3 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases: • Population of the species as a viable component of the site. • Distribution of the species within site. • No significant disturbance of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
				There is therefore a need for additional mitigation measures.	• The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Non-Physical Disturbance (barrier to species movement)** Presence of sub-surface structures and disturbance (visual) associated with suspended or cage production may present a barrier to movement and block migratory pathways or access to feeding grounds depending on design.	8	Potential vulnerability maximum considered to be low (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.8) The potential for aquaculture sites to act as a barrier to movement will be dependent on the extent that noise and visual cues from the site(s) cause an avoidance response. It is also dependent on the ability of marine mammals to navigate around the devices. The significance of any obstruction is also dependent on the spatial confines and size of the aquaculture sites (e.g. whether it spans across the entire mouth of an estuary or channel). In advance of a full understanding about the exposure levels, the potential vulnerability of marine mammals to this effect is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 3 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases: • Population of the species as a viable component of the site. • Distribution of the species within site. • No significant disturbance of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Non-Physical Disturbance (disturbance to species)** Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	9	Potential vulnerability maximum considered to be low (Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.8) Visual disturbance from vessels during the different phases of the Plan will generally only be short term. However, the level of exposure to the impact will depend on the distance vessels are away from major seal haul out sites and major foraging areas for marine mammals. In advance of a full understanding about the exposure levels, the potential vulnerability of marine mammals to this effect is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 3 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases: • Population of the species as a viable component of the site. • Distribution of the species within site. • No significant disturbance of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Non-Physical Disturbance (disturbance to species)** Noise/vibration disturbance and exclusion from areas as a result	10	Potential vulnerability maximum considered to be high (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.8) The effect on marine mammals from vessel noise is not clear, with both attraction and avoidance reactions having been observed (Nedwell and Howell, 2004). Noise levels from the ship's echo-sounder or acoustic emissions from a dynamic positioning system would not be expected to cause widespread disturbance to marine mammals (Scottish Executive, 2007). For harbour porpoises, the zone of audibility of shipping noise ranges from 1-3km depending on the frequency of noise emitted by the ship (Thomsen *et al.*, 2006). The Scottish Marine Wildlife Watching Code advises	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.		that the minimum approach distance for vessels to avoid visual and noise disturbance to dolphins and porpoises is 50m (200-400m for mothers and calves, or for animals that are clearly actively feeding or in transit). The studies reviewed suggest that although hearing injuries from acoustic deterrents are unlikely to occur in marine mammals, strong avoidance responses could occur several kilometres from the source of the acoustic device. However, the level at which an animal at a given range will receive the sound from an acoustic device depends on both the source characteristics of the device and propagation loss. Propagation conditions will vary between sites, being affected by parameters such as bathymetry and bottom type. Seasonal changes in variables such as water temperature profiles will also have an effect. As a precautionary approach the sensitivity of marine mammals to noise/vibration disturbance from acoustic deterrents has been assessed as high. Noise/vibration disturbance to marine mammals from sediment recharge during construction and management activities of aquaculture sites during operation (e.g. noise and light) are considered to be low. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 3 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases: • Population of the species as a viable component of the site. • Distribution of the species within site. • No significant disturbance of the species.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Toxic Contamination (reduction in water quality)** Spillage of fluids, fuels and/or construction materials (including from surface coatings/ treatments) during survey/ maintenance, construction/ decommissioning or operation.	11	Potential vulnerability maximum considered to be low (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.9) Spillage of oils and fluids from construction vessels and plant machinery into the marine environment could adversely affect sediment or water quality during all phases of the South Marine Plan, for instance, through vessel collision, or improper construction or maintenance. There is also the potential that some of the aquaculture sites will use antifouling coatings. In the unlikely event of an incident, any oil entering the environment would be dispersed and degraded ensuring the exposure to marine mammals remains low. Marine mammals are highly mobile and have large foraging ranges and therefore sensitivity is considered to be low. Given the low level of exposure and sensitivity levels, potential vulnerability is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 3 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases: • Population of the species as a viable component of the site. • Distribution of the species within site. • No significant disturbance of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
				any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Toxic Contamination (reduction in water quality)** Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	12	Potential vulnerability maximum considered to be low (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.9) There is a risk to marine mammals from the release of contaminants during the mobilisation of sediment during aquaculture harvesting, beach nourishment and intertidal recharge works. Sediments are likely to be low in contaminant levels within the south marine plan areas, given the characteristically higher energy environments within the study area. This will assist in the dispersion of any localised contamination, thus minimising any impacts on water quality. However there is still the potential risk that some of these contaminants may be temporarily bioaccumulated in the tissues of certain prey species, such as fish. Marine mammals are highly mobile and have large foraging ranges and therefore sensitivity is considered to be low. Given the low level of exposure and sensitivity levels, potential vulnerability is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 4 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases: • Population of the species as a viable component of the site. • Distribution of the species within site. • Structure, function and supporting processes of habitats supporting the species. • No significant disturbance of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Toxic Contamination (reduction in water quality)** Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).	13	Potential vulnerability maximum considered to be low (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.9) During the operational phase of an aquaculture activity there is potential for the introduction of non-synthetic compounds from feed pellets, faecal particles, medicines and sea lice treatment. However, only small amounts of these compounds are likely to be released and these will be quickly dispersed in the water column the rate of which will depend on local flow conditions. Marine mammals are highly mobile and have large foraging ranges and therefore sensitivity is considered to be low. Given the low level of exposure and sensitivity levels, potential vulnerability is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 4 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases: • Population of the species as a viable component of the site. • Distribution of the species within site. • Structure, function and supporting processes of habitats supporting the species. • No significant disturbance of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin	**Toxic Contamination (reduction in water quality)**	14	Potential vulnerability maximum considered to be low (see Tables 12 and 13 for detail and colour code) **Commentary/Risk Review** (see Section 3.6.9) During the construction phase of beneficial use activities and the operational phase of aquaculture activities there is potential for organic enrichment caused by beach nourishment works and	Possibility of an adverse effect on integrity (AEOI).	No adverse effect on integrity (NAEOI).

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
▪ Harbour porpoise	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.		intertidal recharge and any organic matter released during aquaculture activities. However, only small amounts of these compounds are likely to be released and these will be quickly dispersed in the water column the rate of which will depend on local flow conditions. Marine mammals are highly mobile and have large foraging ranges and therefore sensitivity is considered to be low. Given the low level of exposure and sensitivity levels, potential vulnerability is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 4 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases: • Population of the species as a viable component of the site. • Distribution of the species within site. • Structure, function and supporting processes of habitats supporting the species. • No significant disturbance of the species.	Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Common seal ▪ Grey seal ▪ Bottlenose dolphin ▪ Harbour porpoise	**Non-Toxic Contamination (elevated turbidity)** Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste	15	Potential vulnerability maximum considered to be low (see Tables 12 and 13 for detail and colour code) **Commentary/ Review** (see Section 3.6.10) Local suspended sediment concentrations may increase during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge. Increased turbidity could affect foraging, social and predator/prey interactions of marine mammals. However, marine mammals are highly mobile and have large foraging ranges and therefore sensitivity is considered to be low. Given that the level of exposure is low, the potential vulnerability of marine mammals to this impact is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.4) Of the 5 objectives listed, the following 4 are considered to be particularly relevant to impacts from physical damage as a result of collision risk with vessels during all phases of projects and with tidal energy devices during the operational phases:	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (Also see Section 3.6)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	(e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		• Population of the species as a viable component of the site. • Distribution of the species within site. • Structure, function and supporting processes of habitats supporting the species. No significant disturbance of the species.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

3.9.5 Potential effects on fish and freshwater pearl mussel features

The conservation objectives for the qualifying fish interest features seek to avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features.

The conservation objectives are to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species, including range of genetic types for salmon, as a viable component of the site.
- Distribution of the species within site.
- Distribution and extent of habitats supporting the species.
- Structure, function and supporting processes of habitats supporting the species.
- No significant disturbance of the species.
- Distribution and viability of the species' host species (e.g. freshwater pearl mussel).
- Structure, function and supporting processes of habitats supporting the species' host species.

Taking account of these conservation objectives and the Plan-level activities to which the fish interest features are potentially vulnerable, the effects of South Marine Plan on the integrity of the European/Ramsar sites with fish interest features is reviewed in Table 19.

Table 19: Assessment of the potential effects of the South Marine Plan on fish and pearl mussel features

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2					
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**	**Is There an Adverse Effect on Integrity With Initial Mitigation Measures?**	**Is There an Adverse Effect on Integrity With Additional Mitigation Measures?**
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Physical Damage (indirect change to habitat)** Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).	3	Potential vulnerability maximum considered to be low to medium (see Table 4 for detail and colour code) **Commentary/Risk Review** (see Section 3.7.4) Cages and their subsequent moorings Seabed structures could potentially act both as artificial reefs and as FADs (Wilhelmsson *et al*., 2006, Dempster *et al*., 2009). However, there has been a lack of studies relevant which can be used to determine the degree to which species would aggregate, thought to be determined by a number of factors including size. Devices with the highest FAD potential are those with large elements (e.g. large mooring points or floating structures). The latter, such as any potential offshore finfish cages, may be expected to attract pelagic fish by analogy to floating pontoons (Clynick, 2008), as well as vessels (Røstad *et al*., 2006) as has been documented by Dempster *et al*. (2009). Aquaculture sites with large moorings may provide additional shelter and food (habitat) for small demersal fish such as territorial blennies and gobies (Love *et al*., 2000). Commensurately, the FAD potential of devices with small footprints such as the trestle tables used for oyster cultivation and structures with smaller device moorings would be predicted to be low. Additionally, structures placed in areas with high flow rates would be predicted to attract and aggregate fewer fish. Salmon and lamprey are highly mobile species undergoing large migrations and seasonal movements and are attracted to these structures. **Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. All 7 objectives listed are to some degree relevant to this impact pathway because both species viability and distribution rather than habitat composition are affected (although habitat composition is not altered within the boundaries of the relevant designated sites). These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • Distribution and extent of habitats supporting the species. • Structure, function and supporting processes of habitats supporting the species. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function, and supporting processes of habitats supporting the species' host species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Physical Damage (direct damage to species from collision risk)** Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	6	Potential vulnerability maximum considered to be low (see Table 4 for detail and colour code) **Commentary/Risk Review** (see Section 3.7.5) The main collision risk to fish are posed by increased vessel activity associated with the survey and construction of both beneficial use and aquaculture activities. The operation and maintenance of the aquaculture sites alongside the presence of the mooring and antipredator nets associated with aquaculture will also cause a potential collision risk. The ability for fish to avoid a potential collision with an object is dependent on sensory capabilities (such as vision and hearing), perception levels and swimming speeds of the species. Marine animals in high latitude coastal areas have to contend with variable and often poor visual conditions, resulting from fluctuations in ambient light levels and in the light transmission properties of the water. Fish have well developed eyes and the variety of colour patterns and specific movements that they display invites comparisons between the most visually orientated species among birds and mammals (Guthrie and Muntz, 1993; Brawn, 1969). **Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus on species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Physical Damage (direct damage to species from marine litter)** Damage to marine species through ingestion,	7	Potential vulnerability maximum considered to be low (see Table 14 for detail and colour code) **Commentary/Risk Review** (see Section 3.7.6) If a fish were to become entangled in an abandoned or broken net or cultivation bag it would experience reduced movement potentially resulting in serious injury or death by starvation. There is also potential for fish species to ingest broken aquaculture gear causing physical damage and potential mechanical blockage of the oesophagus and digestive system which in turn could lead to internal infections or death. Overall the sensitivity of fish to this impact pathway is low. Due to the scale of the plan area, the risk of exposure to this impact pathway is also low.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	entanglement and smothering of marine litter.		**Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus on species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Non-Physical Disturbance (barrier to species movement)** Presence of sub-surface structures and disturbance (visual) associated with suspended or cage production may present a barrier to movement and block migratory pathways or	8	Potential vulnerability maximum considered to be low (see Table 14 for detail and colour code) **Commentary/Risk Review** (see Section 3.7.7) Both Atlantic salmon, sea lamprey and shad species are migratory species which could be sensitive to any objects which could block migratory routes. Shad species are largely confined to migrating from rivers to estuaries and coastal area. Knowledge of the key migration routes and geographic distribution of post-smolts of Atlantic salmon in oceanic waters is sparse. Atlantic salmon and sea lamprey should be able to swim around or avoid shellfish sites or finfish cage locations, but this will be dependent on the extent that noise and visual cues given off by the site(s) and whether it causes an avoidance response. It is also dependent on the ability of fish to navigate around the devices and associated turbulence. Lampreys attach and then feed on a variety of pelagic and demersal fish species in the marine phase of their lifecycle and, thus, their movements and distribution at sea will largely be dictated by their host. The significance of any obstruction is also dependent on the spatial confines and size of the aquaculture sites (e.g. whether it spans across the entire mouth of an estuary) and the functional use of the area by fish.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities).	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	access to feeding grounds depending on design.		**Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus on species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	• The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Non-Physical Disturbance (disturbance to species)** Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture	10	Potential vulnerability maximum considered to be low(see Table 14for detail and colour code) **Commentary/Risk Review** (see Section 3.7.8) Disturbance to fish could come from a variety of sources, construction activities and vessel movements across both sectors and from the use of seal scarers in finfish aquaculture sites. There is an increasing understanding of the source noise levels and frequencies associated with marine construction activities from various reports largely associated with offshore wind farms (Nedwell and Howell, 2004; Thomsen *et al.*, 2006). The noise impacts associated with the screened in Plan activities are considered to be very small and unlikely to result in a significant displacement and/or disturbance to fish. **Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus of species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad Freshwater pearl mussel (indirectly)	**Toxic Contamination (reduction in water quality)** Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	11	Potential vulnerability maximum considered to be low (see Table 14for detail and colour code) **Commentary/Risk Review** (see Section 3.7.8) The quantities and toxicities associated with antifouling coatings are generally expected to be extremely small and, therefore, it is considered that this potential effect will be of negligible significance. It is not possible to make any realistic estimate of the geographical extent of this impact due to the large numbers of variables involved (quantities leaked, metocean conditions, etc.) (Scottish Executive, 2007). In the unlikely event of an incident, any oil entering the environment would be dispersed and degraded very quickly by the hydrodynamic conditions found within the South Marine Plan areas, ensuring the exposure to Atlantic salmon and sea lamprey remains low. **Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus of species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad Freshwater pearl mussel (indirectly)	**Toxic Contamination (reduction in water quality)** Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	12	Potential vulnerability maximum considered to be low to medium (see Table 14for detail and colour code) **Commentary/Risk Review** (see Section 3.7.8) There is a risk to fish from the release of contaminants during the mobilisation of sediment during aquaculture harvesting, beach nourishment and intertidal recharge works. Sediments are likely to be low in contaminant levels within the south marine plan areas, given the characteristically higher energy environments within the study area. This will assist in the dispersion of any localised contamination, thus minimising any impacts on water quality. However there is still the potential risk that some of these contaminants may be temporarily bioaccumulated in the tissues of certain fish prey, such as polychaete worms and marine bivalves, and made available for uptake by feeding fish. However, given the small scale of the impacts, potential vulnerability is considered low to medium. **Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus of species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Toxic Contamination (reduction in water quality)** Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).	13	Potential vulnerability maximum considered to be low to medium (see Table 14for detail and colour code) **Commentary/ Review** (see Section 3.7.8) During the operational phase of an aquaculture activity there is potential for the introduction of non-synthetic compounds from feed pellets, faecal particles, medicines and sea lice treatment. However, only small amounts of these compounds are likely to be released and these will be quickly dispersed in the water column the rate of which will depend on local flow conditions. All species are sensitive to this effect, however the potential vulnerability of species is considered low during all phases of the Plans as only very small areas have the potential to be affected. All species are sensitive to this effect, however the potential vulnerability of species is considered low during all phases of the Plans as only very small areas have the potential to be affected. **Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus of species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Toxic Contamination (reduction in water quality)** Organic enrichment of sediments and water column as a result of the	14	Potential vulnerability maximum considered to be low to medium (see Table 14 for detail and colour code) **Commentary/ Review** (see Section 3.7.8) During the construction phase of beneficial use activities and the operational phase of aquaculture activities there is potential for organic enrichment caused by beach nourishment works and intertidal recharge and any organic matter released during aquaculture activities. However, only small amounts of these compounds are likely to be released and these will be quickly dispersed in the water column the rate of which will depend on local flow conditions. All species are sensitive to this effect, however the potential vulnerability of species is considered low during all phases of the Plans as only very small areas have the potential to be affected.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.		**Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus of species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Non-toxic Contamination (Increased turbidity)** Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during	15	Potential vulnerability maximum considered to be low (see Table 14 for detail and colour code) **Commentary/ Review** (see Section 3.7.9) Atlantic salmon and sea lamprey successfully pass through estuaries with extremely high suspended sediments and, therefore, can be considered tolerant of turbid conditions. Sediments are likely to be low in contaminant levels within the offshore areas. The characteristically high-energy environments in which the devices will be located will assist in the dispersion of any localised contamination, thus minimising any impacts on water quality. **Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus of species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities).	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		• Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	• The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Biological Disturbance (translocation of native species)** Translocation and escape of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.	17	Potential vulnerability maximum considered to be low to medium (see Table 14 for detail and colour code) **Commentary/ Review** (see Section 3.10.7) There is potential for escapees and the translocation of indigenous species as a result of aquaculture activities. If successful breeding occurs between wild and farmed stock, there is potential that the genetics of the native populations may be altered. The sensitivity of native populations to this potential impact is high, however, due to the relatively low numbers of escapees exposure to this impact is low. Therefore there is a low to medium level of vulnerability. **Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus of species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.7)	**Summary Impact Pathway** (See also Table 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
▪ Atlantic salmon ▪ Sea lamprey ▪ River lamprey ▪ Allis shad ▪ Twaite shad ▪ Freshwater pearl mussel (indirectly)	**Biological Disturbance (introduction/transfer of parasites/ pathogens)** Introduction/transfer of parasites/pathogens as a result of aquaculture activities.	20	Potential vulnerability maximum considered to be low to medium (see Table 14 for detail and colour code) **Commentary/ Review** (see Section 3.7.10) There is the potential for the introduction or transfer of parasites or pathogens as a result of aquaculture activities within the South Marine Plan. This can occur directly via escapees or indirectly via pathogens in the water (Peeler, 2010). The sensitivity of native populations to this potential impact is high, however, due to the relatively low numbers of escapees exposure to this impact is low. Therefore there is a low to medium level of vulnerability. **Relevant Conservation Objectives** (see Section 3.10.5) The relevant objectives seek to 'avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained'. Of the 7 objectives listed, the following 5 are relevant to this impact pathway because they focus of species viability and distribution rather than habitat composition. These objectives are to maintain in the long term: • Population of the species as a viable component of the site, including range of genetic types for salmon. • Distribution of the species within site. • No significant disturbance of the species. • Distribution and viability of freshwater pearl mussel host species. • Structure, function and supporting processes of habitats supporting freshwater pearl mussel host species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

3.9.6 Potential effects on otter features

The conservation objectives for the qualifying otter interest feature seek to avoid deterioration of the habitats or significant disturbance to otter, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for this qualifying feature.

The conservation objectives are to ensure for the qualifying species that the following are maintained or restored in the long term:

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

Taking account of these conservation objectives and the Plan activities to which the otter interest feature is potentially vulnerable, the effects of the South Marine Plan on the integrity of the European/Ramsar sites with otter interest features is reviewed in Table 20.

Table 20: Assessment of the potential effects of the South Marine Plan on the otter interest feature

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.8)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
▪ Otter	**Physical Damage (indirect change to habitat)** Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).	3	Potential vulnerability maximum considered to be low (see Table 15 for detail and colour code) **Commentary/Risk Review** (see Section 3.8.4) The effects arising from any coastal/offshore development will be highly dependent upon the locations selected, the scale of the work proposed and the proximity of the works to their holts and sheltering grounds. In advance of a full understanding about the exposure levels, the potential vulnerability of this species to this effect is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following 2 are considered to be most relevant: • Distribution and extent of habitats supporting the species. • Structure and function and supporting processes of habitats supporting the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.8)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
▪ Otter	**Physical Damage (direct damage to species from collision risk)** Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	6	**Potential vulnerability** maximum considered to be low (see Table 15 for detail and colour code) **Commentary/Risk Review** (see Section 3.8.5) The extent to which otters from locations within European/Ramsar sites will be subject to vessel collision is likely to be very low given the high mobility/agility of otter and that there are no known current vessel collision issues with existing shipping activities. **Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following 2 are considered to be most relevant: • Population of the species. • Distribution of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Otter	**Physical Damage (direct damage to species from marine litter)** Damage to marine species through	7	**Potential vulnerability** maximum considered to be medium (see Table 15 for detail and colour code) **Commentary/Risk Review** (see Section 3.8.6) Otters are often attracted to aquaculture pens to feed on farmed species, therefore, there is the potential for accidental entanglement, smothering or ingestion of aquaculture gear. The potential vulnerability of this species is therefore, considered to be medium. There is no overlap with mud recharge activities.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of:	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.8)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	ingestion, entanglement and smothering of marine litter.		**Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following 2 are considered to be most relevant: • Population of the species. • Distribution of the species.	• The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Otter	**Non-Physical Disturbance (disturbance to species)** Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	9	**Potential vulnerability** maximum considered to be low (see Table 15 for detail and colour code) **Commentary/Risk Review** (see Section 3.8.7) The degree to which otters from locations within European/Ramsar sites will be subject to visual disturbance from survey and construction activities will largely be a function of the proximity of such works to their holts and foraging grounds. Evidence suggests that otters have become habituated to disturbance in some instances. Within the South Marine Plan Area the European site screened in for otters is set away from the coast and, therefore, visual disturbance is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following 2 are considered to be most relevant: • Population of the species. • Distribution of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities).	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.8)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
				• The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Otter	**Non-Physical Disturbance (disturbance to species)** Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	10	**Potential vulnerability** maximum considered to be low (see Table 15 for detail and colour code) **Commentary/Risk Review** The degree to which otters from locations within European/Ramsar sites will be subject to noise disturbance from survey and construction activities will largely be a function of the proximity of such works to their holts and foraging grounds. Evidence suggests that otters have become habituated to disturbance in some instances. Within the South Marine Plan Area the European site screened in for otters is set away from the coast and, therefore, noise/vibration disturbance is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following 2 are considered to be most relevant: • Population of the species. • Distribution of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan.

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.8)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
					See Section 5 for further details about these measures.
▪ Otter	**Toxic Contamination (reduction in water quality)** Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	11	**Potential vulnerability** maximum considered to be low (see Table 15 for detail and colour code) **Commentary/Risk Review** (see Section 3.8.8) Pollution may influence otters either directly, through ingestion or fur contamination, or indirectly, through damage to food supply or habitat. In advance of a full understanding about the exposure levels, the potential vulnerability of this species to this effect is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following are considered to be most relevant: • Distribution and extent of habitats supporting the species. • Structure and function and supporting processes of habitats supporting the species. • Population of the species. • Distribution of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Otter	**Toxic Contamination (reduction in water quality)**	12	**Potential vulnerability** maximum considered to be low (see Table 15 for detail and colour code) **Commentary/Risk Review** (see Section 3.8.8) Contaminants may influence otters either directly, through ingestion or fur contamination, or indirectly, through damage to food supply or habitat. In advance of a full understanding about the exposure levels, the potential vulnerability of this species to this effect is considered to be low.	Possibility of an adverse effect on integrity (AEOI).	No adverse effect on integrity (NAEOI).

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.8)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.		**Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following are considered to be most relevant: • Distribution and extent of habitats supporting the species. • Structure and function and supporting processes of habitats supporting the species. • Population of the species. • Distribution of the species.	Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Otter	**Toxic Contamination (reduction in water quality)** Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets,	13	**Potential vulnerability** maximum considered to be low (see Table 15 for detail and colour code) **Commentary/Risk Review** (see Section 3.8.8) Changes to water quality may influence otters either directly, through ingestion or fur contamination, or indirectly, through damage to food supply or habitat. In advance of a full understanding about the exposure levels, the potential vulnerability of this species to this effect is considered to be low. There is no overlap with mud recharge activities. **Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following 2 are considered to be most relevant: • Population of the species. • Distribution of the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures:

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.8)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
	faecal particles, medicines and sea lice treatments).			the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Otter	**Toxic Contamination (reduction in water quality)** Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.	14	**Potential vulnerability** maximum considered to be low (see Table 15 for detail and colour code) **Commentary/Risk Review** (see Section 3.8.8) Changes to water quality may influence otters indirectly, through damage to food supply or habitat. In advance of a full understanding about the exposure levels, the potential vulnerability of this species to this effect is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following 2 are considered to be most relevant: • Distribution and extent of habitats supporting the species. • Structure and function and supporting processes of habitats supporting the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities).	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and

Sites at Which These Qualifying Features are Present and are Considered for the South Marine Plan are Reviewed in Tables 3 and 4 in Annex 2				Is There an Adverse Effect on Integrity With Initial Mitigation Measures?	Is There an Adverse Effect on Integrity With Additional Mitigation Measures?
Qualifying and Supporting Feature (See also Section 3.8)	**Summary Impact Pathway** (See also Table 2 above and Table 1 in Annex 2)	**Pathway Ref. No.**	**Potential Vulnerability, Commentary and Relevant Conservation Objectives**		
				• The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	• The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.
▪ Otter	**Non-Toxic Contamination (elevated turbidity)** Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	15	**Potential vulnerability** maximum considered to be low (see Table 15 for detail and colour code) **Commentary/Risk Review** (see Section 3.8.9) Changes to turbidity may influence otters indirectly, through damage to food supply or habitat. In advance of a full understanding about the exposure levels, the potential vulnerability of this species to this effect is considered to be low. **Relevant Conservation Objectives** (see Section 3.9.6) All of the 6 objectives listed are pertinent, although the following 2 are considered to be most relevant: • Distribution and extent of habitats supporting the species. • Structure and function and supporting processes of habitats supporting the species.	Possibility of an adverse effect on integrity (AEOI). Further work would be required to confirm no AEOI. This is because of: • The level of uncertainty associated with the Plan (e.g. the precise location and nature of activities). • The absence of any mitigation measures within the Plan. There is therefore a need for additional mitigation measures.	No adverse effect on integrity (NAEOI). Assurance that the Plan will have NAEOI is provided through the application of the following two key measures: • The need for an HRA process to be adopted for projects and plans affecting the south marine plan areas; and • The adoption of an IPR process for the implementation of the South Marine Plan. See Section 5 for further details about these measures.

3.9.7 Conclusion

This AAIR has reviewed the impacts arising from the relevant South Marine Plan policies according to the iterative process identified in Section 2.2. Across all of the impact pathways that have been reviewed (see Table 2), the judgement reached is that it is not possible to be certain of NAEOI of European/Ramsar sites in advance of considering mitigation measures.

This is despite the fact that there are a number of plan level policies that are consistent with the conservation objectives for European/Ramsar sites, and aim to reduce human pressures and/or protect biodiversity. These environmental policies address issues such as non-native species (Policy S-NIS-1), disturbance and displacement (Policy-DIST-1), underwater noise (Policy S-UWN-2) and marine litter (S-ML-2). These policies reduce rather than eliminate the potential LSE and vulnerability of the European/Ramsar interest features to pressures. They are therefore not definitive or robust enough to withstand the scrutiny of the Habitat Regulations.

It is also not possible to be certain of NAEOI because of the uncertainties that exist about the South Marine Plan and also the lack of absolute guarantee that there will be no evidence/analysis gap in the future. While in many cases the location of potential future developments are known and identified within the South Marine Plan (see Figures 2a and 2b in Annex 1) for the aquaculture and beneficial re-use sectors that have been reviewed, many uncertainties remain which include:

- The baseline environmental conditions.
- The project-level details such as the techniques and methods that might be used.
- The sensitivities of marine habitats and species to impacts via many of the various impact pathways (e.g. limited evidence on the effects of aquaculture and beneficial re-use on mobile interest features).
- The changes that will arise to project developments and to the number and location of European/Ramsar sites in the future.

Such uncertainties are an inherent characteristic of the marine planning process given the broad spatial extent and multi-sectoral nature of such planning.

A further, significant, consideration is that these issues also apply to the assessment of in-combination effects across sectors. The issues associated with understanding the potential in-combination effects are reviewed further in Section 4 and the additional mitigation that has been identified to address all the above considerations and avoid an AEOI are reviewed in Section 5.

4 Potential In-Combination Effects

The Habitat Regulations require that, in determining whether a plan or project is likely to have a significant effect on a European/Ramsar site, its effects should be considered both alone and in-combination with other plans or projects. In this case, this applies not just to the in-combination effects arising from projects across the two sectors under review in this AAIR but to their effects in tandem with all other sectoral activities within the plan area[9]. This includes even those which, at this stage, are 'Criteria Based' Marine Plan Policies and as such have no specific spatially-definable implications for activities within the Marine Plan area.

4.1 Plans and projects

A review of existing and relevant plans and projects across all marine sectors that may potentially affect the same interest features of the European/Ramsar sites has been undertaken. For some of these sectors, a Strategic Environmental Assessment (SEA) and plan-level HRA already exists (e.g. offshore windfarms, oil and gas, coastal defence) and for some there are no such regional scale SEA/HRA although individual developments have undertaken detailed project-level HRAs as required under the Habitats Regulations.

Further details of the relevant plans and projects, and variations in approach to assessment across marine sectors are as follows:

Oil and Gas: Each offshore oil and gas licensing rounds has been subject to a statutory SEA (e.g. DECC, 2011) and HRAs have been conducted for potential developments that were considered to have potentially significant environmental effects.

Offshore Wind: This sector has been subject to statutory SEA which identified potentially significant environmental effects (DECC, 2009). A plan-level HRA has been undertaken by The Crown Estate for potential developments associated with the R3 offshore wind plan (R3OWF) (Entec, 2009a; 2009b). A project-level HRA has also been undertaken for the Rampion Offshore Wind Farm located off the Sussex coast within the South Marine Plan area (E.ON, 2012).

Tidal: The Crown Estate has agreed seabed rights for new wave and tidal demonstration zones and new wave and tidal current sites. The locations for the demonstration zones and project sites include two off the south coast of England. A plan-level HRA has been produced for these wave and tidal lease areas (ABPmer, 2014). In addition, a project-level HRA has been completed for the Perpetuus Tidal Energy Centre off the coast of the Isle of Wight.

Passenger Services: HRAs have been prepared for passenger services that were deemed to have a LSE on European/Ramsar sites (e.g. ABPmer, 2009).

[9] Therefore, all the original 295 European/Ramsar sites that were initially screened in (MMO, 2015a) would be relevant to such an in-combination assessment.

Ports and Harbours: HRAs have been produced for current licensable activities of ports and harbours as well as future opportunities for port expansion identified in Port Master Plans already (Ramboll, 2014; ABPmer, 2010b; ABPmer, 2011a).

Dredging and Disposal: Individual HRAs have been produced for licensed dredging and disposal areas (e.g. ABPmer, 2008).

Aggregates: A voluntary (i.e. non-statutory) 'Marine Aggregate Regional Environmental Assessment' (MAREA) has been undertaken (SCDA, 2011) which encompasses a large part but not all of the south marine plan areas. A plan-level HRA has been undertaken by The Crown Estate for new proposed aggregate option areas (MarineSpace and NIRAS, 2015) but no plan-level HRA has been undertaken for existing exploration and option agreement areas. Furthermore, individual HRAs have been produced for aggregate areas which have been granted and formally applied for.

Tourism and recreation: Individual HRAs have been produced for tourism and recreation sector (e.g. Royal Pier Waterfront regeneration project).

Coastal Protection: Coastal protection requirements are subject to non-statutory Shoreline Management Plans (SMPs) which are accompanied by plan-level HRAs. These identify, at a strategic level, the requirements for compensatory measures (through managed realignment) to offset the direct impacts or the losses to be incurred through future sea level rise (coastal squeeze). One such example compensatory site in the South Marine Plan area is Medmerry Managed Realignment which has been screened into this assessment and is shown on Figure 3d in Annex 1.

Fishing: This is a sector that has recently been confirmed to be a plan or project under the Habitats Regulations. The approach to the management of commercial fisheries in European Marine Sites has thus been revised to ensure that all existing and potential commercial fishing operations are managed in line with Article 6 of the Habitats Directive (MMO, 2014).

Other Marine Plans: A plan-level HRA has been undertaken for the East Marine Plans (MMO, 2013a). It is anticipated that a plan-level HRA will be undertaken for the Welsh National Marine Plan which is currently being developed.

The above review is relatively comprehensive and encompasses a wide range of the known activities, issues and potential impacts that are relevant in the south coast and surrounding area. It is clear that there are a range of different approaches that have been, and are being, taken forward in relation to the implementation of plans and projects across the south marine plan areas. Many give assurances that individual projects will not have any AEOI of European/Ramsar sites because of the thoroughness of the existing assessment process.

It is, however, recognised that this review is relatively generic in nature and that it is not feasible for this high level assessment to generate complete lists of all relevant and extant plans and projects which may have an in-combination effect with all elements of the South Marine Plan. For instance, plans and projects that might be important at a local small-scale or on land have not been included. It must also be

noted that due to the high level principles which the South Marine Plan embodies, this exercise is limited and that the assessment of in-combination effects will have to be revisited and addressed in a more comprehensive way at the project level. This is because there are lots of uncertainties that exist about the South Marine Plan and details which are not known at this stage (see Section 3.9.7).

4.2 In-combination assessment conclusion

Given the uncertainties that exist about the South Marine Plan, the above plan-level in-combination review was, necessarily, high level. It is recognised therefore that in-combination effects will need to be revisited and addressed in a more comprehensive manner at the project-level when more detailed information is available.

There are a number of key guidance and research papers which provide relatively early and sound guidance on undertaking cumulative impact assessments (CIA) (CEQ, 1997; Hyder, 1999). More recently, a number of initiatives have been taken forward in the UK, mainly driven by the requirements to adequately assess the cumulative impacts of offshore wind and wet renewables development. These include a review of common approaches to key CIA issues in PFOW (The Crown Estate, 2013), identifying potentially significant cumulative and in-combination effects resulting from wave and tidal development in PFOW (The Crown Estate, 2011), work to develop methodologies for CIA for seabirds (King *et al*., 2009), a general review of CIA for offshore wind farm development (MMO, 2013b) and work to develop guiding principles for offshore wind CIA (RUK/NERC, 2013).

A generic framework for undertaking CIA has also been developed by ABPmer (2014b) to provide the basis for Natural England case officers advising on CIA of human activities affecting MPA features. A set of principles for practical implementation of marine cumulative effects assessment has also recently been published by Judd *et al.* (2015). These, together with any further advances in this field, should be considered by developers to ensure that robust CIAs are being undertaken at the project-level.

However, a continued reliance of project-level HRAs alone will not, on its own, guarantee that an AEOI on European/Ramsar sites will be avoided into the future. This is because there can be no definitive conclusion (with the requisite level of certainty that is needed under the Habitats Regulations) that no evidence/analysis gaps will arise between the different assessment processes and methods leading to an in-combination effect (even recognising that each assessment in its own right needs to consider the in-combination effects with other plans or projects).

In conclusion, there can be no guarantee that the South Marine Plan will not have an AEOI of European/Ramsar sites in-combination with other plans or projects. Therefore, as noted in Section 3.9.7, mitigation measures are required to be assured that there will be NAEOI. One such measure will be to undertake project-level HRA once more detailed information is available. In particular, the process of plan implementation is important and it is recognised that the role of the South Marine Plan is to form a forward-looking, proactive new system for managing marine activities on the south coast and by its very nature it encompasses all activities affecting the plan areas.

5 Mitigation Requirements

To address the issues highlighted in Section 4, and ensure that the South Marine Plan will have NAEOI of European/Ramsar sites, additional mitigation measures/considerations were identified. These two measures are an iterative process for plan implementation and project-level HRA.

Whilst it is acknowledged that there are a number of plan level policies that address issues such as disturbance and displacement, underwater noise, marine litter and non-native species, these policies are not definitive or robust enough to withstand the scrutiny of the Habitat Regulations. Mitigation measures must ensure there will be no LSE through avoidance measures as discussed in Tyldesley (2011). The policies within the South Marine Plan reduce rather than eliminate the potential vulnerability of the European/Ramsar interest features to the pressure associated within the Plan.

5.1 Iterative plan review

The central principle of this measure is that there needs to be a clear process for the implementation of the South Marine Plan. In particular, the process needs to involve a phased and iterative approach to implementation which is linked to ongoing project developments and their associated monitoring work and with the findings from such project-level work feeding back into the next phases of plan-implementation.

The pursuance of such an 'Iterative Plan Review' (IPR) process, in which the lessons learned from consented projects feed into subsequent development applications on an ongoing basis, will provide assurances that developments affecting the marine plan areas are being managed to avoid adverse effects especially in-combination effects. Most importantly, this process will need to remain flexible enough to allow project-level decisions and revisions to be made in order to be assured that individual projects do not result in an AEOI of any European/Ramsar site. The application of such a process is in-keeping with the approaches identified in previous plan-level HRA work where residual uncertainties exist about the impacts arising (e.g. ABPmer, 2011b; 2011c; 2013a; 2013b; 2014; MMO, 2013a)[10].

Part of this IPR process (which is described in Diagram 2) will include a review of the monitoring data that is collected as part of strategic initiatives (e.g. from MMO's Strategic Evidence Programme). Such work will ensure, either through the application of survey or providing guidance to separate initiatives, that sufficient

[10] In some previous Plan-level HRAs, such as those for the Pentland Firth and Orkney Waters Marine Renewable Energy Strategy (e.g. ABPmer, 2010a; 2010b) or the Round 3 Offshore Wind Farms (Entec 2009a; 2009b), the application of project-level HRA has been deemed to provide sufficient reassurance that the plans as a whole will not have an adverse effect. However, these examples relate to plans which cover smaller areas, refer to single sectors and where there are lower levels of uncertainty (especially in a broader strategic context) about the impacts arising than is the case for the Marine Plan.

strategic evidence is available to fill gaps in understanding that are not addressed by individual project-level monitoring programmes. Also, the mitigation measures that are applied for project developments will be regularly reviewed to determine their effectiveness and the role they play in offsetting impacts on an ongoing basis.

To ensure that the process is iterative and that the plans can be adaptive/ responsive, these reviews of project-level assessment, monitoring and mitigation and the lessons that are learned will be linked to (and will inform) future reviews of the South Marine Plan. As part of this iterative sequence, the MMO will revisit the Marine Plans at 3 and 6 yearly intervals. Adaptability is a key facet of the process and it is recognised that if prescriptive measures are set out now they could be a hindrance to projects in the future (at which time we may know that certain requirements are more or less relevant) as projects are implemented and new lessons are learned, which has the potential to frustrate learning opportunities and the development of new, potentially more appropriate, mitigation measures.

The process will also include regular consultation with other UK Devolved Administrations and EU Member States to address issues relating to transnational sites to ensure no in-combination effects.

The Habitats Regulations, and the case-law that informs their implementation, place great emphasis on developers demonstrating 'no adverse effect' using best available scientific knowledge and beyond reasonable scientific doubt. The process of ongoing research and feeding the results of targeted monitoring back into the assessment process will address the relevant uncertainties, but it should be noted that there is a process to be followed (as described above) which may influence the rate and scale of project-level developments.

5.2 Project-level HRA requirements

Further assurances that there will be NAEOI of European/Ramsar sites is provided by the fact that each individual development that is undertaken within the south marine plan areas will be legally required to undergo an HRA process in its own right. A project-level AA will also be required wherever the possibility of a LSE on a European/Ramsar site cannot be excluded on the basis of currently available information. Such project level HRA work will need to give consideration to the potential effects of the individual project in-combination with all other extant plans and projects within and outside the south marine plan areas.

These project-level assessments and their associated monitoring review work will be linked to (and will inform) regular reviews of the South Marine Plan as part of the IPR process that will be pursued (see Section 5.1). Information that will need to be supplied within project-level HRAs will include:

- Details on the location, and nature of the proposed activities.
- The location and status of any relevant new European designations.
- Distinction between interest features within a site and those where interest features are qualifying features of the designation (but not a primary reason for site selection).

- Latest information of the Conservation objectives and the Favourable Condition Status of relevant European site features.
- Latest information on the interest features sensitivities (in the context of the latest scientific understanding).
- Assessment of effects during all phases of the project (including the in-combination effects with other plans or projects).
- Proposed mitigation measures where identified to be relevant and necessary.

This AAIR is designed to give direction to these future project level HRAs and, where required, AAs. However, it does so only for the aquaculture and beneficial re-use sectors. The information provided on impact pathways, species sensitivities and potential vulnerabilities will be transferable in many cases to developments undertaken in other sectors but the information provided is not tailored specifically to such other projects.

Future developments across all sectors will need to re-visit the information presented in this HRA and ensure that they adhere to any relevant mitigation measures at the project-level where they are necessary to avoid an AEOI of a European/Ramsar site. There are many project-level mitigation measures available to help avoid and reduce the ecological effects where necessary.

To assist with judgements about the possible need for such measures in the future, an overall list of generic measures to address potential effects to European/Ramsar site interest features from aquaculture and beneficial re-use activities has been assembled (Table 21). These are derived from regularly used or previously proposed mitigation measures that the Marine Management Organisation (MMO) may draw upon as part of their consents and licensing responsibilities taking into account recommendations from SNCBs. However, it is important to note that these mitigation measures have not been framed within any formal SEA and therefore do not carry statutory weight beyond being options for the MMO to consider in future licensing decisions.

Table 21: Generic mitigation measures

Mitigation description	Mitigation purpose	Impact Pathway Ref No.	Interest feature group	Sector	
				Aquaculture	Beneficial re-use
Best practice approach to project siting (e.g. avoid protected habitats and species where possible)	Avoid loss and/or damage to habitats and species	1-5	All	✓	✓
Deployment of equipment or vessels onto the seabed (e.g. anchors) to be kept to a minimum	Reduce loss/damage to habitats and species	1-5	All	✓	✓
Construction works restricted to a defined working area where appropriate	Reduce loss/damage to habitats and species	1, 2	Habitats		✓
Landscaping in keeping with existing geomorphology where necessary	Minimise damage to habitats	1, 2	Habitats		✓
Re-vegetate habitat if necessary	Offset loss and/or damage to habitats	1, 2	Habitats		✓
Use of dynamic positioning by vessels instead of anchors where possible	Minimise damage to habitats	2	Habitats	✓	✓
Use of anti-predator nets with appropriate tensioning and mesh sizes	Minimise entanglement	6	Birds, marine mammals, fish and otters	✓	
Timing/phasing of construction work if necessary	To minimise disturbance to species at sensitive times of year (e.g. breeding or migration seasons)	9, 10	Birds, marine mammals, fish, otters	✓	✓
Use of cetacean friendly pingers or rely solely on anti-predator nets as appropriate	To avoid noise disturbance from seal scarers	10	Marine mammals	✓	

Mitigation description	Mitigation purpose	Impact Pathway Ref No.	Interest feature group	Sector	
				Aquaculture	Beneficial re-use
Appropriate storage of fuel, oil, equipment and construction materials	Minimise risk of sediment or water pollution	11	All	✓	✓
Use of emergency plan to manage accidents or spillages	Minimise adverse impacts of sediment or water pollution	11	All	✓	✓
Adherence to the International Convention for the Prevention of Pollution from Ships (MARPOL) regulations and best practice guidance for working over water (e.g. Pollution Prevention Guideline (PPG) 5)	Minimise risk of sediment or water pollution	11	All	✓	✓
Chemical testing of beneficial re-use (dredge spoil) material	Avoid the reduction of water or sediment quality	12	All		✓
Possible water monitoring to detect water quality changes if necessary	Manage water quality	12-15	All	✓	
Use only necessary quantities of food and food pellets designed to float longer in the water column if possible	Avoid overfeeding and reduction in water quality	13	All	✓	
Move cages periodically to different locations if necessary	Avoid accumulation of organic waste below cages	13, 14	All	✓	
Consider low-density stocking	Avoid reduction in water quality	13-15	All	✓	
Site in areas with good current flows if possible, to help remove sediments and replenish oxygen	Control of organic enrichment and turbidity	14,15	All	✓	

Mitigation description	Mitigation purpose	Impact Pathway Ref No.	Interest feature group	Sector	
				Aquaculture	Beneficial re-use
Use strong nets and consider containment (i.e. closed systems)	Avoid escapes	16, 17	Habitats, fish	✓	
Use of triploids (theoretically sterile) for biological containment where appropriate	Avoid settlement of non-native species and genetic integration with wild species	16, 17	Habitats, fish	✓	
Follow best practice ballast water management guidelines and where appropriate use approved anti-fouling substances	Avoid introduction of non-native species	19	Habitats	✓	✓
Use certified pathogen-free stock whenever possible	Prevent spread of disease	20	Habitats, fish	✓	
Use a minimum separation distance between farms where necessary	Prevent spread of disease	20	Habitats, fish	✓	
Consider quarantine for introduced fish	Avoid introduction of disease	20	Habitats, fish	✓	
Vaccination/ immunisation of fish	Prevent disease	20	Habitats, fish	✓	
Isolate diseased fish	Prevent spread of disease	20	Habitats, fish	✓	
Surveillance and monitoring of fish health as appropriate	Monitor disease outbreaks	20	Habitats, fish	✓	
Consider low-density stocking	Avoid stress and disease from overcrowding	20	Habitats, fish	✓	

It follows that the manner in which these measures are applied and the detail of the individual initiatives required to achieve them will be subject to the findings of the project-level HRAs. Therefore, it is recognised that not all measures have to be applied in all cases, but only where the project requires it to ensure that there is NAEOI of any European/Ramsar sites.

Of these measures, the one that is most intuitive is that during the early stages in the design of the project, interest feature habitats within a European/Ramsar site could be avoided to minimise exposure and risk. However, it is also the case that European sites should not be viewed as a 'no go' area because project-level mitigations may well exist, and have been proven to exist in the past, which enable projects within designated sites to go ahead with NAEOI of protected habitats/species.

It should be further emphasised that there is no presumption within this HRA or under the Habitats Regulations that developments cannot occur within European sites. However, the risks of impact and the requirements for mitigation are likely to be greater where this is the case. It is expected that developers will, in the first instance, seek to recognise the greater challenges that may be faced by undertaking work within or near European sites.

It should also be recognised that it may well be necessary, as part of the project-level HRAs, to undertake a more focussed screening exercise than the high-level screening process undertaken for this plan-level HRA. The plan-level HRA has involved, by necessity, a broad overview of the possible European sites that could be affected. At a project-level, when more information will be available about the location of the cable route, a more detailed review of the 'screened-in' and 'screened-out' list of European sites will need to be undertaken. For example, at this project-level more details will be known about the location and nature of landside infrastructure so it is possible that European sites that have been screened out at the plan-level (in particular, terrestrial sites and features) may need to be screened in at the project-level (and vice versa). On the same premise, there is likely to be baseline information available at the project-level that will reduce the number of screened in European sites and features on the basis that there will be no potential impact pathway.

It is not recommended that the methods applied for screening the South Marine Plan are directly applied for screening project-level HRAs. Instead project-level screening should be undertaken based on the knowledge of the project details and using, where required, the latest scientific evidence on the impact pathways and sensitivities as well as information on the baseline environmental conditions. It will also need to be done to the satisfaction of the consenting body (as competent authority at the project stage), taking account of advice from statutory nature conservation agencies and consultees where appropriate.

5.3 Conclusion

The application of two key mitigation measures (IPR and project-level HRA) provide the necessary assurances that the South Marine Plan as a whole will not to have an AEOI of European/Ramsar sites either alone or in-combination with other plans or projects.

6 References

ABP Research & Consultancy Ltd. (2000). Humber International Terminal (HIT) Ornithological Survey: Annual Monitoring Report 1999/2000, ABP Research & Consultancy Ltd, Research Report No. R.882.

