Department of Energy & Climate Change

Offshore Oil & Gas Licensing 28th Seaward Round

Irish Sea and St George's Channel

Blocks 103/2, 103/3, 106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28, 106/29, 107/11, 107/16, 110/12b, 110/13c, 110/13e, 110/14b, 110/15b, 110/17, 110/18b

Habitats Regulations Assessment

Stage 2 - Appropriate Assessment

June 2015

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1 Introduction

1.1 Background and purpose

On 24th January 2014, the Secretary of State for the Department of Energy and Climate Change (DECC) invited applications for licences in the 28th Seaward Licensing Round. The licensing Round forms part of a plan/programme adopted by the Secretary of State following completion of the Offshore Energy Strategic Environmental Assessment (DECC 2011). Applications for Traditional Seaward, Frontier Seaward and Promote Licences covering over 360 blocks/part Blocks were received.

To comply with obligations under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended), in summer 2014, the Secretary of State undertook a screening assessment to determine whether the award of any of the Blocks applied for would be likely to have a significant effect on a relevant site, either individually or in combination with other plans or projects (DECC 2014a).

In doing so, the Department has applied the Habitats Directive test (elucidated by the European Court of Justice in the case of Waddenzee (Case C-127/02)) which test is[1]:

> Any plan or project not directly connected with or necessary to the management of the site is to be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives if it cannot be excluded, on the basis of objective information, that it will have a significant effect on that site, either individually or in combination with other plans or projects.
>
> Where a plan or project not directly connected with or necessary to the management of the site is likely to undermine the site's conservation objectives, it must be considered likely to have a significant effect on that site. The assessment of that risk must be made in the light, *inter alia*, of the characteristics and specific environmental conditions of the site concerned by such a plan or project.

The screening assessment (including consultation with the statutory agencies/bodies) forming the first stage of the Habitats Regulations Assessment (HRA) process, identified 94 whole or part Blocks as requiring further assessment prior to decisions on whether to grant licences (DECC 2014a). Because of the wide distribution of these Blocks around the UKCS, the Appropriate Assessments (AA) in respect of each potential licence award, are contained in five regional reports as follows:

- Southern North Sea
- Moray Firth
- Northern and Central North Sea

[1] Also see the Advocate General's Opinion in the recent 'Sweetman' case (Case C-258/11), which confirms those principles set out in the Waddenzee judgement.

- West of Shetland
- Irish Sea and St George's Channel

This report documents the further assessment of 24 Blocks in the Irish Sea and St George's Channel.

1.2 Irish Sea and St George's Channel Blocks

The Irish Sea and St George's Channel Blocks applied for in the 28th Round and considered in this assessment are listed below and shown in Figures 1.1 and 1.2[2]. These Blocks were identified as requiring further assessment by the screening process (DECC 2014a).

103/2	103/3	106/13	106/14	106/15	106/18
106/19	106/20	106/22	106/23	106/24	106/26
106/27	106/28	106/29	107/11	107/16	110/12b
110/13c	110/13e	110/14b	110/15b	110/17	110/18b

1.3 Relevant Natura 2000 sites

The Natura 2000 sites considered in this assessment were identified based on their location in relation to the relevant Blocks and the foreseeable possibility of interactions. The sites considered include designated Natura 2000 sites (also referred to as 'European Sites' and including Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) and potential sites for which there is adequate information on which to base an assessment. Additionally, potential interactions between mobile species which are qualifying features of these sites, and work programme activities that may arise from licensing, are considered beyond site boundaries (e.g. foraging marine mammals, seabirds and migratory fish).

Guidance in relation to sites which have not yet been submitted to the European Commission is given by Circular 06/2005 (ODPM 2005) which states that: "*Prior to its submission to the European Commission as a cSAC, a proposed SAC (pSAC) is subject to wide consultation. At that stage it is not a European site and the Habitats Regulations do not apply as a matter of law or as a matter of policy. Nevertheless, planning authorities should take note of this potential designation in their consideration of any planning applications that may affect the site.*" Despite reference to the Habitats Regulations not applying as a matter of policy to such sites, in accordance with the National Planning Policy Framework (DCLG 2012[3]), Planning Policy Wales Welsh Government 2014[4]), and the Marine Policy Statement (HM Government 2011), the relevant sites considered include classified and potential SPAs, possible, candidate and designated SACs and Sites of Community Importance (SCIs).