ABP Research & Consultancy Ltd. (2001). Immingham Outer Harbour, Environmental Statement, August 2001, ABP Research & Consultancy Ltd, Research Report No. R.903.

ABPmer. (2002). ABP Teignmouth Quay Development Environmental Statement. ABP Marine Environmental Research Ltd, Report No. R.984a.

ABPmer (2005). Atlantic Salmon (Salmo salar L.) Literature Review. ABP Marine Environmental Research Ltd, Report No. R.1229A.

ABPmer (2008). Environmental Statement for Port of Southampton: Southampton Approach Channel Dredge – Volume 2: Appendix D: Appropriate Assessment Signposting Document. Report for Associated British Ports (ABP) December 2008; ABP Marine Environmental Research Ltd, Report No. R.1464.

ABPmer (2009). Wightlink – Replacement Lymington to Yarmouth Ferries: Updated Information for Appropriate Assessment. Report for Wightlink Ltd February 2009; ABP Marine Environmental Research Ltd, Report No. R.1509.

ABPmer (2010a). Screening and Scoping Review for the Pentland Firth Strategic Area (PFSA) Leasing Round Habitats Regulations Assessment. Report for The Crown Estate January 2010; ABP Marine Environmental Research Ltd, Report No. R.1601.

ABPmer (2010b). Port of Southampton Master Plan: Shadow Appropriate Assessment. Report for Associated British Ports (ABP) January 2010; ABP Marine Environmental Research Ltd, Report No. R.1553.

ABPmer (2011a). Environmental Statement for Port of Southampton: Berth 201/202 Works Updated by Further Information – Appendix D: Appropriate Assessment Signposting Document. Report for Associated British Ports (ABP) October 2011; ABP Marine Environmental Research Ltd. Report No. R.1836.

ABPmer (2011b). Habitats Regulations Appraisal of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters: Information for Appropriate Assessment. Report for the Scottish Government January 2011; ABP Marine Environmental Research Ltd. Report No. R. 1722 (overall summary) and R1772a-c (pre-screening, screening and assessment information reports).

ABPmer (2011c). Habitats Regulations Appraisal of National Infrastructure Renewables Plan (N-RIP): Information for Appropriate Assessment. Report for the Scottish Government January 2011; ABP Marine Environmental Research Ltd. Report No. R.1740 (overall summary) and R1772a & b. (pre-screening, screening and assessment information reports).

ABPmer (2013a). Habitats Regulations Appraisal of the Draft Sectoral Plans for Wind, Wave and Tidal Energy Generation in Scottish Waters. Report for Marine Scotland 2013; ABP Marine Environmental Research Ltd, Draft Final Report Nos: R.2121a (Pre-Screening); R.2121b (Screening); and R2121c (Report to Inform Appropriate Assessment).

ABPmer (2013b). Habitats Regulations Appraisal of Draft Plan for Wave and Tidal Energy in Scottish Waters: Appropriate Assessment Information Review. Report for Marine Scotland 2013; ABP Marine Environmental Research Ltd, Final Report January 2013 Report No. R.1863c.

ABPmer (2014). Wave and Tidal Further Leasing: HRA Principles Document, Screening Report and Appropriate Assessment Information Report. Reports for The Crown Estate. ABP Marine Environmental Research Ltd. Report numbers R.2160a c.

ABPmer, 2014b. Development of a Generic Framework for Informing Cumulative Impact Assessment (CIA) Related to Marine Protected Areas through Evaluation of Best Practice. Report for Natural England. Report No. R.2112.

Aecom and ABPmer (2015). ISLES Spatial Plan Habitat Regulations Appraisal: Pre-Screening, and Appropriate Assessment Information Report. ABP Marine Environmental Research Ltd, Report Nos. R2308a and b..

Alabaster, J.S. (1993). River Usk Barrage Order 1993. Proof of Evidence on Pollution and Fisheries.

Anderwald, P., Evans, P. G., Dyer, R., Dale, A., Wright, P. J., & Hoelzel, A. (2012). Spatial scale and environmental determinants in minke whale habitat use and foraging. Marine Ecology Progress Series, 450, 259-274.

Arena, PT., Jordan, LKB., Spieler, RE. (2007). Fish assemblages on sunken vessels and natural reefs in southeast Florida. Hydrobiologia 580: 157-171

Baker, J.R., A.M. Jones, T.P. Jones, and H.C. Watson. (1981). Otter (*Lutra lutra*) mortality and marine oil pollution. Biological Conservation 20:311?21.

BERR, 2008. Review of cabling techniques and environmental effects applicable to the offshore wind farm industry - Technical Report. BERR. [cited in Entec UK Ltd, 2009a]

Bexton, S., Thompson, D., Brownlow, A., Barley, J., Milne, R., & Bidewell, C. (2012). Unusual Mortality of Pinnipeds in the United Kingdom Associated with Helical (Corkscrew) Injuries of Anthropogenic Origin. Aquatic Mammals, 38(3), 229.

Blaxter, J. H. S., Gray, J.A.B and Denton, E.J. (1981). Sound and startle responses in herring shoals. J.mar.biol.Ass.UK. 61, 851-869.

Boorman (2003). L.A. Boorman, Saltmarsh Review. An overview of coastal saltmarshes, their dynamic and sensitivity characteristics for conservation and management, JNCC, Peterborough (2003).

Brawn V.M. (1969). Feeding behaviour of cod (Gadus morhua). J. Fish. Res. Board Can 26, 583-596

BSG Ecology, 2014. Bat migration research (2012 -2014). Available online at: http://www.bsg-ecology.com/research/bsg-ecology-bat-migration-research-2012-2014/, accessed on 27 April 2015.

Carter, C., 2007. Marine Renewable Energy Devices: A Collision Risk for Marine Mammals? MSc thesis University of Aberdeen

Cattaneo-Vietti. R., Benatti, U., Cerrano, C., Giovine, M., Tazioli, S., Bavestrello, G. (2003). A marine biological underwater depuration system (MUDS) to process waste waters. Biomolecular Engineering 20: 291-298

CEQ (Council on Environmental Quality). (1997). Considering Cumulative Effects Under the National Environmental Policy Act. January 1997.

Chanin, P (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough. Ecology Series No.10 English Nature, Peterborough.

Chesworth, J. C., Leggett, V. L. and Rowsell, E. S. (2010). Solent Seal Tagging Project Summary Report. Wildlife Trusts' South East Marine Programme, Hampshire and Isle of Wight Wildlife Trust, Hampshire.

Clement, D. (2013). Literature review of ecological effects of aquaculture. Effects on Marine Mammals. Ministry for Primary Industries. New Zealand.

Clynick, BG. (2008). Characteristics of an urban fish assemblage: distribution of fish associated with coastal marinas. Marine Environmental Research 65: 18-33

Coram, A., Gordon, J., Thompson, D. and Northridge, S (2014). Evaluating and assessing the relative effectiveness of non-lethal measures, including Acoustic Deterrent Devices, on marine mammals. Scottish Government.

Crowe, T.P., Fitch. J.E., Frid, C.L.J. and Somerfield, P.J. (2011). A framework for managing seabed habitats in near shore Special Areas of Conservation. A report for the Department of the Environment, Heritage and Local Government, Ireland.

Cui, G., Wardle, C. S., Glass, C.W., Johnstone, A.D.F and Mojsiewicz, W.R. (1991). Light level thresholds of visual reaction of mackerel, Scomber scombrus L. to coloured monofilament nylon gillnet materials. Fisheries Research 10, 255-263.

David Tyldesley and Associates (2009). Revised Draft Guidance, The Habitats Regulations Assessment of Local Development Documents. Report for Natural England, February 2009.

David Tyldesley and Associates (2012). Habitats Regulations Appraisal of Plans. Guidance for Plan-making Bodies in Scotland Version 2.0, August 2012 SNH Ref 1739.

Davidson, I. C., Zabin, C. J., Chang, A. L., Brown, C. W., Sytsma, M. D., and Ruiz, G. M. (2010). Recreational boats as potential vectors of marine organisms at an invasion hotspot. Aquatic Biology, 11(2), 179-191.

DECC, Department of Energy and Climate Change (2009). UK Offshore Energy Strategic Environmental Assessment: Future Leasing for Offshore Wind Farms and Licensing for Offshore Oil & Gas and Gas Storage. DECC, London, 339p (excl. appendices). Available online at: http://www.offshore-sea.org.uk/consultations/Offshore_Energy_SEA/index.php, accessed on 15 September 2015.

DECC, Department of Energy and Climate Change (2011). Offshore Oil & Gas Licensing. 26th Seaward Round Southern North Sea. Available online at: http://www.offshore-sea.org.uk/downloads/26th_Round_Southern_North_Sea_Blocks_AA.pdf, accessed on 15 September 2015.

Dempster T and Kingsford, M.J., 2004. Homing of pelagic fish to fish aggregation devices (FADs): The role of sensory cues. Marine Ecology Progress Series 258: 213-222.

Dempster, T., Uglem, I., Sanchez,- Jerez, P., Fernandez-Jover, D., Bayle-Sempere, J., Nilsen, R. and Bjorn, P.A. (2009). Coastal salmon farm attract large and persistent aggregations of wild fish: an ecosystem effect. Marine Ecology Progress Series. 385 1-14 doi: 10.3354/meps08050

Elliott, M., Nedwell, S., Jones, NV., Read, SJ., Cutts, ND., Hemingway, KL. (1998). Intertidal sand and mudflats and subtidal mobile sandbanks (volume II). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs. 151 pp.

Ellison W.T., Southall B.L., Clark C.W., Frankel A.S. (2012). A new context-based approach to assess marine mammal behavioral responses to anthropogenic sounds. Conservation Biology 26: 21–8.

Enders, E.C., Boisclair, D and Roy A.G. (2003). The effect of turbulence on the cost of swimming for juvenile Atlantic salmon (Salmo salar). Canadian Journal of Fisheries and Aquatic Sciences 60: 1149-1160.

Eno, C.N., Sanderson, W.G. (1997). Non-native marine species in British waters: a review and directory. Vol. 152. Peterborough: Joint Nature Conservation Committee, 1997.

Enstipp, M.R., Daunt, F., Wanless, S., Humphreys, E.M., Hamer, K.C., Benvenuti, S. and Grémillet, D. (2006). Foraging energetics of North Sea birds confronted with fluctuating prey availability. Top Predators in Marine Ecosystems: Their Role in Monitoring and Management (eds I. Boyd, S. Wanless & C.J. Camphuysen), pp 191-210. Conservation Biology 12. Cambridge University Press, Cambridge, UK.

Entec UK Ltd. (2009a). Habitats Regulations Assessment of the Round 3 Plan. Screening Report, Report for The Crown Estate October 2009.

Entec UK Ltd. (2009b). Habitats Regulations Assessment of the Round 3 Plan. Information to Inform an Appropriate Assessment, Report for The Crown Estate December 2009.

EPA (2012). Marine Debris Impacts. Available at: http://water.epa.gov/type/oceb/marinedebris/md_impacts.cfm Accessed: 17/09/15

E.ON (2012). Rampion Offshore Wind Farm No Significant Effects Report. E.ON Climate & Renewables Document 5.3. December 2012.

ERM (Environmental Resources Management). (1996). South Humber Power Station, Pyewipe, Bird Monitoring Study, April 1996. Report for ABB Power Generation

European Commission (2001). Assessment of plans and projects significantly affecting Natura 2000 sites.

European Commission (2007). Interpretation Manual of European Union Habitats (EUR27) Appendix 1 http://ec.europa.eu/environment/nature/natura2000/marine/docs/appendix_1_habitat.pdf

European Commission. (2012). Guidance document on aquaculture activities in the Natura 2000 Network. Available online at: http://ec.europa.eu/fisheries/cfp/emff/doc/guidance-aquaculture-natura2000.pdf, accessed on 15 September 2015.

Fanshawe, T. and Everard. M. (2002). The impacts of marine litter. Marine Pollution Monitoring Management Group. Report of the Marine Litter Task Team (MaLiTT) May 2002.

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

Freon, P and Dagorn, L. (2000). Review of fish associative behaviour: toward a generalisation of the meeting point hypothesis. Rev. Fish. Biol. Fisheries 10: 183-207.

Fry, D.M., Fefer, S.I. & Sileo, L. (1987). Ingestion of plastic debris by Laysan albatrosses and wedge tailed shearwaters in the Hawaiian Islands. Marine Pollution Bulletin, 18(6B), 339-343.

Furness, R.W. & Tasker, M.L. (2000). Seabird-fishery interactions: quantifying the sensitivity of seabirds to reductions in sandeel abundance, and identification of key areas for sensitive seabirds in the North Sea. Marine Ecology Progress Series 202: 253-264

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

Gaston, A.J. & Jones, I.L. (1998). The Auks. Oxford University Press, Oxford, New York.

Gaston, A.J. (2004). Seabirds: A Natural History. Christopher Helm A & C Black, London, UK

Gerstner, C.L. (1998). Use of substratum ripples for flow refuging by Atlantic cod, Gadus morhua. Environmental Biology of Fishes 51: 455-460.

Graham, I. M., Harris, R. N., Denny, B., Fowden, D., and Pullan, D. (2009). Testing the effectiveness of an acoustic deterrent device for excluding seals from Atlantic salmon rivers in Scotland. – ICES Journal of Marine Science, 66: 860–864.

Gowen, R.J., Rosenthal, H., Makinen, T. and Ezzi, I. (1990). Environmental impact of aquaculture activities. In: De Pauw N, Billard R, editors. Aquaculture Europe 89-Business joins science. European Aquaculture Society. Special Publication No. 12, Bredene, Belgium, 1990.

Guthrie, D.M., and Muntz, W.R.A. (1993). Role of vision in fish behaviour. In Behaviour of teleost fishes. Edited by T.J. Pitcher. Chapman and Hall, London, UK.

Hastings, M.C., and Popper, A.N. (2005). Effects of sounds on fish. Report to Jones and Stokes for California Department of Transportation, January 2005. 82pp

Harris, R. N., Harris, C. M., Duck, C. D., and Boyd, I. L. (2013) The effectiveness of a seal scarer at a wild salmon net fishery. – ICES Journal of Marine Science.

Hazen, E. L., Friedlaender, A. S., Thompson, M. A., Ware, C. R., Weinrich, M. T., Halpin, P. N., & Wiley, D. N. (2009). Fine-scale prey aggregations and foraging ecology of humpback whales Megaptera novaeangliae. Marine Ecology Progress Series, 395, 75-89.

Hazel, J., Lawler, IR., Marsh, H., Robson, S. (2007). Vessel speed increases collision risk for the green turtle Chelonia mydas. Endangered Species Research 3, 105-113

Helvey, M. (2002). Are southern California oil and gas platforms essential fish habitat? ICES Journal of Marine Science 59: 266-271

Hendry, K and Cragg-Hine D. (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No. 7. English Nature, Peterborough.

Hinojosa, I.A., Thiel, M. (2009). Floating marine debris in fjords, gulfs and channels of southern Chile. Marine Pollution Bulletin. 58 341 -350

Hockin, D., Ounsted, M., Gorman, M., Keller, V., and Barker, M.A. (1992). Examination of the effects of disturbance of birds with reference to its importance in ecological assessments. Journal of Environmental Management, 36:253-286.

Hoelzel, R.A (ed). (2002). Marine Mammal Biology: An evolutionary approach. Blackwell Publishing. 452pp.

Hoover-Miller, A., Bishop, A., Prewitt, J., Conlon, S., Jezierski, C., & Armato, P. (2013). Efficacy of voluntary mitigation in reducing harbor seal disturbance. The Journal of Wildlife Management.

Huntington, T., Roberts H., Cousins N., Pitta V., Marchesi N., Sanmamed A., Hunter-Rowe T., Fernandes T., Tett P., McCue J. and Brockie N. (2006). Some Aspects of the Environmental Impact of Aquaculture in Sensitive Areas. Report to the DG Fish and Maritime Affairs of the European Commission. Available online at: http://ec.europa.eu/fisheries/documentation/studies/aquaculture_environment_2006_en.pdf, accessed on 15 September 2015.

Hyder. (1999). Guidelines for the assessment of indirect and cumulative impacts as well as impact interactions. Brussels: EC DGX1 Environment, Nuclear Safety and Civil Protection

IECS, 2009. Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Institute of Estuarine and Coastal Studies Report to Humber INCA.

IMO. (2014). Ballast Water Management. Available online at: http://www.imo.org/OurWork/Environment/BallastWaterManagement/Pages/Default.aspx, accessed on 15 September 2015.

Jepson, P.D., Tregenza, N and Simmonds, M.P. (2009). Disappearing bottlenose dolphins (Tursiops truncatus) – is there a link to chemical pollution? 16th ASCOBANS Advisory Committee Meeting, 2009.

JNCC. (2008). The deliberate disturbance of marine European Protected Species: Interim guidance for English and Welsh territorial waters and the UK offshore marine area

JNCC, Natural England and Countryside Council for Wales, 2010. The protection of marine European Protected Species from injury and disturbance. Guidance for the marine area in England and Wales and the UK offshore marine area. October 2010.
Johansen, L-H., Jesen,I., Mikkelsen, H., Bjorn, P-A., Jansen, P.A., Bergh, O. (2011). Disease interaction and pathogens exchange between wild and farmed fish populations with special reference to Norway. Aquaculture 315, 167 -186

Johnson, L., Dorn, P., Muench, K., and Hood, M., (1976). An evaluation of fish entrapment associated with the offshore cooling water intake system at Redondo Beach Steam Generating Station Units 7 and 8. South. Calif. Edison Co. Res. Develop. Ser. 77-RD-12, Rosemead, Calif., 36 p.

Judd A.D., Backhaus T. and Goodsir, F. (2015). An effective set of principles for practical implementation of marine cumulative effects assessment. Environmental Science &Policy 54: 254-262.

King, S., Prior, A., Maclean, I. and Norman, T. (2009). Developing guidance on ornithological cumulative impact assessment for offshore wind farm developers. COWRIE.

Learmonth, JA., Macloed, CD., Santos, MB., Pierce, GJ., Crick, HQP., Robinson, RA. (2006). Potential effects of climate change on marine mammals. Oceanography and Marine Biology: An Annual Review 44: 431-464

Lenhardt, M.L. and Sismour, E. (1995). Hearing in the sea lamprey (*Petromyzon marinus*) and the long nose gar (*Lepisosteus spatula*). Assoc. Res. Otolaryngol. Abs: 259. The Association for Research in Otolaryngology.

Lepper, P.A., Gordon, J., Booth, C., Theobald, P., Robinson, S. P., Northridge, S. & Wang, L. (2014). Establishing the sensitivity of cetaceans and seals to acoustic deterrent devices in Scotland. Scottish Natural Heritage Commissioned Report No. 517.

Liao, J.C. (2007). A review of fish swimming mechanics and behaviour in altered flows. Philosophical transactions of the Royal Society Series B 362: 1973-1993.

Linley, EAS., Wilding, TA., Black, K., Hawkins, AJS., Mangi, S. (2007). Review of the reef effects of offshore wind farm structures and their potential for enhancement and mitigation. Report from PML Applications Ltd and the Scottish Association for Marine Science to the Department for Business, Enterprise and Regulatory Reform (BERR), Contract No: RFCA/005/0029P

Lucke, K., Siebert, U., Lepper, P.A. and Blanchet, M.A. (2009). Temporary shift in masked hearing thresholds in a harbour porpoise (Phocoena phocoena) after exposure to seismic airgun stimuli. Journal of the Acoustical Society of America, 125: 4060 – 4070.

Maitland. P.S. (2003). Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

Marine Management Organisation (2013a). East of England Marine Plans Habitats Regulations Assessment - Pre-Screening, Screening and Appropriate Assessment Information Review. Reports Prepared by ABP Marine Environmental Research, Hartley Anderson and Hyder Consulting (UK) Ltd ABPmer Report No.R.2020a-c. March 2013.

MMO (2013b) Evaluation of the current state of knowledge on potential cumulative effects from offshore wind farms to inform marine planning and licensing. Authors: Kershaw, P., Birchenough, S., Judd, A., Freeman, S., Wood, D. MMO project:1009.

Marine Management Organisation (2014a). South Marine Plan Habitats Regulations Assessment – Pre-Screening report. Report prepared by ABP Marine Environmental Research Ltd. Report No.2219. July 2014.

Marine Management Organisation (2014b). Use of beneficial dredged materials in the South Inshore and South Offshore Marine Plan Areas. MMO Project No. 1073. Report prepared by ABP Marine Environmental Research Ltd. Report No.2242. September 2014.

Marine Management Organisation (2014). Revised approach to the management of commercial fisheries in European Marine Sites – Overarching policy and delivery document. Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/345970/REVISED_APPROACH_Policy_and_Delivery.pdf, accessed on 16 September 2015.

Marine Management Organisation (2015). South Marine Plan Habitats Regulations Assessment – Screening report. Report prepared by ABP Marine Environmental Research Ltd. Report No.2470b. August 2015.

Marine Scotland. (2012). Vulnerability of Scottish Seabirds to Offshore Wind Turbines. Prepared by MacArthur Green Ltd (Furness and Wade).

MarineSpace and NIRAS (2015). Habitats Regulations Assessment of the Marine Minerals licensing Round Plan: Report to Inform Appropriate Assessment.

Marubini, F., Gimona, A., Evans, P.G.H., Wright, P.J. and Pierce, G.J. (2009). Habitat preferences and interannual variability in occurrence of the harbour porpoise *Phocoena phocoena* in the north-west of Scotland. Marine Ecology Progress Series, 381: 297-310.

Mason, C.F. & Macdonald, S.M. (1986). Otters. Ecology and Conservation. Cambridge Univ. Press. 236 pp.

Mikkelsen, L., Mouritsen, K. N., Dahl, K., Teilmann, J., & Tougaard, J. (2013). Re-established stony reef attracts harbour porpoises *Phocoena phocoena*. Marine Ecology-Progress Series, 481, 239-248.

Naylor, R., Hindar, K., Fleming, I.A., Goldburg, R. Williams, S., Volpe, J., Whoriskey, F., Eagle, J., Kelso, D. and Mangel, M. (2005). Fugitive Salmon: Assessing the Risks of Escaped Fish from Net-Pen Aquaculture. BioScience 55, 427. Available online at: http://www.esajournals.org/doi/abs/10.1890/1540-9295(2005)003%5B0021:FSFAFF%5D2.0.CO;2, accessed on 15 September 2015.

Nedwell , JR., Parvin, SJ., Edwards, B., Workman, R., Brooker, AG., Kynoch, JE. (2007a). Measurement and interpretation of underwater noise during construction and operation of offshore wind farms in UK waters. Subacoustech Report No. 544R0738 to COWRIE Ltd.

Nedwell, JR., Turnpenny, AWH., Lovell, J, Parvin, SJ., Workman, R., Spinks, JAL., Howell, D. (2007b). A validation of the dBht as a measure of the behavioural and auditory effects of underwater noise. Subacoustech Report No. 534R1231

Nedwell, J., Howell, D. (2004). A review of offshore wind farm related underwater noise sources. Report No. 544 R 0308

Northridge, S.P., Gordon, J.G., Booth, C., Calderan, S., Cargill, A., Coram, A., Gillespie, D., Lonergan, M. and Webb, A. (2010). Assessment of the impacts and utility of acoustic deterrent devices. Final Report to the Scottish Aquaculture Research Forum, project code. SARF044.

Northridge, S., Coram, A. & Gordon, J. (2013). Investigations on seal depredation at Scottish fish farms. Edinburgh: Scottish Government.

Pace D.S. Miragliuolo A., and Mussi B., 2006. Vessels and dolphins: scars that tell stories. Fins, p 19-2

Packard, A., Karlsen, H. E., Sand, O. (1990). Low frequency hearing in cephalopods. Journal of Comparative Physiology A. Vol. 166, 501 - 505.

Peeler, E.J. (2010). Disease interaction between wild and farmed fish – it is important for import risk analysis ? Joint AESAN/EFSA Workshop 'Science Supporting Risk Surveillance of Imports' - 10 February 2010, Seville (Spain).

Perrow, M.R., Gilroy, J.J., Skeate, E.R. and Tomlinson, M.L. (2011). Effects of construction of Scroby Sands offshore wind farm on the prey base of little tern *Sternula albifrons* at its most important UK colony. Marine Pollution Bulletin 62: 1661-1670

Pierpoint, C. (2008). Harbour porpoise (Phocoena phocoena) foraging strategy at a high energy, near-shore site in south-west Wales, UK. Journal of the Marine Biological Association of the United Kingdom, 2008, 88(6) 1167-1173.

Pillay. (2004). Aquaculture and the Environment. Second Edition. Published by Fishing New Books. Blackwell Scientific Publications.

Oakes, CT., Pondella, DJ. (2009). The value of a net-cage as a fish aggregating device in Southern California. Journal of the World Aquaculture Society 40: 1-21

Odeh, M., Noreika, JF., Haro, A., Maynard, A., Castro-Santos, T., Cada, G.F. (2002). Evaluation of the effects of turbulence on the behaviour of migratory fish. In Final Report 2002, report to Bonneville Power Administration, Contract no. 00000022 p1-55 (Cited from Liao 2007)

Olesiuk, P.F., Nichol, L.M., Sowden, M.J. and Ford, J.K.B. (2002). Effect of the sound generated by an acoustic harassment device on the relative abundance and distribution of harbour porpoises (Phocoena phocoena) in retreat passage, British Columbia. Marine Mammal Science, 18, pp.843-862.

OSPAR Commission. (2009). OSPAR Guidelines for the Management of Dredged Material. Reference number: 2009/4.

Ragot, P. (2009). Référentiel pour la gestion dans les sites Natura 2000 en mer. Tome 1. Les cultures marines. Activités - Interactions - Dispositifs d'encadrement. Orientations de gestion. Agence des aires marines protégées. 2009.

Ramboll (2014). Harbours Act 1964 (As amended) The Poole Harbour Revision (Works) Order 2014 Environmental Statement. Volume 4: Habitats Regulations Assessment.

Reid, JB., Evans, PGH., Northridge, SP. (2003). Atlas of Cetacean distribution in north-west European waters

Remonti, L., Prigioni, C., Balestrieri, A., Sgrosso, S., and Priore, G. (2010). Eurasian otter (*Lutra lutra*) prey selection in response to a variation of fish abundance. Italian Journal of Zoology, 77(3): 331-338.

Richardson, W.J., Green Jr, C.R., Malme, C.I. and Thomson, D.H. (1995). Marine Mammals and Noise. Academic Press, New York.

Roos, A., Loy, A., de Silva, P., Hajkova, P. & Zemanová, B. (2015). *Lutra lutra*. The IUCN Red List of Threatened Species 2015: e.T12419A21935287. http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T12419A21935287.en Downloaded on 16 September 2015.

Røstad, A., Kaartvedt, S., Klevjer, T.A, Webjørn, M. (2006). Fish are attracted to vessels. ICES Journal of Marine Science 63: 1431-1437

Ruesink, J.L., Lenihan, H.S., Trimble, A.C., Heiman, K.W., Micheli,F, Byers, J.E. and Kay, M.C. (2005). Introduction of non-native osyters: Ecosytem Effects and Restoration Implications. Annu. Rev. Ecol. Evol. Syst. 2005. 36:643–89 doi: 10.1146/annurev.ecolsys.36.102003.152638

RUK/NERC (2013) Guiding principles for cumulative effects assessment (CIA) in offshore wind farms (OWF).

Sanchez-Jerez, (2010). Effects Of Offshore Fish Farms On Wild Stocks. The Fish Site. Available at: http://www.thefishsite.com/articles/990/effects-of-offshore-fish-farms-on-wild-stocks/ Accessed: 17/09/15

Sayer, MDJ., Magill, SH, Pitcher, TJ., Morissette, L., Ainsworth C. (2005). Simulation-based investigations of fishery changes as affected by the scale and design of artificial habitats. Journal of Fish Biology 67: 218-243

SCDA, South Coast Dredging Association (2011). South Coast Marine Aggregate Regional Environmental Assessment (MAREA).

Scottish Executive. (2007). Scottish Marine Renewables: Strategic Environmental Assessment (SEA). Report prepared for the Scottish Executive by Faber Maunsell and Metoc PLC
http://www.seaenergyscotland.net/SEA_Public_Environmental_Report.htm

SCOS. (2012). Scientific advice on matters related to the management of seal populations: 2012. Special Committee on Seals, 174pp.

Schulte-Pelkum, N., Wieskotten, S., Hanke, W., Dehnhardt, G., Mauck, B. (2007). Tracking of biogenic hydrodynamic trails in harbour seals (Phoca vitulina). Journal of Experimental Biology 210(5): 781-787

SNH, (2010). Otter and Development – Scottish Wildlife Series. Online site access January 2010
http://www.snh.org.uk/publications/on-line/wildlife/otters/default.asp

South Devon AONB (2015). South Devon's top 10 natural events. Available at http://www.southdevonaonb.org.uk/coast-countryside/wildlife Accessed: 17/09/15

Southall, B. L., Bowles, A. E., Ellison, W. T., Finneran, J. J., Gentry, R. L., Greene Jr, C. R., Kastak, D., Miller, J.H., Nachigall, P.E., Richardson, W,.J., Thomas, J.A and Tyack, P.L. (2007). Marine mammal noise exposure criteria: initial scientific recommendations. Aquatic Mammals 33:411–521.

Stringell, T. B., Millar, C. P., Sanderson, W. G., Westcott, S. M., & McMath, M. J. (2013). When aerial surveys will not do: grey seal pup production in cryptic habitats of Wales. Journal of the Marine Biological Association of the United Kingdom, 1-5.

Terhune, J. M., C. L. Hoover, and S.R. Jacobs. (2002). Potential detection and deterrence ranges by harbor seals of underwater acoustic harassment devices (AHD) in the Bay of Fundy, Canada. J. World Aquacult. Soc. 33(2): 176-1

Thaxter C.B., Daunt F., Hamer K.C., Watanuki Y., Harris M.P., Grémillet D., Peters G., Wanless S. (2009). Sex-specific food provisioning in a monomorphic seabird, the Common Guillemot Uria aalge: nest defence, foraging efficiency or parental effort? Journal of Avian biology 40:75-84.

Thaxter, C.B., Wanless, S., Daunt, F., Harris, M.P., Benvenuti, S., Watanuki, Y., Grémillet, D., Hamer, K.C. (2010). Influence of wing loading on trade off between pursuit-diving and flight in Common Guillemots and razorbills. J.Exp. Biol. 213: 1018-1025.

The Crown Estate. (2011). Identification of cumulative and in combination effects associated with wave and tidal developments in the Pentland Firth and Orkney waters. Pentland Firth and Orkney Waters Enabling Actions Report

The Crown Estate, 2013. Cumulative Impact Assessment in Pentland Firth and Orkney waters. Pentland Firth and Orkney Waters Enabling Actions Report.

Thomsen, F., Lüdemann, K., Kafemann, R., Piper, W. (2006). Effects of offshore wind farm noise on marine mammals and fish. Biola, Hamburg, Germany on behalf of COWRIE Ltd. 62pp.

Thompson, D., Bexton, S., Brownlow, A., Woods, D., Patterson, T., Pye, K., Lonergan, M. and Milne, R. 2010. Report on recent seal mortalities in UK waters caused by extensive lacerations. Available online at: http://www.smru.st-and.ac.uk/documents/366.pdf.

Thompson, P.M., Hastie G.D., Nedwell J., Barham, R., Brookes K.L., Cordes L.S., Bailey H. and McLean, N., (2013). Framework for assessing impacts of pile-driving noise from offshore wind farm construction on a harbour seal population. Environmental Impact Assessment Review 43: 73–85.

Thompson, D., Onoufriou, J., Brownlow and Bishop, A. (2015). Preliminary report on predation by adult Grey seal pups as a possible explanation for corkscrew injury patterns seen in the unexplained seal deaths. SMRU

Thorstad, E.B., Fleming, I.A., McGinnity, P., Soto, D., Wennevik, V. and Whoriskey, F. (2008). Incidence and impacts of escaped farmed Atlantic salmon Salmo salar in nature. NINA Special Report 36. 110 pp.

Tyldesley, D. 2011 Assessing projects under the Habitats Directive: guidance for competent authorities. Report to the Countryside Council for Wales, Bangor.

UK Inter-Agency Marine Mammal Working Group (2015). Management Units for marine mammals in UK waters (June 2015) and cover note prepared by the UK Statutory Nature Conservation Bodies (SNCBs).

UKMMAS, (2010). Charting Progress 2: Feeder Report: Productive Seas The Green and Blue (2009). Sewage and waste water discharges from boats.

Votier, S.C., Birkhead, T.R., Oro, D., Trinder, M., Grantham, M.J., Clark, J.A., McCleery, R.H. and Hatchwell, B.J. (2008). Recruitment and survival of immature seabirds in relation to oil spills and climate variability. Journal of Animal Ecology, 77, 974-983.

Wardle, C.S. (1986). Fish behaviour and fishing gear. In: Pitcher T.J. (ed) The behaviour of Teleost fishes. Croom Helm Ltd, London, UK, p 463-495.

Wernham, C.V., Peach, W.J. and Browne, S.J. (1997). Survival rates of rehabilitated guillemots. BTO Research Report 186. British Trust for Ornithology, Thetford.

WDCS. (2009). UK - Vessel Collisions. http://www.wdcs.org/submissions_bin/uk_vessel_collisions.pdf

WDCS. (2010). Toward Marine Protected Areas for Cetaceans in Scotland, England and Wales. A scientific review identifying critical habitat and key recommendations.

Wilding, T. and Hughes, D. (2010). A review and assessment of the effects of marine fish farm discharges on Biodiversity Action Plan habitats. Scottish Aquaculture Research Forum (SARF).

Wilson, B., Batty, RS., Daunt, F., Carter, C. (2007). Collision risks between marine renewable energy devices and mammals, fish and diving birds. Report to the Scottish Executive. Scottish Association for Marine Science, Oban

Wilhelmsson, D., Malm, T., Öhman, M. (2006). The influence of offshore wind power on demersal fish. ICES Journal of Marine Science 63: 775-784

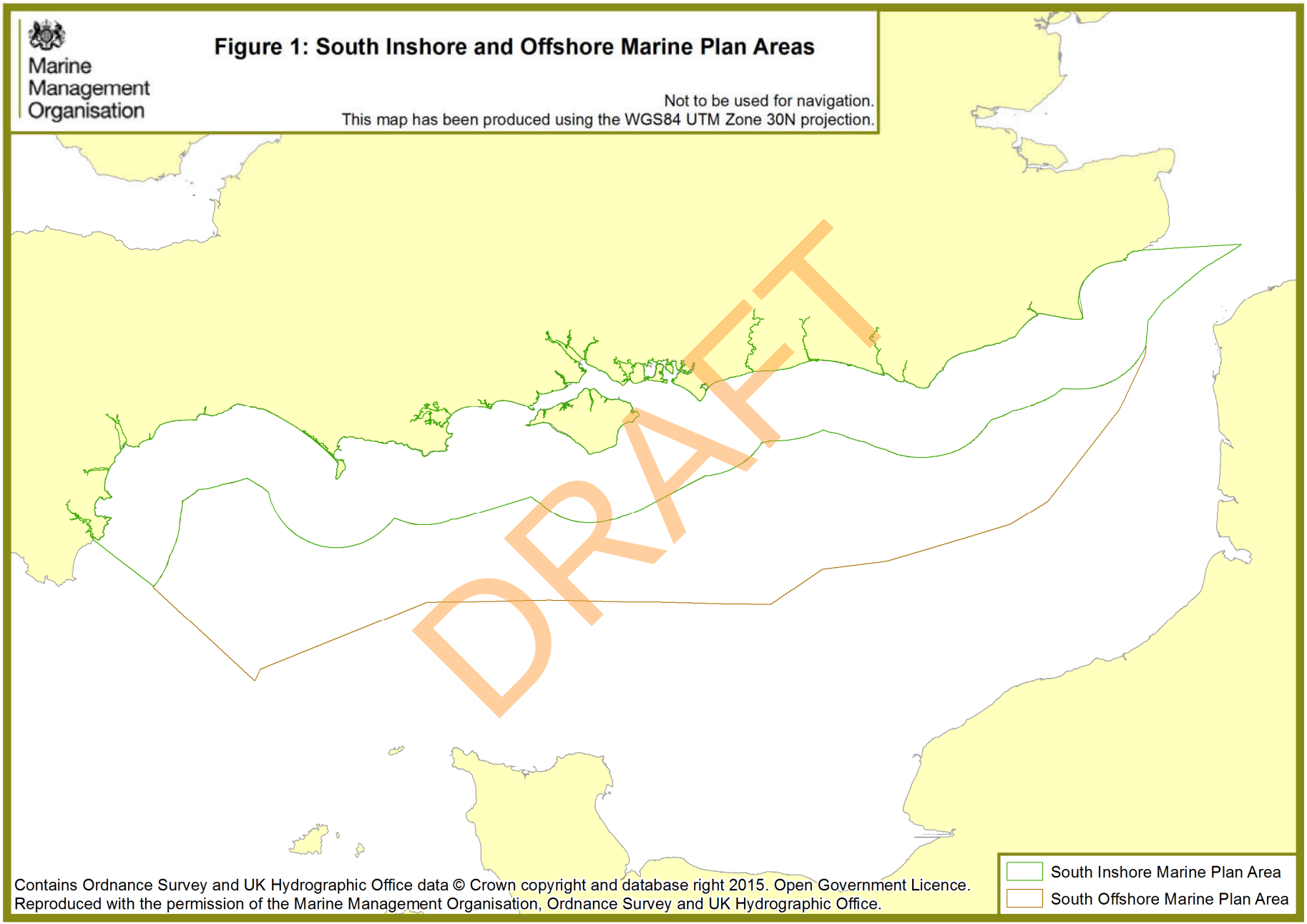
Winslade, P. (1974). Behavioural studies on lesser sandeel Ammodytes marinus (Raitt). 2. Effect of light intensity on activity. Journal of Fish Biology, 6, 577-586.

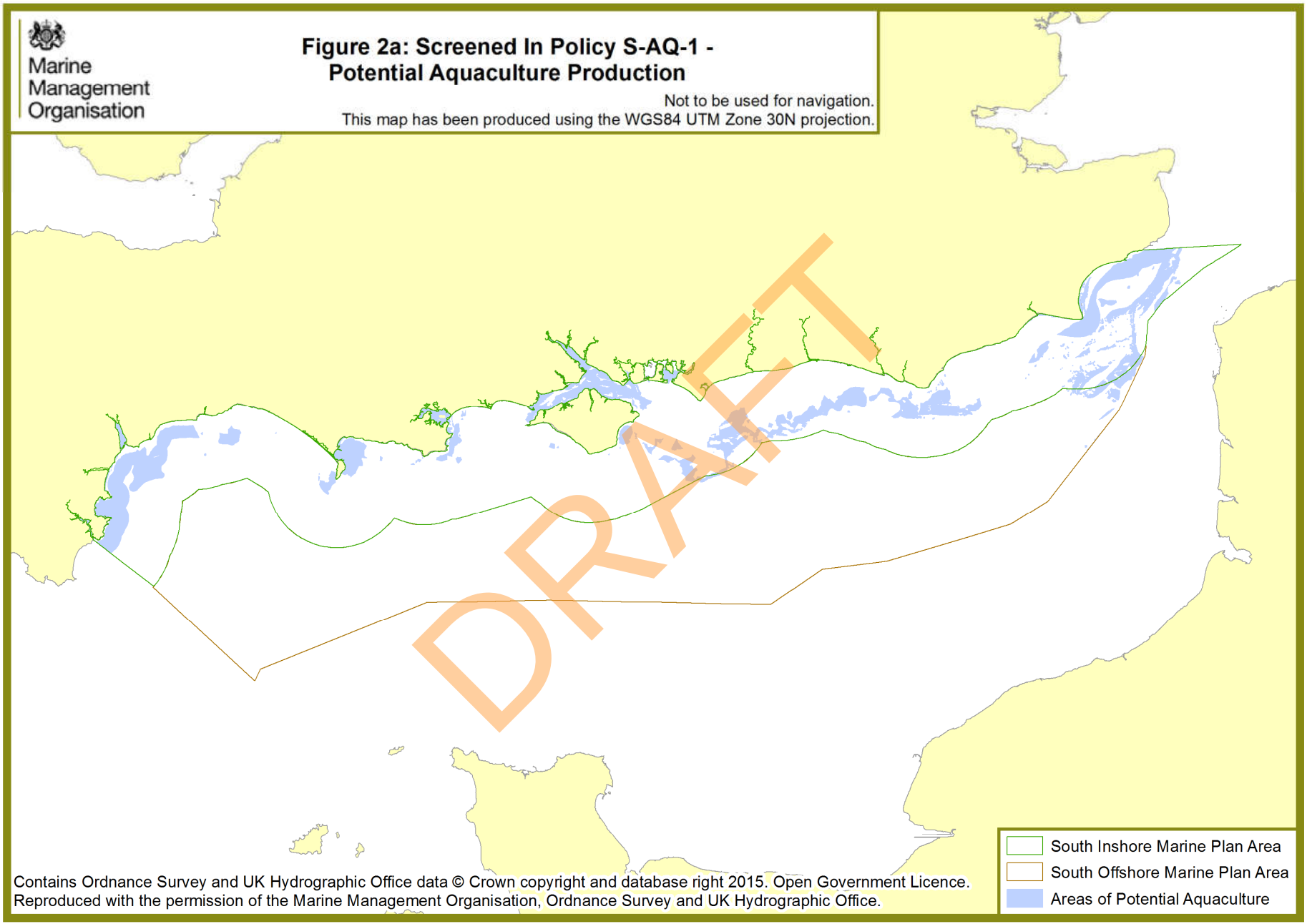
Wright *et al*. (2007a). Do Marine Mammals Experience Stress Related to Anthropogenic Noise?, International Journal of Comparative Psychology, 20, 274-316.

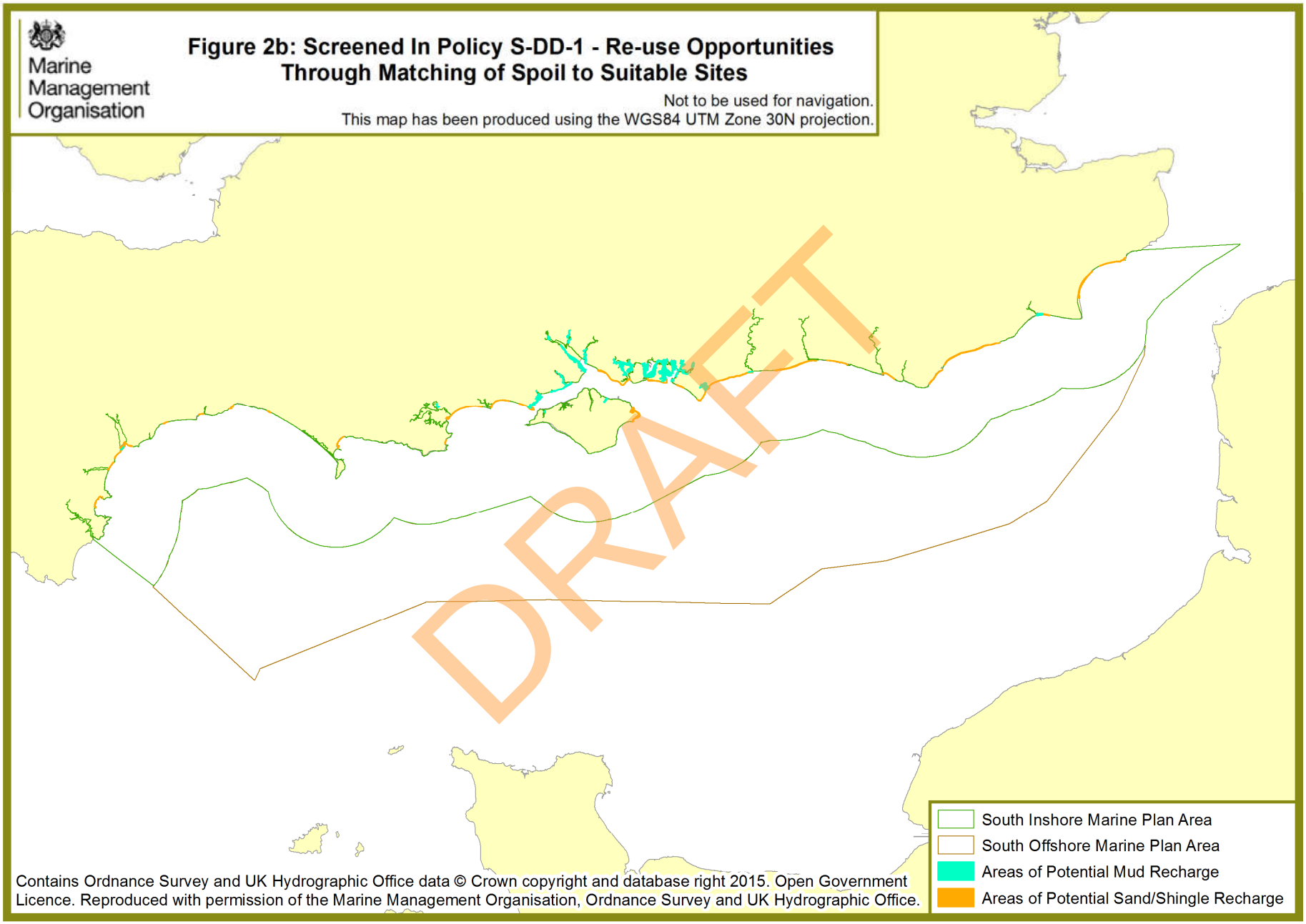
Wright *et al*. (2007b). Anthropogenic Noise as a Stressor in Animals: A Multidisciplinary Perspective International Journal of Comparative Psychology, 20, 250-273.

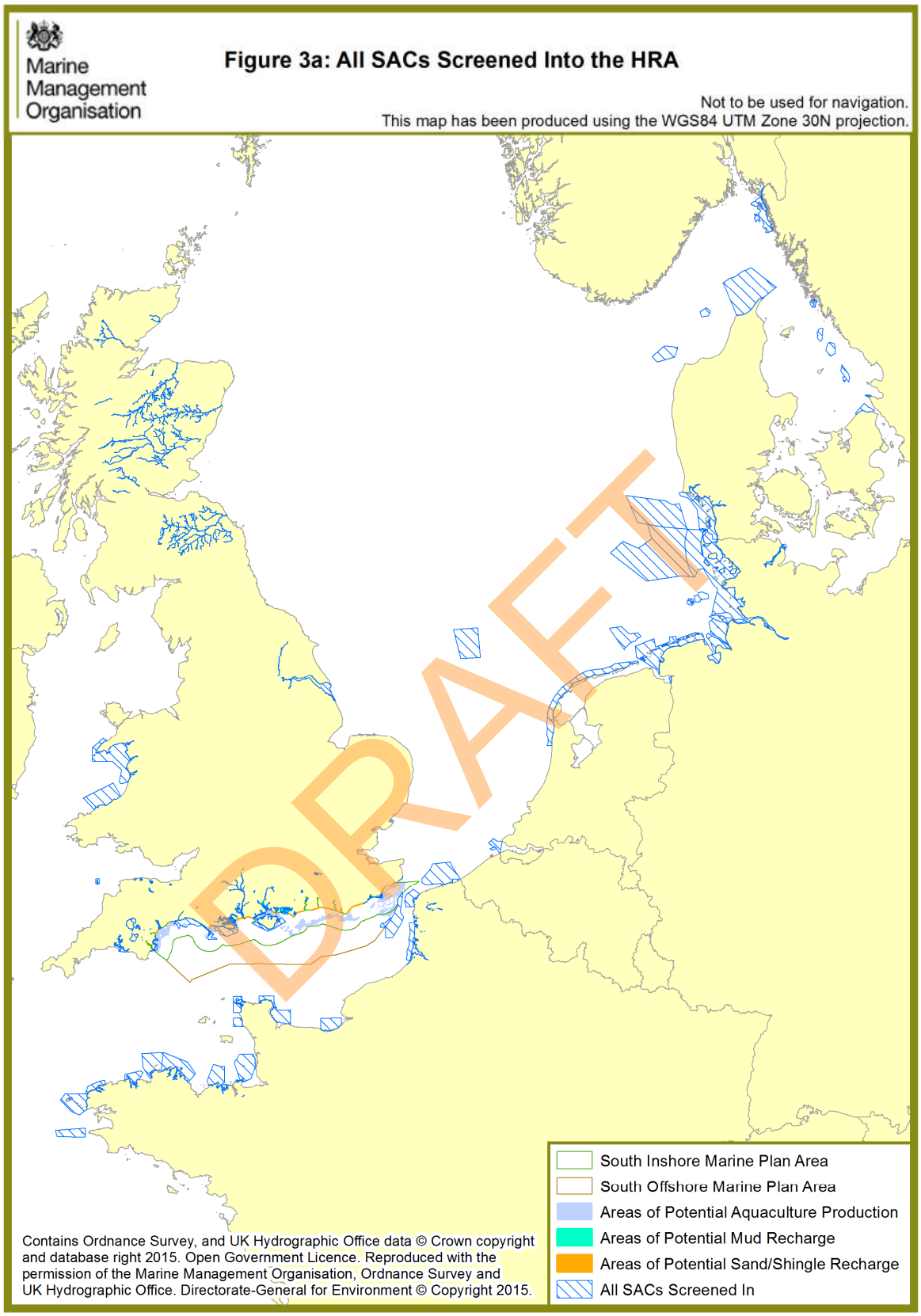
Zollett E.A., and Rosenberg A.A. (2005). A review of cetacean bycatch in trawl fisheries of New Hampshire. Literature review.

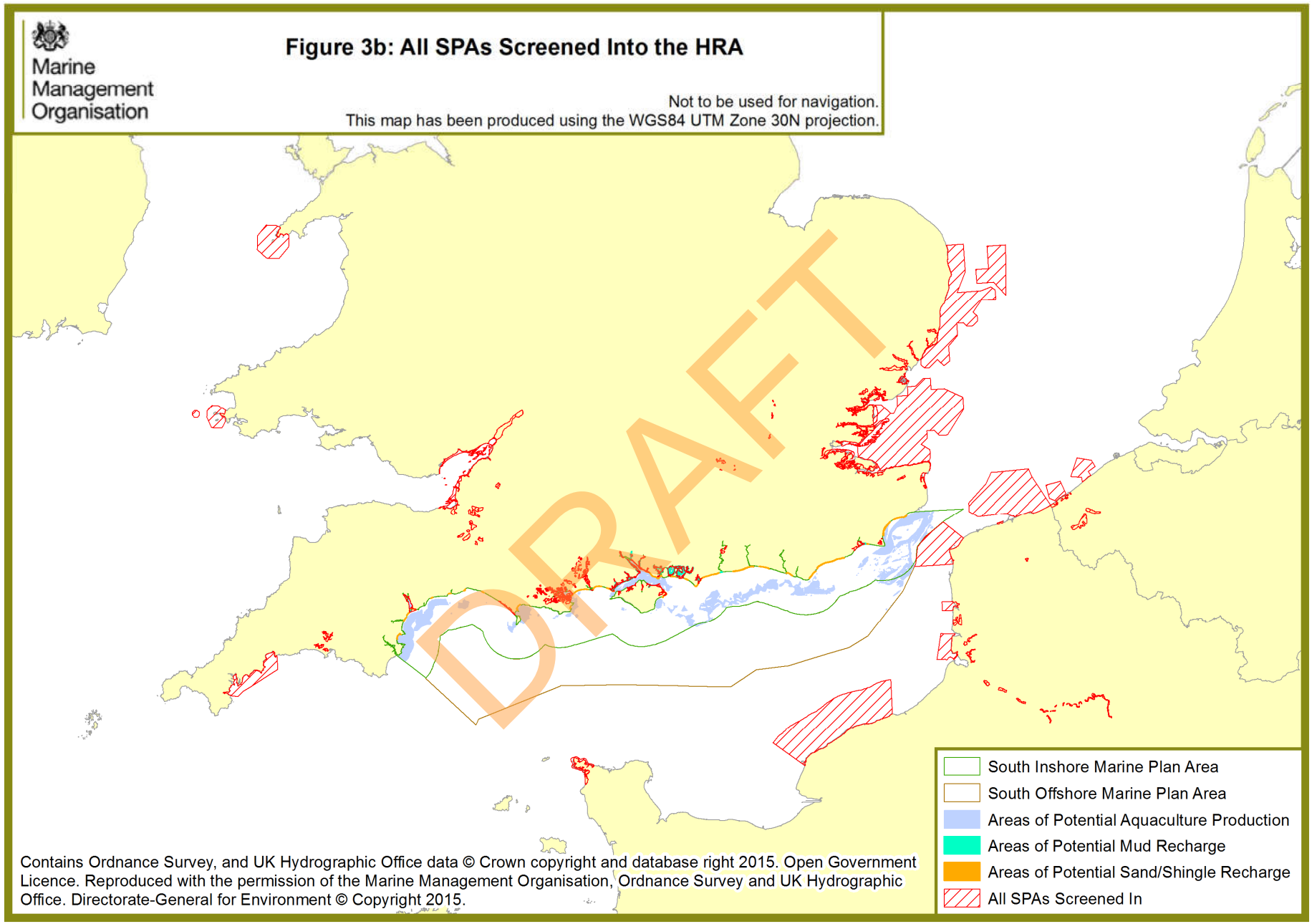
Annex 1: Screening map of the policy and ecological screening process

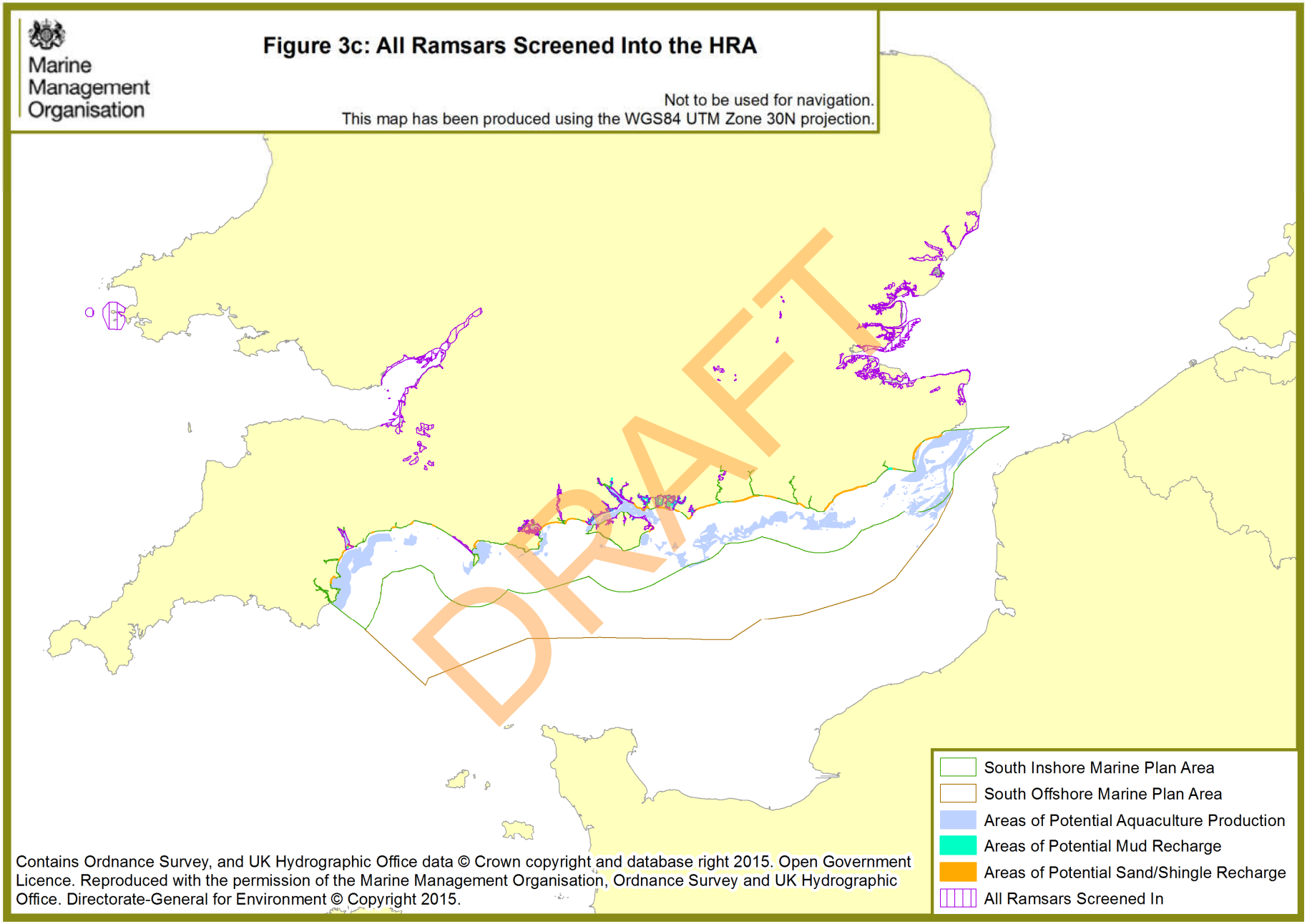

Marine Management Organisation
Figure 1: South Inshore and Offshore Marine Plan Areas
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
Contains Ordnance Survey and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence.
Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office.
South Inshore Marine Plan Area
South Offshore Marine Plan Area

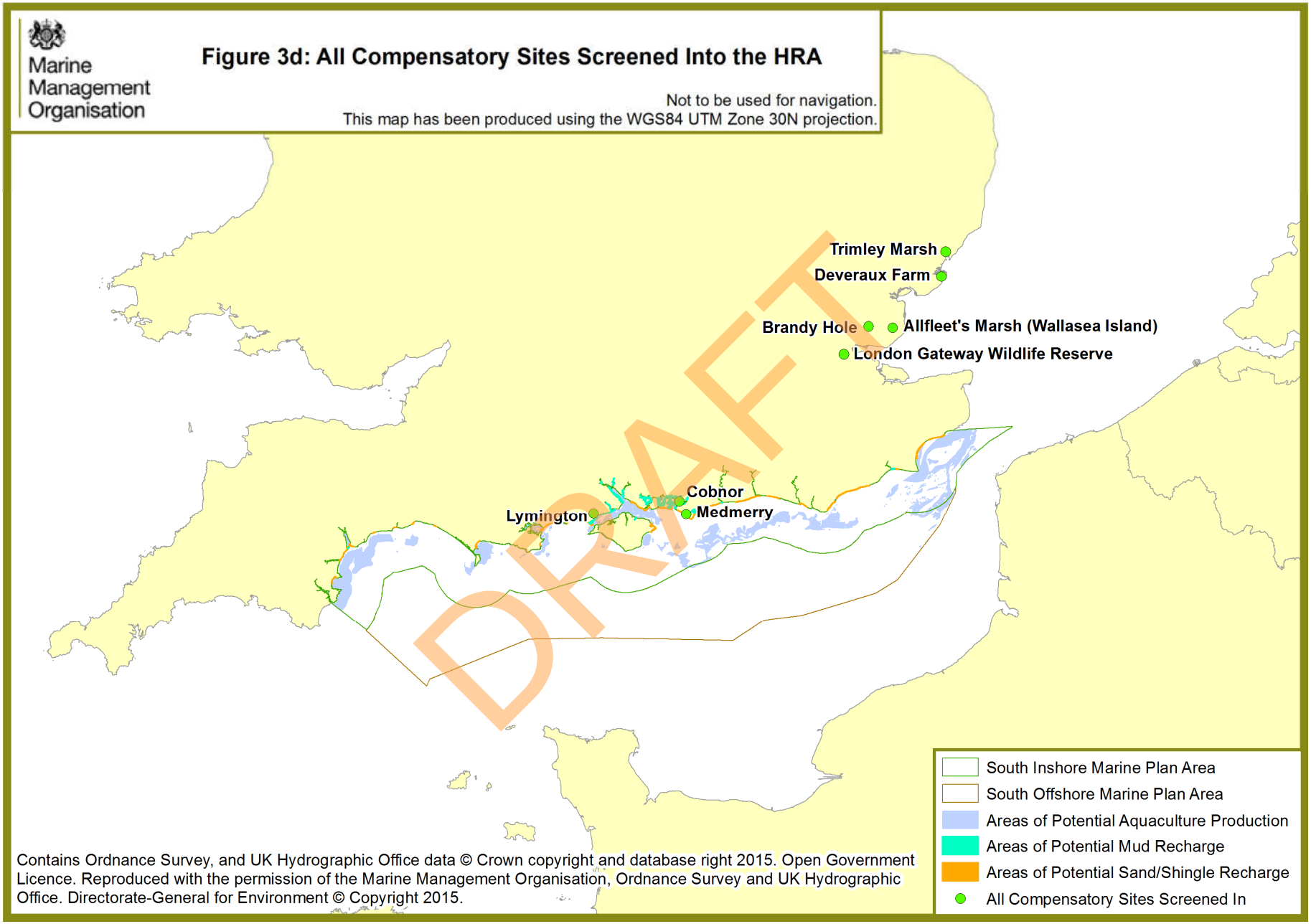

Marine Management Organisation
Figure 2a: Screened In Policy S-AQ-1 - Potential Aquaculture Production
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture
Contains Ordnance Survey and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence.
Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office.

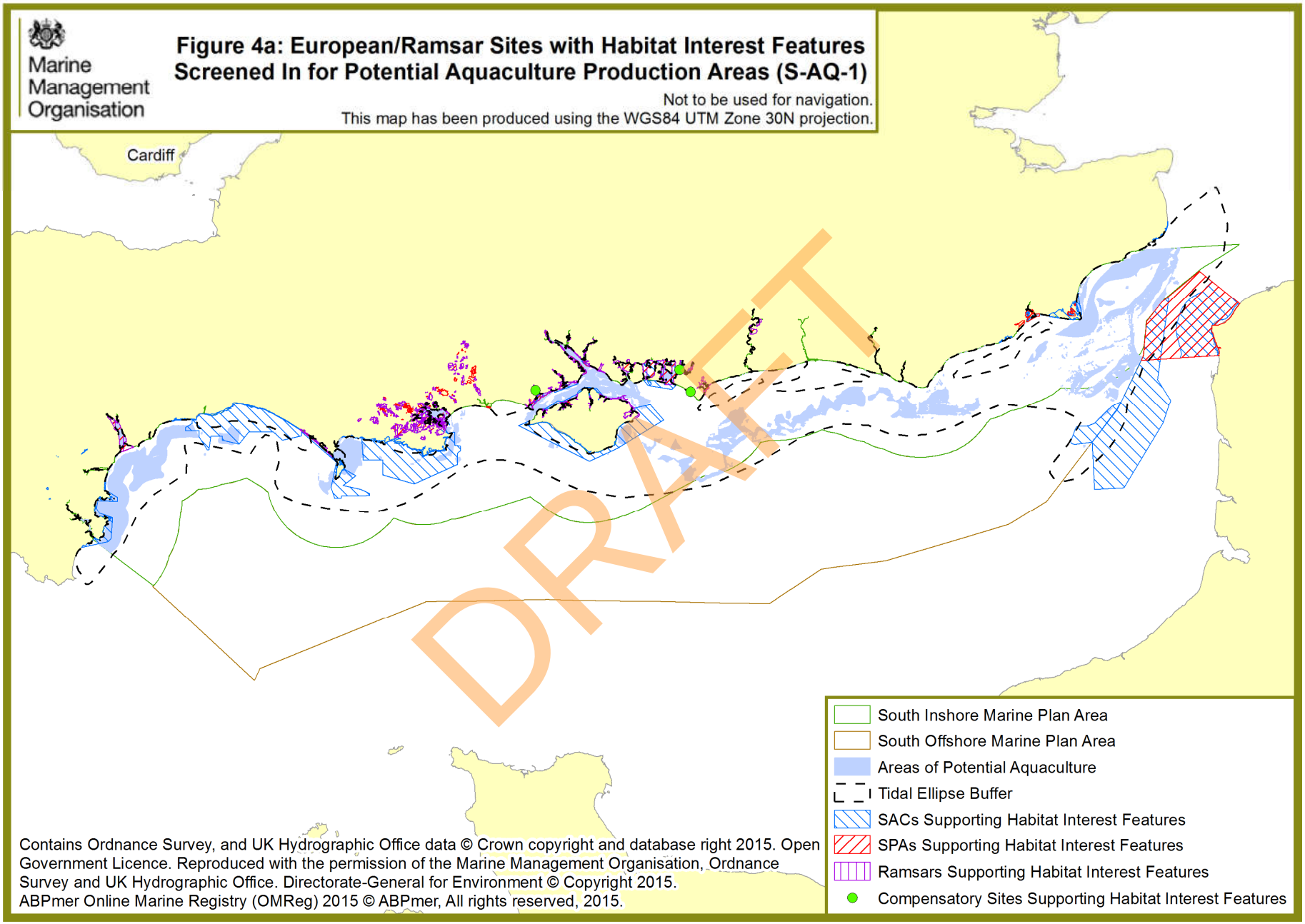

Marine Management Organisation
Figure 2b: Screened In Policy S-DD-1 - Re-use Opportunities Through Matching of Spoil to Suitable Sites
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Mud Recharge
Areas of Potential Sand/Shingle Recharge
Contains Ordnance Survey and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office.

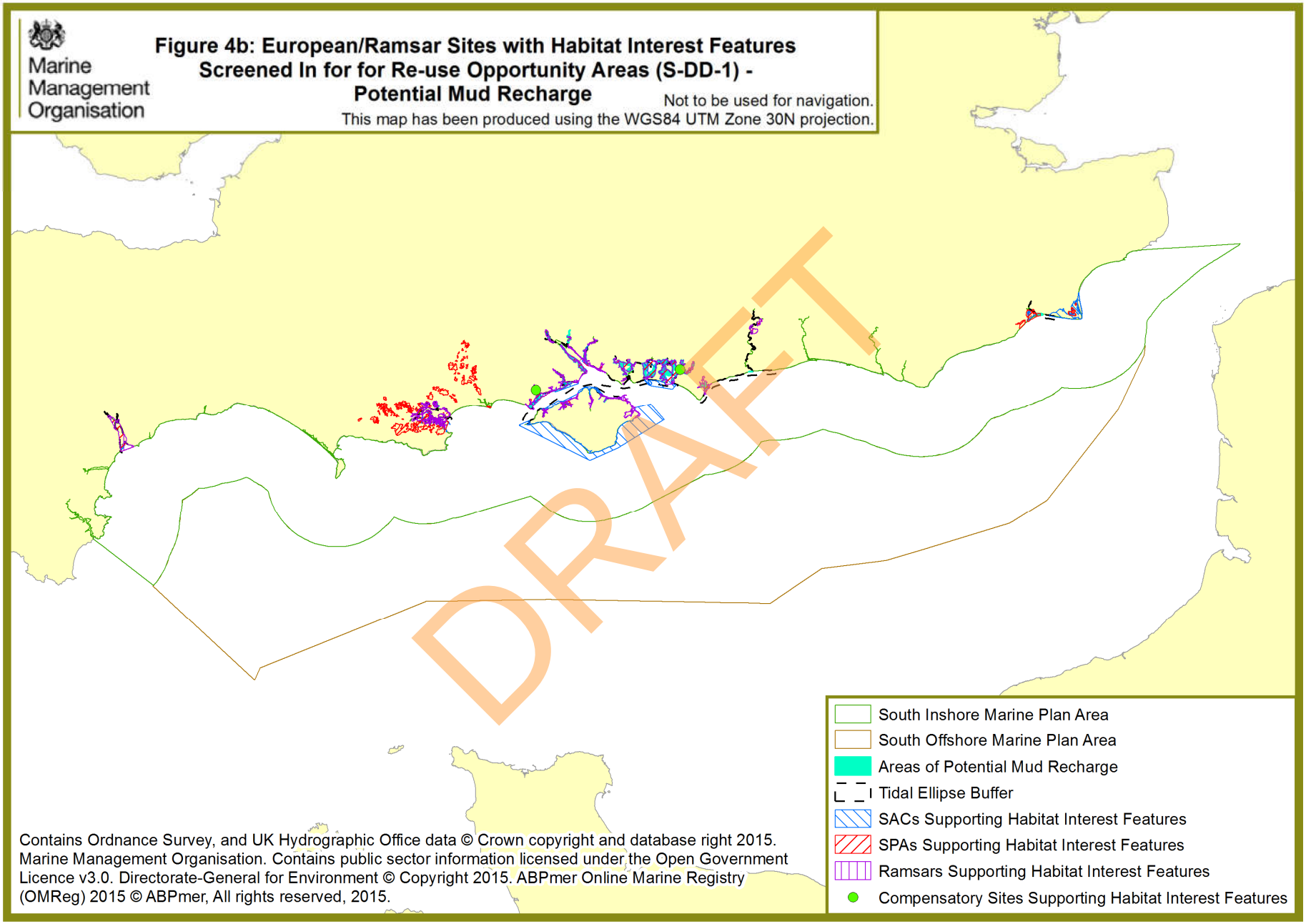

Marine Management Organisation
Figure 3a: All SACs Screened Into the HRA
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
Areas of Potential Mud Recharge
Areas of Potential Sand/Shingle Recharge
All SACs Screened In
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

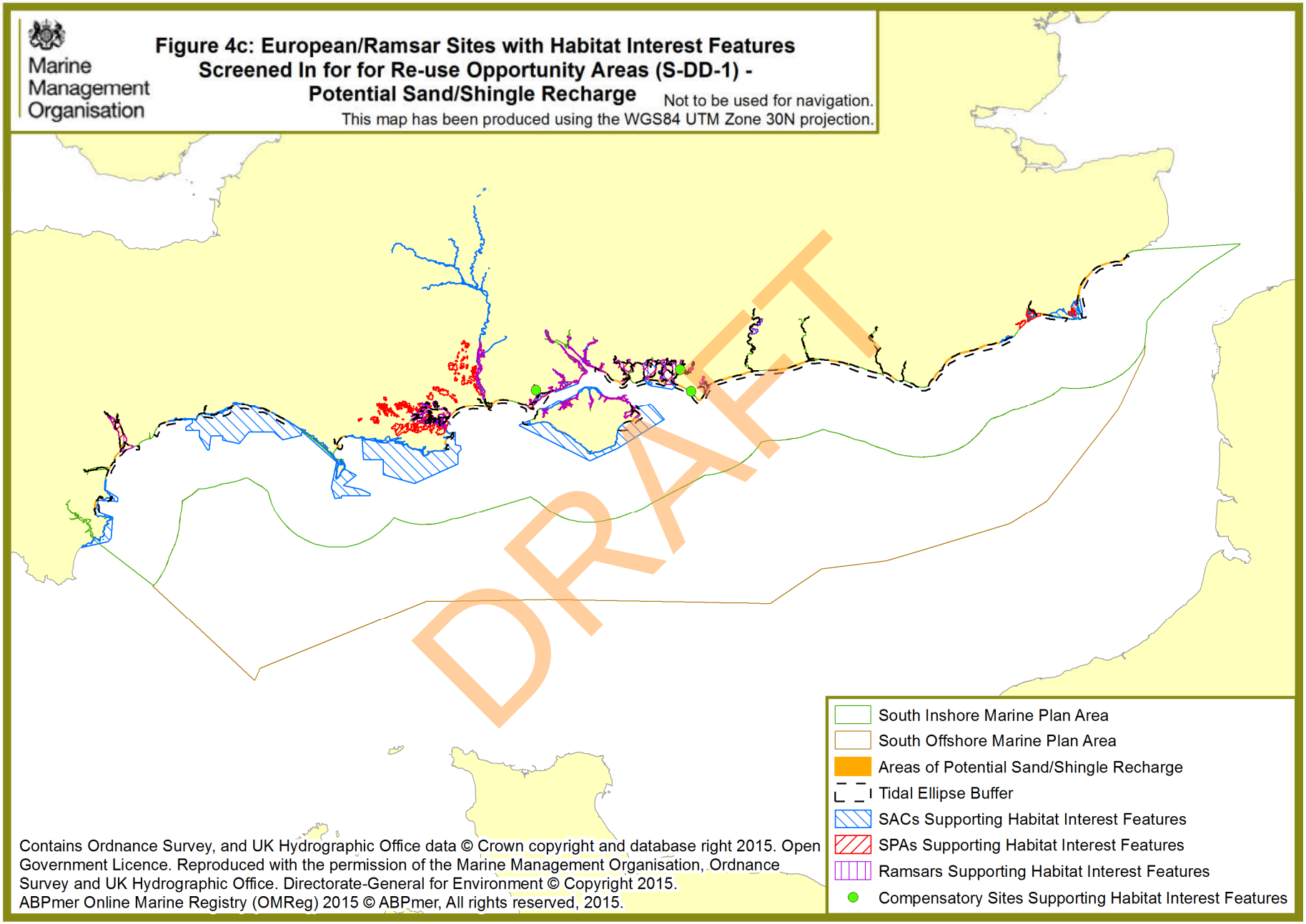

Marine Management Organisation
Figure 3b: All SPAs Screened Into the HRA
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
Areas of Potential Mud Recharge
Areas of Potential Sand/Shingle Recharge
All SPAs Screened In
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

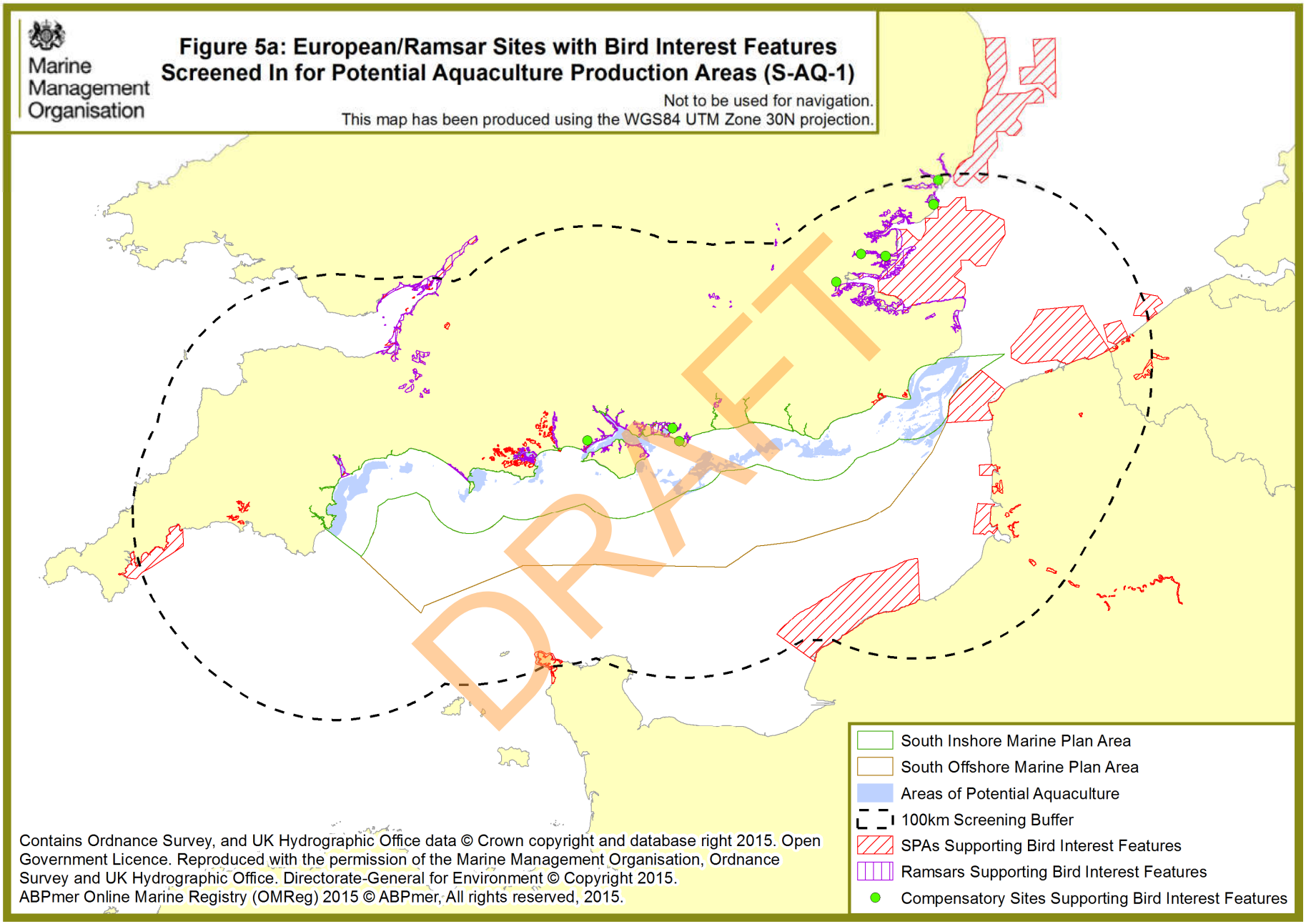

Marine Management Organisation
Figure 3c: All Ramsars Screened Into the HRA
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
Areas of Potential Mud Recharge
Areas of Potential Sand/Shingle Recharge
All Ramsars Screened In
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

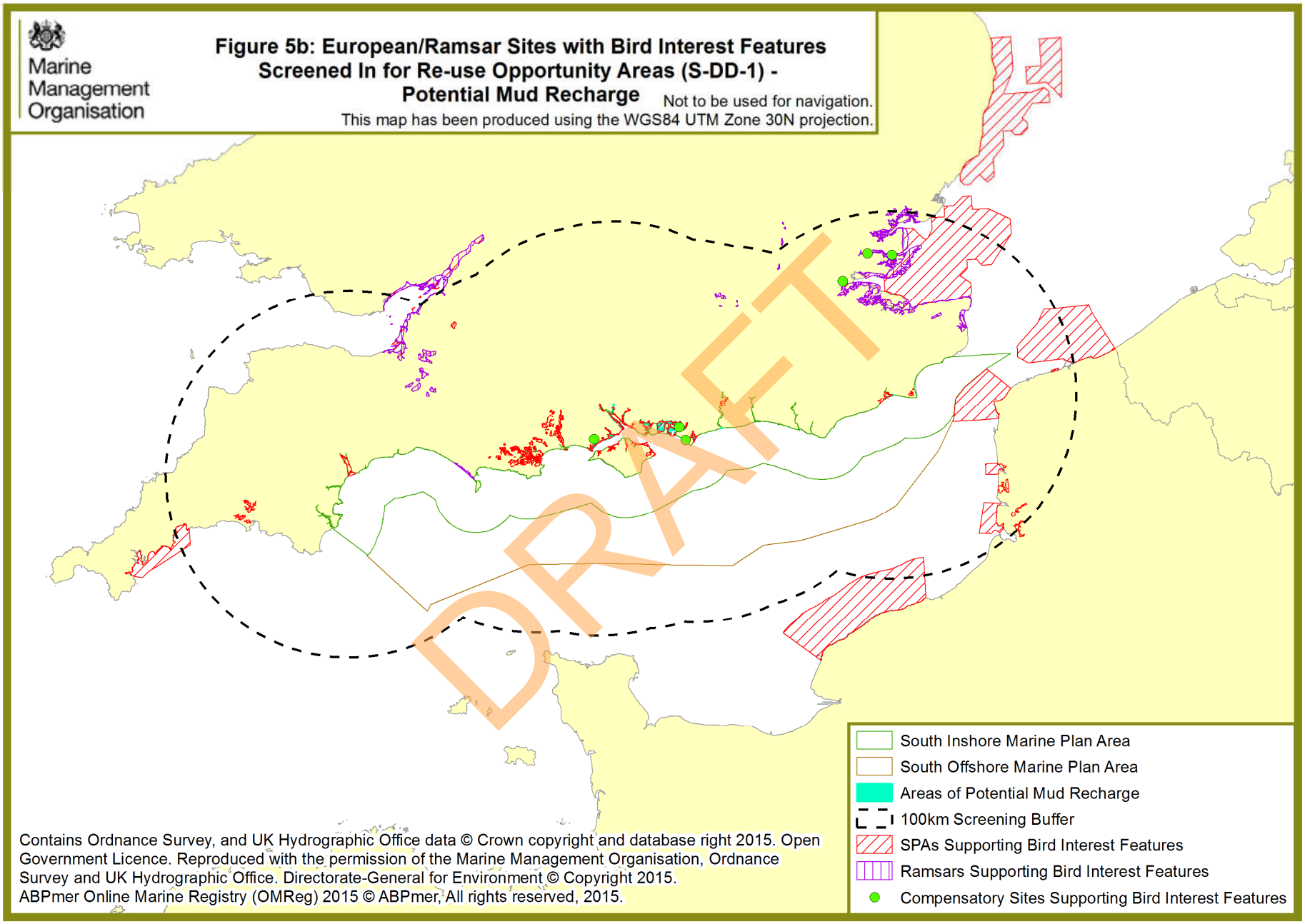

Marine Management Organisation
Figure 3d: All Compensatory Sites Screened Into the HRA
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Trimley Marsh
Deveraux Farm
Brandy Hole
Allfleet's Marsh (Wallasea Island)
London Gateway Wildlife Reserve
Cobnor
Medmerry
Lymington
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
Areas of Potential Mud Recharge
Areas of Potential Sand/Shingle Recharge
All Compensatory Sites Screened In
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

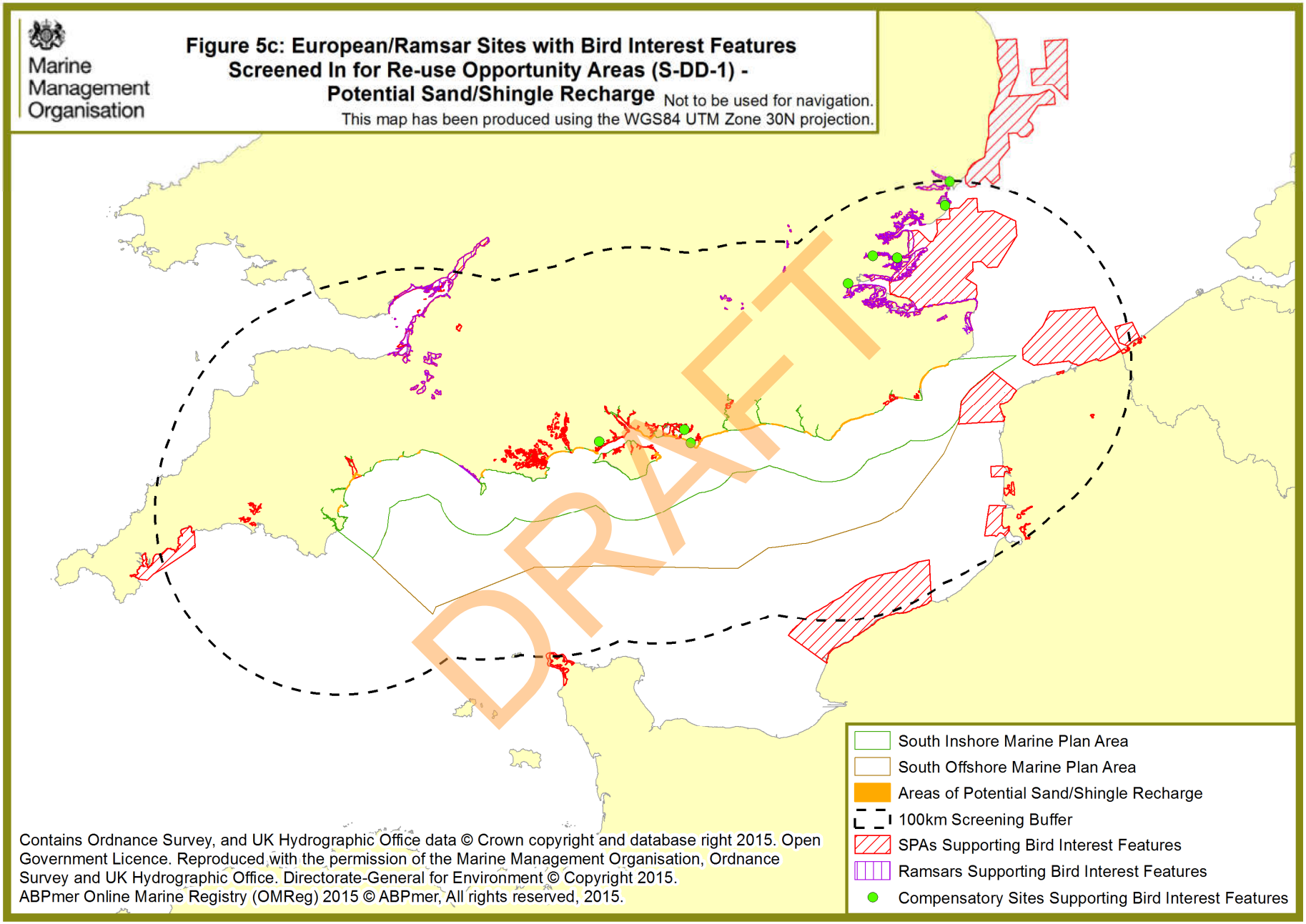

Marine Management Organisation
Figure 4a: European/Ramsar Sites with Habitat Interest Features Screened In for Potential Aquaculture Production Areas (S-AQ-1)
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Cardiff
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture
Tidal Ellipse Buffer
SACs Supporting Habitat Interest Features
SPAs Supporting Habitat Interest Features
Ramsars Supporting Habitat Interest Features
Compensatory Sites Supporting Habitat Interest Features
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.
ABPmer Online Marine Registry (OMReg) 2015 © ABPmer, All rights reserved, 2015.

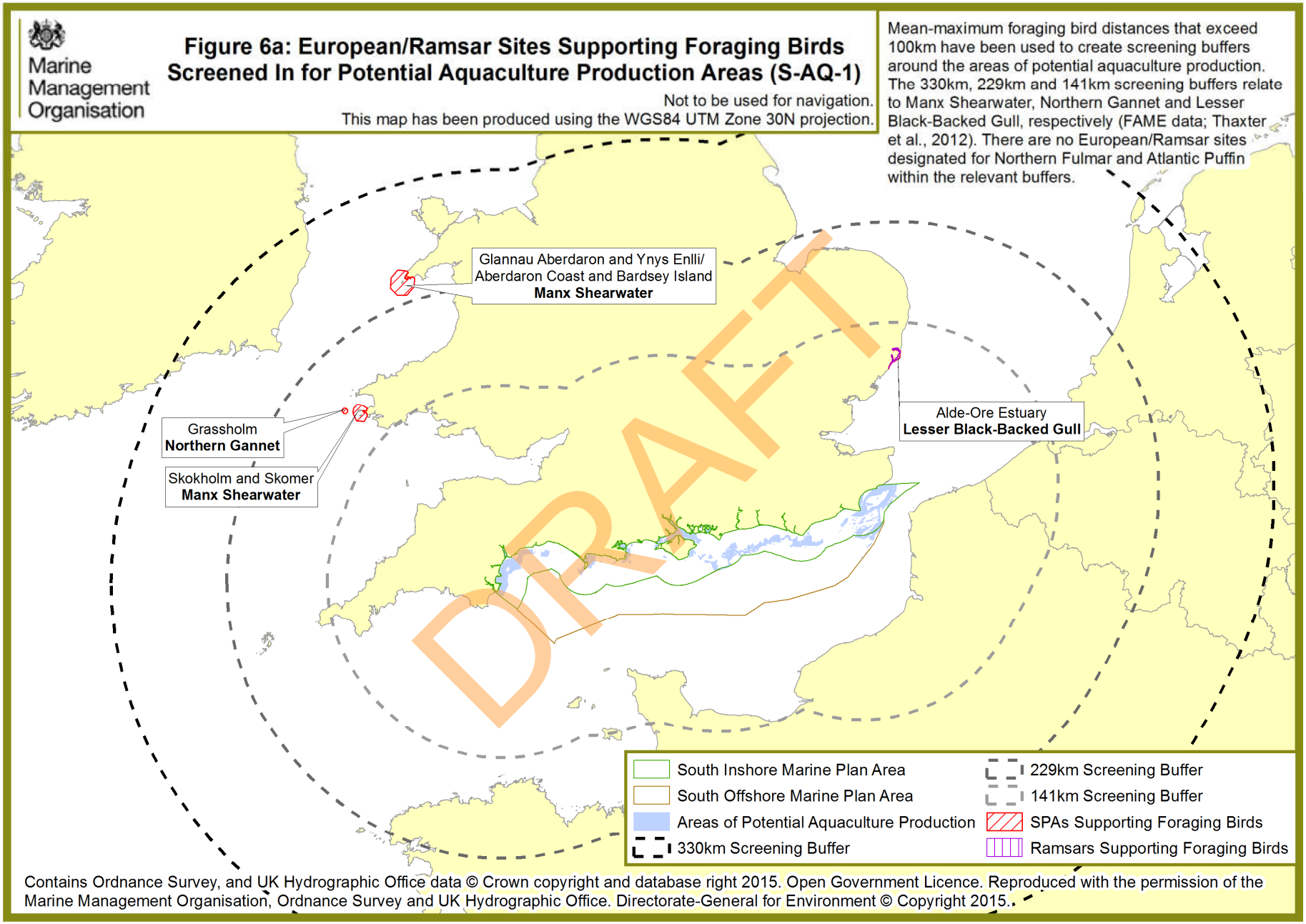

Marine Management Organisation
Figure 4b: European/Ramsar Sites with Habitat Interest Features Screened In for for Re-use Opportunity Areas (S-DD-1) - Potential Mud Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Mud Recharge
Tidal Ellipse Buffer
SACs Supporting Habitat Interest Features
SPAs Supporting Habitat Interest Features
Ramsars Supporting Habitat Interest Features
Compensatory Sites Supporting Habitat Interest Features
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Marine Management Organisation. Contains public sector information licensed under the Open Government Licence v3.0. Directorate-General for Environment © Copyright 2015. ABPmer Online Marine Registry (OMReg) 2015 © ABPmer, All rights reserved, 2015.

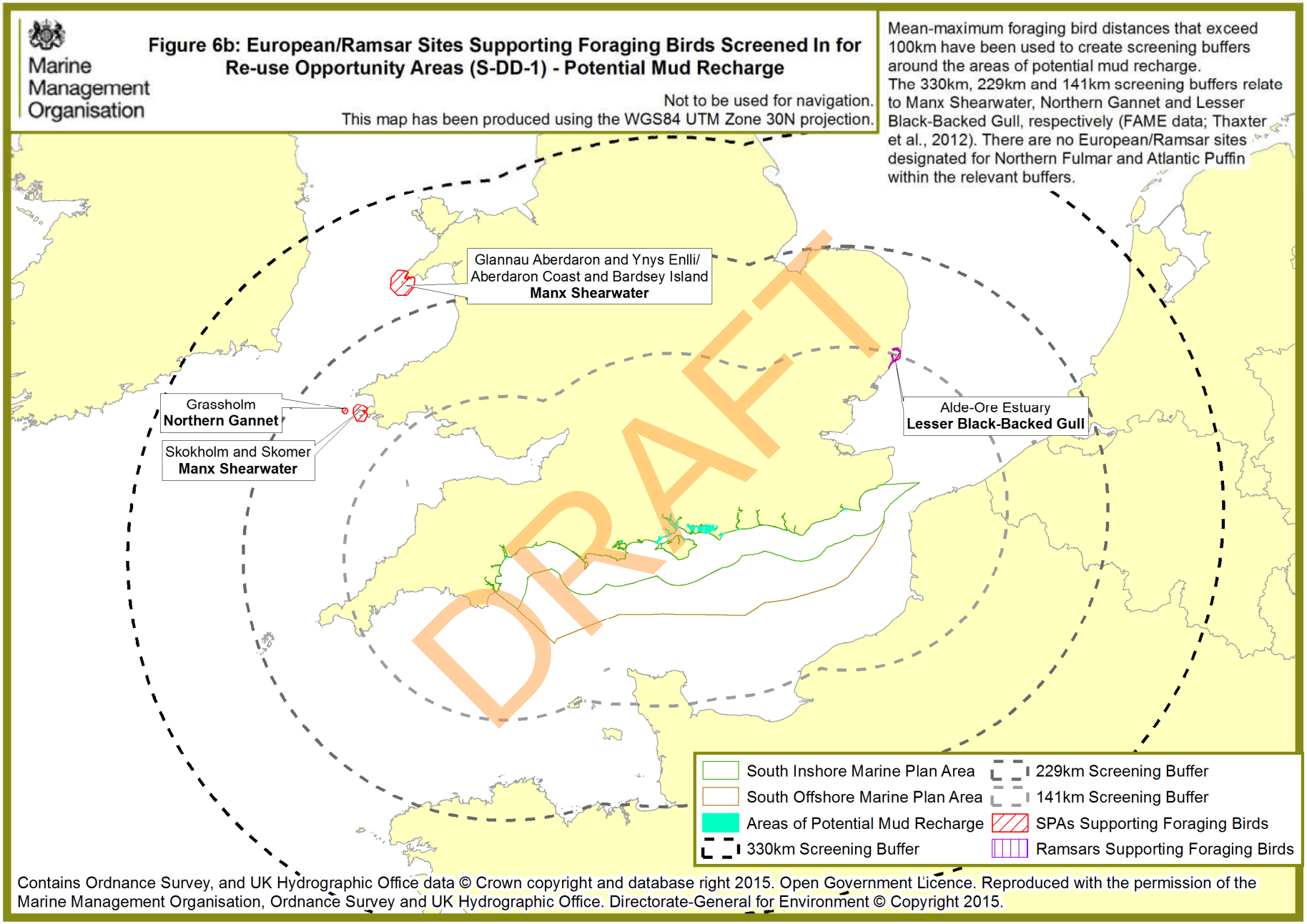

Marine Management Organisation
Figure 4c: European/Ramsar Sites with Habitat Interest Features Screened In for for Re-use Opportunity Areas (S-DD-1) - Potential Sand/Shingle Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Sand/Shingle Recharge
Tidal Ellipse Buffer
SACs Supporting Habitat Interest Features
SPAs Supporting Habitat Interest Features
Ramsars Supporting Habitat Interest Features
Compensatory Sites Supporting Habitat Interest Features
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.
ABPmer Online Marine Registry (OMReg) 2015 © ABPmer, All rights reserved, 2015.