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[2] Figures do not include Blocks for which Promote licence applications were made. The screening assessment concluded that likely significant effects on European sites could not occur from the award of Promote licences and these Blocks were screened out. DECC will undertake HRA for the potential for likely significant effects on European sites in advance of decisions being taken on whether any of the 28th Round Promote licences should proceed to a second term when field operations could be carried out.

[3] Which states that "listed or proposed Ramsar sites should be given the same protection as European sites." UK coastal Ramsar sites are typically coincident with SACs and/or SPAs.

[4] Which states that "potential SPAs and candidate SACs should be treated in the same way as classified SPAs and designated SACs. Sites which the UK and the European Commission have agreed as Sites of Community Importance and which are to be designated as SACs attract the same legal protection as if they had already been designated. The same considerations should, as a matter of policy, be applied to listed Ramsar sites."

Information gathering is in progress to inform the potential designation of further Natura 2000 sites, for instance the work of Kober *et al*. (2010, 2012) – see Section 6.3.1. Natural Resources Wales (NRW) are currently considering a number of sea areas as possible new SPA sites (see Section 6.3.1) and possible SACs for harbour porpoise (see Section 5.3.1). Should further sites be established in the future, these would be considered as necessary in subsequent project specific assessments.

In addition to European sites, the characteristics of broadscale physical and ecological features in the area are described in the Offshore Energy SEA (DECC 2009, 2011), Charting Progress 2 (Defra 2010) and the OSPAR Quality Status Report (OSPAR 2010).

The relevant sites are shown in Figures 1.1 and 1.2, and summarised in Appendix A.

Figure 1.1: Location of Irish Sea and St George's Channel Blocks and relevant SPAs