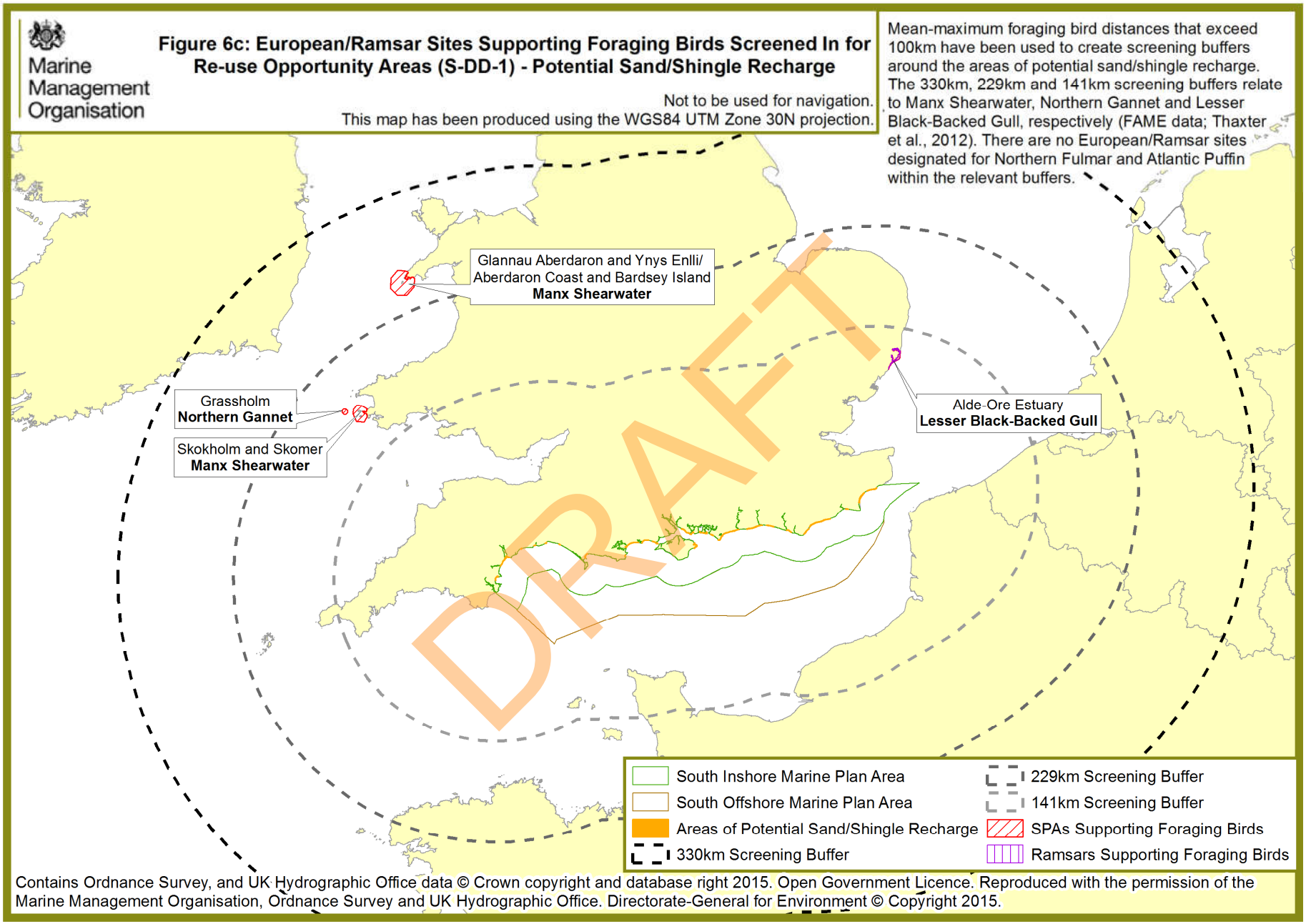

Marine Management Organisation
Figure 5a: European/Ramsar Sites with Bird Interest Features Screened In for Potential Aquaculture Production Areas (S-AQ-1)
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture
100km Screening Buffer
SPAs Supporting Bird Interest Features
Ramsars Supporting Bird Interest Features
Compensatory Sites Supporting Bird Interest Features
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.
ABPmer Online Marine Registry (OMReg) 2015 © ABPmer, All rights reserved, 2015.

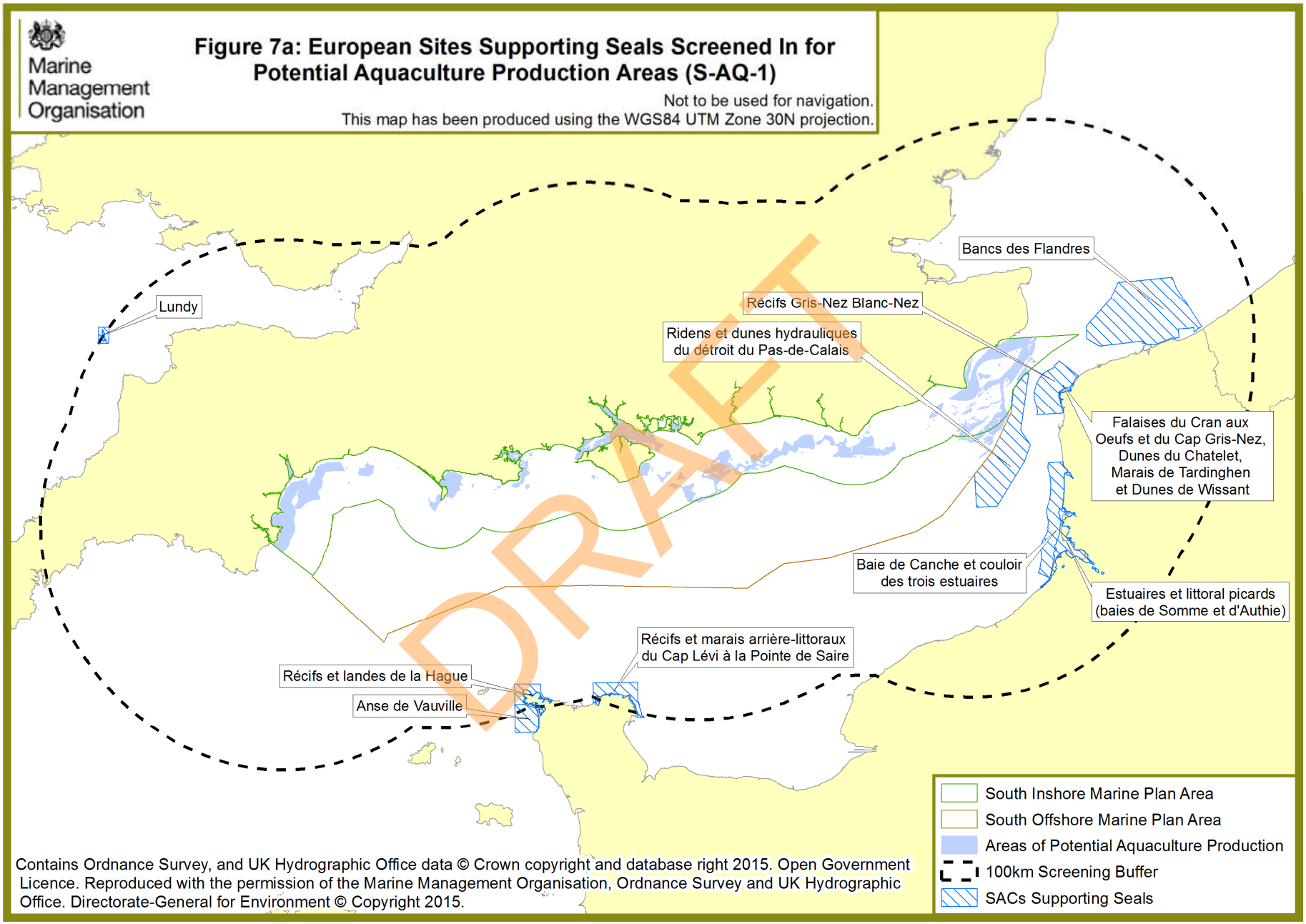

Marine Management Organisation
Figure 5b: European/Ramsar Sites with Bird Interest Features Screened In for Re-use Opportunity Areas (S-DD-1) - Potential Mud Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Mud Recharge
100km Screening Buffer
SPAs Supporting Bird Interest Features
Ramsars Supporting Bird Interest Features
Compensatory Sites Supporting Bird Interest Features
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.
ABPmer Online Marine Registry (OMReg) 2015 © ABPmer, All rights reserved, 2015.

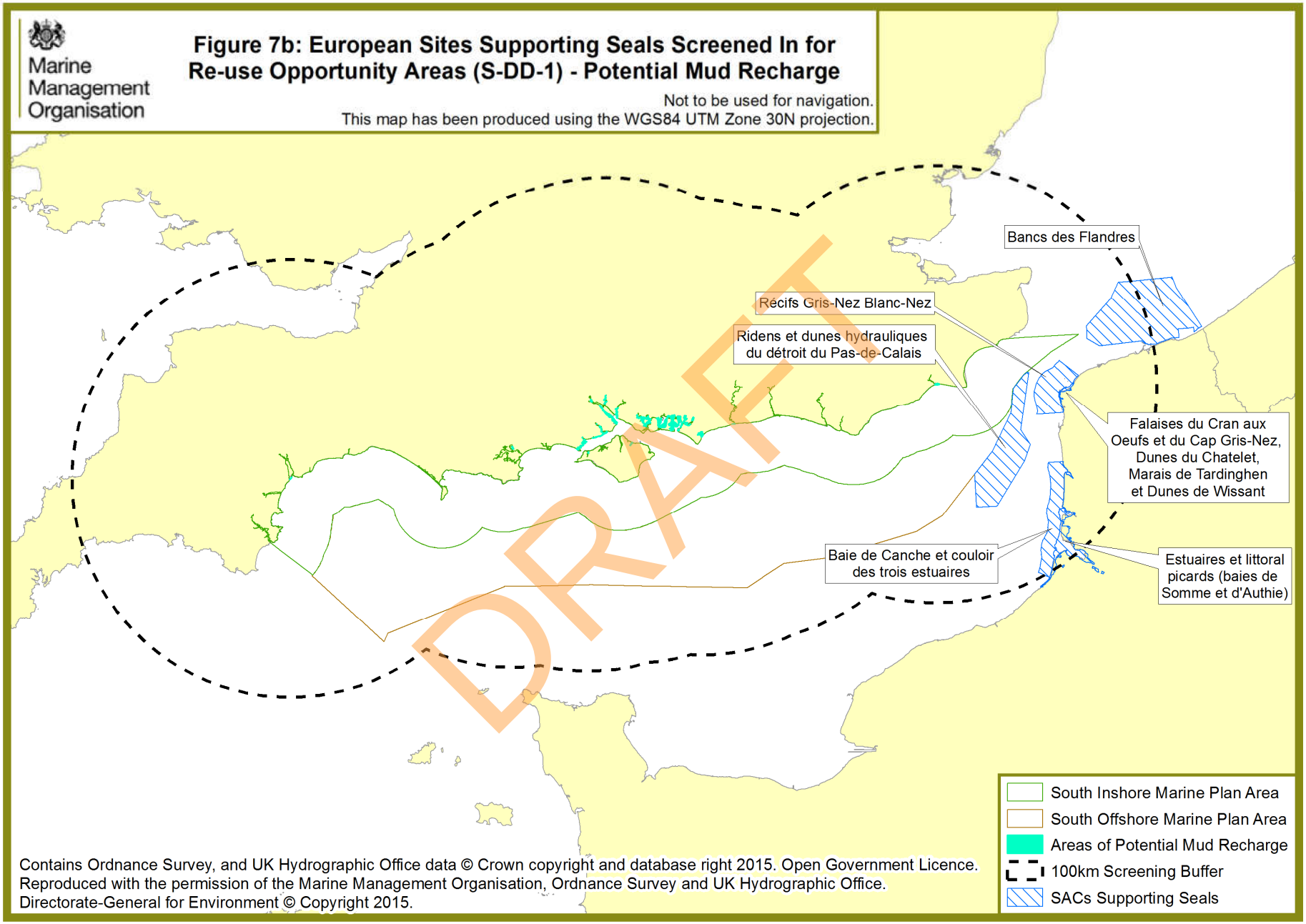

Marine Management Organisation
Figure 5c: European/Ramsar Sites with Bird Interest Features Screened In for Re-use Opportunity Areas (S-DD-1) - Potential Sand/Shingle Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Sand/Shingle Recharge
100km Screening Buffer
SPAs Supporting Bird Interest Features
Ramsars Supporting Bird Interest Features
Compensatory Sites Supporting Bird Interest Features
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.
ABPmer Online Marine Registry (OMReg) 2015 © ABPmer, All rights reserved, 2015.

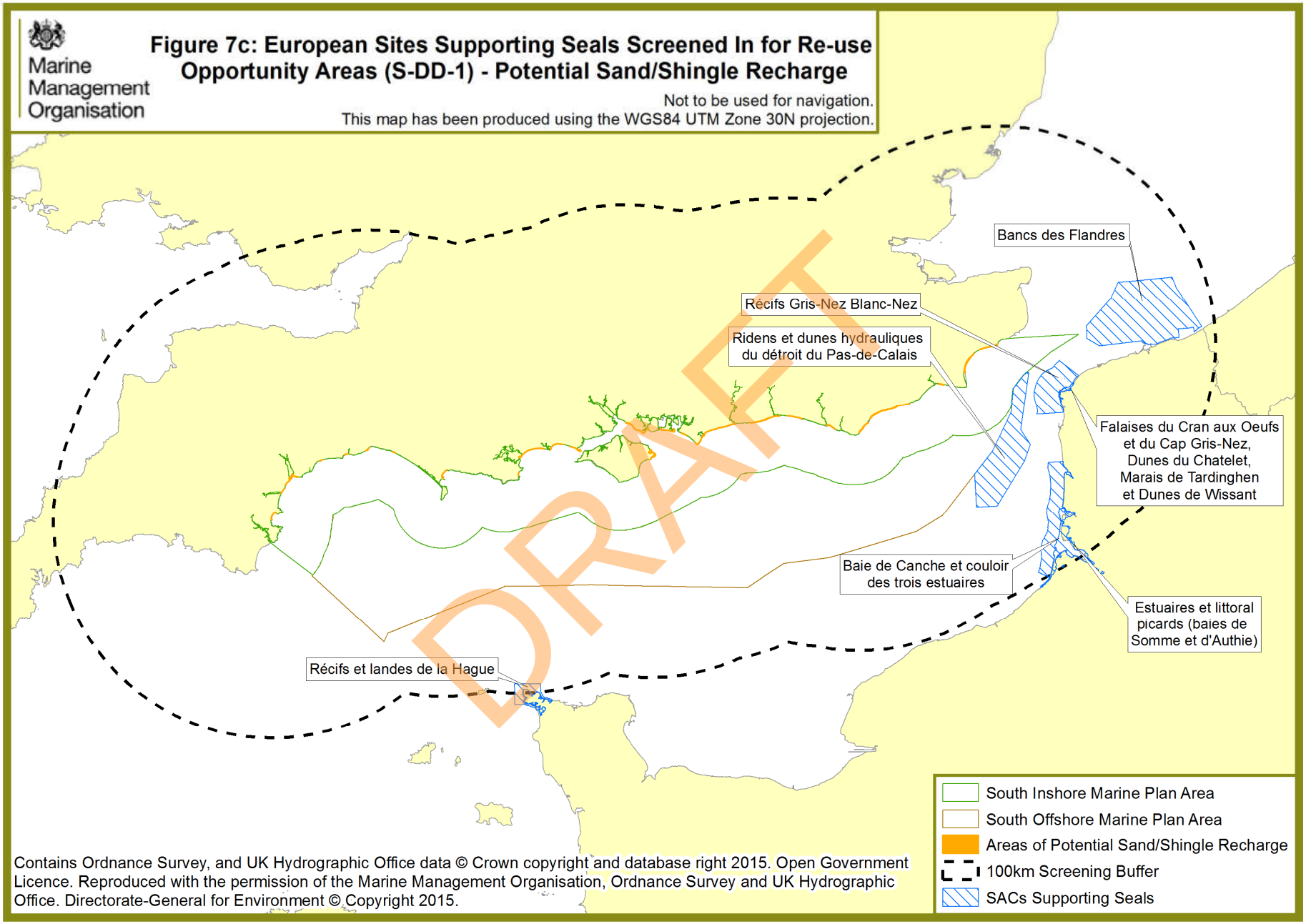

Marine Management Organisation
Figure 6a: European/Ramsar Sites Supporting Foraging Birds Screened In for Potential Aquaculture Production Areas (S-AQ-1)
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Mean-maximum foraging bird distances that exceed 100km have been used to create screening buffers around the areas of potential aquaculture production. The 330km, 229km and 141km screening buffers relate to Manx Shearwater, Northern Gannet and Lesser Black-Backed Gull, respectively (FAME data; Thaxter et al., 2012). There are no European/Ramsar sites designated for Northern Fulmar and Atlantic Puffin within the relevant buffers.
Glannau Aberdaron and Ynys Enlli/ Aberdaron Coast and Bardsey Island
Manx Shearwater
Grassholm
Northern Gannet
Skokholm and Skomer
Manx Shearwater
Alde-Ore Estuary
Lesser Black-Backed Gull
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
330km Screening Buffer
229km Screening Buffer
141km Screening Buffer
SPAs Supporting Foraging Birds
Ramsars Supporting Foraging Birds
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015..

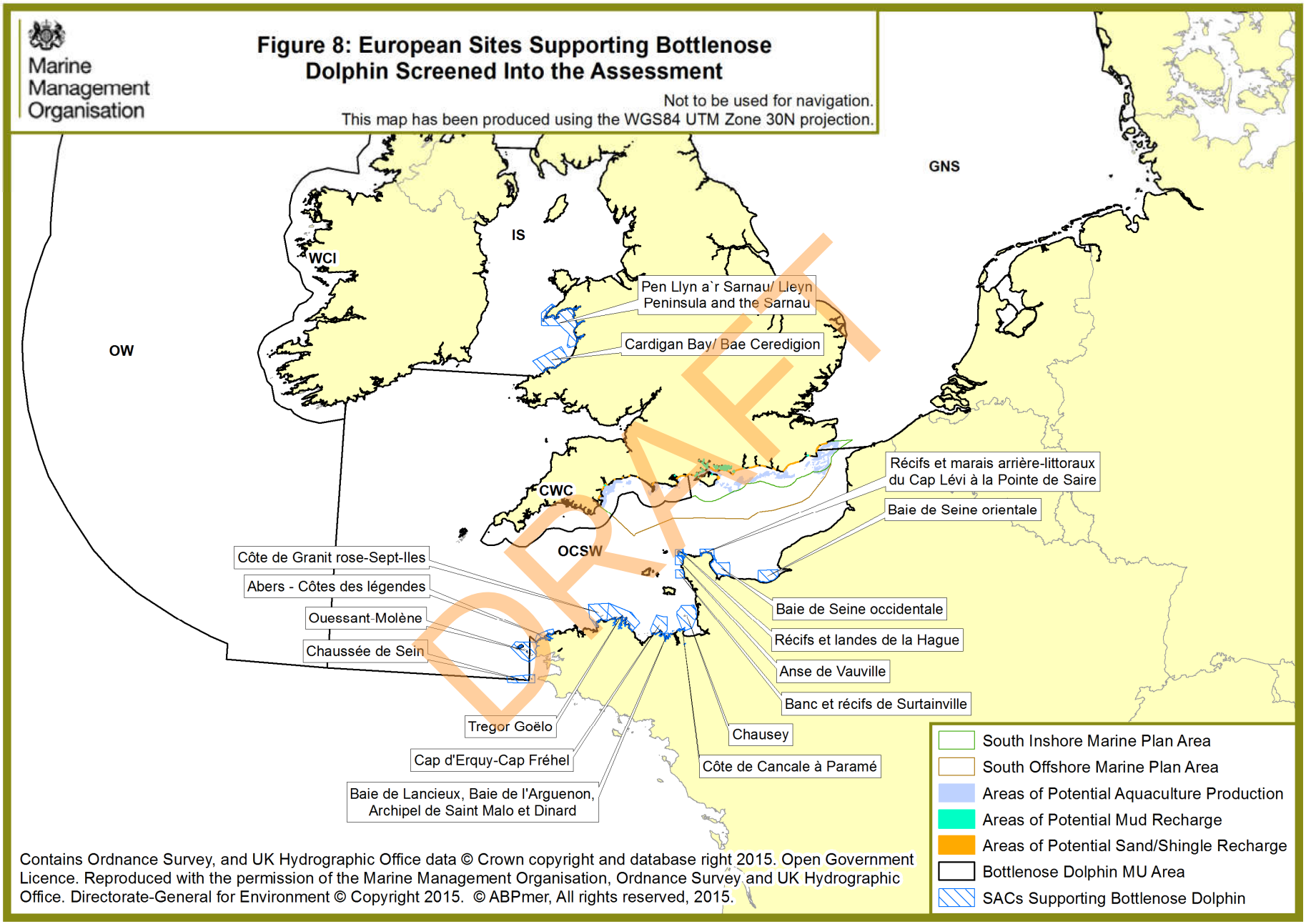

Marine Management Organisation
Figure 6b: European/Ramsar Sites Supporting Foraging Birds Screened In for Re-use Opportunity Areas (S-DD-1) - Potential Mud Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Mean-maximum foraging bird distances that exceed 100km have been used to create screening buffers around the areas of potential mud recharge.
The 330km, 229km and 141km screening buffers relate to Manx Shearwater, Northern Gannet and Lesser Black-Backed Gull, respectively (FAME data; Thaxter et al., 2012). There are no European/Ramsar sites designated for Northern Fulmar and Atlantic Puffin within the relevant buffers.
Glannau Aberdaron and Ynys Enlli/ Aberdaron Coast and Bardsey Island
Manx Shearwater
Grassholm
Northern Gannet
Skokholm and Skomer
Manx Shearwater
Alde-Ore Estuary
Lesser Black-Backed Gull
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Mud Recharge
330km Screening Buffer
229km Screening Buffer
141km Screening Buffer
SPAs Supporting Foraging Birds
Ramsars Supporting Foraging Birds
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

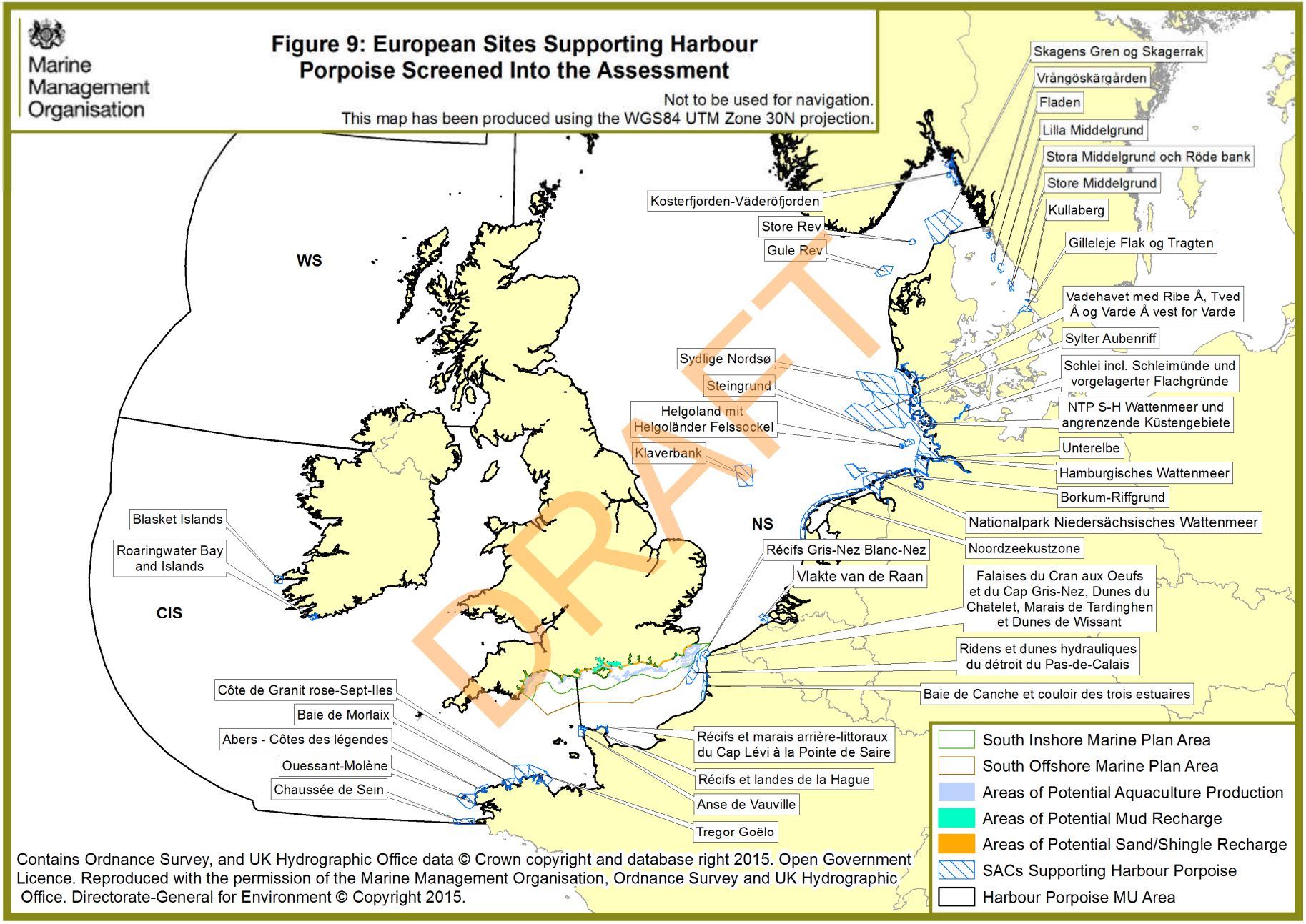

Marine Management Organisation
Figure 6c: European/Ramsar Sites Supporting Foraging Birds Screened In for Re-use Opportunity Areas (S-DD-1) - Potential Sand/Shingle Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Mean-maximum foraging bird distances that exceed 100km have been used to create screening buffers around the areas of potential sand/shingle recharge. The 330km, 229km and 141km screening buffers relate to Manx Shearwater, Northern Gannet and Lesser Black-Backed Gull, respectively (FAME data; Thaxter et al., 2012). There are no European/Ramsar sites designated for Northern Fulmar and Atlantic Puffin within the relevant buffers.
Glannau Aberdaron and Ynys Enlli/ Aberdaron Coast and Bardsey Island
Manx Shearwater
Grassholm
Northern Gannet
Skokholm and Skomer
Manx Shearwater
Alde-Ore Estuary
Lesser Black-Backed Gull
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Sand/Shingle Recharge
330km Screening Buffer
229km Screening Buffer
141km Screening Buffer
SPAs Supporting Foraging Birds
Ramsars Supporting Foraging Birds
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

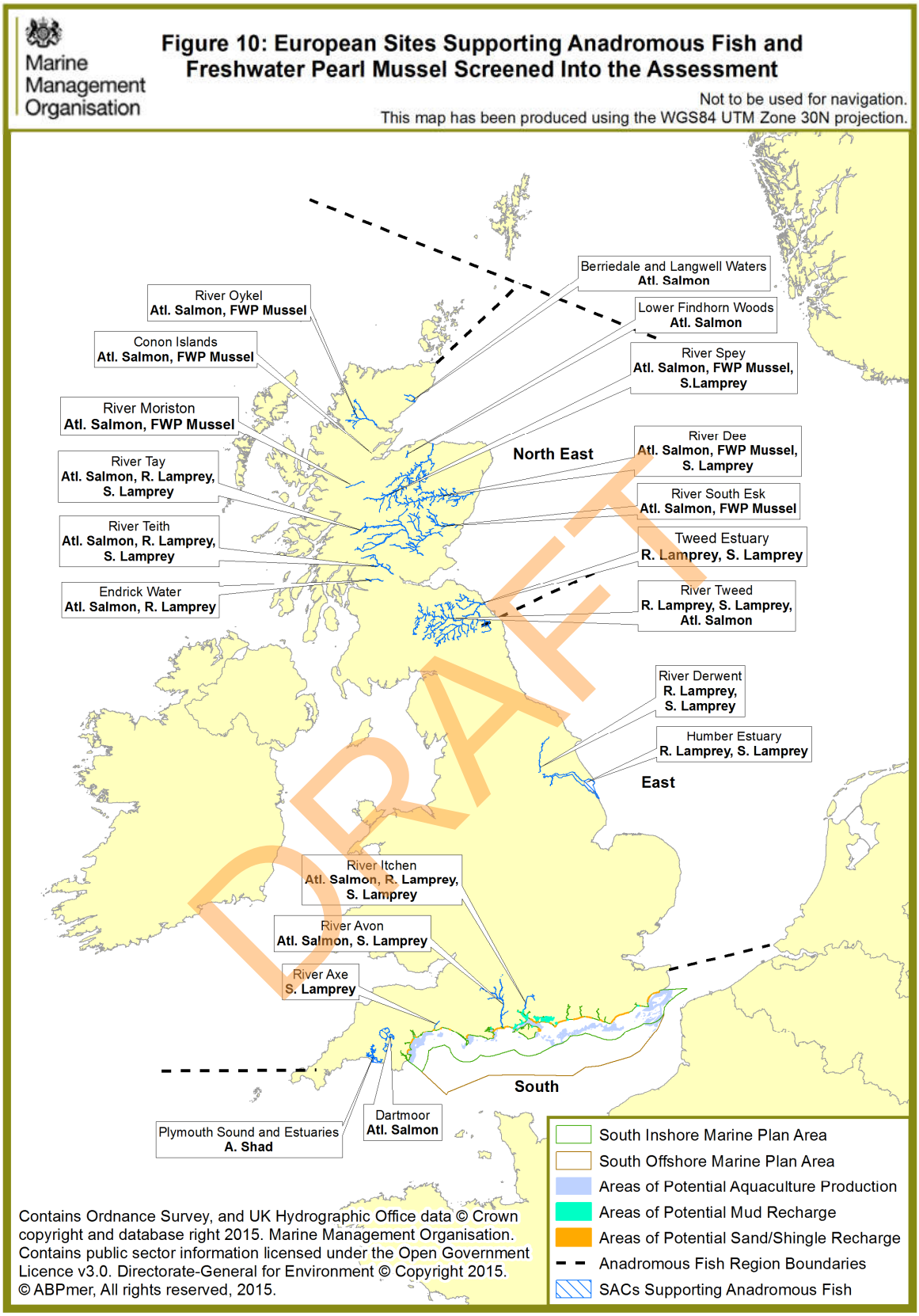

Marine Management Organisation
Figure 7a: European Sites Supporting Seals Screened In for Potential Aquaculture Production Areas (S-AQ-1)
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Bancs des Flandres
Lundy
Récifs Gris-Nez Blanc-Nez
Ridens et dunes hydrauliques du détroit du Pas-de-Calais
Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant
Baie de Canche et couloir des trois estuaires
Estuaires et littoral picards (baies de Somme et d'Authie)
Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire
Récifs et landes de la Hague
Anse de Vauville
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
100km Screening Buffer
SACs Supporting Seals
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

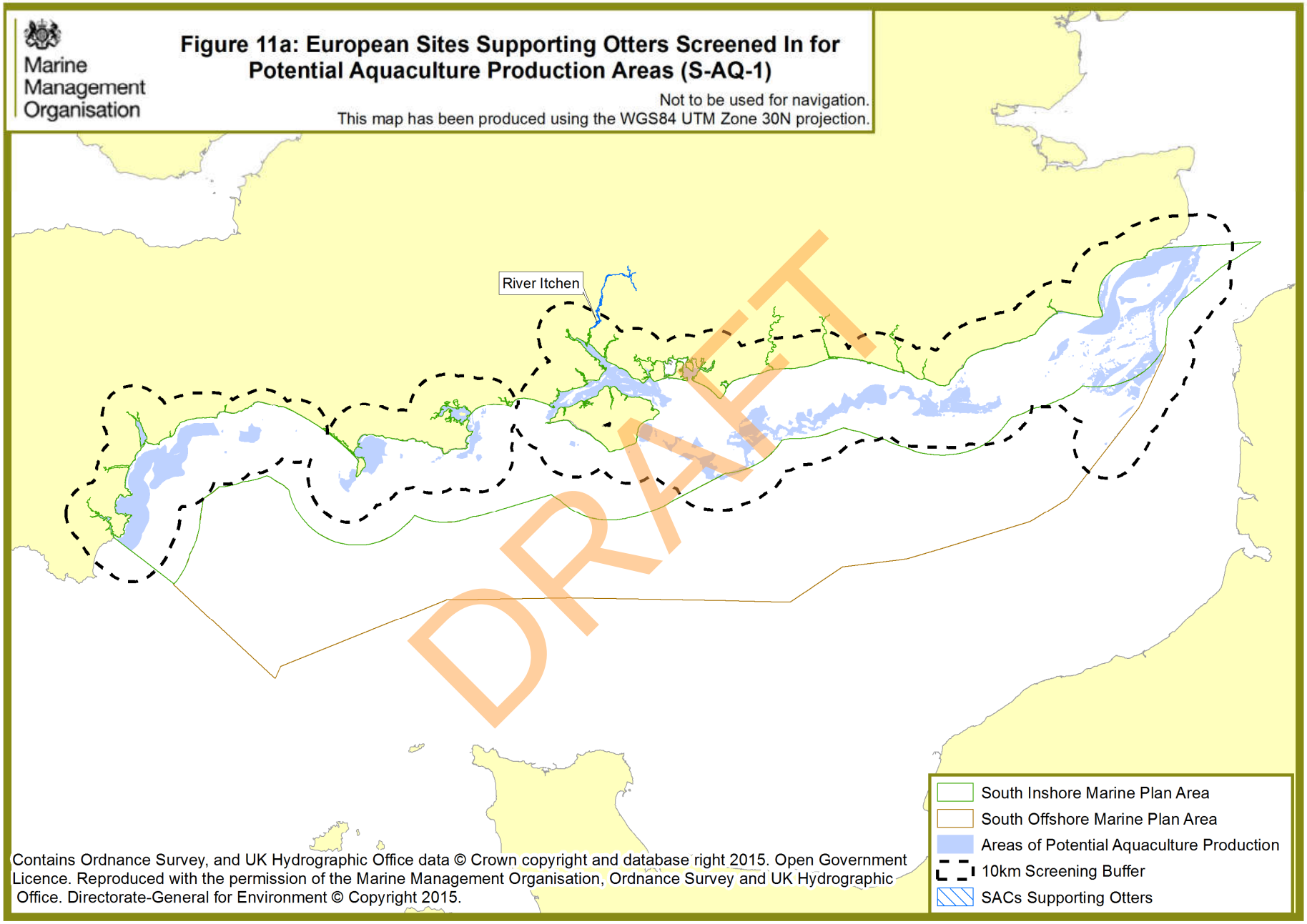

Marine Management Organisation
Figure 7b: European Sites Supporting Seals Screened In for Re-use Opportunity Areas (S-DD-1) - Potential Mud Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Bancs des Flandres
Récifs Gris-Nez Blanc-Nez
Ridens et dunes hydrauliques du détroit du Pas-de-Calais
Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant
Baie de Canche et couloir des trois estuaires
Estuaires et littoral picards (baies de Somme et d'Authie)
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Mud Recharge
100km Screening Buffer
SACs Supporting Seals
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence.
Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office.
Directorate-General for Environment © Copyright 2015.

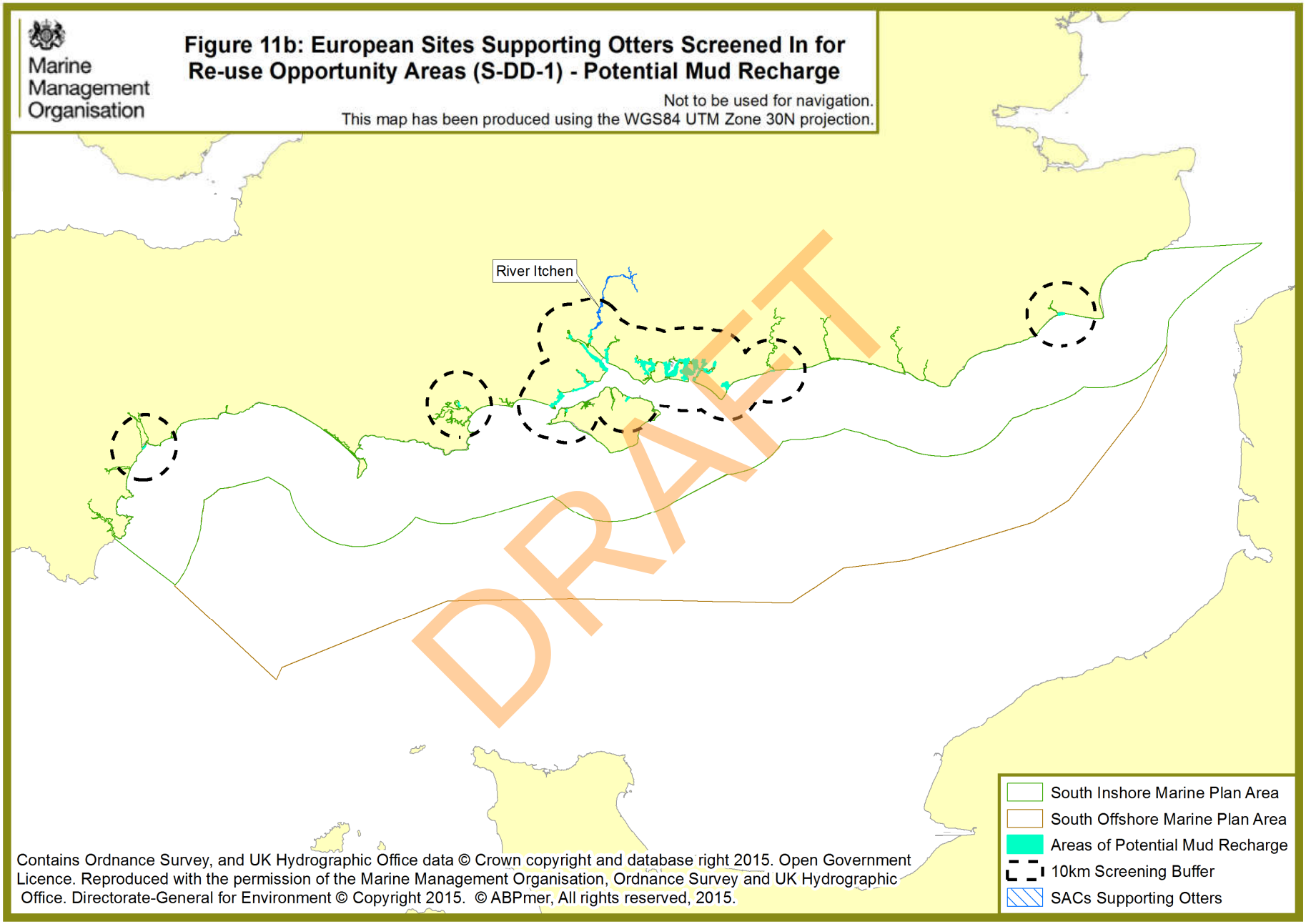

Marine Management Organisation
Figure 7c: European Sites Supporting Seals Screened In for Re-use Opportunity Areas (S-DD-1) - Potential Sand/Shingle Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Bancs des Flandres
Récifs Gris-Nez Blanc-Nez
Ridens et dunes hydrauliques du détroit du Pas-de-Calais
Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant
Baie de Canche et couloir des trois estuaires
Estuaires et littoral picards (baies de Somme et d'Authie)
Récifs et landes de la Hague
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Sand/Shingle Recharge
100km Screening Buffer
SACs Supporting Seals
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

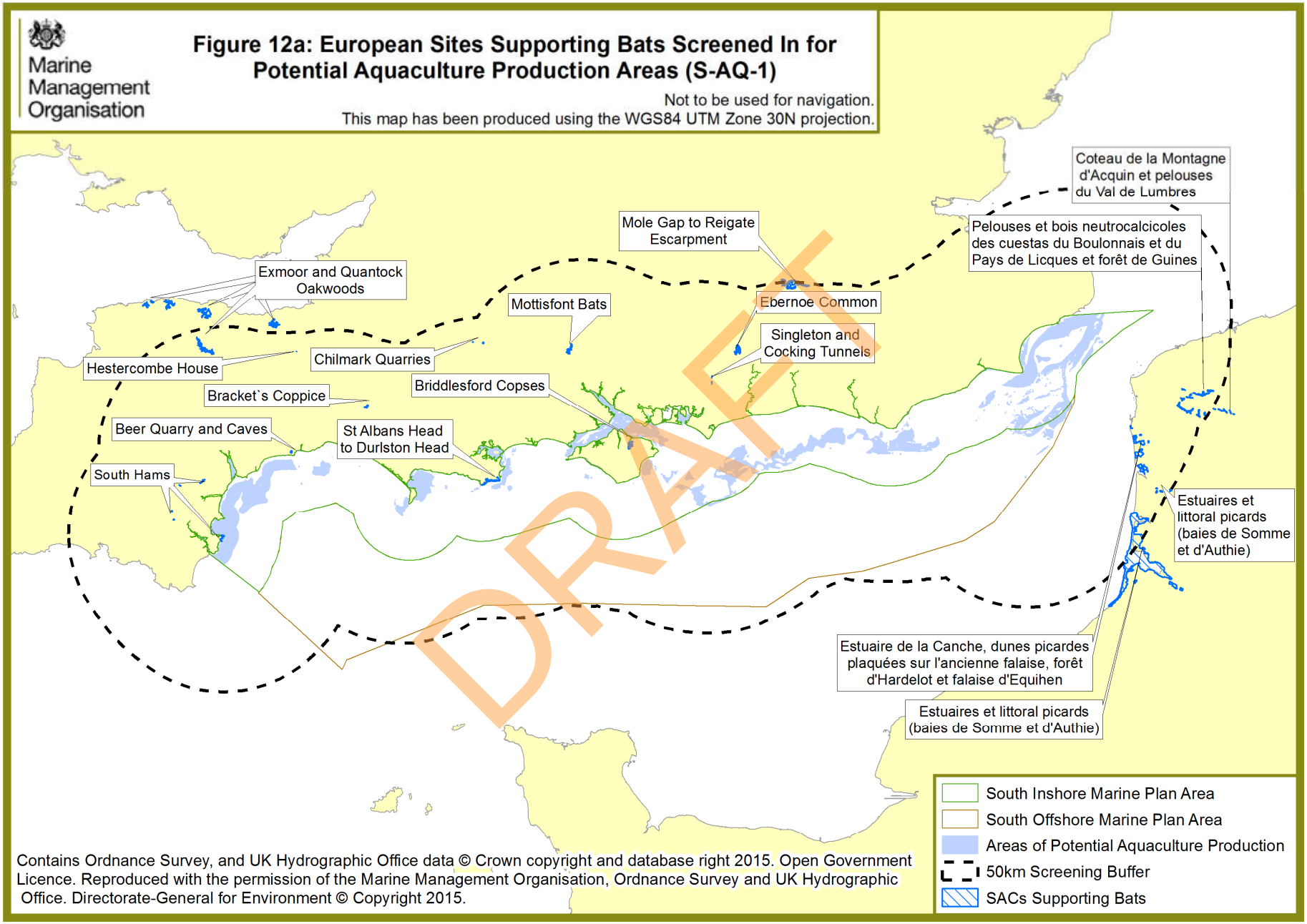

Marine Management Organisation
Figure 8: European Sites Supporting Bottlenose Dolphin Screened Into the Assessment
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
GNS
IS
WCI
OW
CWC
OCSW
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau
Cardigan Bay/ Bae Ceredigion
Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire
Baie de Seine orientale
Baie de Seine occidentale
Récifs et landes de la Hague
Anse de Vauville
Banc et récifs de Surtainville
Chausey
Côte de Cancale à Paramé
Côte de Granit rose-Sept-Iles
Abers - Côtes des légendes
Ouessant-Molène
Chaussée de Sein
Tregor Goëlo
Cap d'Erquy-Cap Fréhel
Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
Areas of Potential Mud Recharge
Areas of Potential Sand/Shingle Recharge
Bottlenose Dolphin MU Area
SACs Supporting Bottlenose Dolphin
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015. © ABPmer, All rights reserved, 2015.