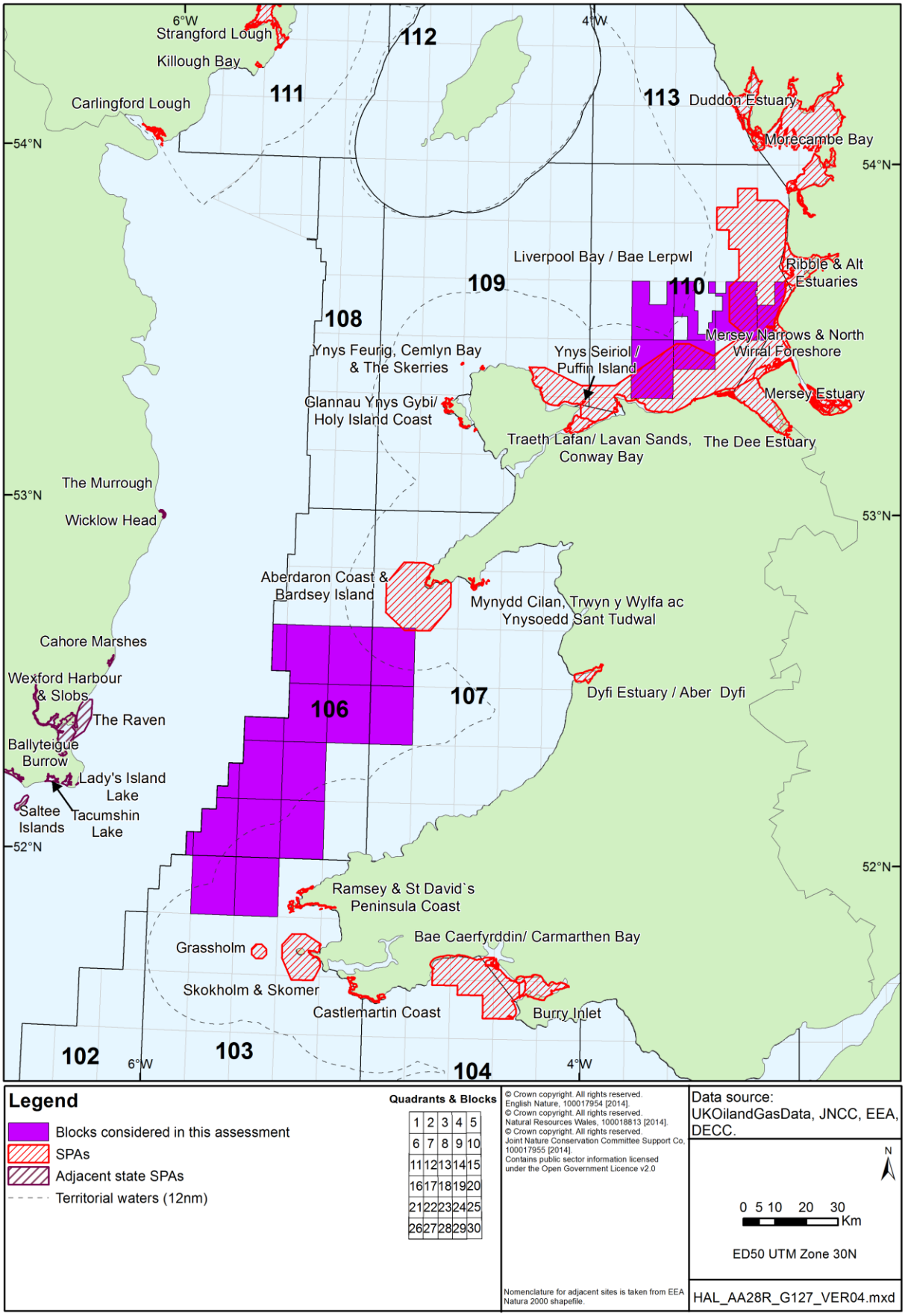
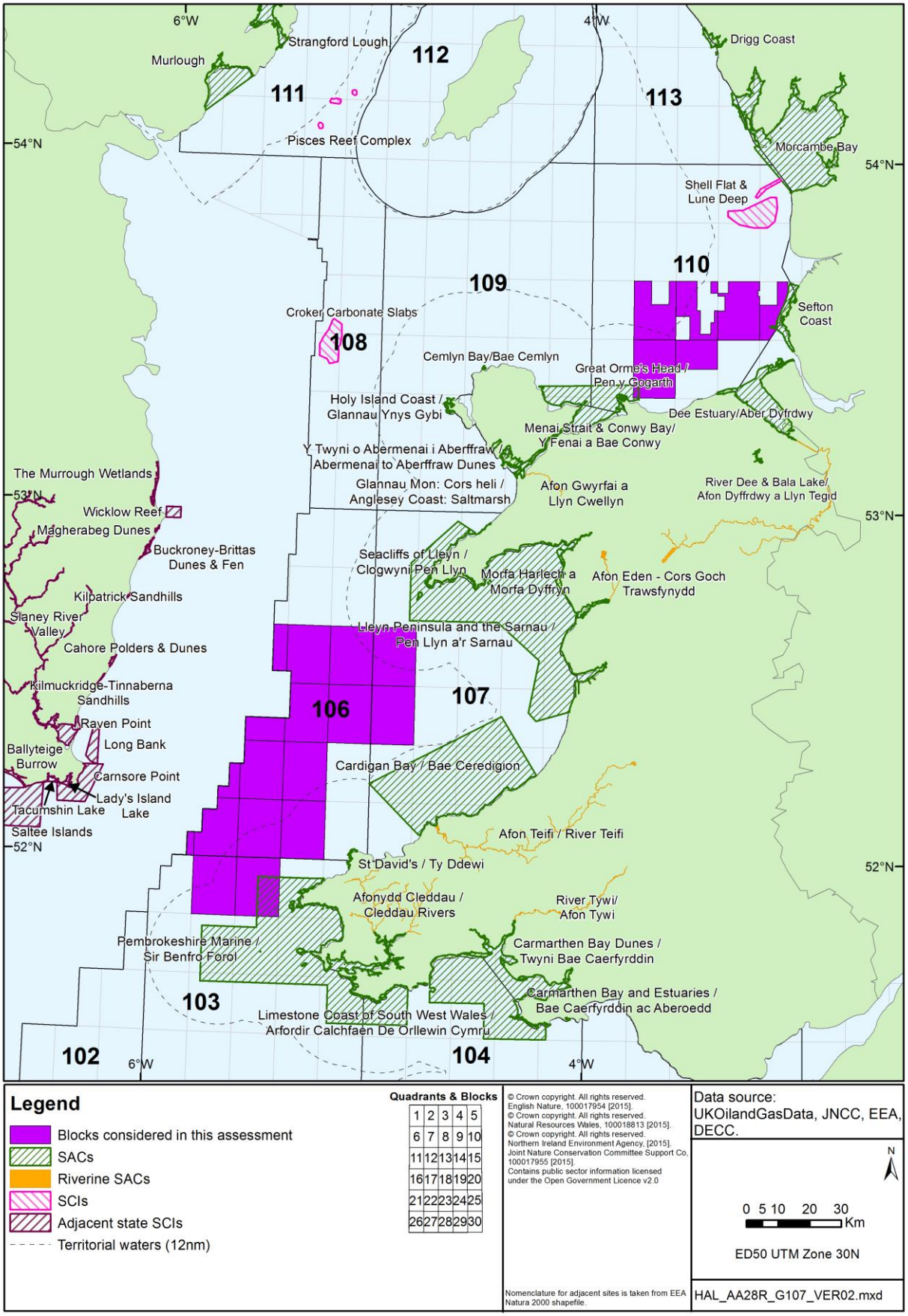