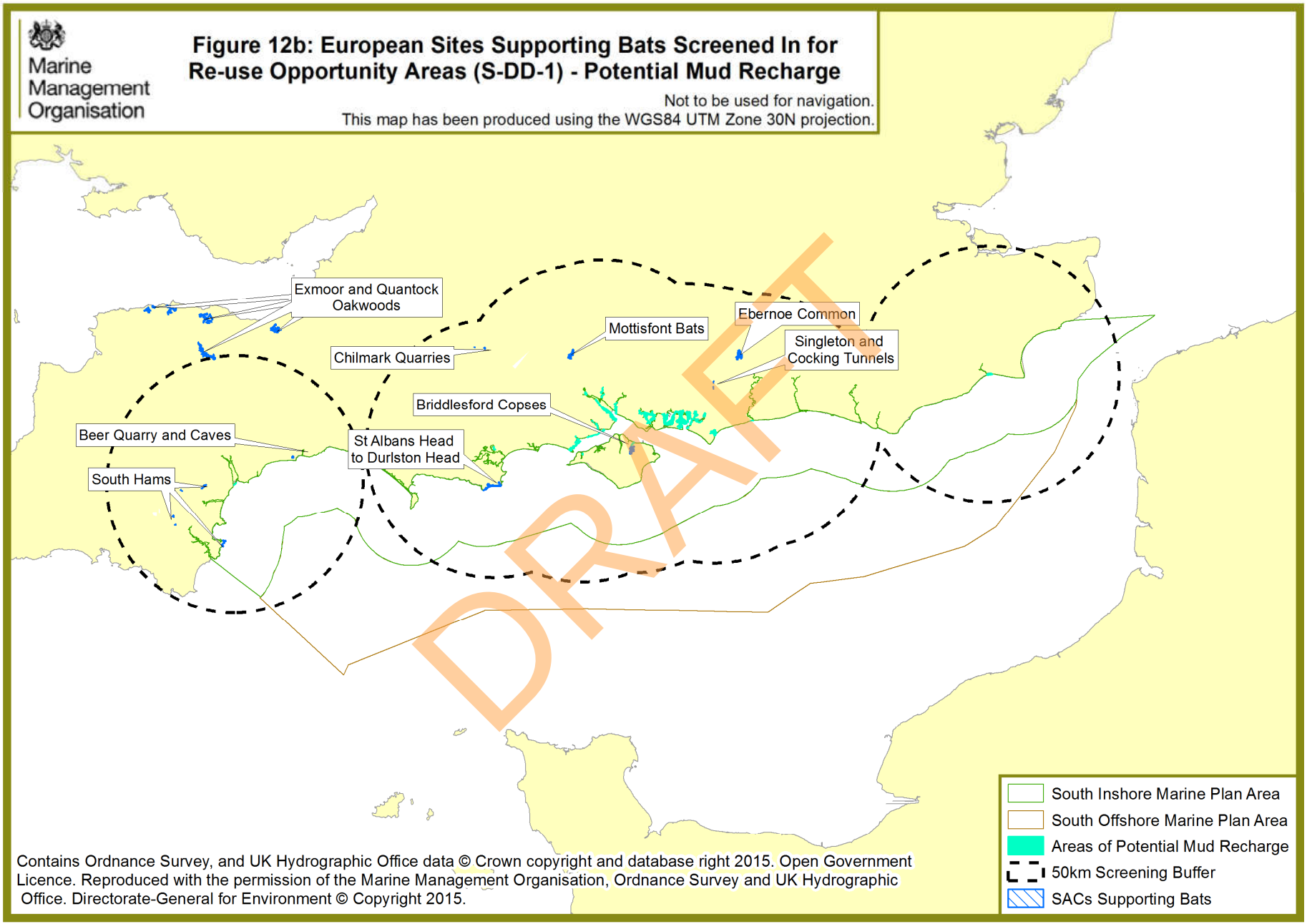

Marine Management Organisation
Figure 9: European Sites Supporting Harbour Porpoise Screened Into the Assessment
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
WS
CIS
NS
Skagens Gren og Skagerrak
Vrångöskärgården
Fladen
Lilla Middelgrund
Stora Middelgrund och Röde bank
Store Middelgrund
Kullaberg
Gilleleje Flak og Tragten
Kosterfjorden-Väderöfjorden
Store Rev
Gule Rev
Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde
Sylter Aubenriff
Sydlige Nordsø
Steingrund
Schlei incl. Schleimünde und vorgelagerter Flachgründe
Helgoland mit Helgoländer Felssockel
NTP S-H Wattenmeer und angrenzende Küstengebiete
Klaverbank
Unterelbe
Hamburgisches Wattenmeer
Borkum-Riffgrund
Blasket Islands
Roaringwater Bay and Islands
Nationalpark Niedersächsisches Wattenmeer
Noordzeekustzone
Récifs Gris-Nez Blanc-Nez
Vlakte van de Raan
Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant
Ridens et dunes hydrauliques du détroit du Pas-de-Calais
Baie de Canche et couloir des trois estuaires
Côte de Granit rose-Sept-Iles
Baie de Morlaix
Abers - Côtes des légendes
Ouessant-Molène
Chaussée de Sein
Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire
Récifs et landes de la Hague
Anse de Vauville
Tregor Goëlo
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
Areas of Potential Mud Recharge
Areas of Potential Sand/Shingle Recharge
SACs Supporting Harbour Porpoise
Harbour Porpoise MU Area
DRAFT
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

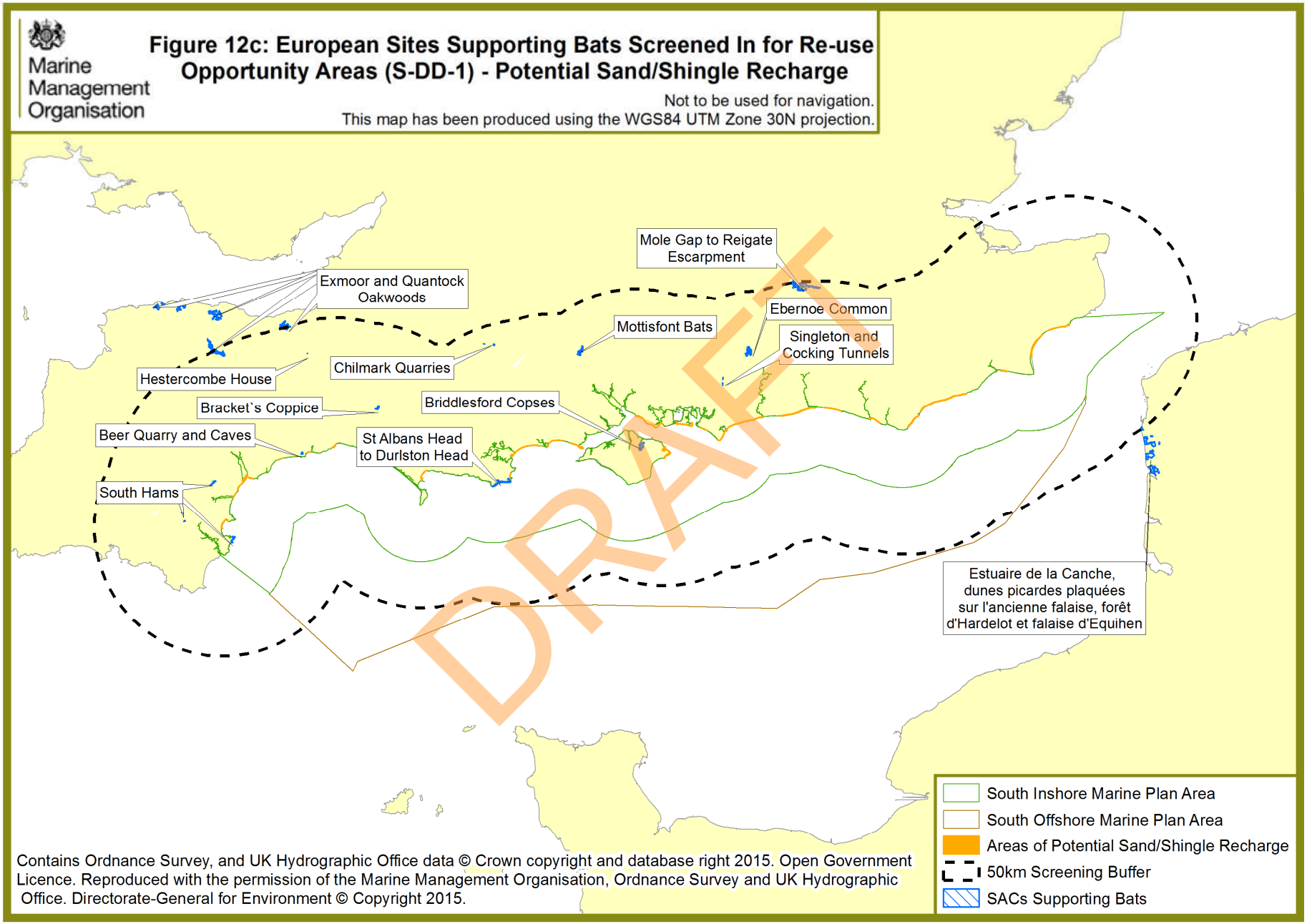

Marine Management Organisation
Figure 10: European Sites Supporting Anadromous Fish and Freshwater Pearl Mussel Screened Into the Assessment
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Berriedale and Langwell Waters
Atl. Salmon
River Oykel
Atl. Salmon, FWP Mussel
Lower Findhorn Woods
Atl. Salmon
Conon Islands
Atl. Salmon, FWP Mussel
River Spey
Atl. Salmon, FWP Mussel, S.Lamprey
River Moriston
Atl. Salmon, FWP Mussel
North East
River Dee
Atl. Salmon, FWP Mussel, S. Lamprey
River Tay
Atl. Salmon, R. Lamprey, S. Lamprey
River South Esk
Atl. Salmon, FWP Mussel
River Teith
Atl. Salmon, R. Lamprey, S. Lamprey
Tweed Estuary
R. Lamprey, S. Lamprey
Endrick Water
Atl. Salmon, R. Lamprey
River Tweed
R. Lamprey, S. Lamprey, Atl. Salmon
River Derwent
R. Lamprey, S. Lamprey
Humber Estuary
R. Lamprey, S. Lamprey
East
River Itchen
Atl. Salmon, R. Lamprey, S. Lamprey
River Avon
Atl. Salmon, S. Lamprey
River Axe
S. Lamprey
South
Plymouth Sound and Estuaries
A. Shad
Dartmoor
Atl. Salmon
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
Areas of Potential Mud Recharge
Areas of Potential Sand/Shingle Recharge
Anadromous Fish Region Boundaries
SACs Supporting Anadromous Fish
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Marine Management Organisation. Contains public sector information licensed under the Open Government Licence v3.0. Directorate-General for Environment © Copyright 2015.
© ABPmer, All rights reserved, 2015.
DRAFT


Marine Management Organisation
Figure 11a: European Sites Supporting Otters Screened In for Potential Aquaculture Production Areas (S-AQ-1)
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
River Itchen
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
10km Screening Buffer
SACs Supporting Otters
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.


Marine Management Organisation
Figure 11b: European Sites Supporting Otters Screened In for Re-use Opportunity Areas (S-DD-1) - Potential Mud Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
River Itchen
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Mud Recharge
10km Screening Buffer
SACs Supporting Otters
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015. © ABPmer, All rights reserved, 2015.


Marine Management Organisation
Figure 12a: European Sites Supporting Bats Screened In for Potential Aquaculture Production Areas (S-AQ-1)
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Coteau de la Montagne d'Acquin et pelouses du Val de Lumbres
Mole Gap to Reigate Escarpment
Pelouses et bois neutrocalcicoles des cuestas du Boulonnais et du Pays de Licques et forêt de Guines
Exmoor and Quantock Oakwoods
Mottisfont Bats
Ebernoe Common
Singleton and Cocking Tunnels
Chilmark Quarries
Hestercombe House
Briddlesford Copses
Bracket`s Coppice
Beer Quarry and Caves
St Albans Head to Durlston Head
South Hams
Estuaires et littoral picards (baies de Somme et d'Authie)
Estuaire de la Canche, dunes picardes plaquées sur l'ancienne falaise, forêt d'Hardelot et falaise d'Equihen
Estuaires et littoral picards (baies de Somme et d'Authie)
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Aquaculture Production
50km Screening Buffer
SACs Supporting Bats
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.


Marine Management Organisation
Figure 12b: European Sites Supporting Bats Screened In for Re-use Opportunity Areas (S-DD-1) - Potential Mud Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Exmoor and Quantock Oakwoods
Chilmark Quarries
Mottisfont Bats
Ebernoe Common
Singleton and Cocking Tunnels
Briddlesford Copses
Beer Quarry and Caves
St Albans Head to Durlston Head
South Hams
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Mud Recharge
50km Screening Buffer
SACs Supporting Bats
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.


Marine Management Organisation
Figure 12c: European Sites Supporting Bats Screened In for Re-use Opportunity Areas (S-DD-1) - Potential Sand/Shingle Recharge
Not to be used for navigation.
This map has been produced using the WGS84 UTM Zone 30N projection.
Mole Gap to Reigate Escarpment
Exmoor and Quantock Oakwoods
Ebernoe Common
Mottisfont Bats
Singleton and Cocking Tunnels
Chilmark Quarries
Hestercombe House
Bracket`s Coppice
Briddlesford Copses
Beer Quarry and Caves
St Albans Head to Durlston Head
South Hams
Estuaire de la Canche, dunes picardes plaquées sur l'ancienne falaise, forêt d'Hardelot et falaise d'Equihen
DRAFT
South Inshore Marine Plan Area
South Offshore Marine Plan Area
Areas of Potential Sand/Shingle Recharge
50km Screening Buffer
SACs Supporting Bats
Contains Ordnance Survey, and UK Hydrographic Office data © Crown copyright and database right 2015. Open Government Licence. Reproduced with the permission of the Marine Management Organisation, Ordnance Survey and UK Hydrographic Office. Directorate-General for Environment © Copyright 2015.

Annex 2: Steps 1- 3 in the Appropriate Assessment Information Review (AAIR) Process

Table 1: Generic impact pathways associated with aquaculture and beneficial re-use

Pathway Ref No.	Potential sensitivity category		Impact pathway description	Sector	
	Categories of deterioration or disturbance*	Code		Aquaculture	Beneficial re-use
1	Physical Loss/Gain of Habitat (loss of habitat in development footprint)	PLG	Loss of coastal and offshore habitat under the footprint of cultivation sites, cage fixtures, any sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works.	✓	✓
2	Physical Damage (direct and temporary damage to habitat)	PD	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.	✓	✓
3	Physical Damage (indirect change to habitat)	PLG	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).	✓	✓
4	Physical Damage (indirect and temporary damage to habitat)	PD	Changes to coastal and offshore habitat as a result of alterations to the hydrodynamic (wave and tide) and sediment transport regime from the presence of structures (e.g. shellfish trestles, finfish cages) or altered morphology (e.g. steepened beach profile).	✓	✓
5	Physical Damage (direct damage to seal haul out habitat)	PD	Damage to seal haul out locations from equipment use causing abrasion, damage or smothering during construction/decommissioning and operation.	✓	✓
6	Physical Damage (direct damage to species from collision risk)	PD	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	✓	✓
7	Physical Damage (direct damage to species from marine litter)	PD	Damage to marine species through ingestion, entanglement and smothering of marine litter.	✓	
8	Non-Physical Disturbance (barrier to species movement)	NPD	Presence of sub-surface structures and disturbance (visual) associated with suspended or cage production may present a barrier to movement and block migratory pathways or access to feeding grounds depending on design.	✓	
9	Non-Physical Disturbance (disturbance to species)	NPD	Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	✓	✓
10	Non-Physical Disturbance (disturbance to species)	NPD	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	✓	✓
11	Toxic Contamination (reduction in water quality)	TC	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	✓	✓
12	Toxic Contamination (reduction in water quality)	TC	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	✓	✓
13	Toxic Contamination (reduction in water quality)	TC	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).	✓	
14	Toxic Contamination (reduction in water quality)	TC	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.	✓	✓
15	Non-Toxic Contamination (elevated turbidity)	NTC	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	✓	✓
16	Biological Disturbance (direct introduction of non-native species)	BD	Introduction of non-native species as a result of the cultivation of these species (e.g. slipper limpet and Pacific oyster).	✓	
17	Biological Disturbance (translocation of native species)	BD	Translocation of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.	✓	
18	Biological Disturbance (indirect introduction of non-native species)	BD	Introduction of new structures (e.g. cages, trestles) on the seabed facilitating the colonisation and ingress of invasive non-native species.	✓	✓
19	Biological Disturbance (direct introduction of non-native species)	BD	Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	✓	✓
20	Biological Disturbance (introduction/transfer of parasites/ pathogens)	BD	Introduction/transfer of parasites/pathogens as a result of aquaculture activities.	✓	

* As derived from the standard 'categories of operations which may cause deterioration or disturbance' (UK Marine SAC project, 2001).

Table 2: Impact-activity-feature matrix for aquaculture and beneficial re-use projects

Project Phase	Activity	Change	Potential sensitivity category	Impact pathway description	Pathway Ref No.	Sector		Interest feature group				
						Aquaculture	Beneficial re-use	Habitats	Birds	Marine mammals	Fish and freshwater pearl mussel	Otters
Survey (where surveys are required to inform baseline environmental descriptions, or to investigate biophysical parameters for aquaculture)	Sampling during environmental baseline surveys	Temporary removal of, or change to, species or habitat features	Physical Damage (direct and temporary damage to habitat)	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.	2	✓	✓	✓				
	Increased vessel activity during baseline surveys	Elevated collision risk for marine species especially marine mammals	Physical Damage (direct damage to species from collision risk)	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	6	✓	✓		✓	✓	✓	✓
	Increased vessel activity during baseline surveys	Visual disturbance of species	Non-Physical Disturbance (disturbance to species)	Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	9	✓	✓		✓	✓		✓
	Increased vessel activity during baseline surveys	Increased vessel activity causing elevated noise	Non-Physical Disturbance (disturbance to species)	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	10	✓	✓		✓	✓	✓	✓
	Increased vessel activity during baseline surveys	Elevated risk of spillages/ releases of oil or other contaminants & toxic effects on marine species	Toxic Contamination (reduction in water quality)	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	11	✓	✓	✓	✓	✓	✓	✓
	Increased vessel activity during baseline surveys	Elevated risk of introducing non-native species as biofouling on the surfaces of vessels	Biological Disturbance (direct intro-duction of non-native species)	Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	19	✓	✓	✓				
Construction and decommissioning (applies where structures need to be installed/ removed or material needs to be pumped/ placed)	Placement of material and/or structures	Loss of seabed habitat and species from the placement of material and/or structures	Physical Loss/Gain of Habitat (loss of habitat in development footprint)	Loss of coastal and offshore habitat under the footprint of cultivation sites, cage fixtures, any sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works.	1	✓	✓	✓				
	Activities associated with the placement of material and installation/removal of structures (e.g. finfish cage)	Damage to habitats from construction activities including abrasion from equipment and smothering of habitats	Physical Damage (direct and temporary damage to habitat)	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.	2	✓	✓	✓				
	Activities associated with the placement of material and installation/removal of structures (e.g. finfish cage)	Where significant losses occur to intertidal or subtidal habitats (e.g. substratum) then they can lead to impacts to species' food resources	Physical Damage (indirect change to habitat)	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).	3	✓	✓		✓	✓	✓	✓
	Activities associated with the placement of material and installation/removal of structures (e.g. finfish cage)	Temporary damage to seal haul out locations during installation and decommissioning processes	Physical Damage (direct damage to seal haul out habitat)	Damage to seal haul out locations from equipment use causing abrasion, damage or smothering during construction/decommissioning and operation.	5	✓	✓			Seal		
	Increased vessel activity during construction/decommissioning	Elevated collision risk for marine species especially marine mammals	Physical Damage (direct damage to species from collision risk)	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	6	✓	✓		✓	✓	✓	✓
	Increased vessel activity during construction/decommissioning	Visual disturbance of species	Non-Physical Disturbance (disturbance to species)	Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	9	✓	✓		✓	✓		✓
	Increased vessel activity during construction/decommissioning	Increased vessel activity causing elevated noise	Non-Physical Disturbance (disturbance to species)	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	10	✓	✓		✓	✓	✓	✓
	Activities associated with the placement of material	Noise and vibration generated by placement of material	Non-Physical Disturbance (disturbance to species)	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	10		✓		✓	✓	✓	✓
	Increased vessel activity during construction/decommissioning	Elevated risk of spillages/releases of oil or other contaminants & toxic effects on marine species	Toxic Contamination (reduction in water quality)	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	11	✓	✓	✓	✓	✓	✓	✓
	Increase in suspended sediments with associated contaminant from placement of material	Toxic effects on marine species	Toxic Contamination (reduction in water quality)	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	12		✓	✓	✓	✓	✓	✓

Project Phase	Activity	Change	Potential sensitivity category	Impact pathway description	Pathway Ref No.	Sector		Interest feature group				
						Aquaculture	Beneficial re-use	Habitats	Birds	Marine mammals	Fish and freshwater pearl mussel	Otters
	Increase in suspended sediments with associated organic material from placement of material	Toxic effects on marine species	Toxic Contamination (reduction in water quality)	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.	14		✓	✓	✓	✓	✓	✓
	Increase in suspended sediments from placement of material	Adverse effects on marine species	Non-Toxic Contamination (elevated turbidity)	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	15		✓	✓	✓	✓	✓	✓
	Increased vessel activity during construction/decommissioning	Elevated risk of introducing non-native species as biofouling on the surfaces of vessels	Biological Disturbance (direct introduction of non-native species)	Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	19	✓	✓	✓				
Operation (includes the process of harvesting species, the maintenance/operation of aquaculture sites, and the presence of material and/or structures)	Permanent (operational period) presence of structures	Loss of seabed habitat and species from the presence of structures	Physical Loss/Gain of Habitat (loss of habitat in development footprint)	Loss of coastal and offshore habitat under the footprint of cultivation sites, cage fixtures, any sediment retaining structures and the short term loss of underlying habitats during beach nourishment and mud recharge works.	1	✓	✓	✓				
	Harvesting (dredging) of species at aquaculture sites	The removal of surface substratum and associated seabed benthos leading to damage but followed by a process of re-colonisation and recovery.	Physical Damage (direct and temporary damage to habitat)	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.	2	✓		✓				
	Activities associated with the maintenance of structures	Damage to habitats from maintenance activities including abrasion from equipment and smothering of habitats	Physical Damage (direct and temporary damage to habitat)	Changes to coastal and offshore habitat as a result of damage from baseline surveys (e.g. trawls, grabs); from equipment use causing abrasion, damage or smothering during installation and operation; from vessels mooring/anchoring.	2	✓		✓				
	Permanent (operational period) presence of structures	Change to habitat composition and resulting changes to prey availability and species behaviour (e.g. fish aggregation, artificial reef or bird roosting)	Physical Damage (indirect change to habitat)	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).	3	✓	✓		✓	✓	✓	✓
	Harvesting (dredging) of species at aquaculture sites	Where significant changes occur to intertidal or subtidal habitats (e.g. substratum) then they can lead to impacts to species' food resources	Physical Damage (indirect change to habitat)	Change in quality of foraging areas from equipment use causing abrasion, damage or smothering; from hydrodynamic and/or sediment transport regime change; or from presence of structures on seabed resulting in changes to prey and species behaviour (e.g. acting as FAD (Fish Aggregating Device), artificial reef or bird roost).	3	✓			✓	✓	✓	✓
	Presence and operation of structures or changes to the seabed bathymetry	Changes to the hydrodynamics causing seabed disturbance through local scour and more distant erosion and smothering by re-deposition of mobilised sediment	Physical Damage (indirect and temporary damage to habitat)	Changes to coastal and offshore habitat as a result of alterations to the hydrodynamic (wave and tide) and sediment transport regime from the presence of structures (e.g. shellfish trestles, finfish cages) or altered morphology (e.g. steepened beach profile).	4	✓	✓	✓				
	Presence of structures on intertidal habitats	Impacts to seal haul out locations where any structures remain permanently present across intertidal areas (possibly also causing scour across adjacent areas)	Physical Damage (direct damage to seal haul out habitat)	Damage to seal haul out locations from equipment use causing abrasion, damage or smothering during construction/decommissioning and operation.	5	✓	✓			Seal		
	Permanent (operational period) presence of structures	Entanglement risk with mooring elements or anti-predator nets	Physical Damage (direct damage to species from collision risk)	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	6	✓			✓	✓	✓	✓
	Increased vessel maintenance activity	Elevated collision risk for marine species especially marine mammals	Physical Damage (direct damage to species from collision risk)	Collision risk and possible mortality of species due to vessels/dredgers travelling to and from the site; risk of entanglement following a collision with mooring elements or anti-predator nets.	6	✓			✓	✓	✓	✓
	Abandoned, lost, broken or discarded aquaculture gear (broken net)	Marine litter resulting in damage to marine species	Physical Damage (direct damage to species from marine litter)	Damage to marine species through ingestion, entanglement and smothering of marine litter.	7	✓			✓	✓	✓	✓
	Permanent (operational period) presence of structures	Barrier to movement of marine species	Non-Physical Disturbance (barrier to species movement)	Presence of sub-surface structures and disturbance (visual) associated with suspended or cage production may present a barrier to movement and block migratory pathways or access to feeding grounds depending on design.	8	✓				✓	✓	

Project Phase	Activity	Change	Potential sensitivity category	Impact pathway description	Pathway Ref No.	Sector		Interest feature group				
						Aquaculture	Beneficial re-use	Habitats	Birds	Marine mammals	Fish and freshwater pearl mussel	Otters
	Increased vessel maintenance activity	Visual disturbance to species	Non-Physical Disturbance (disturbance to species)	Visual disturbance and exclusion from areas as a result of surveying; construction/decommissioning and operational activities (including movements of vessels).	9	✓	✓		✓	✓		✓
	Harvesting (dredging) of species at aquaculture sites	Dredger activity causing elevated noise	Non-Physical Disturbance (disturbance to species)	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	10	✓	✓		✓	✓	✓	✓
	Increased vessel maintenance activity	Increased vessel activity causing elevated noise	Non-Physical Disturbance (disturbance to species)	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	10	✓	✓		✓	✓	✓	✓
	Use of seal scarers in finfish aquaculture	Noise and vibration disturbance from seal scarers	Non-Physical Disturbance (disturbance to species)	Noise/vibration disturbance and exclusion from areas as a result of movements of dredgers, vessels and/or bulldozers; the placement of sediment (e.g. pumping, spraying); or the use of seal scarers in finfish aquaculture.	10	✓				✓	✓	✓
	Increased vessel maintenance activity	Elevated risk of spillages/releases of oil or other contaminants & toxic effects on marine species	Toxic Contamination (reduction in water quality)	Spillage of fluids, fuels and/or construction materials (including from surface coatings/treatments) during survey/maintenance, construction/decommissioning or operation.	11	✓	✓	✓	✓	✓	✓	✓
	Increase in suspended sediments with associated contaminant during aquaculture harvesting (dredging)	Toxic effects on marine species	Toxic Contamination (reduction in water quality)	Release of contaminants associated with the dispersion of suspended sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	12	✓		✓	✓	✓	✓	✓
	Increase in contamination during operation of finfish cages	Adverse effects on marine species	Toxic Contamination (reduction in water quality)	Introduction of non-synthetic compounds and synthetic compounds as a result of cage production (e.g. feed pellets, faecal particles, medicines and sea lice treatments).	13	✓	✓	✓	✓	✓	✓	✓
	Increase in suspended sediments with associated organic material during aquaculture harvesting (dredging)	Toxic effects on marine species	Toxic Contamination (reduction in water quality)	Organic enrichment of sediments and water column as a result of the breakdown of organic matter from sediments released during aquaculture activities, beach nourishment works and intertidal recharge.	14	✓	✓	✓	✓	✓	✓	✓
	Increase in siltation as a result of an increase in particulate organic waste from aquaculture sites	Adverse effects on marine species	Non-Toxic Contamination (elevated turbidity)	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	15	✓		✓	✓	✓	✓	✓
	Increase in suspended sediments during aquaculture harvesting (dredging)	Adverse effects on marine species	Non-Toxic Contamination (elevated turbidity)	Increase in turbidity (and possibly reduced dissolved oxygen) associated with the release of particulate waste (e.g. fish faeces) during aquaculture cultivation, and the release of sediments during aquaculture harvesting (dredging), beach nourishment works and intertidal recharge.	15	✓		✓	✓	✓	✓	✓
	Cultivation of aquaculture species	Introduction of non-native species as a result of their cultivation	Biological Disturbance (direct introduction of non-native species)	Introduction of non-native species as a result of the cultivation of these species (e.g. slipper limpet and Pacific oyster).	16	✓		✓				
	Cultivation of aquaculture species	Translocation of cultivated species	Biological Disturbance (translocation of native species)	Translocation of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.	17	✓		✓			✓	
	Cultivation of aquaculture species	Escape of cultivated species as a result of accidents or storm damage to structures	Biological Disturbance (translocation of native species)	Translocation of indigenous species (e.g. native oyster, Atlantic salmon) resulting in genetic modification and changes to the community structure and distribution of natural populations.	17	✓		✓			✓	
	Permanent (operational period) presence of structures	Introduction and colonisation of invasive non-native species on introduced hard substrata	Biological Disturbance (indirect introduction of non-native species)	Introduction of new structures (e.g. cages, trestles) on the seabed facilitating the colonisation and ingress of invasive non-native species.	18	✓	✓	✓				
	Increased vessel maintenance activity	Elevated risk of introducing non-native species as biofouling on the surfaces of vessels	Biological Disturbance (direct introduction of non-native species)	Introduction and ingress of invasive non-native species as biofouling species on the surfaces of vessels or construction plant.	19	✓	✓	✓				
	Cultivation of aquaculture species	Introduction of parasites/pathogens	Biological Disturbance (introduction/transfer of parasites/pathogens)	Introduction/transfer of parasites/pathogens as a result of aquaculture activities.	20	✓		✓			✓	

Table 3: European/Ramsar sites and interest features screened in (green) and out (orange) of the HRA

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
Anse de Vauville	SAC	France	Grey seals, Harbour seals, Harbour porpoise and Bottlenose dolphin	Sandbanks which are slightly covered by sea water all the time, Reefs, Marine area and sea inlets.	✓	✓	✓
Arun Valley	SCI	UK		Ramshorn snail.			
Ashdown Forest	SAC	UK		Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, and Great crested newt.			
Aston Rowant	SAC	UK		*Juniperus communis* formations on heaths or calcareous grasslands and *Asperulo-Fagetum* beech forests.			
Avon Gorge Woodlands	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) and *Tilio-Acerion* forests of slopes, screes and ravines.			
Baie de Canche et couloir des trois estuaires	SAC	France	Harbour porpoise, Grey Seal and Harbour seal.	Sandbanks which are slightly covered by sea water at all times, estuaries, mudflats and sandflats not covered by seawater at low tide, Annual vegetation of stony banks	✓	✓	✓
Baie de Seine occidentale	SAC	France	Bottlenose dolphin, Harbour Porpoise and Harbour seal.	Sandbanks which are slightly covered by sea water all the time, Large shallow inlets and bays, Reefs,	✓	✓	✓
Baie de Seine orientale	SAC	France		Sandbanks which are slightly covered by sea water all the time, Large shallow inlets and bays.			
Bancs et récifs de Surtainville	SAC	France	Bottlenose dolphin.	Sandbanks which are slightly covered by sea water all the time and reefs.	✓	✓	✓
Bancs des Flandres	SAC	France	Harbour porpoise, Harbour seal and Grey seal.	Sandbanks which are slightly covered by sea water all the time.	✓	✓	✓
Basse vallée de la Somme de Pont-Rémy à Breilly	SAC	France		Hard oligo-mesotrophic waters with benthic vegetation of Chara spp, Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, Juniperus communis formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*), Transition mires and quaking bogs, Alkaline fens, Bog woodland and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*). Great crested newt, Greater horseshoe bat, Geoffroy's Bat and *Sisymbrium supinum*.			
Bassin de l'Arques	SAC	France		Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation and Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae), Brook Lamprey, Sea Lamprey, River Lamprey, Atlantic salmon and Bullhead.			
Bassurelle Sandbank	SCI	UK	Sandbanks which are slightly covered by sea water all the time.		✓		
Bath and Bradford-on-Avon Bats	SAC	UK		Lesser horseshoe bat, Greater horseshoe bat, Bechstein's bat.			
Beer Quarry and Caves	SAC	UK		Lesser horseshoe bat, Greater horseshoe bat, Bechstein's bat.			
Blackmill Woodlands	SAC	UK		Old sessile oak woods with *Ilex* and Blechnum in the British Isles.			
Blackstone Point	SAC	UK		Shore dock.			
Blean Complex	SAC	UK		Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli*.			
Bracket's Coppice	SAC	UK		Bechstein's bat, *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)			
Braunton Burrows	SAC	UK		Mudflats and sandflats not covered by seawater at low tide, Shifting dunes along the shoreline with Ammophila arenaria ("white dunes"), Fixed dunes with herbaceous vegetation ("grey dunes"), Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*), Humid dune slacks, Petalwort.			
Breney Common and Goss and Tregoss Moors	SAC	UK		Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, Transition mires and quaking bogs, Marsh fritillary butterfly.			
Briddlesford Copses	SAC	UK		Bechstein's bat.			
Bois de la Roquette	SAC	France		Caves not open to the public, Lesser horseshoe bat, Greater horseshoe bat, Barbastelle, Geoffroy's bat and Greater mouse-eared bat.			
Bossen, heiden en valleigebieden van zandig Vlaanderen: westelijk deel	SCI	Belgium		Inland dunes with open Corynephorus and Agrostis grasslands, Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea, Natural eutrophic lakes with Magnopotamion or Hydrocharition -type vegetation, Northern Atlantic wet heaths with Erica tetralix, European dry heaths, Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe), Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion), Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli, Old acidophilous oak woods with Quercus robur on sandy plains and Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae).			

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
Boucles de la Seine Aval	SAC	France		Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, Rivers with muddy banks with vegetation *Chenopodion rubric* and *Bidention*, Northern Atlantic wet heaths with *Erica tetralix*, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Species-rich Nardus grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*), Active raised bogs, Degraded raised bogs still capable of natural regeneration, Depressions on peat substrates of the *Rhynchosporion*, Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*, Petrifying springs with tufa formation (*Cratoneurion*), Bog woodland, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*), Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), *Asperulo-Fagetum* beech forests and *Tilio-Acerion* forests of slopes, screes and ravines. Marsh fritillary butterfly, Stag beetle, Hermit beetle, Great Crested newt, Lesser horseshoe bat, Greater horseshoe bat, Barbastelle, Geoffroy's bat, Bechstein`s bat, Greater mouse-eared bat, Creeping marshwort and Floating water-plantain. Hard oligo-mesotrophic waters with benthic vegetation of Chara spp., Caves not open to the public. Desmoulin`s whorl snail			
Burnham Beeches	SAC	UK		Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*).			
Butser Hill	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia), Taxus baccata woods of the British Isles.			
Cardiff Beech Woods	SAC	UK		*Asperulo-Fagetum* beech forests, *Tilio-Acerion* forests of slopes, screes and ravines.			
Castle Hill	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) and Early gentian.			
Cerne and Sydling Downs	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) and Marsh fritillary butterfly.			
Chesil and the Fleet	SAC	UK	Coastal lagoons, Annual vegetation of drift lines, Perennial vegetation of stony banks, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*).		✓		✓
Chilmark Quarries	SAC	UK		Lesser horseshoe bat, Greater horseshoe bat, Barbastelle and Bechstein's bat.			
Chilterns Beechwoods	SAC	UK		*Asperulo-Fagetum* beech forests, Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) and Stag beetle.			
Coteau de Dannes et de Camiers	SAC	France		*Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*). *Sisymbrium supinum.*			
Coteau de la Montagne d'Acquim et pelouses du Val de Lumbres	SAC	France		*Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) and *Asperulo-Fagetum* beech forests. Pond bat, Geoffroy's bat, Greater horseshoe bat , Bechstein`s bat and Greater mouse eared bat.			
Cothill Fen	SAC	UK		Alkaline fens and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*).			
Crookhill Brick Pit	SAC	UK		Great crested newt.			
Crowdy Marsh	SAC	UK		Transition mires and quaking bogs.			
Culm Grasslands	SAC	UK		Northern Atlantic wet heaths with *Erica tetralix*, *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Marsh fritillary butterfly.			
Dartmoor	SAC	UK	Atlantic salmon	Northern Atlantic wet heaths with Erica tetralix, European dry heaths, Blanket bogs, Old sessile oak woods with Ilex and Blechnum in the British Isles, Southern damselfly, European otter.	✓	✓	✓
Dawlish Warren	SAC	UK	Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"), Fixed dunes with herbaceous vegetation ("grey dunes"), Humid dune slacks and Petalwort.		✓		
Dorset Heaths	SAC	UK		Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Depressions on peat substrates of the *Rhynchosporion*, Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*, Alkaline fens, Old acidophilous oak woods with *Quercus robur* on sandy plains, Southern damselfly, Great crested newt.			
Dorset Heaths (Purbeck and Wareham) and Studland Dunes	SAC	UK	Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria ("white dunes"), Atlantic decalcified fixed dunes (Calluno-Ulicetea), Humid dune slacks	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), Northern Atlantic wet heaths with *Erica tetralix*, Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*, European dry heaths, *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Depressions on peat	✓	✓	✓

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
				substrates of the *Rhynchosporion*, Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*, Alkaline fens, Old acidophilous oak woods with *Quercus robur* on sandy plains, Bog woodland, Southern damselfly, Great crested newt.			
Dover to Kingsdown Cliffs	SAC	UK	Vegetated sea cliffs of the Atlantic and Baltic Coasts	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites).	✓		
Duingebieden Inclusief Ijzermonding En Zwin	SCI	Belgium		Estuaries, Mudflats and sandflats not covered by seawater at low tide, Salicornia and other annuals colonising mud and sand, Spartina swards (Spartinion maritimae), Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Atlantic decalcified fixed dunes (Calluno-Ulicetea), Dunes with Hippophae rhamnoides, Dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp, Fen orchid, Wooden dunes of the Atlantic Continental and Boreal region, . Creeping marshwort, Great crested newt, Narrow-mouthed whorl snail and Desmoulin`s whorl snail.			
Duncton to Bignor Escarpment	SAC	UK		*Asperulo-Fagetum* beech forests.			
Dunes de la plaine maritime flamande	SAC	France		Wooden dunes of the Atlantic Continental and Boreal region, Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis). Great crested Newt, Sandbanks which are slightly covered by sea water all the time, Mudflats and sandflats not covered by seawater at low tide, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Hippophae rhamnoides, Humid dune slacks.			
Dunes de l'Authie et Mollières de Berck	SAC	France		Wooden dunes of the Atlantic Continental and Boreal region, Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), and Alkaline fens. Creeping marshwort.Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Hippophae rhamnoides, Dunes with Salix repens ssp. argentea (Salicion arenariae), Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.			
Dunes et marais arrière-littoraux de la plaine maritime picarde	SAC	France		Wooden dunes of the Atlantic Continental and Boreal region, Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the IsoëtoNanojunceteaDesmoulin`s whorl snail, Great crested newt, Annual vegetation of drift lines, Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Hippophae rhamnoides, Dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp., Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation. Narrow-mouthed whorl snail. Fen orchid.			
Dunes flandriennes décalcifiées de Ghyvelde	SAC	France		Wooden dunes of the Atlantic Continental and Boreal region, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) and Narrow-mouthed whorl snail. Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Hippophae rhamnoides, Dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.			
Dungeness	SAC	UK	Annual vegetation of drift lines, Perennial vegetation of stony banks	Great crested newt.	✓	✓	✓
Dunraven Bay	SAC	UK		Shore dock.			
East Devon Pebblebed Heaths	SAC	UK		Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, Southern damselfly.			
East Hampshire Hangers	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Asperulo-Fagetum* beech forests, *Tilio-Acerion* forests of slopes, screes and ravines, *Taxus baccata* woods of the British Isles, Early gentian.			
Ebernoe Common	SAC	UK		Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), Barbastelle, Bechstein's bat.			
Emer Bog	SAC	UK		Transition mires and quaking bogs.			
Epping Forest	SAC	UK		Atlantic *acidophilous* beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths and Stag beetle.			
Essex Estuaries	SAC	UK		Estuaries, mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, Spartina swards (*Spartinion maritimae*), Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) and sandbanks which are slightly covered by seawater all the time.			
Estuaire de la Canche, dunes picardes plaquées sur l'ancienne falaise, forêt d'Hardelot et falaise d'Equihen	SAC	France		Wooden dunes of the Atlantic Continental and Boreal region, Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae), Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea. Species-rich Nardus grassland, on siliceous substrates in			

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
				mountain areas (and submountain areas in continental Europe), Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), Bog Woodland, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae). Narrow-mouthed whorl snail, Great crested Newt, Estuaries, Mudflats and sandflats not covered by seawater at low tide, Annual vegetation of drift lines, Vegetated sea cliffs of the Atlantic and Baltic coasts, Salicornia and other annuals colonising mud and sand, Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Hippophae rhamnoides, Dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.and Fen orchid. Greater horseshoe bat			
Estuaire de la Seine	SAC	France		Wooden dunes of the Atlantic Continental and Boreal region, Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion), Asperulo-Fagetum beech forests and Tilio-Acerion forests of slopes, screes and ravines.Sandbanks which are slightly covered by sea water all the time, Estuaries, Mudflats and sandflats not covered by seawater at low tide, Reefs, Annual vegetation of drift lines, Perennial vegetation of stony banks, Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Hippophae rhamnoides, Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp., Caves not open to the public			
Estuaires et littoral picards (baies de Sommes et d'Authie)	SAC	France	Harbour seal	Bats, Wooden dunes of the Atlantic Continental and Boreal region, Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae), Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation, Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Alkaline fens, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae). Great crested newt, Geoffroy's bat, Creeping marshwort, Sandbanks which are slightly covered by water all the time, Estuaries, Mudflats and sandflats not covered by seawater at low tide, Coastal Lagoons, Annual vegetation of drift lines, Perennial vegetation of stony banks, Vegetated sea cliffs of the Atlantic and Baltic coasts, Salicornia and other annuals colonising mud and sand, Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi), Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Hippophae rhamnoides, Dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp., and Fen orchid.	✓	✓	✓
Exmoor and Quantock Oakwoods	SAC	UK		Old sessile oak woods with Ilex and Blechnum in the British Isles, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae), European otter. Barbastelle, Bechstein's bat			
Exmoor Heaths	SAC	UK		Northern Atlantic wet heaths with Erica tetralix, European dry heaths, Blanket bogs, Alkaline fens, Old sessile oak woods with Ilex and Blechnum in the British Isles.Vegetated sea cliffs of the Atlantic and Baltic coasts			
Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant	SAC	France	Harbour porpoise, Grey Seal and harbour seal.	Wooden dunes of the Atlantic Continental and Boreal region, Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea, Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation, Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Petrifying springs with tufa formation (Cratoneurion). Great crested newtSandbanks which are slightly covered by sea water all the time, Mudflats and sandflats not covered by seawater at low tide, Reefs, Vegatated sea cliffs of the Atlantic and Baltic coasts, Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`) and Dunes with Hippophae rhamnoides.	✓	✓	✓
Falaises et dunes de Wimereux, estuaire de la Slack, Garennes et Communaux d'Ambleteuse-Audresselles	SAC	France		Wooden dunes of the Atlantic Continental and Boreal region, Species-rich Nardus grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe), Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), Petrifying			

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
				springs with tufa formation (Cratoneurion). Brook lamprey, Bullhead and Great Crested Newt. Estuaries, Mudflats and sandflats not covered by seawater at low tide, Reefs, Annual vegetation of drift lines, Perennial vegetation of stony banks, Vegetated sea cliffs of the Atlantic and Baltic coasts, Salicornia and other annuals colonising mud and sand, Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Atlantic decalcified fixed dunes (Calluno-Ulicetea), Dunes with Hippophae rhamnoides, Dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks and River lamprey.			
Falaises et pelouses du Cap Blanc Nez, du Mont d'Hubert, des Noires Mottes, du Fond de la Forge et du Mont de Couple	SAC	France		Juniperus communis formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia), Petrifying springs with tufa formation (Cratoneurion). Mudflats and sandflats not covered by seawater at low tide, Reefs, Vegetated sea cliffs of the Atlantic and Baltic coasts			
Fal and Helford	SAC	UK		Sandbanks which are slightly covered by sea water all the time, Mudflats and sandflats not covered by seawater at low tide, Large shallow inlets and bays, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Estuaries, Reefs, Shore dock.			
Folkestone to Etechinghill Escarpment	SAC	UK		Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*).			
Fontmell and Melbury Downs	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) and Early gentian.			
Forêt d'Eawy	SAC	France		Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*) and *Asperulo-Fagetum* beech forests.			
Forêts de Desvres et de Boulogne et bocage prairial humide du Bas-Boulonnais	SAC	France		Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae), Northern Atlantic wet heaths with Erica tetralix, Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Bog woodland, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae), Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion), Asperulo-Fagetum beech forests and Old acidophilous oak woods with Quercus robur on sandy plains.			
Forêt de Tournehem et pelouses de la cuesta du pays de Licques	SAC	France		*Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) and Caves not open to the public.			
Glaswelltiroedd Cefn Cribwr/ Cefn Cribwr Grasslands	SAC	UK		*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Marsh fritillary butterfly.			
Great Yews	SAC	UK		*Taxus baccata* woods of the British Isles.			
Hackpen Hill	SAC	UK		Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) and Early gentian.			
Hamford Water	cSAC	UK		Fisher's estuarine moth.			
Hartslock Wood	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Taxus baccata* woods of the British Isles.			
Hastings Cliffs	SAC	UK	Vegetated sea clilffs of the Atlantic and Baltic Coasts.		✓		✓
Hestercombe House	SAC	UK		Lesser horseshoe bat.			
Holme Moor and Clean Moor	SAC	UK		*Molinia* meadows on calcareous, peaty or clayey-silt laden soils (*Molinion caeruleae*), Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*, Alkaline fens.			
Holnest	SAC	UK		Great crested newt.			
Isle of Portland to Studland Cliffs	SAC	UK	Annual vegetation of drift lines, Vegetated sea cliffs of the Atlantic and Baltic coasts.	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia), Early gentian.	✓		✓
Isle of Wight Downs	SAC	UK		Vegetated sea cliffs of the Atlantic and Baltic coasts. European dry heaths, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Early gentian.			
Kenfig/Cynffig	SAC	UK		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Fixed dunes with herbaceous vegetation ("grey dunes"), Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*), Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp., Petalwort, Fen orchid.			
Kennet and Lambourn Floodplain	SAC	UK		Desmoulin's whorl snail.			
Kennet Valley Alderwoods	SAC	UK		Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*).			
Kingley Vale	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Taxus baccata* woods of the British Isles.			
Landes, mares et bois acides du Plateau de Sorrus Saint Josse, prairies alluviales et bois tourbeux en aval	SAC	France		Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae)*, Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, Northern Atlantic wet heaths with *Erica tetralix* , European Dry heaths, Species-rich *Nardus* grassland, on siliceous			

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
de Montreuil				substrates in mountain areas (and submountain areas in continental Europe), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Depressions on peat substrates of the *Rhynchosporion*, Bog woodland, Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), Old acidophilous oak woods with *Quercus robur* on sandy plains.Greater horseshoe bat.			
La forêt d'Eu et les pelouses adjacentes	SAC	France		Northern Atlantic wet heaths with *Erica tetralix*, *Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), *Asperulo-Fagetum* beech forests and Marsh fritillary butterfly.			
Lewes Downs	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*).			
Littoral Cauchois	SAC	France	Reefs, Vegetated sea cliffs of the Atlantic and Baltic coasts	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix, Active raised bogs, Degraded raised bogs still capable of natural regeneration, Petrifying springs with tufa formation (Cratoneurion), Tilio-Acerion forests of slopes, screes and ravines.	✓	✓	✓
Little Wittenham	SAC	UK		Great crested newt.			
Littoral ouest du Cotentin de Saint-Germain-sur-Ay au Rozel	SAC	France		Wooded dunes of the Atlantic, Continental and Boreal region, Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels. Great crested newt, Creeping marshwort, Estuaries, Mudflats and sandflats not covered by seawater at low tide, Reefs, Annual vegetation of drift lines, Vegetated sea cliffs of the Atlantic and Baltic coasts, Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks Fen orchid.			
Lundy	SAC	UK		Reefs, Submerged or partially submerged sea caves, Sandbanks which are slightly covered by seawater all the time, Grey seal.			
Lydden and Temple Ewell Downs	SAC	UK		Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites).			
L'Yères	SAC	France		Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), Alkaline fens, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae). Brook lamprey, Bullhead, Estuaries, River lamprey.			
Lyme Bay and Torbay	SCI	UK	Reefs, Submerged or partially submerged sea caves.		✓		✓
Marais arrière-littoraux du Bessin	SAC	France		Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation, Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Calcareous fens with Cladium mariscus and species of the Caricion davallianae and Alkaline fens. Mudflats and sandflats not covered by seawater at low tide, Annual vegetation of drift lines, Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Hippophae rhamnoides, Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp., Desmoulin`s whorl snail.			
Marais arrière-littoraux picards	SAC	France		Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae)*, Natural eutrophic lakes with Magnopotamion or *Hydrocharition*-type vegetation, European dry heaths, Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae),* Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Transition mires and quaking bogs, Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*, Alkaline fens, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsio*r (*Alno-Padion, Alnion incanae, Salicion albae*). Great crested newt, Creeping marshwort. Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. Fen orchid			
Marais de la grenouillère	SAC	France		Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels and Desmoulin`s whorl snail.			
Marais du Cotentin et du Bessin - Baie des Veys	SAC	France	Harbour seal	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, Natural dystrophic lakes and ponds, Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Transition mires and quaking bogs, Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*, Alkaline fens. Southern damselfly, Marsh fritillary butterfly, Stag beetle, Great crested newt, Greater horseshoe bat, Greater mouse-eared bat, Floating water-plantain.Estuaries, Mudflats and		✓	✓

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
				sandflats not covered by seawater at low tide, Coastal lagoons, Annual vegetation of drift lines, Salicornia and other annuals colonising mud and sand, Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`), Dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. Sea lamprey, River lamprey, Atlantic salmon, Allis shad, Twaite shad and fen orchid.			
Marais et monts de Mareuil-Caubert	SAC	France		Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae)*, Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, *Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Transition mires and quaking bogs, Alkaine fens and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*). Greater horseshoe bat, Geoffroys bat, Greater mouse eared bat, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.			
Marais Vernier, Risle Maritime	SAC	France		Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*), Active raised bogs, Depressions on peat substrates of the *Rhynchosporion*, Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*, Alkaline fens, Caves not open to the public, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*), *Asperulo-Fagetum* beech forests and Tilio-Acerion forests of slopes, screes and ravines. Southern damselfly, Stage beetle, Brook lamprey, Bullhead, Great crested newt, Greater horseshoe bat, Greater mouse eared bat, Geoffroy's bat, and Bechstein's bat. Mudflats and sandflats not covered by seawater at low tide, Fixed dunes with herbaceous vegetation ('grey dunes'), Dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. River lamprey			
Margate and Long Sands	SCI	UK		Sandbanks which are slightly covered by sea water all the time.			
Massif dunaire de Héauville à Vauville	SAC	France		Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation, Northern (Great) crested newt, Natterjack toad, Parsley frog, Marbled newt, Smooth newt.Mudflats and sandflats not covered by seawater at low tide, Annual vegetation of drift lines, Embroynic shifting dunes, Shifting dunes along the shoreline with Ammophils arenaria (white dunes), Fixed coastal dunes with herbaceaous vegetation (grey dunes), Dunes with Salix repens ssp argentea (Salicion arenariae), Humid dune slacks, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. Marine area, Sea inlets.			
Massif forestier de Crécy-en-Ponthieu	SAC	France		Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*) and *Asperulo-Fagetum* beech forests.			
Mells Valley	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia), Greater horseshoe bat.Caves not open to the public			
Mendip Limestone Grasslands	SAC	UK		European dry heaths, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Tilio-Acerion* forests of slopes, screes and ravines, Greater horseshoe bat.Caves not open to the public			
Mendip Woodlands	SAC	UK		*Tilio-Acerion* forests of slopes, screes and ravines.			
Mole Gap to Reigate Escarpment	SAC	UK		European dry heaths, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Asperulo-Fagetum* beech forests, *Taxus baccata* woods of the British Isles, Barbastelle bats, and Great crested newt			
Mottisfont Bats	SAC	UK		Barbastelle bats.			
Newlyn Downs	SAC	UK		Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix*, European dry heaths.			
North Downs Woodlands	SAC	UK		*Asperulo-Fagetum* beech forests, *Taxus baccata* woods of the British Isles and Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (important orchid sites).			
North Meadow and Clattinger Farm	SAC	UK		Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*).			
North Somerset and Mendip Bats	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Tilio-Acerion* forests of slopes, screes and ravines, Lesser horseshoe bat, Greater horseshoe bat and Caves not open to the public			
Oxford meadows	SAC	UK		Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) and Creeping marshwort.			

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
Parkgate Down	SAC	UK		Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (important orchid sites).			
Pays de Bray – Cuestas Nord et Sud	SAC	France		*Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Asperulo-Fagetum* beech forests, *Tilio-Acerion* forests of slopes, screes and ravines. Marsh fritillary butterfly and Stag Beetle.			
Pays De Bray Humide	SAC	France		Oligotrophic waters containing very few minerals of sandy plains *(Littorelletalia uniflorae)*, Northern Atlantic wet heaths with *Erica tetralix*, Species-rich Nardus grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*), Active raised bogs, Degraded raised bogs still capable of natural regeneration, Siliceous rocky slopes with chasmophytic vegetation, Bog woodland, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*), Atlantic acidophilous beech forests with Ilex and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*) and Old acidophilous oak woods with *Quercus robur* on sandy plains. Stag beetle, Brook lamprey, Bullhead, Great crested newt and Geoffroy's bat, Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.			
Pelouses, bois acides à neutrocalcicoles, landes nord-atlantiques du plateau d'Helfaut et système alluvial de la moyenne vallée de l'Aa	SAC	France		Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, *Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*), Medio-European calcareous of hill and amp montane level, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (A*lno-Padion, Alnion incanae, Salicion albae*), Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), *Asperulo-Fagetum* beech forests, Old acidophilous oak woods with *Quercus robur* on sandy plains. Cave not open to the public, Great crested newt, Pond bat and Geoffroy's bat.			
Pelouses, bois, forêts neutrocalcicoles et système alluvial de la moyenne vallée de l'Authie	SAC	France		Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, *Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*), *Asperulo-Fagetum* beech forests, *Tilio-Acerion* forests of slopes, screes and ravines. Brook lamprey, Bullhead, Great crested newt, Barbastelle bat and Greater mouse eared bat.			
Pelouses Et Bois Neutrocalcicoles De La Cuesta Sud Du Boulonnais	SAC	France		*Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*), Petrifying springs with tufa formation (*Cratoneurion*), *Asperulo-Fagetum* beech forests and *Tilio-Acerion* forests of slopes, screes and ravines.			
Pelouses et bois neutrocalcicoles des cuestas du Boulonnais et du Pays de Licques et forêt de Guines	SAC	France		*Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Asperulo-Fagetum* beech forests. Geoffroy's bat, Greater horseshoe bat and Pond bat and Caves not open to the public.			
Peter's Pit	SAC	UK		Great crested newt.			
Pewsey Downs	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Early gentian.			
Pevensey Levels	SCI	UK		Ramshorn snail.			
Phoenix United Mine and Crow's Nest	SAC	UK		Calaminarian grasslands of the *Violetalia calaminariae*.			
Plymouth Sound and Estuaries	SAC	UK	Allis Shad.	Sandbanks which are slightly covered by sea water all the time, Estuaries, Large shallow inlets and bays, reefs, Atlantic salt meadows (Glauco-Puccinellietalia maritimae), Mudflats and sandflats not covered by seawater at low tide, Shore dock,	✓	✓	✓
Polders	SAC	Belgium		Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), Transition mires and quaking bogs, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) and Pond bat.Salicornia and other annuals colonising mud			

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
				and sand, Atlantic salt meadows (Glauco-Puccinellietalia maritimae).			
Polruan to Polperro	SAC	UK		Vegetated sea cliffs of the Atlantic and Baltic coasts, European dry heaths, Shore dock.			
Prairies et marais tourbeux de Guines	SAC	France		Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea, Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation, Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), Transition mires and quaking bogs, Alkaline fens, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae). Great crested newt, Brook lamprey, Bullhead and Great crested newt. Desmoulin`s whorl snail and Atlantic salmon			
Prairies et marais tourbeux de la basse vallée de l'Authie	SAC	France		Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*), Transition mires and quaking bogs, Alkaline fens.			
Prescombe Down	SAC	UK		Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Marsh fritillary butterfly, Early gentian.			
Quants	SAC	UK		Marsh fritillary butterfly.			
Queendown Warren	SAC	UK		Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (important orchid sites).			
Récifs et landes de la Hague	SAC	France	Bottlenose dolphin.	European dry heaths, Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Degraded raised bogs still capable of natural regeneration, Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion), Tilio-Acerion forests of slopes, screes and ravines, Geoffroys bat, Mouse eared bat, Shore dock, Sandbanks which are slightly covered by sea water all the time, Reefs, Mudflats and sandflats not covered by water at low tide, Annual vegetation of drift lines, Vegetated sea cliffs of the Atlantic and Baltoc Coasts, Atlantic salt meadow, Humid dune slacks, Marine areas, Sea inlets and saltmarshes salt pastures and Salt Steppes. Jersey tigar moth, Killarney fern, Bechstein's Bat, Greater horseshoe bat.	✓	✓	✓
Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire	SAC	France	Grey seal, Harbour seal, Harbour porpoise, Bottlenose dolphin,	Northern crested newt, Bechstein's bat, Greater horseshoe bat, Oligotrophic waters containing very few minerals of sandy plains, European dry heaths, Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe), Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis), Atlantic acidophilous beech forests with Ilex Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion).Sandbanks which are slightly covered by sea water all the time, Reefs, Mudflats and sandflats not covered by water at low tide, Annual vegetation of drift lines, Vegetated sea cliffs of the Atlantic and Baltic Coasts, Atlantic salt meadow, Humid dune slacks, Marine areas, Sea inlets and saltmarshes salt pastures & Salt Steppes, reefs, Perennial vegetation of stony banks, salicornia and other annuals, Mediterranean salt meadows, Embryonic shifting dunes, Shifting dunes along the shoreline with Ammophila arenaria (white dunes), fixed coastal dunes with herbaceaous vegetation	✓	✓	✓
Récifs Gris-Nez Blanc-Nez	SAC	France	Sandbanks which are slightly covered by sea water all the time and Reefs. Harbour porpoise, Grey Seal, Harbour seal.		✓	✓	✓
Réseau de cavités du nord-ouest de la Seine-Maritime	SAC	France		Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli*, Lesser horseshoe bat. Caves which are not open to the public			
Réseau de coteaux calcaires du Ponthieu méridional	SAC	France		*Juniperus communis* formations on heaths or calcareous grasslands and Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*).			
Réseau de coteaux calcaires du Ponthieu oriental	SAC	France		*Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Asperulo-Fagetum* beech forests, *Tilio-Acerion* forests of slopes, screes and ravines.			
Richmond Park	SAC	UK		Stag beetle.			
Ridens et dunes hydrauliques du détroit du Pas-de-Calais	SAC	France	Sandbanks which are slightly covered by sea water all the time and Reefs. Harbour porpoise, Grey seal and Harbour seal.		✓	✓	✓
River Avon	SAC	UK	Sea lamprey, Atlantic salmon.	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachionn vegetation, European brook Lamprey, European bullhead and Desmoulin's whorl snail	✓	✓	✓
River Axe	SAC	UK	Sea lamprey	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, European brook lamprey, European bullhead	✓	✓	✓

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
River Camel	SAC	UK		European dry heaths, Old sessile oak woods with Ilex and Blechnum in the British Isles, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae), European Bullhead. Atlantic salmon, European otter.			
River Itchen	SAC	UK	Atlantic salmon, European otter.	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, Southern damselfly, European freshwater crayfish, European brook lamprey, European bullhead	✓	✓	✓
River Lambourn	SAC	UK		Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, European brook lamprey, European bullhead.			
River Usk/ Afon Wysg	SAC	UK		Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, European brook Lamprey, European bullhead, Sea lamprey, European river lamprey, Allis shad, Twaite shad, Atlantic salmon, European otter.			
River Wye/ Afon Gwy	SAC	UK		Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, Transition mires and quaking bogs, European bullhead, Brook lamprey, White clawed crayfish, Sea lamprey, River lamprey, Twaite shad, Atlantic salmon, European otter, Allis shad.			
Rook Clift	SAC	UK		*Tilio-Acerion* forests of slopes, screes and ravines.			
Rooksmoor	SAC	UK		Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) and Marsh fritillary butterfly.			
Salisbury Plain	SAC	UK		*Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Marsh fritillary butterfly.			
Sandwich Bay	SAC	UK		Embryonic shifting dunes, "Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")", "Fixed coastal dunes with herbaceous vegetation ("grey dunes")", Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) and Humid dune slacks.			
Severn Estuary/ Môr Hafren	SAC	UK		Sandbanks which are slightly covered by sea water all the time, Estuaries, Mudflats and sandflats not covered by seawater at low tide, Reefs, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Sea lamprey, European river lamprey, Twaite shad.			
Shortheath Common	SAC	UK		European dry heaths, Transition mires and quaking bogs, Bog woodland.			
Sidmouth to West Bay	SAC	UK	Annual vegetation of drift lines, Vegetated sea cliffs of the Atlantic and Baltic coasts	*Tilio-Acerion* forests of slopes, screes and ravines.	✓		✓
Singleton and Cocking Tunnels	SAC	UK		Barbastelle, Bechstein's bat.			
Solent and Isle of Wight Lagoons	SAC	UK	Coastal lagoons.		✓	✓	✓
Solent Maritime	SAC	UK	Sandbanks which are slightly covered by sea water all the time, Estuaries, Mudflats and sandflats not covered by seawater at low tide, Coastal lagoons, Annual vegetation of drift lines, Perennial vegetation of stony banks, Salicornia and other annuals colonising mud and sand, Spartina swards (*Spartinion maritimae*), Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"), Desmoulin's whorl snail.		✓	✓	✓
South Dartmoor Woods	SAC	UK		European dry heaths, Old sessile oak woods with *Ilex* and Blechnum in the British Isles.			
South Devon Shore Dock	SAC	UK		Vegetated sea cliffs of the Atlantic and Baltic coasts, Shore dock.			
South Hams	SAC	UK	Vegetated sea cliffs of the Atlantic and Baltic coasts, Caves not open to the public.	European dry heaths, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Tilio-Acerion* forests of slopes, screes and ravines,Greater horseshoe bat.	✓		
South Wight Maritime	SAC	UK	Reefs, Vegetated sea cliffs of the Atlantic and Baltic coasts, Submerged or partially submerged sea caves.		✓	✓	✓
Start Point to Plymouth Sound and Eddystone	SCI	UK		Reefs.			
Studland to Portland	cSAC	UK	Reefs.		✓		✓
St Albans Head to Durlston Head	SAC	UK	Vegetated sea cliffs of the Atlantic and Baltic coasts.	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia), Early gentian. Greater horseshoe bat	✓		
St Austell Clay Pits	SAC	UK		Western rustwort.			
Stodmarsh	SAC	UK		Desmoulin's whorl snail.			
Tankerton Slopes and Swalecliffe	SCI	UK		Fisher's estuarine moth.			
Tatihou - Saint-Vaast-la-Hougue	SAC	France		Mudflats and sandflats not covered by seawater at low tide, Reefs, Annual vegetation of drift lines, Perennial vegetation of stony banks, Vegetated sea cliffs of the Atlantic and Baltic coasts, *Salicornia* and other annuals colonising mud and sand, *Spartina* swards (*Spartinion maritimae*), Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*), Embryonic shifting dunes, Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`).			
Thanet Coast	SAC	UK		Reefs and Submerged or partially submerged sea caves.			
The Mens	SAC	UK		Atlantic acidophilous beech forests with Ilex and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), Barbastelle.			
The New Forest	SAC	UK		Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, *Molinia* meadows on calcareous, peaty or			

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
				clayey-silt-laden soils (*Molinion caeruleae*), Depressions on peat substrates of the Rhynchosporion, Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), *Asperulo-Fagetum* beech forests, Old acidophilous oak woods with *Quercus robur* on sandy plains, Bog woodland, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*), Transition mires and quaking bogs, Alkaline fens, Southern damselfly, Stag beetle, Northern crested newt.			
Thursley, Ash, Pirbright and Chobham	SAC	UK		Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, Depressions on peat substrates of the Rhynchosporion.			
Tintagel-Marsland-Clovelly Coast	SAC	UK		European dry heaths, Old sessile oak woods with Ilex and Blechnum in the British Isles.Vegetated sea cliffs of the Atlantic and Baltic coasts			
Val Eglantier	SAC	France		Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae). Brook lamprey and bullhead.			
Vallée de la Bresle	SAC	France		Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, Juniperus communis formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae), Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion), Asperulo-Fagetum beech forests. Brook lamprey, Bullhead, Greater horseshoe bat, Geoffroy's bat, Bechstein's bat, Greater mouse eared bat. Sea lamprey, River lamprey and Atlantic salmon.			
Vallée de l'Authie	SAC	France		Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae), Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation, Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation, Juniperus communis formations on heaths or calcareous grasslands, Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia), Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, Transition mires and quaking bogs, Alkaline fens, Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae), Asperulo-Fagetum beech forests, and Creeping marshwort and Atlantic Salmon			
Vlaamse Banken	SAC	Belgium		Sandbanks which are slightly covered by sea water all the time, Reefs.			
West Dorset alder Woods	SAC	UK		Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Old acidophilous oak woods with *Quercus robur* on sandy plains, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*), Marsh fritillary butterfly, Great crested newt.			
Westvlaams Heuvelland	SAC	Belgium		Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, Species-rich Nardus grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*), *Asperulo-Fagetum* beech forests, Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli*, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*), Great crested newt.			
Wight-Barfleur Reef	SCI	UK	Reefs.		✓		
Wimbledon Common	SAC	UK		Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths and Stag beetle			
Windsor Forest and Great Park	SAC	UK		Old acidophilous oak woods with *Quercus robur* on sandy plains, Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae or Ilici-Fagenion*) and Violet click beetle.			
Woolmer Forest	SAC	UK		Natural dystrophic lakes and ponds, Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, Transition mires and quaking bogs, Depressions on peat substrates of the Rhynchosporion.			
Wormley Hoddesdonpark Woods	SAC	UK		Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli.*			
Wye and Crundale Downs	SAC	UK		Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites).			
Abberton Reservoir	SPA	UK	Wintering populations of Northern shoveler, Eurasian teal, Eurasian wigeon, Gadwall, Common pochard, Tufted duck, Common goldeneye, Mute swan, Eurasian coot, Great crested grebe and breeding populations of Great cormorant. 39,763 waterfowl.		✓	✓	✓

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
Arun Valley	SPA	UK	Overwintering populations of Tundra swan. 27,241 waterfowl (Article 4.2) supported in the non-breeding season.		✓	✓	✓
Ashdown Forest	SPA	UK		Breeding populations of European nightjar and Dartford warbler.			
Avon Valley	SPA	UK	Overwintering populations of Tundra swan. Article 4.2 overwintering populations of Gadwall.		✓	✓	✓
Baie de Seine occidentale	SPA	France		Breeding populations of Little egret, European herring gull, Great black-backed gull, European shag, Great cormorant, Common eider and Common shelduck. Overwintering populations of Razorbill, Ruddy turnstone, Purple sandpiper, Black-throated loon, Great northern loon, Red-throated diver, European herring gull, Great black-backed gull, Mediterranean gull, Little gull, Common scoter, Red-breasted merganser, European shag, Great cormorant, Horned grebe, Great crested grebe, Common eider, Common shelduck, Common guillemot.			
Bancs des Flandres	SPA	France	Populations of Gulliemot, Northern Fulmer, Black throated divers, kittewake, red throated diver, Razorbill,		✓	✓	✓
Basses Vallées du Cotentin et Baie des Veys	SPA	France		Populations of Eurasian Bittern, Little Egret, Ruff, Kentish Plover, Sandwich tern, Little tern, Black tern, Eurasian curlew, Common Redshank, Common shelduck, Red knot, Herring Gull. Breeding populations of Mediterranean Gull, Common tern, Whiskered tern. Eurasian teal, Northern Shoveler, Garganey, Common Snipe, Black-tailed Godwit, Northern lapwing, and Black headed Gull. Wintering populations of Great Egret, Bar-tailed Godwit, Peregrine Falcon, Golden Plover, Gadwall, Northern Pintail, Spotted Redshank, Greylag Goose, Dunlin, Oystercatcher, Ringed Plover, Grey Plover, Sanderling, Ruddy Turnstone, Common Gull. Sedge warbler, Horned lark and snow bunting. Populations of, Short-eared Owl, Common Kingfisher, Aquatic warbler, Common eider. Breeding populations of White Stork, Western Marsh Harrier, Montagu's Harrier, Spotted Crake, Corn Crake, Bluethroat.			
Benfleet and Southend Marshes	SPA	UK	Over wintering populations of Brant Geese, Dunlin, Red Knot, Common ringed plover and Grey plover. 34,789 water fowl.		✓	✓	✓
Blackwater Estuary (Mid-Essex Coast Phase 4)	SPA	UK	Breeding populations of Common Pochard, Ringed Plover and Little Tern.Wintering populations of Hen Harrier, Dark-bellied Brent Goose, Ringed Plover, Dunlin, Black-tailed Godwit and Grey Plover, supports 109,964 waterfowl.		✓	✓	✓
Cap Gris-Nez	SPA	France	Populations of Cory's Shearwater, Storm Petrel, Little Egret, Ruff, Bar-tailed Godwit, Wood sandpiper, Osprey, Merlin, Hen Harrier, Peregrine falcon, Roseate tern, Kentish plover, Golden plover, common tern, Artic tern, Little tern, Pied avocet, Whiskered tern, Black tern, Short-eared Owl, teal, Greater white-front goose, Greylag goose, Oystercatcher, Little ringed plover, Ringed Plover, Pomarine Skua, Greater Skua, Wintering populations of Red throated diver, Bittern, White Stork, Eurasian Spoonbill, Barnacle Goose, Smew, Mediterranean gull, Sandwich tern, Black throated diver, Great Northern Diver, Horned Grebe, manx shearwater, Greater Scaup, Common eider, Northern Gannet, Great Cormorant, Eurasian curlew, Barnacle goose, Common Scoter, Velvet Scoter, Red-breasted Merganser, Purple sandpiper, Dunlin, Grey Plover, Northern Lapwing, Sanderling, Black legged kittiwake, Guillemot, Razorbill, Atlantic puffin, Great crested Grebe, Red necked grebe, Black necked grebe and Fulmar.	Northern Goshawk, woodlark, European Honey buzzard,Black kite, European marsh harrier,Black winged stilt,Kingfisher, Red-backed shrike,	✓	✓	✓
Chesil Beach and the Fleet	SPA	UK	Article 4.2 overwintering populations of Brent goose.		✓	✓	✓
Chew Valley Lake	SPA	UK	Article 4.2 overwintering populations of Northern shoveler.		✓	✓	✓
Chichester and Langstone Harbours	SPA	UK	Breeding populations of Little tern, Common tern and Sandwich tern. Overwintering populations of Bar-tailed godwit. Article 4.2 overwintering populations of Northern pintail, Northern shoveler, Eurasian teal, Eurasian wigeon, Ruddy turnstone, Brent goose, Sanderling, Dunlin, Ringed plover, Red-breasted merganser, Eurasian curlew, Grey plover, Common shelduck and Common redshank. 93,230 waterfowl (Article 4.2) supported over the winter.		✓	✓	✓
Colne Estuary (Mid-Essex Coast Phase 2)	SPA	UK	Wintering population of Dark-bellied Brent Goose, Hen Harrier and Redshank, supports 38,600 waterfowl. Breeding population of Common Pochard, Ringed Plover and Little Tern.		✓	✓	✓
Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	SPA	UK	Wintering populations of Hen Harrier and Dark-bellied Brent Goose, supports 18607 waterfowl.		✓	✓	✓
Deben Estuary	SPA	UK	Wintering populations of Dark-bellied Brent Goose and Pied Avocet.		✓		
Dengie (Mid-Essex Coast Phase 1)	SPA	UK	Wintering populations of Dark-bellied Brent Goose, Hen Harrier, Grey Plover and Knot, supports 31,454 waterfowl.		✓	✓	✓
Dorset Heathlands	SPA	UK	Overwintering populations of Hen harrier and Merlin.	Breeding populations of European nightjar, Woodlark and Dartford warbler.	✓	✓	✓
Dunes de Merlimont	SPA	France	Populations of Little Egret, Black Stork, Eurasian spoonbill, Osprey, Short-eared owl, Teal, Northern Pintail, Garganey and Common Gull. Wintering populations of Bittern, Great Egret,	Breeding populations of European honey buzzard, Hen harrier, and European nightjar and Breeding populations of Black wood pecker, Kingfisher, Bluethroat , Aquatic warbler,	✓	✓	✓
Dungeness to Pett Level	SPA	UK	Wintering population of Northern Shoveler and Bewick's Swan. Breeding population of Mediterranean Gull, Little Tern and Common Tern.		✓	✓	✓
East Devon Heaths	SPA	UK		Breeding populations of European nightjar and Dartford warbler.			
Estuaire de la Canche	SPA	France	Populations of Little Bittern, Little Egret, Great Egret, Eurasian Spoonbill, Ruff, Bar-tailed godwit, Wood sandpiper Barnacle goose, Smew, Spotted Crake, Common Crane, Black winged Stilt, Pied avocet, Kentish plover, Golden Plover, Red necked phararope, Common tern, artic tern, Little tern, Black tern . Wintering	Populations of , Greater Spotted Eagle, Osprey,Hen Harrier, Montagu's Harrier, Peregrine Falcon and Woodlark. Breeding populations of European Nightjar and Blue Throat.Black-crowned Night Heron, stork and kingfisher	✓	✓	✓

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
			populations of Red throated diver, Bittern, Merlin, White tailed eagle, Western Marsh Harrier, Mediterranean Gull, Sandwich tern, Short-eared Owl, and Black throated diver.				
Estuaire de l'Orne	SPA	France		Populations of Leach's Storm Petrel, Purple heron, Ruff, Wood sandpiper, Brent Goose, Common Crane, Black winged Stilt, Eurasian Thick Knee, Golden plover, Sandwich Tern, Common Tern, Artic Tern, Little Tern, Roseate Tern, Black tern . Wintering populations of Little Egret, Eurasian Spoonbill, Whooper swan, Hen Harrier, Pied avocet . Osprey,Eurasian Honey Buzzard, Western Marsh Harrier, Montagu's Harrierand Dartford warbler. Wintering populatuions of Short-eared Owl.			
Estuaire et marais de la Basse Seine	SPA	France		Populations of Little Bittern, Purple heron, Black Stork, Eurasian Spoonbill, Ruff, Woodsandpiper, , Smew, Black kite, Red kite, Western marsh Western marsh harrier, Hen harrier, Peregrine Falcon, Common crane, Golden plover, Mediterranean Gull, Little Gull, Sandwich tern, Common tern, Artic tern, Aquatic warbler, Ortolan, Wintering populations of Red throated diver, Bittern, Little Egret, Bar-tailed godwit, Merlin, Breeding populations of White stork,Spotted crake, Corn crake, Black winged stilt, Pied avocet, Kentish plover. Osprey. Breeding populations of European Honey Buzzard, Short-eared Owl, European nightjar, Kingfisher, Red-backed shrike, Bluethroat.			
Estuaires picards: Baie de Somme et d' Authie.	SPA	France	Breeding and wintering populations of Little egret, Wintering populations of Great egret, Smew. Populations of Brant Goose. Breeding population of Mediterranean gull and resident population of Pied avocet.	wintering population of Short-eared Owl	✓	✓	✓
Étangs et marais du basin de la Somme	SPA	France	Breeding populations of Little Bittern, Black-crowned Night Heron,Spotted Crake and Common tern. Populations of Little Egret.	Breeding populations of European Honey Buzzard, Western Marsh Harrier, Hen Harrier, Common Kingfisher and Blue throat.	✓		
Exe Estuary	SPA	UK	Wintering populations of Brant Goose, Gray plover, Dunlin, Eurasian oystercatcher, Black tailed godwit, Horned grebe, Pied avocet. 23,811 waterfowl.		✓	✓	✓
Falaise du Bessin Occidental	SPA	France		Wintering populations of Red throated diver, Peregrine Falcon, Great cormorant, Red-breasted merganser, Guillemot, Razorbill, Breeding population of Lesser black-backed gull, herring gull, Black legged kittiwake. Short eared owl. Breeding populations of Dartford Warbler.			
Falmouth Bay to St Austell Bay	pSPA	UK	Overwintering populations of black throated diver, Great northern divers and Slovenian grebe.			✓	✓
Foulness (Mid-Essex Coast Phase 5)	SPA	UK	Wintering populations of Hen Harrier, Bar-tailed Godwit, Pied Avocet, Dark-bellied Brent Goose, Knot, Eurasian Oystercatcher, Grey Plover and Redshank, supports 107,999 waterfowl. Breeding populations of Ringed Plover, Pied Avocet, Little Tern, Common Tern and Sandwich Tern.		✓	✓	✓
Hamford Water	SPA	UK	Wintering populations of Eurasian Teal, Dark-bellied Brent Goose, Ringed Plover, Black-tailed Godwit, Grey Plover, Pied Avocet, Redshank and Common Shelduck.Breeding population of Little Tern.		✓		✓
Ijzervallei	SPA	Belgium	Wintering populations of Lesser white fronted goose, short eared owl, Bittern, Barnacle goose, Hen harrier, Bewick's Swan, Whooper swan, Peregrine Falcon, Smew, Golden plover, Northern pintail; Northern shoveler, Teal, Wigeon, Mallard, Gadwall, Greater white-fronted goose, Pink footed goose, Common pochard, Tufted duck, Mute swan, Coot, Great crested grebe, Little grebe and shelduck. Population of Ruff, Greylag goose, Grey Heron, Black-tailed godwit, Curlew, Whimbrel and Great cormorant.	. Populations of Merlin, Osprey,Breeding population of Western marsh harrier, Black stork, Corn crake, Ruff, Spotted crake,	✓		
Landes et dunes de la Hague	SPA	France	Breeding populations of Northern shoveler, Garganey, Gadwall, Common pochard, Tufted duck, Sanderling, European nightjar, Kentish plover, Ringed plover, European shag, Dartford warbler and Little grebe. Overwintering populations of Gadwall, Eurasian bittern, Kentish plover, Western marsh-harrier, Hen harrier, Merlin, Peregrine falcon, Black-throated loon, Great northern loon, Red-throated diver and Mediterranean gull.	Breeding populations of Western marsh-harrier, Hen harrier, Peregrine falcon, Eurasian hobby, Overwintering populations of Common kingfisher, Short-eared Owl,	✓		✓
Lee Valley	SPA	UK	Wintering populations of Eurasian Bittern, Northern Shoveler and Gadwell.		✓	✓	✓
Littoral augeron	SPA	France	Wintering populations of Red throated diver, common eider, Great cormorant, common scoter, Velvet scoter, Great crested grebe, Resident populations of sandwich tern, common tern, Horned grebe.				
Littoral seino-marin	SPA	France	Wintering population of Red throated diver and Black throated diver, Northern gannet, Great Skua, Razorbill, Great crested grebe, Breeding and wintering populations of Great Cormorant, European shag, , Herring gull, Kittiwake, Guillemot and Northern Fulmar. Breeding population of Population of Mediterranean gull, Little gull, Sandwich tern, common tern, Pomarine Skua.	Breeding populations of Peregrine falcon	✓	✓	✓
Marais arrière-littoraux picards	SPA	France	Wintering and breeding populations of Bittern,	Breeding populations of Bluethroat Populations of Western Marsh Harrier, Breeding populations of Spotted crake, Baillon's crake, Black winged stilt .	✓	✓	✓
Marais de Balançon	SPA	France	Wintering populations of Bittern and Merlin.		✓	✓	✓
Medway Estuary & Marshes	SPA	UK	Breeding populations of Pied Avocet, Little Tern and Common Tern, and an internationally important assemblage of breeding waterfowl. Wintering populations of Bewick's Swan, Pied Avocet, Northern Pintail, Northern Shoveler, Eurasian Teal, Eurasian Wigeon, Ruddy Turnstone, Dark-bellied Brent Goose, Dunlin, Knot, Ringed Plover, Eurasian Oystercatcher, Black-tailed Godwit, Curlew, Grey Plover, Common Shelduck, Redshank and Common Greenshank, supports 65,496 waterfowl.		✓	✓	✓
New Forest	SPA	UK		Breeding population of European nightjar, Woodlark, European honey buzzard and Dartford warbler. Overwintering populations of Hen harrier. Art 4.2 breeding populations of Eurasian hobby and Wood warbler.			

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
Outer Thames Estuary	SPA	UK	Wintering population of Red-throated Diver.		✓	✓	✓
Pagham Harbour	SPA	UK	Breeding populations of Little tern and Common tern. Overwintering populations of Ruff. Article 4.2 overwintering populations of Brent goose.		✓	✓	✓
Platier d'Oye	SPA	France	Wintering population of bittern, Eurasian Spoonbill, Barnacle goose, Smew, Dunlin, Sanderling, Horned lark, Twite, Snow bunting, Population of Merlin, Bewicks swan, Golden plover, Snipe. Redshank, .Northern lapwing, Breeding population of Pied Avocet, Red necked phararope, Mediterranean gull, sandwich tern. Ringed plover and Black necked grebe. Breeding and wintering population of Kentish plover.			✓	
Poldercomplex	SPA	Belgium		Breeding populations of Kingfisher, Short-eared Owl, Bittern, Western march harrier, Black winged stilt, Little Bittern, Bluethroat, Pied avocet, Common tern, Wintering populations of Northern Pintail, Northern Shoveler, Teal, Wigeon, Greater white fronted goose, Pink fronted goose, Lesser white fronted goose, bean goose, Common Pochard, Barnacle goose, Red-breasted goose, Hen Harrier, Tundra Swan, Whooper swan, Red throated diver, Smew, Golden plover, Little grebe, Common shelduck, Concentration of Merlin, Eurasian Curlew, Ruff.			
Poole Harbour	SPA	UK	Breeding populations of Mediterranean gull and Common tern. Overwintering populations of Pied avocet. Article 4.2 overwintering populations of Black-tailed godwit and Common shelduck. 25,091 waterfowl (Article 4.2) supported over the winter.		✓	✓	✓
Porton Down	SPA	UK		Breeding populations of Eurasian stone-curlew.			
Portsmouth Harbour	SPA	UK	Article 4.2 Overwintering populations of Brent goose, Dunlin, Black-tailed godwit and Red-breasted merganser.		✓	✓	✓
Salisbury Plain	SPA	UK		Breeding populations of Eurasian stone-curlew. Overwintering populations of Hen harrier. Article 4.2 breeding populations of Quail and Eurasian hobby.			
Sbz 1 / Zps 1	SPA	Belgium	Wintering population of Black throated diver, Red throated diver, common scoter, Great crested grebe and Guillemot. Concentration of Little gull, Common tern, Sandwich tern.		✓		✓
Sbz 2 / Zps 2	SPA	Belgium	Wintering population of Black throated diver, Red throated diver, common scoter, Great crested grebe and Guillemot. Concentration of Little gull, Common tern, Sandwich tern.		✓		
Sbz 3 / Zps 3	SPA	Belgium		Wintering population of Black throated diver, Red throated diver, common scoter, Great crested grebe and Guillemot. Concentration of Little gull, Common tern, Sandwich tern.			
Severn Estuary	SPA	UK	Overwintering populations of Tundra swan. Article 4.2 overwintering populations of Gadwall, Greenland white-fronted goose, Dunlin, Common shelduck and Common redshank. 84,317 waterfowl (Article 4.2) supported over the winter.		✓	✓	✓
Solent and Southampton Water	SPA	UK	Breeding populations of Mediterranean gull, Little tern, Roseate tern, Common tern and Sandwich tern. Article 4.2 overwintering populations of Eurasian teal, Barnacle goose, Ringed plover and Black-tailed godwit. 51,361 waterfowl (Article 4.2) supported over the winter.		✓	✓	✓
Somerset levels and Moors	SPA	UK	Overwintering populations of Tundra swan and European golden plover. Article 4.2 overwintering populations of Eurasian teal and Northern lapwing. 73,014 waterfowl (Article 4.2) supported over the winter.		✓	✓	✓
South West London Waterbodies	SPA	UK	Overwintering populations of Northern shoveler and Gadwall.		✓	✓	✓
Stodmarsh	SPA	UK	Wintering populations of Eurasian Bittern, Hen Harrier, Northern Shoveler and Gadwall. Breeding populations of Gadwall, and an internationally important assemblage of breeding waterfowl.		✓	✓	✓
Stour and Orwell Estuaries	SPA	UK	Breeding population of Pied Avocet. Wintering populations of Northern Pintail, Dark-bellied Brent Goose, Dunlin, Knot, Black-tailed Godwit, Grey Plover, Redshank, supports 63,017 waterfowl. Population of Redshank on passage.		✓		✓
Tamar Estuaries Complex	SPA	UK	Overwintering populations of Pied avocet. On passage the area regularly supports Little egret.		✓	✓	✓
Thames Basin Heaths	SPA	UK		Breeding populations of European nightjar, Woodlark and Dartford warbler.			
Thames Estuary & Marshes	SPA	UK	Wintering populations of , Hen Harrier, Pied Avocet, Dunlin, Knot, Black-tailed Godwit, Grey Plover, Redshank, supports 75,019 waterfowl. Population of Ringed Plover on passage.		✓	✓	✓
Thanet Coast & Sandwich Bay	SPA	UK	Breeding population of Little Tern. Wintering populations of Golden Plover and Ruddy Turnstone.		✓	✓	✓
The Swale	SPA	UK	Wintering populations of Dark-bellied Brent Goose, Dunlin, Redshank, supports 65,588 waterfowl. Internationally important assemblage of breeding waterfowl.		✓	✓	✓
Thursley, Hankley and Frensham Commons (Wealden Heaths Phase 1)	SPA	UK		Breeding populations of European nightjar, Woodlark and Dartford warbler.			
Vallée de la Lys (Comines-Warneton)	SPA	Belgium		Breeding populations of Great reed warbler, Sedge warbler, Black-winged stilt, Little Bittern, Savi's Warbler, Bluethroat, Sand martin, Pairs of kingfisher, Wintering populations of Teal, Smew, Concentrations of Garganey, Purple heron, Black tern, White stork, Western Marsh harrier, Hen harrier, Little egret, Great egret, Jack snipe, Black-crowned nigh heron, Honey buzzard, Ruff, Eurasian Spoonbill, Golden plover, Pied avocet and common tern.			
Wealden Heaths Phase 2	SPA	UK		Breeding populations of European nightjar, Woodlark and Dartford warbler.			
Westkust	SPA	Belgium	Concentrations of Grey Heron, Ruddy turnstone, Pochard, Tufted duck, Tundra swan, Mute swan, Coot, Mediterranean gull, Smew, Scoter, Curlew, Whimbrel, Red necked Phalarope, great crested grebe, Pied avocet, Little tern, common tern, sandwich tern, Little grebe,	Short-eared Owl, breeding populations of Woodlark, Bluethroat.	✓		✓

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
			Shelduck and Woodsandpiper. Wintering populations of Hen harrier,				
Abberton Reservoir	Ramsar	UK	Ramsar Criterion 5 - site supports a winter population of 23,787 waterfowl.Ramsar Criterion 6 - Spring/autumn populations of Gadwall and Northern Shoveler and wintering population of Eurasian Wigeon. Species/populations identified subsequent to designation for possible future consideration under Criterion 6 include; overwintering populations of Mute Swan and Common Pochard.		✓	✓	✓
Arun Valley	Ramsar	UK	Ramsar Criterion 5 - 13,774 waterfowl in the winter. Ramsar Criterion 6 - Peak winter counts of Northern pintail.	Ramsar Criterion 2 - The site holds seven wetland invertebrate species listed in the British Red Data Book as threatened. One of these, Pseudamnicola confusa, is considered to be endangered. The site also supports four nationally rare and four nationally scarce plant species. Ramsar Criterion 3 - The ditches intersecting the site have a particularly diverse and rich flora. All five British duckweed Lemna species, all five water-cress Rorippa species, and all three British water milfoils (Myriophyllum species), all but one of the seven British water dropworts (Oenanthe species), and two-thirds of the British pondweeds (Potamogetonspecies) can be found on site.	✓	✓	✓
Avon Valley	Ramsar	UK	Ramsar Criterion 6 - Peak winter counts of Gadwall. Populations of species identified for possible future consideration over winter populations of Northern pintail and Black-tailed godwit.	Ramsar Criterion 1 - Greater range of habitats than any other chalk river in Britain. Ramsar Criterion 2 - Diverse range of assemblage of wetland flora and fauna including several nationally rare species.	✓	✓	✓
Benfleet and Southend Marshes	Ramsar	UK	Ramsar Criterion 5 - Site supports a winter population of 32,867 waterfowl. Ramsar Criterion 6 - Site supports a spring/autumn population of Dark-bellied Brent Goose and overwintering populations of Grey Plover and Knot. Species/populations identified subsequent to designation for possible future consideration under Criterion 6 include; overwintering population of Dunlin.		✓	✓	✓
Blackwater Estuary (Mid-Essex Coast Phase 4)	Ramsar	UK	Ramsar Criterion 1 - Qualifies by virtue of the extent and diversity of saltmarsh habitat present. Ramsar Criterion 2 - The invertebrate fauna is well represented and includes at least 16 British Red Data Book species. Ramsar Criterion 3 - This site supports a full and representative sequence of saltmarsh plant communities covering the range of variation in Britain. Ramsar Criterion 5 - Site supports a winter population of 105,061 waterfowl. Ramsar criterion 6 – Site supports overwintering populations of Dark-bellied Brent Goose, Grey Plover, Dunlin and Black-tailed Godwit. Species/populations identified subsequent to designation for possible future consideration under Criterion 6 include; overwintering populations of Common Shelduck, European Golden Plover, and Common Redshank.		✓	✓	✓
Chesil Beach and the Fleet	Ramsar	UK	Ramsar Criterion 1 - Rare lagoon and the largest of its kind in the UK. Supports rare saltmarsh habitats. Ramsar Criterion 2 - 15 specialist lagoonal species. One of the most important UK sites for Shingle habitats and species. Ramsar Criterion 3 - Largest barrier built saline lagoon in the UK and has the greatest diversity of habitats and biota. Ramsar Criterion 4 - Important site for species at a critical stage in their life cycle including post-larval and juvenile bass. Ramsar Criterion 6 - Peak winter counts of Dark-bellied Brent goose, and possible consideration for Mute swan. Ramsar Criterion 8 - Important nursery for bass.		✓		
Chichester and Langstone Harbours	Ramsar	UK	Ramsar Criterion 1 - 2 large estuarine basins linked by the channel. Includes intertidal mudflats, saltmarsh, sand and shingle spits and sand dunes. Ramsar Criterion 5 - 76,480 waterfowl in the winter. Ramsar Criterion 6 - Peak spring/autumn counts of Ringed plover, Black-tailed godwit, Redshank. Peak winter counts of Dark-bellied Brent goose, Shelduck, Grey plover and Dunlin. Identified as possible future consideration: During breeding season - Little tern.		✓	✓	✓
Colne Estuary (Mid-Essex Coast Phase 2)	Ramsar	UK	Ramsar Criterion 1 - The site is important due to the extent and diversity of saltmarsh present. Ramsar Criterion 2 - Site supports 12 species of nationally scarce plants and at least 38 British Red Data Book invertebrate species. Ramsar Criterion 3 - This site supports a full and representative sequence of saltmarsh plant communities covering the range of variation in Britain. Ramsar Criterion 5 - Site supports a winter population of 32,041 waterfowl. Ramsar Criterion 6 - Site supports overwintering populations of Dark-bellied Brent Goose and Common Redshank. Species/populations identified subsequent to designation for possible future consideration under Criterion 6 include; overwintering population of Black-tailed Godwit.		✓	✓	✓
Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	Ramsar	UK	Ramsar Criterion 2 - Site supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plant and animal including 13 nationally scarce plant species and several important invertebrate species. Ramsar Criterion 5 - Site supports a winter population of 16,970 waterfowl. Ramsar Criterion 6 - Site supports an overwintering population of Dark-bellied Brent Goose.		✓	✓	✓
Deben Estuary	Ramsar	UK	Ramsar Criterion 2 – Site supports a population of the mollusc *Vertigo angustior*.Ramsar Criterion 6 - Site supports an overwintering population of Dark-bellied Brent Goose.		✓		
Dengie (Mid-Essex Coast Phase 1)	Ramsar	UK	Ramsar Criterion 1 - Qualifies by virtue of the extent and diversity of saltmarsh habitat present. Ramsar Criterion 2 - Site supports a number of rare plant and animal species including 11 species of nationally scarce plants (including the eelgrass *Zostera angustifolia, Z. marina* and *Z. noltei*) and Red Data Book invertebrate species. Ramsar Criterion 3 - This site supports a full and representative		✓	✓	✓

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
			sequence of saltmarsh plant communities covering the range of variation in Britain. Ramsar Criterion 5 – Site supports a winter population of 43,828 waterfowl. Ramsar Criterion 6 - Site supports overwintering populations of Dark-bellied Brent Goose, Grey Plover and Knot. Species/populations identified subsequent to designation for possible future consideration under Criterion 6 include; overwintering populations of Bar-tailed Godwit.				
Dorset Heathlands	Ramsar	UK		Ramsar Criterion 1 - Contains particularly good examples of northern Atlantic wet heaths with cross - leaved heath Erica tetralix and acid mire with *Rhynchosporion*. Largest examples in Britain of southern Atlantic wet heaths with Dorset heaths *Erica ciliaris* and cross-leaved heath *Erica tetralix*. Ramsar Criterion 2 - Nationally rare and scarce wetland plant species and wetland invertebrates. Ramsar Criterion 3 - High species richness and ecological diversity of wetland habitat types and transitions. Lies in one of the most biologically rich wetland areas of lowland Britain being between 3 other Ramsar sites.			
Exe Estuary	Ramsar	UK	Ramsar Criterion 5 - 20,263 waterfowl in winter. Ramsar Criterion 6 - Peak winter counts of Dark-bellied brent goose. Species identified for possible future consideration: Black-tailed godwit.		✓	✓	✓
Foulness (Mid-Essex Coast Phase 5)	Ramsar	UK	Ramsar Criterion 1 - This site qualifies by virtue of the extent and diversity of saltmarsh habitat present. Ramsar Criterion 2 - The site supports a number of nationally-rare and nationally-scarce plant species, and British Red Data Book invertebrates. Ramsar Criterion 3 - The site contains extensive saltmarsh habitat, with areas supporting full and representative sequences of saltmarsh plant communities covering the range of variation in Britain. Ramsar Criterion 5 – Site supports a winter population of 82,148 waterfowl. Ramsar criterion 6 - Site supports a spring/autumn population of Common Redshank and winter populations of Dark-bellied Brent Goose, Eurasian Oystercatcher, Grey Plover, Knot and Bar-tailed Godwit.		✓	✓	✓
Hamford Water	Ramsar	UK	Ramsar Criterion 6 - Site supports spring/autumn populations of Red Plover and Common Redshank and overwintering populations of Dark-bellied Brent Goose and Black-tailed Godwit. Species/populations identified subsequent to designation for possible future consideration under Criterion 6 include; an overwintering population of Grey Plover.		✓		✓
Lee Valley	Ramsar	UK	. Ramsar Criterion 6 - Site supports spring/autumn populations of Northern shoveler and Gadwell.	Ramsar Criterion 2 - Site supports the nationally scarce plant species whorled water-milfoil Myriophyllum verticillatum and the rare or vulnerable invertebrate Micronecta minutissima (a water-boatman)	✓	✓	✓
Marais Audomarois	Ramsar	France	Ramsar criterion 1: Unique marsh habitat. Criterion 2: Supports high diversity of wetland bird species including Bittern, Little Bittern, Garganey and Sedge warbler. Criterion 3: Aquatic marsh flora. Criterion 4: Important habitat for birds during migrations from the north of European to the Iberian peninsula and/or Africa.	Criterion 7: Large diversity of fish species present during different stages of their life cycle. Criterion 8: Important network of channels which make it a favourable habitat for a diverse range of fish.	✓	✓	✓
Medway Estuary & Marshes	Ramsar	UK	Ramsar Criterion 2 - The site supports a number of species of rare plants and animals, including at least twelve British Red Data Book species of wetland invertebrates. A significant number of non-wetland British Red Data Book species also occur. Ramsar Criterion 5 - Site supports a winter population of 47,637 waterfowl. Ramsar Criterion 6 - Site supports spring/autumn populations of Grey Plover and Common Redshank and wintering populations of Dark-bellied Brent Goose, Common Shelduck, Northern Pintail, Ringed Plover, Knot and Dunlin. Species/populations identified subsequent to designation for possible future consideration under Criterion 6 include; a spring/autumn population of Black-tailed Godwit.		✓	✓	✓
New Forest	Ramsar	UK		Ramsar Criterion 1 - Valley Mires and wet heaths are of outstanding scientific interest and the largest concentration of intact valley mires of their type in Britain. Ramsar Criterion 2 - Diverse assemblage of wetland plants and animals and nationally rare species. Ramsar Criterion 3 - Mire habitats of high ecological quality and diversity.			
Pagham Harbour	Ramsar	UK	Ramsar Criterion 6 - Peak winter counts of Dark-bellied brent goose and Black-tailed godwit (possible future consideration).		✓	✓	✓
Pevensey Levels	Ramsar	UK		Ramsar criterion 2 – Site supports an outstanding assemblage of wetland plants and invertebrates including many British Red Data Book species. Ramsar criterion 3 – site supports 68% of vascular plant species in Great Britain that can be described as aquatic. Probably the best site in Britain for freshwater molluscs, top five best sites for aquatic beetles and supports dragonflies.			
Poole Harbour	Ramsar	UK	Ramsar Criterion 1 - Best and largest example of bar built estuary with lagoonal characteristics in Britain. Ramsar Criterion 3 - Mediterranean and thermo Atlantic halophilous scrubs, Transitions from saltmarsh through to peatland mires are of exceptional conservation importance as few such examples remain in Britain. Site supports breeding water fowl (Common tern, Mediterranean gull) and over winter Pied Avocet. Ramsar Criterion 5 - 24,709 waterfowl in winter. Ramsar Criterion 6 - Peak winter counts of Shelduck, Black-tailed godwit. Future consideration of winter counts of Pied avocet.	Ramsar Criterion 2 - Two species of nationally rare plant and one nationally rare alga. At least 3 British Red Data Book Invertebrates.	✓	✓	✓
Portsmouth Harbour	Ramsar	UK	Ramsar Criterion 3 - Intertidal mudflat with extensive bed of eelgrass which support grazing dark bellied brent geese. *Hydriobia ulvae*, which supports wading birds. Common cord grass dominates saltmarsh and extensive areas of green algae and sea lettuce. Sea purslane.		✓	✓	✓

Site	Designation	Country	Interest features for which there is a likely significant effect (LSE)	Interest features for which there is no likely significant effect (LSE)	Aquaculture	Beneficial re-use	
						Mud recharge	Sand/ shingle recharge
			Number of saline lagoon hosting nationally important species. Ramsar Criterion 6 - Overwintering Dark-bellied brent goose.				
Severn Estuary	Ramsar	UK	Ramsar Criterion 1 - immense tidal range with affects physical environment and biological communities. Ramsar Criterion 3 - Due to unusual estuarine communities, reduced diversity and high productivity. Ramsar Criterion 4 - Diverse estuary with over 110 species recorded including salmon, sea trout, sea lamprey, river lamprey, allis shad, twaite shad and eel who all use the estuary as a key migration route to their spawning grounds. Also important feeding and nursery ground for many fish species. Ramsar Criterion 5 - Peak winter counts of waterfowl - 70,919. Ramsar Criterion 6 - Peak winter counts of Tundra swan, Greater white-fronted goose, Common shelduck, Gadwall, Dunlin and Common redshank. During the breeding season identified for possible future consideration - Lesser black-backed gull. Peak spring/autumn counts of Ringed plover. Peak winter counts of Eurasian teal and Northern Pintail. Ramsar Criterion 8 - Salmon, sea trout, sea lamprey, river lamprey, Allis shad, Twaite shad and eel use the Severn Estuary as a key migration route to their spawning grounds. The site is important as a feeding and nursery ground for many fish species particularly allis shad and twaite shad.		✓	✓	✓
Somerset Levels and Moors	Ramsar	UK	Ramsar Criterion 2- 17 species of British Red Data Book Invertebrates. Ramsar Criterion 5 - Peak winter counts of 97,155 waterfowl. Ramsar Criterion 6 - Peak winter counts of Tundra swan, Eurasian teal, Northern lapwing. Species for possible future consideration are Mute Swan, Eurasian wigeon, Northern Pintail, Northern shoveler.		✓	✓	✓
Solent and Southampton Water	Ramsar	UK	Ramsar Criterion 1 - Double tide which has long periods of slack water and high and low tide. Wetland habitats, saline lagoons, saltmarshes, estuaries, intertidal flats, shallow coastal water, grazing marshes, reedbed, coastal woodland and rocky boulder reefs. Ramsar Criterion 5 - 51,343 waterfowl in winter. Ramsar Criterion 6 - Peak spring/autumn populations of Ringed plover. Peak winter counts of Dark-bellied brent goose, Eurasian teal and Black-tailed godwit.	Ramsar Criterion 2 - Important assemblage of rare plants and invertebrates.	✓	✓	✓
South West London Waterbodies	Ramsar	UK	Ramsar criterion 6 – peak counts of Northern shoveler. Winter counts of Gadwall.		✓	✓	✓
Stodmarsh	Ramsar	UK	Ramsar Criterion 2 – Site supports six British Red Data Book wetland invertebrates, two nationally rare plants, and five nationally scarce species. A diverse assemblage of rare wetland birds including breeding population of Gadwall, spring/autumn populations of Gadwall and overwintering populations of Great Bittern, Northern Shoveler and Hen Harrier.		✓	✓	✓
Stour and Orwell Estuaries	Ramsar	UK	Ramsar Criterion 2 – Site contains seven nationally scarce plants: stiff saltmarsh-grass *Puccinellia rupestris*; small cord-grass *Spartina maritima*; perennial glasswort *Sarcocornia perennis*; lax-flowered sea lavender *Limonium humile*; and the eelgrasses *Zostera angustifolia, Z. marina* and *Z. noltei*. Contains five British Red Data Book invertebrates: the muscid fly *Phaonia fusca*; the horsefly *Haematopota grandis*; two spiders, *Arctosa fulvolineata* and *Baryphema duffeyi*; and the Endangered swollen spire snail *Mercuria confusa*. Ramsar Criterion 5 – Site supports a winter population of 63,017 waterfowl. Ramsar Criterion 6 - Site supports a spring/autumn population of Common Redshank and overwintering populations of Dark-bellied Brent Goose, Northern Pintail, Grey Plover, Knot, Dunlin, Black-tailed Godwit and Common Redshank.		✓		✓
Thames Estuary & Marshes	Ramsar	UK	Ramsar Criterion 2 - The site supports one endangered plant species and at least 14 nationally scarce plants of wetland habitats. The site also supports more than 20 British Red Data Book invertebrates. Ramsar Criterion 5 – Site supports a winter population of 45,118 waterfowl. Ramsar Criterion 6 - Site supports spring/autumn populations of Ringed Plover and Black-tailed Godwit and overwintering populations of Grey Plover, Knot, Dunlin and Common Redshank.		✓	✓	✓
Thanet Coast & Sandwich Bay	Ramsar	UK	Ramsar Criterion 2 – Site supports 15 British Red Data Book wetland invertebrates.Ramsar Criterion 6 - Site supports an overwintering population of Ruddy Turnstone.		✓	✓	✓
The Swale	Ramsar	UK	Ramsar Criterion 2 - The site supports nationally scarce plants and at least seven British Red data book invertebrates. Ramsar Criterion 5 – Site supports a winter population of 77,501 waterfowl. Ramsar Criterion 6 - Site supports a spring/autumn population of Common Redshank and overwintering populations of Dark-bellied Brent Goose and Grey Plover. Species/populations identified subsequent to designation for possible future consideration under Criterion 6 include; a spring/autumn population of Ringed Plover and overwintering populations of Eurasian Wigeon, Northern Pintail, Northern Shoveler and Black-tailed Godwit.		✓	✓	✓
Thursley and Ockley Bog	Ramsar	UK		Ramsar criterion 2 – Supports a community of rare wetland invertebrate species including a notable number of dragonflies. Ramsar criterion 3 – One of few sites that supports all six native reptile species. Site also supports breeding populations of European Night Jar and Woodlark.			

Table 4a: SAC/Ramsar site activity screening schedules for aquaculture and beneficial re-use

Key for interest features that have been screened into the plan-level Appropriate Assessment							
A1 (P)	Annex I Habitat (primary reason)	A2 (P)	Annex II Species (primary reason)	✓	Inland habitats and species (terrestrial and riverine)	✓	Screening criteria
A1 (Q)	Annex I Habitat (qualifying)	A2 (Q)	Annex II Species (qualifying)	✓	Intertidal and Coastal habitats and species		
Cri 6	Ramsar Criterion No.	30,000	Number of birds regularly occurring	✓	Marine/Offshore habitats and species		

Country/Location Code							
Eng	England	**NI**	Northern Ireland	**Dmk**	Denmark	**NL**	Netherlands
Scot	Scotland	**RoI**	Republic of Ireland	**Fr**	France	**Swe**	Sweden
Wales	Wales	**Bel**	Belgium	**Ger**	Germany	**OF**	Offshore

Draft Plan Policy Screened in																		
	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
		Sand/ shingle	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**		✓	✓	✓	✓	✓	✓	✓	✓				✓	✓		✓
	> 100km		✓			✓	✓					✓	✓	✓	✓	✓	✓
	< 100km			✓	✓			✓	✓	✓	✓						
	Within ellipse										✓						
	Footprint																
(back to contents page)	**Distribution**																
Designation			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SCI	SAC	SAC	SAC	SAC	SAC	SAC
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Abers - Côtes Des Legendes	Anse de Vauville	Baie De Canche Et Couloir Des Trois Estuaires	Baie de Lancieux, Baie de l'arguenon, Archipel de Saint Malo et Dinard	Baie De Morlaix	Baie De Seine Occidentale	Bancs Des Flandres	Banc et Récifs de Surtainville	Bassurelle Sandbank	Berriedale and Langwell Waters	Blasket Islands	Borkum-Riffgrund	Cap D'erquy-Cap Frehel	Cardigan Bay/ Bae Ceredigion	Chausey
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				FR53 00017	FR25 02019	FR31 02005	FR53 00012	FR530 0015	FR25 02020	FR31 02002	FR25 02018	UK00 30368	UK00 30088	IRE00 2172	DE21 04301	FR53 00011	UK00 12712	FR250 0079
Country				Fr	Fr	Fr	Fr	Fr	Fr	Fr	Fr	UK	UK	IRE	Ger	Fr	Wales	Fr
Mammals																		
Grey Seal		✓	✓		A2 (P)	A2 (P)				A2 (Q)								
Common Seal		✓	✓		A2 (P)	A2 (P)			A2 (P)	A2 (Q)								
Harbour Porpoise			✓	A2 (Q)		A2 (Q)		A2 (Q)	A2 (Q)	A2 (P)				A2 (P)	A2 (Q)			
Bottlenose dolphin			✓	A2 (P)	A2 (P)		A2 (P)		A2 (Q)		A2 (P)					A2 (P)	A2 (P)	A2 (Q)
Otter	✓	✓																
Fish and other species																		
Salmon	✓	✓	✓										A2 (P)					
Allis shad	✓	✓	✓															
Twaite shad	✓	✓	✓															
Sea Lamprey	✓	✓	✓															
River Lamprey	✓	✓	✓															
Freshwater Pearl Mussel	✓																	
Coastal Habitats																		
Sandbanks slightly covered by seawater all the time		✓	✓									A1 (P)						
Estuaries		✓																
Mudflats and sandflats not covered by seawater at low tide		✓																
Coastal lagoons		✓																
Large shallow inlets and bays		✓																
Reefs		✓	✓															
Submarine structures made by leaking gases			✓															
Submerged or partially submerged sea caves		✓	✓															
Annual vegetation of drift lines		✓																
Salicornia and other annuals colonising mud and sand		✓																
Spartina swards		✓																
Atlantic salt meadows		✓																
Mediterranean and thermo-Atlantic halophilous scrubs		✓																
Saltmarsh (type not specified)		✓																
Atlantic decalcified fixed dunes (Calluno-Ulicetea)		✓																
Humid Dune Slacks		✓																
Shifting dunes along the shoreline with Ammophila arenaria		✓																
Embryonic shifting dunes		✓																
Perennial vegetation of stony banks	✓	✓																
Fixed dunes with herbaceous vegetation		✓																
Dunes with Hippophae rhamnoides		✓																
Decalcified fixed dunes with *Empetrum nigrum*		✓																
Vegetated sea cliffs	✓	✓																
Dunes with *Salix repens*	✓	✓																
Coastal dunes with *Juniperus spp*	✓	✓																
Machair	✓																	
Petalwort																		
Dune systems		✓																
Sand dunes		✓																
Rare Saltmarsh and dune communities		✓																
Shingle Banks		✓																
Reed Bed	✓	✓																
Shore Dock		✓																
Caves not open to the public	✓	✓	✓															
Rare Algae communities		✓	✓															
Peat	✓	✓																

Draft Plan Policy Screened in	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
		Sand/ shingle	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**				✓	✓								✓	✓	✓	✓
	> 100km				✓	✓						✓			✓	✓	✓
	< 100km			✓			✓	✓	✓	✓	✓		✓	✓			
	Within ellipse			✓				✓	✓	✓	✓						
	Footprint																
(back to contents page)	**Distribution**																
Designation			SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC	SAC
European/Ramsar Site	**Landward/Riverine**		Chaussée de Sein	Chesil and the Fleet	Cote De Granit Rose-Sept-Iles	Cote De Cancale A Parame	Dartmoor	Dawlish Warren	Dorset Heaths (Purbeck and Wareham) and studland Dunes	Dover to Kingsdown Cliffs	Dungeness	Endrick Water	Estuaires et littoral picards (baies de Sommes et d'Authie)	Falaises Du Cran Aux Oeufs Et Du Cap Gris-Nez, Dunes Du Chatelet, Marais De Tardinghen Et Dunes De Wissant	Fladen	Gilleleje Flak Og Tragten	Gule Rev
	Intertidal/Coastal																
	Marine/Offshore																
Interest Features (grouped in some cases e.g. dunes) / **Site Code**			FR530 2007	UK00 17076	FR530 0009	FR530 0052	UK00 12929	UK00 30130	UK00 30038	UK00 30330	UK00 13059	UK00 19840	FR220 0346	FR310 0478	SE051 0127	DK00 VA171	DK00 VA259
Country			Fr	Eng	Fr	Fr	Eng	Eng	Eng	Eng	Eng	Scot	Fr	Fr	Swe	Dmk	Dmk
Mammals																	
Grey Seal		✓	✓											A2 (P)			
Common Seal		✓	✓										A2 (P)	A2 (Q)			
Harbour Porpoise			✓	A2 (Q)		A2 (Q)								A2 (Q)	A2 (Q)	A2 (Q)	A2 (Q)
Bottlenose dolphin			✓	A2 (P)		A2 (P)	A2 (P)										
Otter	✓	✓															
Fish and other species																	
Salmon	✓	✓	✓					A2 (Q)					A2 (Q)				
Allis shad	✓	✓	✓														
Twaite shad	✓	✓	✓														
Sea Lamprey	✓	✓	✓														
River Lamprey	✓	✓	✓														
Freshwater Pearl Mussel	✓																
Coastal Habitats																	
Sandbanks slightly covered by seawater all the time		✓	✓														
Estuaries		✓															
Mudflats and sandflats not covered by seawater at low tide		✓															
Coastal lagoons		✓		A1 (P)													
Large shallow inlets and bays		✓															
Reefs		✓	✓														
Submarine structures made by leaking gases			✓														
Submerged or partially submerged sea caves		✓	✓														
Annual vegetation of drift lines		✓		A1 (P)							A1 (P)						
Salicornia and other annuals colonising mud and sand		✓															
Spartina swards		✓															
Atlantic salt meadows		✓		A1 (Q)													
Mediterranean and thermo-Atlantic halophilous scrubs		✓		A1 (P)													
Saltmarsh (type not specified)		✓															
Atlantic decalcified fixed dunes (Calluno-Ulicetea)		✓							A1 (P)								
Humid Dune Slacks		✓						A1 (P)	A1 (P)								
Shifting dunes along the shoreline with Ammophila arenaria		✓						A1 (Q)	A1 (P)								
Embryonic shifting dunes		✓							A1 (P)								
Perennial vegetation of stony banks	✓	✓		A1 (P)							A1 (P)						
Fixed dunes with herbaceous vegetation		✓						A1 (Q)									
Dunes with Hippophae rhamnoides		✓															
Decalcified fixed dunes with *Empetrum nigrum*		✓															
Vegetated sea cliffs	✓	✓								A1 (P)							
Dunes with *Salix repens*	✓	✓															
Coastal dunes with *Juniperus spp*	✓	✓															
Machair	✓																
Petalwort								A1 (P)									
Dune systems		✓															
Sand dunes		✓															
Rare Saltmarsh and dune communities		✓															
Shingle Banks		✓															
Reed Bed	✓	✓															
Shore Dock		✓															
Caves not open to the public	✓	✓	✓														
Rare Algae communities		✓	✓														
Peat	✓	✓															

Draft Plan Policy Screened in																		
	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
	Beneficial re-use	Mud Recharge		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	
		Sand/ shingle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Screening Criteria (Location Relative to Area of Interest)	**Transnational**			✓	✓			✓	✓	✓	✓		✓	✓		✓	✓	
	> 100km			✓	✓	✓		✓	✓	✓			✓		✓	✓	✓	
	< 100km		✓				✓				✓	✓		✓				
	Within ellipse		✓				✓					✓						
	Footprint																	
(back to contents page)	**Distribution**																	
Designation			**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SCI**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Hastings Cliffs	Hamburgisches Wattenmeer	Helgoland mit Helgoländer Felssockel	Humber Estuary	Isle of Portland to Studland Cliffs	Klaverbank	Kosterfjorden-Väderöfjorden	Kullaberg	Littoral Cauchois	Lyme Bay and Torbay	Lilla Middelgrund	Marais du Contentin et du Bessin - Baie des Veys	Moray Firth	Nationalpark Niedersächsisches Wattenmeer	Noordzeekustzone
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				UK00 30165	DE20 16301	DE18 13391	UK00 30170	UK00 19861	NL200 8002	SE05 20170	SE04 30092	FR23 00139	UK00 30372	SE05 10126	FR25 00088	UK00 19808	DE23 06301	NL200 8004
Country				Eng	Ger	Ger	Eng	Eng	NL	Swe	Swe	Fr	Eng	Swe	Fr	Scot	Ger	NL
Mammals																		
Grey Seal		✓	✓															
Common Seal		✓	✓												A2 (P)			
Harbour Porpoise			✓		A2 (Q)	A2 (Q)			A2 (P)	A2 (Q)	A2 (P)			A2 (Q)			A2 (P)	A2 (P)
Bottlenose dolphin			✓													A2 (P)		
Otter	✓	✓																
Fish and other species																		
Salmon	✓	✓	✓															
Allis shad	✓	✓	✓															
Twaite shad	✓	✓	✓															
Sea Lamprey	✓	✓	✓				A2 (Q)											
River Lamprey	✓	✓	✓				A2 (Q)											
Freshwater Pearl Mussel	✓																	
Coastal Habitats																		
Sandbanks slightly covered by seawater all the time		✓	✓															
Estuaries		✓																
Mudflats and sandflats not covered by seawater at low tide		✓													A1 (P)			
Coastal lagoons		✓																
Large shallow inlets and bays		✓																
Reefs		✓	✓									A1 (P)	A1 (P)					
Submarine structures made by leaking gases			✓															
Submerged or partially submerged sea caves		✓	✓										A1 (P)					
Annual vegetation of drift lines		✓						A1 (Q)										
Salicornia and other annuals colonising mud and sand		✓																
Spartina swards		✓																
Atlantic salt meadows		✓																
Mediterranean and thermo-Atlantic halophilous scrubs		✓																
Saltmarsh (type not specified)		✓																
Atlantic decalcified fixed dunes (Calluno-Ulicetea)		✓																
Humid Dune Slacks		✓																
Shifting dunes along the shoreline with Ammophila arenaria		✓																
Embryonic shifting dunes		✓																
Perennial vegetation of stony banks	✓	✓										A1 (P)						
Fixed dunes with herbaceous vegetation		✓																
Dunes with Hippophae rhamnoides		✓																
Decalcified fixed dunes with *Empetrum nigrum*		✓																
Vegetated sea cliffs	✓	✓		A1 (P)				A1 (P)				A1 (P)						
Dunes with *Salix repens*	✓	✓																
Coastal dunes with *Juniperus spp*	✓	✓																
Machair	✓																	
Petalwort																		
Dune systems		✓																
Sand dunes		✓																
Rare Saltmarsh and dune communities		✓																
Shingle Banks		✓																
Reed Bed	✓	✓																
Shore Dock		✓																
Caves not open to the public	✓	✓	✓															
Rare Algae communities		✓	✓															
Peat	✓	✓																

Draft Plan Policy Screened in																				
	Aquaculture			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Sand/ shingle		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**			✓	✓				✓	✓	✓									
	> 100km			✓	✓		✓								✓	✓		✓	✓	
	< 100km					✓		✓	✓	✓	✓	✓	✓	✓			✓			
	Within ellipse								✓	✓	✓									
	Footprint																			
(back to contents page)	**Distribution**																			
Designation				**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	NTP S-H Wattenmeer und angrenzende Küstengebiete	Ouessant-Molene	Plymouth Sound and Estuaries	Pen Llyn a'r Sarnau/ Lleyn Peninsula and the Sarnau	Récifs et landes de la Hague	Recifs et marais arriere-littoraux du cap levi a la Pointe de Saire	Recifs Gris-Nez Blanc-Nez	Ridens Et Dunes Hydrauliques Du Detroit Du Pas-De-Calais	River Avon	River Axe	River Dee	River Derwent	River Itchen	River Moriston	River Oykel		
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				DE09 16391	FR530 0018	UK00 13111	UK00 13117	FR250 0084	FR250 0085	FR310 2003	FR310 2004	UK00 13016	UK00 30248	UK00 30251	UK00 30253	UK00 12599	UK00 30259	UK00 30259		
Country				Ger	Fr	Eng	Wales	Fr	Fr	Fr	Fr	Eng	Eng	Scot	Eng	Eng	Scot	Scot		
Mammals																				
Grey Seal		✓	✓						A2 (P)	A2 (Q)	A2 (Q)									
Common Seal		✓	✓						A2 (P)	A2 (Q)	A2 (Q)									
Harbour Porpoise			✓	A2 (P)	A2 (Q)					A2 (Q)	A2 (Q)									
Bottlenose dolphin			✓		A2 (P)		A2 (Q)	A2 (Q)	A2 (P)											
Otter	✓	✓														A2 (Q)				
Fish and other species																				
Salmon	✓	✓	✓									A2 (P)		A2 (P)		A2 (Q)	A2 (Q)	A2(Q)		
Allis shad	✓	✓	✓			A2 (Q)														
Twaite shad	✓	✓	✓																	
Sea Lamprey	✓	✓	✓									A2 (P)	A2 (Q)		A2 (Q)					
River Lamprey	✓	✓	✓												A2 (P)					
Freshwater Pearl Mussel	✓																A2 (P)	A2 (P)		
Coastal Habitats																				
Sandbanks slightly covered by seawater all the time		✓	✓							A1 (P)	A1 (P)									
Estuaries		✓																		
Mudflats and sandflats not covered by seawater at low tide		✓																		
Coastal lagoons		✓																		
Large shallow inlets and bays		✓																		
Reefs		✓	✓							A1 (P)	A1 (Q)									
Submarine structures made by leaking gases			✓																	
Submerged or partially submerged sea caves		✓	✓																	
Annual vegetation of drift lines		✓																		
Salicornia and other annuals colonising mud and sand		✓																		
Spartina swards		✓																		
Atlantic salt meadows		✓																		
Mediterranean and thermo-Atlantic halophilous scrubs		✓																		
Saltmarsh (type not specified)		✓																		
Atlantic decalcified fixed dunes (Calluno-Ulicetea)		✓																		
Humid Dune Slacks		✓																		
Shifting dunes along the shoreline with Ammophila arenaria		✓																		
Embryonic shifting dunes		✓																		
Perennial vegetation of stony banks	✓	✓																		
Fixed dunes with herbaceous vegetation		✓																		
Dunes with Hippophae rhamnoides		✓																		
Decalcified fixed dunes with *Empetrum nigrum*		✓																		
Vegetated sea cliffs	✓	✓																		
Dunes with *Salix repens*	✓	✓																		
Coastal dunes with *Juniperus spp*	✓	✓																		
Machair	✓																			
Petalwort																				
Dune systems		✓																		
Sand dunes		✓																		
Rare Saltmarsh and dune communities		✓																		
Shingle Banks		✓																		
Reed Bed	✓	✓																		
Shore Dock		✓																		
Caves not open to the public	✓	✓	✓																	
Rare Algae communities		✓	✓																	
Peat	✓	✓																		

Draft Plan Policy Screened in	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓		
		Sand/ shingle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
Screening Criteria (Location Relative to Area of Interest)	**Transnational**							✓	✓		✓						
	> 100km		✓	✓	✓	✓	✓	✓	✓		✓						
	< 100km									✓		✓	✓	✓	✓	✓	✓
	Within ellipse									✓		✓	✓	✓	✓	✓	✓
	Footprint																
(back to contents page)	**Distribution**																
Designation			**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**cSAC**	**SAC**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	River South Esk	River Spey	River Tay	River Teith	River Tweed	Roaringwater Bay and Islands	Schlei incl. Schleimünde und vorgelagerter Flachgründe	Sidmouth to West Bay	Skagens Gren og Skagerrak	Solent and Isle of Wight Lagoons	Solent Maritime	South Hams	South Wight Maritime	Studland to Portland	St Albans Head to Durlston Head
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				UK00 30262	UK00 19811	UK00 30312	UK00 30263	UK00 12691	IE000 101	DE14 23394	UK00 19864	DK00 FX112	UK00 17073	UK00 30059	UK00 12650	UK00 30061	UK00 30382	UK001 9863
Country				Scot	Scot	Scot	Scot	Scot	RoI	Ger	Eng	Dmk	Eng	Eng	Eng	Eng	Eng	Eng
Mammals																		
Grey Seal		✓	✓															
Common Seal		✓	✓															
Harbour Porpoise			✓						A2 (Q)	A2 (Q)		A2 (P)						
Bottlenose dolphin			✓															
Otter	✓	✓																
Fish and other species																		
Salmon	✓	✓	✓	A2 (P)	A2 (P)	A2 (P)	A2 (Q)	A2 (P)										
Allis shad	✓	✓	✓															
Twaite shad	✓	✓	✓															
Sea Lamprey	✓	✓	✓		A2 (P)	A2 (Q)	A2 (P)	A2 (Q)										
River Lamprey	✓	✓	✓			A2 (Q)	A2 (P)	A2 (Q)										
Freshwater Pearl Mussel	✓			A2 (P)	A2 (P)													
Coastal Habitats																		
Sandbanks slightly covered by seawater all the time		✓	✓											A1 (Q)				
Estuaries		✓												A1 (P)				
Mudflats and sandflats not covered by seawater at low tide		✓												A1 (Q)				
Coastal lagoons		✓											A1 (P)	A1 (Q)				
Large shallow inlets and bays		✓																
Reefs		✓	✓													A1 (P)	A1 (P)	
Submarine structures made by leaking gases			✓															
Submerged or partially submerged sea caves		✓	✓													A1 (P)		
Annual vegetation of drift lines		✓									A1 (Q)			A1 (Q)				
Salicornia and other annuals colonising mud and sand		✓												A1 (Q)				
Spartina swards		✓												A1 (P)				
Atlantic salt meadows		✓												A1 (P)				
Mediterranean and thermo-Atlantic halophilous scrubs		✓																
Saltmarsh (type not specified)		✓																
Atlantic decalcified fixed dunes (Calluno-Ulicetea)		✓																
Humid Dune Slacks		✓																
Shifting dunes along the shoreline with Ammophila arenaria		✓												A1 (Q)				
Embryonic shifting dunes		✓																
Perennial vegetation of stony banks	✓	✓												A1 (Q)				
Fixed dunes with herbaceous vegetation		✓																
Dunes with Hippophae rhamnoides		✓																
Decalcified fixed dunes with *Empetrum nigrum*		✓																
Vegetated sea cliffs	✓	✓									A1 (P)				A2 (Q)	A1 (P)		A1 (P)
Dunes with *Salix repens*	✓	✓																
Coastal dunes with *Juniperus spp*	✓	✓																
Machair	✓																	
Petalwort																		
Dune systems		✓																
Sand dunes		✓																
Rare Saltmarsh and dune communities		✓																
Shingle Banks		✓																
Reed Bed	✓	✓																
Shore Dock		✓																
Caves not open to the public	✓	✓	✓												A2 (Q)			
Rare Algae communities		✓	✓															
Peat	✓	✓																

Draft Plan Policy Screened in	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Sand/ shingle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓
	> 100km		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
	< 100km														✓	
	Within ellipse															
	Footprint															
(back to contents page)	**Distribution**															
Designation			**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**SAC**	**cSAC**	**SAC**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Steingrund	Stora Middelgrund Och Röde Bank	Store Middelgrund	Store Rev	Sydlige Nordsø	Sylter Außenriff	Tregor Goëlo	Tweed Estuary	Unterelbe	Vadehavet Med Ribe Å, Tved Å Og Varde Å Vest For Varde	Vlakte Van De Raan	Vlakte Van De Raan	Wight-Barfleur Reef	Vrångöskärgården
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				DE171 4391	SE051 0186	DK00V A250	DK00V A258	DK00V A347	DE120 9301	FR530 0010	UK003 0292	DE201 8331	DK00A Y176	BEMN Z0005	NL200 8003	UK003 0380	SE052 0001
Country				Ger	Swe	Dmk	Dmk	Dmk	Ger	Fr	Scot	Ger	Dmk	Bel	NL	OF	Swe
Mammals																	
Grey Seal		✓	✓														
Common Seal		✓	✓														
Harbour Porpoise			✓	A2 (P)	A2 (P)	A2 (Q)	A2 (Q)	A2 (Q)	A2 (P)	A2 (Q)		A2 (Q)	A2 (Q)	A2 (Q)	A2 (P)		A2 (Q)
Bottlenose dolphin			✓							A2 (P)							
Otter	✓	✓															
Fish and other species																	
Salmon	✓	✓	✓														
Allis shad	✓	✓	✓														
Twaite shad	✓	✓	✓														
Sea Lamprey	✓	✓	✓								A2 (Q)						
River Lamprey	✓	✓	✓								A2 (Q)						
Freshwater Pearl Mussel	✓																
Coastal Habitats																	
Sandbanks slightly covered by seawater all the time		✓	✓														
Estuaries		✓															
Mudflats and sandflats not covered by seawater at low tide		✓															
Coastal lagoons		✓															
Large shallow inlets and bays		✓															
Reefs		✓	✓													A1 (P)	
Submarine structures made by leaking gases			✓														
Submerged or partially submerged sea caves		✓	✓														
Annual vegetation of drift lines		✓															
Salicornia and other annuals colonising mud and sand		✓															
Spartina swards		✓															
Atlantic salt meadows		✓															
Mediterranean and thermo-Atlantic halophilous scrubs		✓															
Saltmarsh (type not specified)		✓															
Atlantic decalcified fixed dunes (Calluno-Ulicetea)		✓															
Humid Dune Slacks		✓															
Shifting dunes along the shoreline with Ammophila arenaria		✓															
Embryonic shifting dunes		✓															
Perennial vegetation of stony banks	✓	✓															
Fixed dunes with herbaceous vegetation		✓															
Dunes with Hippophae rhamnoides		✓															
Decalcified fixed dunes with *Empetrum nigrum*		✓															
Vegetated sea cliffs	✓	✓															
Dunes with *Salix repens*	✓	✓															
Coastal dunes with *Juniperus spp*	✓	✓															
Machair	✓																
Petalwort																	
Dune systems		✓															
Sand dunes		✓															
Rare Saltmarsh and dune communities		✓															
Shingle Banks		✓															
Reed Bed	✓	✓															
Shore Dock		✓															
Caves not open to the public	✓	✓	✓														
Rare Algae communities		✓	✓														
Peat	✓	✓															

Draft Plan Policy Screened in	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓
		Sand/ shingle	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**																	
	> 100km			✓														
	< 100km		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse				✓				✓	✓					✓			
	Footprint																	
(back to contents page)	**Distribution**																	
Designation			Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Abberton Reservoir	Alde-Or Estuary	Arun Valley	Avon Valley	Benfleet and Southend Marshes	Blackwater Estuary (Mid-Essex Coast Phase 4)	Chesil Beach and The Fleet	Chichester and Langstone Harbours	Colne Estuary (Mid Essex Coast Phase 2)	Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	Deben Estuary	Dengie (Mid-Essex Coast Phase 1)	Exe Estuary	Foulness (Mid-Essex Coast Pashe 5)	Hamford Water	Lee Valley
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				UK11 001	UK11 002	UK11 004	UK11 005	UK11 006	UK11 007	UK11 012	UK11 013	UK11 015	UK11 058	UK11 017	UK11 058	UK11 025	UK11 026	UK11 028	UK11 034
Country				Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng
Mammals																			
Grey Seal		✓	✓																
Common Seal		✓	✓																
Harbour Porpoise			✓																
Bottlenose dolphin			✓																
Otter	✓	✓																	
Fish and other species																			
Salmon	✓	✓	✓																
Allis shad	✓	✓	✓																
Twaite shad	✓	✓	✓																
Sea Lamprey	✓	✓	✓																
River Lamprey	✓	✓	✓																
Freshwater Pearl Mussel	✓																		
Coastal Habitats																			
Sandbanks slightly covered by seawater all the time		✓	✓																
Estuaries		✓									Cri 1								
Mudflats and sandflats not covered by seawater at low tide		✓									Cri 1								
Coastal lagoons		✓								Cri 1 & 3									
Large shallow inlets and bays		✓																	
Reefs		✓	✓																
Submarine structures made by leaking gases			✓																
Submerged or partially submerged sea caves		✓	✓																
Annual vegetation of drift lines		✓																	
Salicornia and other annuals colonising mud and sand		✓																	
Spartina swards		✓																	
Atlantic salt meadows		✓																	
Mediterranean and thermo-Atlantic halophilous scrubs		✓																	
Saltmarsh (type not specified)		✓							Cri 1	Cri 1	Cri 1	Cri 1			Cri 1		Cri 1		
Atlantic decalcified fixed dunes (Calluno-Ulicetea)		✓																	
Humid Dune Slacks		✓																	
Shifting dunes along the shoreline with Ammophila arenaria		✓																	
Embryonic shifting dunes		✓																	
Perennial vegetation of stony banks	✓	✓																	
Fixed dunes with herbaceous vegetation		✓																	
Dunes with Hippophae rhamnoides		✓																	
Decalcified fixed dunes with *Empetrum nigrum*		✓																	
Vegetated sea cliffs	✓	✓																	
Dunes with *Salix repens*	✓	✓																	
Coastal dunes with *Juniperus spp*	✓	✓																	
Machair	✓																		
Petalwort																			
Dune systems		✓																	
Sand dunes		✓										Cri 1							
Rare Saltmarsh and dune communities		✓																	
Shingle Banks		✓								Cri 2	Cri 1								
Reed Bed	✓	✓																	
Shore Dock		✓																	
Caves not open to the public	✓	✓	✓																
Rare Algae communities		✓	✓																
Peat	✓	✓																	

Draft Plan Policy Screened in	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	
		Sand/ shingle	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	
Screening Criteria (Location Relative to Area of Interest)	**Transnational**																		
	> 100km			✓															
	< 100km		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse																		
	Footprint																		
(back to contents page)	**Distribution**																		
Designation			Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram
European/Ramsar Site	**Landward/Riverine**		Abberton Reservoir	Alde-Or Estuary	Arun Valley	Avon Valley	Benfleet and Southend Marshes	Blackwater Estuary (Mid-Essex Coast Phase 4)	Chesil Beach and The Fleet	Chichester and Langstone Harbours	Colne Estuary (Mid Essex Coast Phase 2)	Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	Deben Estuary	Dengie (Mid-Essex Coast Phase 1)	Exe Estuary	Foulness (Mid-Essex Coast Pashe 5)	Hamford Water	Lee Valley
	Intertidal/Coastal																		
	Marine/Offshore																		
Interest Features (grouped in some cases e.g. dunes) / **Site Code**			UK11 001	UK11 002	UK11 004	UK11 005	UK11 006	UK11 007	UK11 012	UK11 013	UK11 015	UK11 058	UK11 017	UK11 058	UK11 025	UK11 026	UK11 028	UK11 034
Country			Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng
Birds-Breeding Season																			
Breeding Seabird Assemblage	✓	✓																	
Golden Eagle	✓																		
Osprey	✓																		
Wood Sandpiper	✓	✓																	
Northern Gannet	✓	✓	✓																
Lesser Black-backed Gull	✓	✓	✓		Cri 6														
Herring Gull	✓	✓	✓																
Black-legged Kittiwake	✓	✓	✓																
Common Guillemot	✓	✓	✓																
Corn Crake	✓																		
Black-throated Diver	✓	✓																	
European Storm Petrel	✓	✓	✓																
Arctic Tern	✓	✓																	
Eurasian Dotterel	✓																		
Northern Fulmar	✓	✓	✓																
European Shag	✓	✓	✓																
Red-throated Diver	✓	✓	✓																
European Golden Plover	✓	✓																	
Short-Eared owl	✓																		
Dunlin	✓	✓																	
Great Cormorant	✓	✓	✓																
Great Black-backed Gull	✓	✓	✓																
Atlantic Puffin	✓	✓	✓																
Razorbill	✓	✓	✓																
Sandwich Tern	✓	✓	✓																
Common Tern	✓	✓	✓																
Little Tern	✓	✓	✓							Cri 6									
Manx Shearwater	✓	✓	✓																
Roseate Tern	✓	✓	✓																
Peregrine Falcon	✓																		
Arctic Skua	✓	✓																	
Whimbrel	✓	✓																	
Red-necked phalarope	✓	✓																	
Great Skua	✓	✓	✓																
Great Crested Grebe	✓	✓																	
Leach's Storm Petrel	✓	✓	✓																
Great Bittern	✓	✓																	
Common Redshank	✓	✓																	
Common Snipe	✓	✓																	
Pochard	✓	✓																	
Gadwall	✓	✓																	
Slavonian Grebe	✓	✓																	
Tufted Duck	✓	✓																	
Northern Shoveler	✓	✓																	
Common Shelduck	✓	✓																	
Ringed Plover	✓	✓																	
Goosander	✓	✓																	
Common Eider	✓	✓																	
Greenshank	✓	✓																	
Eurasian Curlew	✓	✓																	
Common Scoter	✓	✓	✓																
Northern Lapwing	✓	✓																	
Eurasian Teal	✓	✓																	
Eurasian Wigeon	✓	✓																	
Common Goldeneye	✓	✓																	
Black Guillemot	✓	✓																	
Eurasian Oystercatcher	✓	✓																	
Common (Mew) Gull	✓	✓	✓																
Black-headed Gull	✓	✓																	
Mediterranean Gull	✓	✓	✓																
Spotted Crake	✓	✓																	
Pied Avocet	✓	✓																	
Mute Swan	✓	✓																	
Greylag Goose	✓	✓																	
Mallard	✓	✓																	
Sanderling	✓	✓																	
Kentish Plover	✓	✓																	
Garganey	✓	✓																	
Little Grebe	✓	✓	✓																
Bearded Tit	✓	✓																	
Little Egret	✓	✓																	

Draft Plan Policy Screened in	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓		✓	
		Sand/ shingle	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	
Screening Criteria (Location Relative to Area of Interest)	**Transnational**																		
	> 100km			✓															
	< 100km		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse				✓				✓	✓					✓				
	Footprint																		
(back to contents page)	**Distribution**																		
Designation			Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Abberton Reservoir	Alde-Or Estuary	Arun Valley	Avon Valley	Benfleet and Southend Marshes	Blackwater Estuary (Mid-Essex Coast Phase 4)	Chesil Beach and The Fleet	Chichester and Langstone Harbours	Colne Estuary (Mid Essex Coast Phase 2)	Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	Deben Estuary	Dengie (Mid-Essex Coast Phase 1)	Exe Estuary	Foulness (Mid-Essex Coast Pashe 5)	Hamford Water	Lee Valley
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				UK11 001	UK11 002	UK11 004	UK11 005	UK11 006	UK11 007	UK11 012	UK11 013	UK11 015	UK11 058	UK11 017	UK11 058	UK11 025	UK11 026	UK11 028	UK11 034
Country				Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng
Birds Overwintering/Passage																			
Wintering Waterfowl Assemblage	✓	✓	✓	Cri 5		Cri 5		Cri 5	Cri 5		Cri 5	Cri 5	Cri 5		Cri 5	Cri 5	Cri 5		
Common Redshank	✓	✓							Cri 6		Cri 6	Cri 6					Cri 6	Cri 6	
Great Crested Grebe	✓	✓																	
Whooper Swan	✓	✓																	
Barnacle Goose	✓	✓																	
Greylag Goose	✓	✓																	
Greenland White-fronted Goose	✓	✓																	
Pink-footed Goose	✓	✓																	
Light-bellied Brent Goose	✓	✓																	
Dark-bellied Brent Goose	✓	✓						Cri 6	Cri 6	Cri 6	Cri 6	Cri 6	Cri 6		Cri 6	Cri 6	Cri 6	Cri 6	
Ruff	✓	✓																	
Bar-tailed Godwit	✓	✓							Cri 6						Cri 6		Cri 6		
Eurasian Wigeon	✓	✓		Cri 6															
Northern Pintail	✓	✓				Cri 6	Cri 6												
Red Knot	✓	✓						Cri 6							Cri 6		Cri 6		
Purple Sandpiper	✓	✓																	
Ruddy Turnstone	✓	✓																	
Horned Grebe	✓	✓																	
Slavonian Grebe	✓	✓																	
Red-throated Diver	✓	✓																	
Common Eider	✓	✓																	
Common Shelduck	✓	✓							Cri 6		Cri 6								
Great Cormorant	✓	✓																	
Mallard	✓	✓																	
Greater Scaup	✓	✓																	
Long-tailed Duck	✓	✓																	
Black (Common) Scoter	✓	✓	✓																
Velet Scoter	✓	✓	✓																
Common Goldeneye	✓	✓																	
Red-breasted Merganser	✓	✓																	
Common Merganser	✓	✓																	
Eurasian Curlew	✓	✓																	
Eurasian Oystercatcher	✓	✓															Cri 6		
Ringed Plover	✓	✓									Cri 6							Cri 6	
European Golden Plover	✓	✓							Cri 6										
Grey Plover	✓	✓						Cri 6	Cri 6		Cri 6				Cri 6		Cri 6	Cri 6	
Northern Lapwing	✓	✓																	
Dunlin	✓	✓						Cri 6	Cri 6		Cri 6								
Sandwich Tern	✓	✓																	
Sanderling	✓	✓																	
Black-tailed Godwit	✓	✓					Cri 6		Cri 6		Cri 6	Cri 6				Cri 6		Cri 6	
Goosander	✓	✓																	
Eurasian Teal	✓	✓																	
Gadwall	✓	✓		Cri 6			Cri 6												Cri 6
Common Greenshank	✓	✓																	
Black-headed Gull	✓	✓																	
Common Tern	✓	✓	✓																
Common Gull (Mew)	✓	✓	✓																
Northern Shoveler	✓	✓		Cri 6															Cri 6
Bewick Swan	✓	✓																	
Common Pochard	✓	✓		Cri 6															
Tufted Duck	✓	✓																	
Bittern	✓	✓																	
Pied Avocet	✓	✓																	
Lesser Black-back Gull	✓	✓																	
Tundra Swan	✓	✓																	
Roseate Tern		✓	✓																
Little Tern		✓	✓																
Arctic Tern	✓	✓																	
Snipe	✓	✓																	
Mediterranean Gull	✓	✓																	
Mute Swan	✓	✓		Cri 6						Cri 6									
Merlin	✓	✓																	
Egret	✓	✓																	
Short Eared Owl	✓	✓																	
Kentish Plover	✓	✓																	
Peregrine Falcon	✓	✓																	
Black Throated Diver	✓	✓	✓																
Great northern Diver	✓	✓	✓																
Taiga Bean Goose	✓	✓																	
Hen Harrier	✓	✓																	
Razorbill	✓	✓	✓																
Herring Gull	✓	✓	✓																
Great Black-backed Gull	✓	✓	✓																
Little Gull	✓	✓	✓																
European Shag	✓	✓	✓																
Common Guillemot	✓	✓	✓																

Draft Plan Policy Screened in	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
		Sand/ shingle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**		✓													
	> 100km															
	< 100km		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse				✓	✓	✓		✓							
	Footprint															
(back to contents page)	**Distribution**															
Designation			Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Marais Audomarois	Medway Estuary & Marshes	Pagham Harbour	Poole Harbour	Portsmouth Harbour	Severn Estuary	Solent and Southampton Water	Somerset Levels and Moors	South West London Waterbodies	Stodmarsh	Stour and Orwell Estuaries	Thames Estuary and marshes	Thanet Coast & Sandwich Bay	The Swale
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				FR7200030	UK11040	UK11052	UK11054	UK11055	UK11081	UK11063	UK11064	UK11065	UK11066	UK11067	UK11069	UK11070	UK11071
Country				Fr	Eng	Eng	Eng	Eng	Eng/ Wales	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng
Mammals																	
Grey Seal		✓	✓														
Common Seal		✓	✓														
Harbour Porpoise			✓														
Bottlenose dolphin			✓														
Otter	✓	✓															
Fish and other species																	
Salmon	✓	✓	✓														
Allis shad	✓	✓	✓						Cri 4 & 8								
Twaite shad	✓	✓	✓						Cri 4 & 8								
Sea Lamprey	✓	✓	✓						Cri 4 & 8								
River Lamprey	✓	✓	✓						Cri 4 & 8								
Freshwater Pearl Mussel	✓																
Coastal Habitats																	
Sandbanks slightly covered by seawater all the time		✓	✓						Cri 1								
Estuaries		✓					Cri 1		Cri 1	Cri 1							
Mudflats and sandflats not covered by seawater at low tide		✓						Cri 3	Cri 1	Cri 1							
Coastal lagoons		✓						Cri 3		Cri 1							
Large shallow inlets and bays		✓															
Reefs		✓	✓							Cri 1							
Submarine structures made by leaking gases			✓														
Submerged or partially submerged sea caves		✓	✓														
Annual vegetation of drift lines		✓															
Salicornia and other annuals colonising mud and sand		✓															
Spartina swards		✓						Cri 3									
Atlantic salt meadows		✓							Cri 1								
Mediterranean and thermo-Atlantic halophilous scrubs		✓					Cri 3										
Saltmarsh (type not specified)		✓		Cri 1			Cri 3	Cri 3		Cri 1				Cri 2			
Atlantic decalcified fixed dunes (Calluno-Ulicetea)		✓															
Humid Dune Slacks		✓															
Shifting dunes along the shoreline with Ammophila arenaria		✓															
Embryonic shifting dunes		✓															
Perennial vegetation of stony banks	✓	✓															
Fixed dunes with herbaceous vegetation		✓															
Dunes with Hippophae rhamnoides		✓															
Decalcified fixed dunes with *Empetrum nigrum*		✓															
Vegetated sea cliffs	✓	✓															
Dunes with *Salix repens*	✓	✓															
Coastal dunes with *Juniperus spp*	✓	✓															
Machair	✓																
Petalwort																	
Dune systems		✓															
Sand dunes		✓															
Rare Saltmarsh and dune communities		✓															
Shingle Banks		✓															
Reed Bed	✓	✓								Cri 1							
Shore Dock		✓															
Caves not open to the public	✓	✓	✓														
Rare Algae communities		✓	✓				Cri 2										
Peat	✓	✓					Cri 3										

Draft Plan Policy Screened in	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
		Sand/ shingle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**		✓													
	> 100km															
	< 100km		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse				✓	✓	✓		✓							
	Footprint															
(back to contents page)	**Distribution**															
Designation			Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Marais Audomarois	Medway Estuary & Marshes	Pagham Harbour	Poole Harbour	Portsmouth Harbour	Severn Estuary	Solent and Southampton Water	Somerset Levels and Moors	South West London Waterbodies	Stodmarsh	Stour and Orwell Estuaries	Thames Estuary and marshes	Thanet Coast & Sandwich Bay	The Swale
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				FR7200030	UK11040	UK11052	UK11054	UK11055	UK11081	UK11063	UK11064	UK11065	UK11066	UK11067	UK11069	UK11070	UK11071
Country				Fr	Eng	Eng	Eng	Eng	Eng/ Wales	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng
Birds-Breeding Season																	
Breeding Seabird Assemblage	✓	✓															
Golden Eagle	✓																
Osprey	✓																
Wood Sandpiper	✓	✓															
Northern Gannet	✓	✓	✓														
Lesser Black-backed Gull	✓	✓	✓						Cri 6								
Herring Gull	✓	✓	✓														
Black-legged Kittiwake	✓	✓	✓														
Common Guillemot	✓	✓	✓														
Corn Crake	✓																
Black-throated Diver	✓	✓															
European Storm Petrel	✓	✓	✓														
Arctic Tern	✓	✓															
Eurasian Dotterel	✓																
Northern Fulmar	✓	✓	✓														
European Shag	✓	✓	✓														
Red-throated Diver	✓	✓	✓														
European Golden Plover	✓	✓															
Short-Eared owl	✓																
Dunlin	✓	✓															
Great Cormorant	✓	✓	✓														
Great Black-backed Gull	✓	✓	✓														
Atlantic Puffin	✓	✓	✓														
Razorbill	✓	✓	✓														
Sandwich Tern	✓	✓	✓														
Common Tern	✓	✓	✓				Cri 3										
Little Tern	✓	✓	✓														
Manx Shearwater	✓	✓	✓														
Roseate Tern	✓	✓	✓														
Peregrine Falcon	✓																
Arctic Skua	✓	✓															
Whimbrel	✓	✓															
Red-necked phalarope	✓	✓															
Great Skua	✓	✓	✓														
Great Crested Grebe	✓	✓															
Leach's Storm Petrel	✓	✓	✓														
Great Bittern	✓	✓		Cri 2									Cri 2				
Common Redshank	✓	✓															
Common Snipe	✓	✓															
Pochard	✓	✓															
Gadwall	✓	✓											Cri 2				
Slavonian Grebe	✓	✓															
Tufted Duck	✓	✓															
Northern Shoveler	✓	✓															
Common Shelduck	✓	✓															
Ringed Plover	✓	✓															
Goosander	✓	✓															
Common Eider	✓	✓															
Greenshank	✓	✓															
Eurasian Curlew	✓	✓															
Common Scoter	✓	✓	✓														
Northern Lapwing	✓	✓															
Eurasian Teal	✓	✓															
Eurasian Wigeon	✓	✓															
Common Goldeneye	✓	✓															
Black Guillemot	✓	✓															
Eurasian Oystercatcher	✓	✓															
Common (Mew) Gull	✓	✓	✓														
Black-headed Gull	✓	✓															
Mediterranean Gull	✓	✓	✓				Cri 3										
Spotted Crake	✓	✓															
Pied Avocet	✓	✓															
Mute Swan	✓	✓															
Greylag Goose	✓	✓															
Mallard	✓	✓															
Sanderling	✓	✓															
Kentish Plover	✓	✓															
Garganey	✓	✓		Cri 2													
Little Grebe	✓	✓	✓														
Bearded Tit	✓	✓															
Little Egret	✓	✓															

Draft Plan Policy Screened in	Aquaculture		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Beneficial re-use	Mud Recharge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
		Sand/ shingle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**		✓													
	> 100km															
	< 100km		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse				✓	✓	✓		✓							
	Footprint															
(back to contents page)	**Distribution**															
Designation			Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Marais Audomarois	Medway Estuary & Marshes	Pagham Harbour	Poole Harbour	Portsmouth Harbour	Severn Estuary	Solent and Southampton Water	Somerset Levels and Moors	South West London Waterbodies	Stodmarsh	Stour and Orwell Estuaries	Thames Estuary and marshes	Thanet Coast & Sandwich Bay	The Swale
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				FR7200030	UK11040	UK11052	UK11054	UK11055	UK11081	UK11063	UK11064	UK11065	UK11066	UK11067	UK11069	UK11070	UK11071
Country				Fr	Eng	Eng	Eng	Eng	Eng/ Wales	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng
Birds Overwintering/Passage																	
Wintering Waterfowl Assemblage	✓	✓	✓		Cri 5		Cri 5		Cri 5	Cri 5	Cri 5			Cri 5	Cri 5		Cri 5
Common Redshank	✓	✓			Cri 6				Cri 6					Cri 6	Cri 6		Cri 6
Great Crested Grebe	✓	✓															
Whooper Swan	✓	✓															
Barnacle Goose	✓	✓															
Greylag Goose	✓	✓															
Greenland White-fronted Goose	✓	✓							Cri 6								
Pink-footed Goose	✓	✓															
Light-bellied Brent Goose	✓	✓															
Dark-bellied Brent Goose	✓	✓			Cri 6	Cri 6		Cri 6		Cri 6				Cri 6			Cri 6
Ruff	✓	✓															
Bar-tailed Godwit	✓	✓															
Eurasian Wigeon	✓	✓									Cri 6						Cri 6
Northern Pintail	✓	✓			Cri 6				Cri 6		Cri 6			Cri 6			Cri 6
Red Knot	✓	✓			Cri 6									Cri 6	Cri 6		
Purple Sandpiper	✓	✓															
Ruddy Turnstone	✓	✓														Cri 6	
Horned Grebe	✓	✓															
Slavonian Grebe	✓	✓															
Red-throated Diver	✓	✓															
Common Eider	✓	✓															
Common Shelduck	✓	✓			Cri 6		Cri 6		Cri 6								
Great Cormorant	✓	✓															
Mallard	✓	✓															
Greater Scaup	✓	✓															
Long-tailed Duck	✓	✓															
Black (Common) Scoter	✓	✓	✓														
Velet Scoter	✓	✓	✓														
Common Goldeneye	✓	✓															
Red-breasted Merganser	✓	✓															
Common Merganser	✓	✓															
Eurasian Curlew	✓	✓															
Eurasian Oystercatcher	✓	✓															
Ringed Plover	✓	✓			Cri 6				Cri 6	Cri 6					Cri 6		Cri 6
European Golden Plover	✓	✓															
Grey Plover	✓	✓			Cri 6									Cri 6	Cri 6		Cri 6
Northern Lapwing	✓	✓									Cri 6						
Dunlin	✓	✓			Cri 6				Cri 6					Cri 6	Cri 6		
Sandwich Tern	✓	✓															
Sanderling	✓	✓															
Black-tailed Godwit	✓	✓			Cri 6	Cri 6	Cri 6			Cri 6				Cri 6	Cri 6		Cri 6
Goosander	✓	✓															
Eurasian Teal	✓	✓							Cri 6	Cri 6	Cri 6						
Gadwall	✓	✓							Cri 6			Cri 6					
Common Greenshank	✓	✓															
Black-headed Gull	✓	✓															
Common Tern	✓	✓	✓														
Common Gull (Mew)	✓	✓	✓														
Northern Shoveler	✓	✓									Cri 6	Cri 6	Cri 6				Cri 6
Bewick Swan	✓	✓															
Common Pochard	✓	✓															
Tufted Duck	✓	✓															
Bittern	✓	✓											Cri 6				
Pied Avocet	✓	✓					Cri 3 & 6										
Lesser Black-back Gull	✓	✓															
Tundra Swan	✓	✓							Cri 6		Cri 6						
Roseate Tern		✓	✓														
Little Tern		✓	✓														
Arctic Tern	✓	✓															
Snipe	✓	✓															
Mediterranean Gull	✓	✓															
Mute Swan	✓	✓									Cri 6						
Merlin	✓	✓															
Egret	✓	✓															
Short Eared Owl	✓	✓															
Kentish Plover	✓	✓															
Peregrine Falcon	✓	✓															
Black Throated Diver	✓	✓	✓														
Great northern Diver	✓	✓	✓														
Taiga Bean Goose	✓	✓															
Hen Harrier	✓	✓											Cri 6				
Razorbill	✓	✓	✓														
Herring Gull	✓	✓	✓														
Great Black-backed Gull	✓	✓	✓														
Little Gull	✓	✓	✓														
European Shag	✓	✓	✓														
Common Guillemot	✓	✓	✓														

Table 4b: SPA activity screening schedules for aquaculture and beneficial re-use

Key for interest features that have been screened into the plan-level Appropriate Assessment							
4.1	Article 4.1 of Birds Directive	4.2	Article 4.2 of Birds Directive	30,000	Number of birds regularly occurring		
✓	Inland habitats and species (terrestrial and riverine)	✓	Intertidal and Coastal habitats and species	✓	Marine/Offshore habitats and species	✓	Screening criteria

Country/Location Code							
Eng	England	**NI**	Northern Ireland	**Dmk**	Denmark	**NL**	Netherlands
Scot	Scotland	**RoI**	Republic of Ireland	**Fr**	France	**Swe**	Sweden
Wales	Wales	**Bel**	Belgium	**Ger**	Germany	**OF**	Offshore

Draft Plan Policy Screened in															
	S-AG-1		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S-DD-2	Mud Recharge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Sand/Shingle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Screening Criteria (Location Relative to Area of Interest)	**Transnational**						✓			✓						
	> 100km			✓												
	< 100km		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse				✓	✓				✓	✓		✓			
	Footprint															
(back to contents page)			**Special Protected Areas**													
Designation	**Distribution**		SPA	SPA	SPA	SPA	SPA	SPA	SPA	SPA	SPA	SPA	SPA	SPA	SPA	SPA
European/Ramsar Site	**Landward/Riverine**		Abberton Reservoir	Alde-Or Estuary	Arun Valley	Avon Valley	Bancs des Flandres	Benfleet and Southend Marshes	Blackwater Estuary (Mi-Essex Coast Phase 4)	Cap Gris-Nez	Chesil Beach and The Fleet	Chew Valley Lake	Chichester and Langstone Harbours	Colne Estuary (Mid-Essex Ciast Phase 2)	Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	Deben Estuary
	Intertidal/Coastal															
	Marine/Offshore															
Interest Features (grouped in some cases e.g. dunes) / **Site Code**			UK900 9141	UK900 9112	UK902 0281	UK901 1091	FR311 2006	UK900 9171	UK900 9245	FR311 0085	UK901 0091	UK901 0041	UK901 1011	UK900 9243	UK900 9244	UK900 9261
Country			Eng	Eng	Eng	Eng	Fr	Eng	Eng	Fr	Eng	Eng	Eng	Eng	Eng	Eng
Birds-Breeding Season																
Breeding Seabird Assemblage	✓	✓	39,763													
Golden Eagle	✓															
Osprey	✓															
Wood Sandpiper	✓	✓														
Northern Gannet	✓	✓	✓													
Lesser Black-backed Gull	✓	✓	✓	4.2												
Herring Gull	✓	✓	✓													
Black-legged Kittiwake	✓	✓	✓				4.2									
Common Guillemot	✓	✓	✓													
Corn Crake	✓															
Black-throated Diver	✓	✓														
European Storm Petrel	✓	✓	✓													
Arctic Tern	✓	✓														
Eurasian Dotterel	✓															
Northern Fulmar	✓	✓	✓													
European Shag	✓	✓	✓													
Red-throated Diver	✓	✓	✓													
European Golden Plover	✓	✓														
Short-Eared owl	✓															
Dunlin	✓	✓														
Great Cormorant	✓	✓	✓	4.2												
Great Black-backed Gull	✓	✓	✓													
Atlantic Puffin	✓	✓	✓													
Razorbill	✓	✓	✓													
Sandwich Tern	✓	✓	✓										4.1			
Common Tern	✓	✓	✓										4.1			
Little Tern	✓	✓	✓						4.1				4.1	4.2		
Manx Shearwater	✓	✓	✓													
Roseate Tern	✓	✓	✓													
Peregrine Falcon	✓															
Arctic Skua	✓	✓														
Whimbrel	✓	✓														
Red-necked phalarope	✓	✓														
Great Skua	✓	✓	✓													
Great Crested Grebe	✓	✓														
Leach's Storm Petrel	✓	✓	✓													
Great Bittern	✓	✓														
Common Redshank	✓	✓														
Common Snipe	✓	✓														
Pochard	✓	✓							4.2					4.2		
Gadwall	✓	✓														
Slavonian Grebe	✓	✓														
Tufted Duck	✓	✓														
Northern Shoveler	✓	✓														
Common Shelduck	✓	✓														
Ringed Plover	✓	✓							4.2					4.2		
Goosander	✓	✓														
Common Eider	✓	✓														
Greenshank	✓	✓														
Eurasian Curlew	✓	✓														
Common Scoter	✓	✓	✓													
Northern Lapwing	✓	✓														
Eurasian Teal	✓	✓														
Eurasian Wigeon	✓	✓														
Common Goldeneye	✓	✓														
Black Guillemot	✓	✓														
Eurasian Oystercatcher	✓	✓														
Common (Mew) Gull	✓	✓	✓													
Black-headed Gull	✓	✓														
Mediterranean Gull	✓	✓	✓													
Spotted Crake	✓	✓														
Pied Avocet	✓	✓														
Mute Swan	✓	✓														
Greylag Goose	✓	✓														
Mallard	✓	✓														
Sanderling	✓	✓														
Kentish Plover	✓	✓														
Garganey	✓	✓														
Little Grebe	✓	✓	✓													
Bearded Tit	✓	✓														
Little Gull	✓	✓	✓													
Pomeraine Skua	✓	✓	✓													
Black necked grebe	✓	✓														
Little Egret	✓	✓														

Draft Plan Policy Screened in																			
	S-AG-1			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S-DD-2	Mud Recharge		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Sand/Shingle		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Screening Criteria (Location Relative to Area of Interest)	**Transnational**							✓			✓								
	> 100km				✓														
	< 100km			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse					✓	✓				✓	✓			✓				
	Footprint																		
(back to contents page)	**Distribution**			**Special Protected Areas**															
Designation				**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Abberton Reservoir	Alde-Or Estuary	Arun Valley	Avon Valley	Bancs des Flandres	Benfleet and Southend Marshes	Blackwater Estuary (Mi-Essex Coast Phase 4)	Cap Gris-Nez	Chesil Beach and The Fleet	Chew Valley Lake	Chichester and Langstone Harbours	Colne Estuary (Mid-Essex Ciast Phase 2)	Crouch & Roach Estuaries (Mid-Essex Coast Phase 3)	Deben Estuary		
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				UK900 9141	UK900 9112	UK902 0281	UK901 1091	FR311 2006	UK900 9171	UK900 9245	FR311 0085	UK901 0091	UK901 0041	UK901 1011	UK900 9243	UK900 9244	UK900 9261		
Country				Eng	Eng	Eng	Eng	Fr	Eng	Eng	Fr	Eng	Eng	Eng	Eng	Eng	Eng		
Birds Overwintering/Passage																			
Wintering Waterfowl Assemblage	✓	✓	✓			27,241			34,789	109789				93,230	38600	18607			
Common Redshank	✓	✓												4.2	4.2				
Great Crested Grebe	✓	✓		4.2							4.2								
Whooper Swan	✓	✓																	
Barnacle Goose	✓	✓									4.2								
Greylag Goose	✓	✓									4.2								
Greenland White-fronted Goose	✓	✓									4.2								
Pink-footed Goose	✓	✓																	
Light-bellied Brent Goose	✓	✓																	
Dark-bellied Brent Goose	✓	✓							4.2	4.2		4.2		4.2	4.2	4.2	4.2		
Ruff	✓	✓									4.2								
Bar-tailed Godwit	✓	✓									4.2			4.1					
Eurasian Wigeon	✓	✓		4.2										4.2					
Northern Pintail	✓	✓												4.2					
Red Knot	✓	✓							4.2										
Purple Sandpiper	✓	✓									4.2								
Ruddy Turnstone	✓	✓												4.2					
Horned Grebe	✓	✓									4.2								
Slavonian Grebe	✓	✓																	
Red-throated Diver	✓	✓									4.2								
Common Eider	✓	✓									4.2								
Common Shelduck	✓	✓												4.2					
Great Cormorant	✓	✓									4.2								
Mallard	✓	✓																	
Greater Scaup	✓	✓									4.2								
Long-tailed Duck	✓	✓																	
Black (Common) Scoter	✓	✓	✓								4.2								
Velet Scoter	✓	✓	✓								4.2								
Common Goldeneye	✓	✓		4.2															
Red-breasted Merganser	✓	✓									4.2			4.2					
Common Merganser	✓	✓																	
Eurasian Curlew	✓	✓									4.2			4.2					
Eurasian Oystercatcher	✓	✓									4.2								
Ringed Plover	✓	✓							4.2	4.2	4.2			4.2					
European Golden Plover	✓	✓									4.2								
Grey Plover	✓	✓							4.2	4.2	4.2			4.2					
Northern Lapwing	✓	✓									4.2								
Dunlin	✓	✓							4.2	4.2	4.2			4.2					
Sandwich Tern	✓	✓									4.2								
Sanderling	✓	✓									4.2			4.2					
Black-tailed Godwit	✓	✓								4.2									
Goosander	✓	✓																	
Eurasian Teal	✓	✓		4.2							4.2			4.2					
Gadwall	✓	✓		4.2			4.2												
Common Greenshank	✓	✓																	
Black-headed Gull	✓	✓																	
Common Tern	✓	✓	✓								4.2								
Common Gull (Mew)	✓	✓	✓																
Northern Shoveler	✓	✓		4.2									4.2	4.2					
Bewick Swan	✓	✓																	
Common Pochard	✓	✓		4.2															
Tufted Duck	✓	✓		4.2															
Bittern	✓	✓									4.2								
Pied Avocet	✓	✓									4.2						4.1		
Lesser Black-back Gull	✓	✓																	
Tundra Swan	✓	✓				4.1	4.1												
Roseate Tern		✓	✓								4.2								
Little Tern		✓	✓								4.2								
Arctic Tern	✓	✓									4.2								
Snipe	✓	✓																	
Mediterranean Gull	✓	✓									4.2								
Mute Swan	✓	✓		4.2															
Merlin	✓	✓									4.2								
Egret	✓	✓									4.2								
Short Eared Owl	✓	✓									4.2								
Kentish Plover	✓	✓									4.2								
Peregrine Falcon	✓	✓									4.2								
Black Throated Diver	✓	✓	✓					4.2			4.2								
Great northern Diver	✓	✓	✓					4.2			4.2								
Taiga Bean Goose	✓	✓																	
Hen Harrier	✓	✓								4.1					4.1	4.1			
Razorbill	✓	✓	✓					4.2			4.2								
Herring Gull	✓	✓	✓																
Great Black-backed Gull	✓	✓	✓																
Little Gull	✓	✓	✓																
European Shag	✓	✓	✓																
Common Guillemot	✓	✓	✓					4.2			4.2								
Northern Fulmar	✓	✓	✓					4.2											
Cory's Shearwater		✓	✓								4.2								
European Storm Petrel	✓	✓	✓								4.2								
Wood Sandpiper	✓	✓									4.2								
Osprey	✓										4.2								
Whiskered tern	✓	✓	✓								4.2								
Black Tern	✓	✓	✓								4.2								
Pomeraine Skua	✓	✓									4.2								
Great Skua	✓	✓									4.2								
Eurasian Spoonbill	✓	✓									4.1								
Smew	✓	✓	✓								4.2								
Manx Shearwater	✓	✓	✓								4.2								
Northern Gannet	✓	✓	✓								4.2								
Black-legged Kittiwake	✓	✓	✓								4.2								
Atlantic Puffin	✓	✓	✓								4.2								
Red necked grebe	✓	✓									4.2								
black necked grebe	✓	✓									4.2								
Garganey	✓	✓																	
Lesser White Fronted Goose	✓	✓																	
Greater white fronted goose	✓	✓																	
Little Grebe	✓	✓																	
Whimbrel		✓																	
Red-necked phalarope	✓	✓																	
Spotted Crake	✓	✓																	

Draft Plan Policy Screened in	S-AG-1		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	S-DD-2	Mud Recharge	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		
		Sand/Shingle	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	
Screening Criteria (Location Relative to Area of Interest)	**Transnational**				✓		✓		✓							✓
	> 100km												✓	✓		
	< 100km		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
	Within ellipse			✓		✓				✓						
	Footprint															
(back to contents page)	**Distribution**		**Special Protected Areas**													
Designation			**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**pSPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Dengie (Mid-Essex Coast Phase 1)	Dorset Heathlands	Dunes de Merlimont	Dungeness to Pett Level	Estuaire de la Canche	Estuaires picards: Baie de Somme et d'authie	Etangs et marais du basin de la Somme	Exe Estuary	Falmouth Bay to St Austell Bay	Foulness (Mid-Essex Coast Phase 5)	Glannau Aberdaron and Ynys Enlli/ Aberdaron Coast and Bardsey Island	Grassholm	Hamford Water	Ijzervallei
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				UK900 9242	UK901 0101	FR311 2004	UK901 2091	FR311 0038	FR221 0068	FR221 2007	UK901 0081		UK900 9246	UK901 3121	UK901 4041	UK900 9131	BE250 0831
Country				Eng	Eng	Fr	Eng	Fr	Fr	Fr	Eng	Eng	Eng	Wales	Wales	Eng	Bel
Birds-Breeding Season																	
Breeding Seabird Assemblage	✓	✓															
Golden Eagle	✓																
Osprey	✓																
Wood Sandpiper	✓	✓															
Northern Gannet	✓	✓	✓												4.2		
Lesser Black-backed Gull	✓	✓	✓														
Herring Gull	✓	✓	✓														
Black-legged Kittiwake	✓	✓	✓														
Common Guillemot	✓	✓	✓														
Corn Crake	✓																
Black-throated Diver	✓	✓															
European Storm Petrel	✓	✓	✓														
Arctic Tern	✓	✓															
Eurasian Dotterel	✓																
Northern Fulmar	✓	✓	✓														
European Shag	✓	✓	✓														
Red-throated Diver	✓	✓	✓														
European Golden Plover	✓	✓															
Short-Eared owl	✓																
Dunlin	✓	✓															
Great Cormorant	✓	✓	✓														
Great Black-backed Gull	✓	✓	✓														
Atlantic Puffin	✓	✓	✓														
Razorbill	✓	✓	✓														
Sandwich Tern	✓	✓	✓										4.1				
Common Tern	✓	✓	✓				4.1						4.1				
Little Tern	✓	✓	✓				4.1						4.1			4.1	
Manx Shearwater	✓	✓	✓											4.2			
Roseate Tern	✓	✓	✓														
Peregrine Falcon	✓																
Arctic Skua	✓	✓															
Whimbrel	✓	✓															
Red-necked phalarope	✓	✓															
Great Skua	✓	✓	✓														
Great Crested Grebe	✓	✓															
Leach's Storm Petrel	✓	✓	✓														
Great Bittern	✓	✓															
Common Redshank	✓	✓															
Common Snipe	✓	✓															
Pochard	✓	✓															
Gadwall	✓	✓															
Slavonian Grebe	✓	✓															
Tufted Duck	✓	✓															
Northern Shoveler	✓	✓															
Common Shelduck	✓	✓															
Ringed Plover	✓	✓											4.2				
Goosander	✓	✓															
Common Eider	✓	✓															
Greenshank	✓	✓															
Eurasian Curlew	✓	✓															
Common Scoter	✓	✓	✓														
Northern Lapwing	✓	✓															
Eurasian Teal	✓	✓															
Eurasian Wigeon	✓	✓															
Common Goldeneye	✓	✓															
Black Guillemot	✓	✓															
Eurasian Oystercatcher	✓	✓															
Common (Mew) Gull	✓	✓	✓														
Black-headed Gull	✓	✓															
Mediterranean Gull	✓	✓	✓				4.1		4								
Spotted Crake	✓	✓															
Pied Avocet	✓	✓											4.1				
Mute Swan	✓	✓															
Greylag Goose	✓	✓															
Mallard	✓	✓															
Sanderling	✓	✓															
Kentish Plover	✓	✓															
Garganey	✓	✓															
Little Grebe	✓	✓	✓														
Bearded Tit	✓	✓															
Little Gull	✓	✓	✓														
Pomeraine Skua	✓	✓	✓														
Black necked grebe	✓	✓															
Little Egret	✓	✓							4	4.2							

Draft Plan Policy Screened in	S-AG-1		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	S-DD-2	Mud Recharge	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		
		Sand/Shingle	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	
Screening Criteria (Location Relative to Area of Interest)	**Transnational**				✓		✓		✓							✓
	> 100km												✓	✓		
	< 100km		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓
	Within ellipse			✓		✓				✓						
	Footprint															
(back to contents page)	**Distribution**		**Special Protected Areas**													
Designation			**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**pSPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Dengie (Mid-Essex Coast Phase 1)	Dorset Heathlands	Dunes de Merlimont	Dungeness to Pett Level	Estuaire de la Canche	Estuaires picards: Baie de Somme et d'authie	Etangs et marais du basin de la Somme	Exe Estuary	Falmouth Bay to St Austell Bay	Foulness (Mid-Essex Coast Phase 5)	Aberdaron and Ynys Enlli/ Aberdaron Coast and Bardsey	Grassholm	Hamford Water	Ijzervallei
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				UK900 9242	UK901 0101	FR311 2004	UK901 2091	FR311 0038	FR221 0068	FR221 2007	UK901 0081		UK900 9246	UK901 3121	UK901 4041	UK900 9131	BE250 0831
Country				Eng	Eng	Fr	Eng	Fr	Fr	Fr	Eng	Eng	Eng	Wales	Wales	Eng	Bel
Birds Overwintering/Passage																	
Wintering Waterfowl Assemblage	✓	✓	✓	31454							23,811		107999				
Common Redshank	✓	✓											4.2			4.2	
Great Crested Grebe	✓	✓															4.2
Whooper Swan	✓	✓															4.1
Barnacle Goose	✓	✓						4.2									4.1
Greylag Goose	✓	✓															4.2
Greenland White-fronted Goose	✓	✓															
Pink-footed Goose	✓	✓															4.2
Light-bellied Brent Goose	✓	✓															
Dark-bellied Brent Goose	✓	✓		4.2					4.2		4.2		4.2			4.2	4.1
Ruff	✓	✓						4.2									4.2
Bar-tailed Godwit	✓	✓						4.1					4.1				
Eurasian Wigeon	✓	✓															4.2
Northern Pintail	✓	✓				4.2											4.2
Red Knot	✓	✓		4.2									4.2				
Purple Sandpiper	✓	✓															
Ruddy Turnstone	✓	✓															
Horned Grebe	✓	✓									4.1						
Slavonian Grebe	✓	✓										4.2					
Red-throated Diver	✓	✓															
Common Eider	✓	✓															
Common Shelduck	✓	✓														4.2	4.2
Great Cormorant	✓	✓															4.2
Mallard	✓	✓															4.2
Greater Scaup	✓	✓															
Long-tailed Duck	✓	✓															
Black (Common) Scoter	✓	✓	✓														
Velet Scoter	✓	✓	✓														
Common Goldeneye	✓	✓															
Red-breasted Merganser	✓	✓															
Common Merganser	✓	✓															
Eurasian Curlew	✓	✓															4.2
Eurasian Oystercatcher	✓	✓									4.2		4.2				
Ringed Plover	✓	✓														4.2	
European Golden Plover	✓	✓						4.1									4.1
Grey Plover	✓	✓		4.2							4.2		4.2			4.2	
Northern Lapwing	✓	✓															
Dunlin	✓	✓									4.2						
Sandwich Tern	✓	✓						4.1									
Sanderling	✓	✓															
Black-tailed Godwit	✓	✓									4.2					4.2	4.2
Goosander	✓	✓															
Eurasian Teal	✓	✓				4.2										4.2	4.2
Gadwall	✓	✓															4.2
Common Greenshank	✓	✓															
Black-headed Gull	✓	✓															
Common Tern	✓	✓	✓					4.1		4.1							
Common Gull (Mew)	✓	✓	✓			4.2											
Northern Shoveler	✓	✓					4.2										4.2
Bewick Swan	✓	✓					4.1										4.1
Common Pochard	✓	✓															4.2
Tufted Duck	✓	✓															4.2
Bittern	✓	✓				4.2		4.2		4.2							4.1
Pied Avocet	✓	✓						4.1			4.1		4.1			4.1	
Lesser Black-back Gull	✓	✓															
Tundra Swan	✓	✓															
Roseate Tern		✓	✓														
Little Tern		✓	✓														
Arctic Tern	✓	✓						4.1									
Snipe	✓	✓															
Mediterranean Gull	✓	✓						4.1									
Mute Swan	✓	✓															4.2
Merlin	✓	✓			4.1			4.2									
Egret	✓	✓				4.2		4.2	4.2								
Short Eared Owl	✓	✓				4.2		4.2									4.1
Kentish Plover	✓	✓						4.2									
Peregrine Falcon	✓	✓															4.1
Black Throated Diver	✓	✓	✓									4.2					
Great northern Diver	✓	✓	✓									4.2					
Taiga Bean Goose	✓	✓															
Hen Harrier	✓	✓		4.1	4.1								4.1				4.1
Razorbill	✓	✓	✓														
Herring Gull	✓	✓	✓														
Great Black-backed Gull	✓	✓	✓														
Little Gull	✓	✓	✓														
European Shag	✓	✓	✓														
Common Guillemot	✓	✓	✓														
Northern Fulmar	✓	✓	✓														
Cory's Shearwater		✓	✓														
European Storm Petrel	✓	✓	✓														
Wood Sandpiper	✓	✓						4.2									
Osprey	✓					4.2											
Whiskered tern	✓	✓	✓														
Black Tern	✓	✓	✓														
Pomeraine Skua	✓	✓															
Great Skua	✓	✓															
Eurasian Spoonbill	✓	✓				4.1		4.2									
Smew	✓	✓	✓					4.2	4.2								4.1
Manx Shearwater	✓	✓	✓														
Northern Gannet	✓	✓	✓														
Black-legged Kittiwake	✓	✓	✓														
Atlantic Puffin	✓	✓	✓														
Red necked grebe	✓	✓															
black necked grebe	✓	✓						4.2									
Garganey	✓	✓				4.2											
Lesser White Fronted Goose	✓	✓															4.1
Greater white fronted goose	✓	✓															4.2
Little Grebe	✓	✓															4.2
Whimbrel		✓															
Red-necked phalarope	✓	✓						4.2									
Spotted Crake	✓	✓						4.2									

Draft Plan Policy Screened in	S-AG-1		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	S-DD-2	Mud Recharge		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
		Sand/Shingle	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**		✓		✓	✓	✓				✓			✓	✓	
	> 100km															
	< 100km		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse									✓		✓	✓			
	Footprint															
(back to contents page)	**Distribution**		**Special Protected Areas**													
Designation			**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Landes et dunes de la Hague	Lee Valley	Littoral seino-marin	Marais arrière-littoraux picards	Marais de Balançon	Medway Estuary & Marshes	Outer Thames Estuary	Pagham Harbour	Platier d'Oye	Poole Harbour	Portsmouth Harbour	Sbz 1 / Zps 1	Sbz 2 / Zps 2	Severn Estuary
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				FR251 2002	UK901 2111	FR231 0045	FR221 2003	FR311 0083	UK901 2031	UK902 0309	UK901 2041	FR311 0039	UK901 0111	UK901 1051	BEMN Z0002	BEMN Z0003	UK901 5022
Country				Fr	Eng	Fr	Fr	Fr	Eng	Eng	Eng	Fr	Eng	Eng	Bel	Bel	Eng/W ales
Birds-Breeding Season																	
Breeding Seabird Assemblage	✓	✓															
Golden Eagle	✓																
Osprey	✓																
Wood Sandpiper	✓	✓															
Northern Gannet	✓	✓	✓														
Lesser Black-backed Gull	✓	✓	✓														
Herring Gull	✓	✓	✓			4.2											
Black-legged Kittiwake	✓	✓	✓			4.2											
Common Guillemot	✓	✓	✓			4.2											
Corn Crake	✓																
Black-throated Diver	✓	✓															
European Storm Petrel	✓	✓	✓														
Arctic Tern	✓	✓															
Eurasian Dotterel	✓																
Northern Fulmar	✓	✓	✓			4.2											
European Shag	✓	✓	✓	4.2		4.2											
Red-throated Diver	✓	✓	✓														
European Golden Plover	✓	✓															
Short-Eared owl	✓																
Dunlin	✓	✓															
Great Cormorant	✓	✓	✓			4.2											
Great Black-backed Gull	✓	✓	✓														
Atlantic Puffin	✓	✓	✓														
Razorbill	✓	✓	✓														
Sandwich Tern	✓	✓	✓			4.1											
Common Tern	✓	✓	✓			4.1			4.1		4.1	4.1	4.1				
Little Tern	✓	✓	✓						4.1		4.1						
Manx Shearwater	✓	✓	✓														
Roseate Tern	✓	✓	✓														
Peregrine Falcon	✓																
Arctic Skua	✓	✓															
Whimbrel	✓	✓															
Red-necked phalarope	✓	✓										4.2					
Great Skua	✓	✓	✓														
Great Crested Grebe	✓	✓															
Leach's Storm Petrel	✓	✓	✓														
Great Bittern	✓	✓					4.1										
Common Redshank	✓	✓															
Common Snipe	✓	✓															
Pochard	✓	✓		4.2													
Gadwall	✓	✓		4.2													
Slavonian Grebe	✓	✓															
Tufted Duck	✓	✓		4.2													
Northern Shoveler	✓	✓		4.1													
Common Shelduck	✓	✓															
Ringed Plover	✓	✓		4.1								4.1					
Goosander	✓	✓															
Common Eider	✓	✓															
Greenshank	✓	✓															
Eurasian Curlew	✓	✓															
Common Scoter	✓	✓	✓														
Northern Lapwing	✓	✓															
Eurasian Teal	✓	✓															
Eurasian Wigeon	✓	✓															
Common Goldeneye	✓	✓															
Black Guillemot	✓	✓															
Eurasian Oystercatcher	✓	✓															
Common (Mew) Gull	✓	✓	✓														
Black-headed Gull	✓	✓															
Mediterranean Gull	✓	✓	✓			4.1						4.1	4.1				
Spotted Crake	✓	✓															
Pied Avocet	✓	✓							4.1			4.1					
Mute Swan	✓	✓															
Greylag Goose	✓	✓															
Mallard	✓	✓															
Sanderling	✓	✓		4.2													
Kentish Plover	✓	✓		4.1								4.2					
Garganey	✓	✓		4.2													
Little Grebe	✓	✓	✓	4.2													
Bearded Tit	✓	✓															
Little Gull	✓	✓	✓														
Pomeraine Skua	✓	✓	✓														
Black necked grebe	✓	✓										4.2					
Little Egret	✓	✓															

Draft Plan Policy Screened in	S-AG-1		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	S-DD-2	Mud Recharge		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
		Sand/Shingle	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**		✓		✓	✓	✓				✓			✓	✓	
	> 100km															
	< 100km		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse									✓		✓	✓			
	Footprint															
(back to contents page)	**Distribution**		**Special Protected Areas**													
Designation			**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Landes et dunes de la Hague	Lee Valley	Littoral seino-marin	Marais arrière-littoraux picards	Marais de Balançon	Medway Estuary & Marshes	Outer Thames Estuary	Pagham Harbour	Platier d'Oye	Poole Harbour	Portsmouth Harbour	Sbz 1 / Zps 1	Sbz 2 / Zps 2	Severn Estuary
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				FR251 2002	UK901 2111	FR231 0045	FR221 2003	FR311 0083	UK901 2031	UK902 0309	UK901 2041	FR311 0039	UK901 0111	UK901 1051	BEMN Z0002	BEMN Z0003	UK901 5022
Country				Fr	Eng	Fr	Fr	Fr	Eng	Eng	Eng	Fr	Eng	Eng	Bel	Bel	Eng/Wales
Birds Overwintering/Passage																	
Wintering Waterfowl Assemblage	✓	✓	✓						65496				25,091				84,317
Common Redshank	✓	✓							4.2			4.2					4.2
Great Crested Grebe	✓	✓		4.2											4.2	4.2	
Whooper Swan	✓	✓															
Barnacle Goose	✓	✓										4.2					
Greylag Goose	✓	✓															
Greenland White-fronted Goose	✓	✓															4.2
Pink-footed Goose	✓	✓															
Light-bellied Brent Goose	✓	✓															
Dark-bellied Brent Goose	✓	✓							4.2		4.2			4.2			
Ruff	✓	✓									4.1						
Bar-tailed Godwit	✓	✓															
Eurasian Wigeon	✓	✓							4.2								
Northern Pintail	✓	✓							4.2								
Red Knot	✓	✓							4.2								
Purple Sandpiper	✓	✓															
Ruddy Turnstone	✓	✓							4.2								
Horned Grebe	✓	✓															
Slavonian Grebe	✓	✓															
Red-throated Diver	✓	✓		4.1		4.1				4.1					4.1	4.1	
Common Eider	✓	✓															
Common Shelduck	✓	✓							4.2				4.2				4.2
Great Cormorant	✓	✓		4.2													
Mallard	✓	✓															
Greater Scaup	✓	✓															
Long-tailed Duck	✓	✓															
Black (Common) Scoter	✓	✓	✓												4.2	4.2	
Velet Scoter	✓	✓	✓														
Common Goldeneye	✓	✓															
Red-breasted Merganser	✓	✓												4.2			
Common Merganser	✓	✓															
Eurasian Curlew	✓	✓							4.2								
Eurasian Oystercatcher	✓	✓							4.2								
Ringed Plover	✓	✓							4.2								
European Golden Plover	✓	✓										4.1					
Grey Plover	✓	✓							4.2								
Northern Lapwing	✓	✓										4.2					
Dunlin	✓	✓							4.2			4.2		4.2			4.2
Sandwich Tern	✓	✓													4.1	4.1	
Sanderling	✓	✓										4.2					
Black-tailed Godwit	✓	✓							4.2				4.2	4.2			
Goosander	✓	✓															
Eurasian Teal	✓	✓							4.2								
Gadwall	✓	✓		4.2	4.2												4.2
Common Greenshank	✓	✓							4.2								
Black-headed Gull	✓	✓															
Common Tern	✓	✓	✓												4.1	4.1	
Common Gull (Mew)	✓	✓	✓														
Northern Shoveler	✓	✓			4.2				4.2								
Bewick Swan	✓	✓							4.1			4.2					
Common Pochard	✓	✓															
Tufted Duck	✓	✓															
Bittern	✓	✓		4.1	4.1		4.1	4.1				4.1					
Pied Avocet	✓	✓							4.1				4.1				
Lesser Black-back Gull	✓	✓															
Tundra Swan	✓	✓															4.1
Roseate Tern		✓	✓														
Little Tern		✓	✓														
Arctic Tern	✓	✓															
Snipe	✓	✓										4.2					
Mediterranean Gull	✓	✓		4.1													
Mute Swan	✓	✓															
Merlin	✓	✓		4.1				4.1									
Egret	✓	✓															
Short Eared Owl	✓	✓		4.1													
Kentish Plover	✓	✓		4.1													
Peregrine Falcon	✓	✓		4.1													
Black Throated Diver	✓	✓	✓	4.1		4.1									4.1	4.1	
Great northern Diver	✓	✓	✓	4.1													
Taiga Bean Goose	✓	✓															
Hen Harrier	✓	✓		4.1													
Razorbill	✓	✓	✓			4.2											
Herring Gull	✓	✓	✓			4.2											
Great Black-backed Gull	✓	✓	✓														
Little Gull	✓	✓	✓												4.2	4.2	
European Shag	✓	✓	✓			4.2											
Common Guillemot	✓	✓	✓			4.2									4.2	4.2	
Northern Fulmar	✓	✓	✓			4.2											
Cory's Shearwater		✓	✓														
European Storm Petrel	✓	✓	✓														
Wood Sandpiper	✓	✓															
Osprey	✓																
Whiskered tern	✓	✓	✓														
Black Tern	✓	✓	✓														
Pomeraine Skua	✓	✓															
Great Skua	✓	✓		4.2													
Eurasian Spoonbill	✓	✓										4.1					
Smew	✓	✓	✓									4.2					
Manx Shearwater	✓	✓	✓														
Northern Gannet	✓	✓	✓			4.2											
Black-legged Kittiwake	✓	✓	✓			4.2											
Atlantic Puffin	✓	✓	✓														
Red necked grebe	✓	✓															
black necked grebe	✓	✓															
Garganey	✓	✓															
Lesser White Fronted Goose	✓	✓															
Greater white fronted goose	✓	✓															
Little Grebe	✓	✓															
Whimbrel		✓															
Red-necked phalarope	✓	✓															
Spotted Crake	✓	✓															

Draft Plan Policy Screened in	S-AG-1		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S-DD-2	Mud Recharge	✓	✓	✓	✓	✓		✓	✓	✓	✓	
		Sand/Shingle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**												✓
	> 100km		✓										
	< 100km			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse			✓									
	Footprint												
(back to contents page)	**Distribution**		**Special Protected Areas**										
Designation			**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Skokholm and Skomer	Solent and Southampton Water	Somerset Levels and Moors	South West London Waterbodies	Stodmarsh	Stour and Orwell Estuaries	Tamar estuaries Complex	Thames Estuary & Marshes	Thanet Coast & Sandwich Bay	The Swale	Westkust
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				UK901 4051	UK901 1061	UK901 0031	UK901 2171	UK901 2121	UK900 9121	UK901 0141	UK901 2021	UK901 2071	UK901 2011	BE250 0121
Country				Wales	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Bel
Birds-Breeding Season														
Breeding Seabird Assemblage	✓	✓												
Golden Eagle	✓													
Osprey	✓													
Wood Sandpiper	✓	✓												
Northern Gannet	✓	✓	✓											
Lesser Black-backed Gull	✓	✓	✓											
Herring Gull	✓	✓	✓											
Black-legged Kittiwake	✓	✓	✓											
Common Guillemot	✓	✓	✓											
Corn Crake	✓													
Black-throated Diver	✓	✓												
European Storm Petrel	✓	✓	✓											
Arctic Tern	✓	✓												
Eurasian Dotterel	✓													
Northern Fulmar	✓	✓	✓											
European Shag	✓	✓	✓											
Red-throated Diver	✓	✓	✓											
European Golden Plover	✓	✓												
Short-Eared owl	✓													
Dunlin	✓	✓												
Great Cormorant	✓	✓	✓											
Great Black-backed Gull	✓	✓	✓											
Atlantic Puffin	✓	✓	✓											
Razorbill	✓	✓	✓											
Sandwich Tern	✓	✓	✓		4.1									
Common Tern	✓	✓	✓		4.1									
Little Tern	✓	✓	✓		4.1							4.1		
Manx Shearwater	✓	✓	✓	4.2										
Roseate Tern	✓	✓	✓		4.1									
Peregrine Falcon	✓													
Arctic Skua	✓	✓												
Whimbrel	✓	✓												
Red-necked phalarope	✓	✓												
Great Skua	✓	✓	✓											
Great Crested Grebe	✓	✓												
Leach's Storm Petrel	✓	✓	✓											
Great Bittern	✓	✓												
Common Redshank	✓	✓												
Common Snipe	✓	✓												
Pochard	✓	✓												
Gadwall	✓	✓												
Slavonian Grebe	✓	✓												
Tufted Duck	✓	✓												
Northern Shoveler	✓	✓												
Common Shelduck	✓	✓												
Ringed Plover	✓	✓												
Goosander	✓	✓												
Common Eider	✓	✓												
Greenshank	✓	✓												
Eurasian Curlew	✓	✓												
Common Scoter	✓	✓	✓											
Northern Lapwing	✓	✓												
Eurasian Teal	✓	✓												
Eurasian Wigeon	✓	✓												
Common Goldeneye	✓	✓												
Black Guillemot	✓	✓												
Eurasian Oystercatcher	✓	✓												
Common (Mew) Gull	✓	✓	✓											
Black-headed Gull	✓	✓												
Mediterranean Gull	✓	✓	✓		4.1									
Spotted Crake	✓	✓												
Pied Avocet	✓	✓							4					
Mute Swan	✓	✓												
Greylag Goose	✓	✓												
Mallard	✓	✓												
Sanderling	✓	✓												
Kentish Plover	✓	✓												
Garganey	✓	✓												
Little Grebe	✓	✓	✓											
Bearded Tit	✓	✓												
Little Gull	✓	✓	✓											
Pomeraine Skua	✓	✓	✓											
Black necked grebe	✓	✓												
Little Egret	✓	✓												

Draft Plan Policy Screened in	S-AG-1		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	S-DD-2	Mud Recharge	✓	✓	✓	✓	✓		✓	✓	✓	✓	
		Sand/Shingle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening Criteria (Location Relative to Area of Interest)	**Transnational**												✓
	> 100km		✓										
	< 100km			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Within ellipse			✓									
	Footprint												
(back to contents page)	**Distribution**		**Special Protected Areas**										
Designation			**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**	**SPA**
European/Ramsar Site	**Landward/Riverine**	**Intertidal/Coastal**	**Marine/Offshore**	Skokholm and Skomer	Solent and Southampton Water	Somerset Levels and Moors	South West London Waterbodies	Stodmarsh	Stour and Orwell Estuaries	Tamar estuaries Complex	Thames Estuary & Marshes	Thanet Coast & Sandwich Bay	The Swale	Westkust
Interest Features (grouped in some cases e.g. dunes) / **Site Code**				UK901 4051	UK901 1061	UK901 0031	UK901 2171	UK901 2121	UK900 9121	UK901 0141	UK901 2021	UK901 2071	UK901 2011	BE250 0121
Country				Wales	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Eng	Bel
Birds Overwintering/Passage														
Wintering Waterfowl Assemblage	✓	✓	✓		51,361	73,014			63,017		75019		65588	
Common Redshank	✓	✓							4.2		4.2		4.2	
Great Crested Grebe	✓	✓												4.2
Whooper Swan	✓	✓												
Barnacle Goose	✓	✓			4.2									
Greylag Goose	✓	✓												
Greenland White-fronted Goose	✓	✓												
Pink-footed Goose	✓	✓												
Light-bellied Brent Goose	✓	✓												
Dark-bellied Brent Goose	✓	✓							4				4.2	
Ruff	✓	✓												
Bar-tailed Godwit	✓	✓												
Eurasian Wigeon	✓	✓												
Northern Pintail	✓	✓							4					
Red Knot	✓	✓							4.2		4.2			
Purple Sandpiper	✓	✓												
Ruddy Turnstone	✓	✓										4.2		4.2
Horned Grebe	✓	✓												
Slavonian Grebe	✓	✓												
Red-throated Diver	✓	✓												
Common Eider	✓	✓												
Common Shelduck	✓	✓												4.2
Great Cormorant	✓	✓												
Mallard	✓	✓												
Greater Scaup	✓	✓												
Long-tailed Duck	✓	✓												
Black (Common) Scoter	✓	✓	✓											4.2
Velet Scoter	✓	✓	✓											
Common Goldeneye	✓	✓												
Red-breasted Merganser	✓	✓												
Common Merganser	✓	✓												
Eurasian Curlew	✓	✓												4.2
Eurasian Oystercatcher	✓	✓												
Ringed Plover	✓	✓			4.2									
European Golden Plover	✓	✓				4.1						4.1		
Grey Plover	✓	✓							4.2		4.2			
Northern Lapwing	✓	✓				4.2								
Dunlin	✓	✓							4.2		4.2		4.2	
Sandwich Tern	✓	✓												4.1
Sanderling	✓	✓												
Black-tailed Godwit	✓	✓			4.2				4.2		4.2			
Goosander	✓	✓												
Eurasian Teal	✓	✓			4.2	4.2								
Gadwall	✓	✓					4.2	4.2						
Common Greenshank	✓	✓												
Black-headed Gull	✓	✓												
Common Tern	✓	✓	✓											4.1
Common Gull (Mew)	✓	✓	✓											
Northern Shoveler	✓	✓					4.2	4.2						
Bewick Swan	✓	✓												
Common Pochard	✓	✓												4.2
Tufted Duck	✓	✓												4.2
Bittern	✓	✓						4.1						
Pied Avocet	✓	✓								4.1	4.1			4.1
Lesser Black-back Gull	✓	✓												
Tundra Swan	✓	✓				4.1								4.2
Roseate Tern		✓	✓											
Little Tern		✓	✓											4.1
Arctic Tern	✓	✓												
Snipe	✓	✓												
Mediterranean Gull	✓	✓												4.2
Mute Swan	✓	✓												4.2
Merlin	✓	✓												
Egret	✓	✓												
Short Eared Owl	✓	✓												
Kentish Plover	✓	✓												
Peregrine Falcon	✓	✓												
Black Throated Diver	✓	✓	✓											
Great northern Diver	✓	✓	✓											
Taiga Bean Goose	✓	✓												
Hen Harrier	✓	✓						4.1			4.1			4.2
Razorbill	✓	✓	✓											
Herring Gull	✓	✓	✓											
Great Black-backed Gull	✓	✓	✓											
Little Gull	✓	✓	✓											
European Shag	✓	✓	✓											
Common Guillemot	✓	✓	✓											
Northern Fulmar	✓	✓	✓											
Cory's Shearwater		✓	✓											
European Storm Petrel	✓	✓	✓											
Wood Sandpiper	✓	✓												4.2
Osprey	✓													
Whiskered tern	✓	✓	✓											
Black Tern	✓	✓	✓											
Pomeraine Skua	✓	✓												
Great Skua	✓	✓												
Eurasian Spoonbill	✓	✓												
Smew	✓	✓	✓											4.2
Manx Shearwater	✓	✓	✓											
Northern Gannet	✓	✓	✓											
Black-legged Kittiwake	✓	✓	✓											
Atlantic Puffin	✓	✓	✓											
Red necked grebe	✓	✓												
black necked grebe	✓	✓												
Garganey	✓	✓												
Lesser White Fronted Goose	✓	✓												
Greater white fronted goose	✓	✓												
Little Grebe	✓	✓												4.2
Whimbrel		✓												4.2
Red-necked phalarope	✓	✓												4.2
Spotted Crake	✓	✓												

Back Cover