Figure 1.2: Location of Irish Sea and St George's Channel Blocks and relevant SACs



2 Licensing and activity

2.1 Licensing

The exclusive rights to search and bore for and get petroleum in Great Britain, the territorial sea adjacent to the United Kingdom and on the UK Continental Shelf (UKCS) are vested in the Crown and the *Petroleum Act 1998* (as amended) gives the Secretary of State the power to grant licences to explore for and exploit these resources. The main type of offshore Licence is the Seaward Production Licence. Offshore licensing for oil and gas exploration and production commenced in 1964 and has progressed through a series of Seaward Licensing Rounds. A Seaward Production Licence may cover the whole or part of a specified Block or a group of Blocks. A Licence grants exclusive rights to the holders "to search and bore for, and get, petroleum" in the area covered by the Licence, but does not constitute any form of approval for activities to take place in the Blocks, nor does it confer any exemption from other legal or regulatory requirements.

The applications for the 24 Irish Sea and St George's Channel Blocks were for Traditional Production Licences which are the standard type of Seaward Production Licences and run for three successive periods or Terms. Each Licence expires automatically at the end of each Term, unless the licensee has made enough progress to earn the chance to move into the next Term. The Initial Term lasts for four years and the Licence will only continue into a Second Term of four years if the agreed Work Programme has been completed and if 50% of the acreage has been relinquished. The Licence will only continue into a Third Term of 18 years if a development plan has been approved, and all the acreage outside that development has been relinquished. DECC at its discretion can offer different term lengths if an applicant makes a strong enough case, for instance where a high pressure high temperature (HPHT) prospect will take longer to plan and explore. In such cases the initial and/or second terms may be extended to six years.

The model clauses and terms and conditions which are attached to Licences are contained in secondary legislation.

Note that the environmental management capacity and track record of applicants is considered by DECC, through written submissions and interviews, before licences are awarded.

2.2 Activity

As part of the licence application process, applicant companies provide DECC with details of work programmes they propose in the first term to further the understanding or exploration of the Blocks(s) in question. These work programmes are considered with a range of other factors in DECC's decision on whether to license the Blocks and to whom.

With respect to drilling commitments, all of the proposed work programmes for the Blocks indicate a **Drill or Drop (D/D) Drilling Commitment** which is a conditional commitment with the proviso that the licence is relinquished if a well is not drilled. Note that Drill-or-Drop work programmes (subject to further studies by the licensees) will probably result in a well being drilled in less than 50% of the cases.

With respect to seismic data commitments, the proposed work programmes for the Blocks include: **shooting** seismic data by carrying out new 2D or 3D seismic survey; **obtaining** seismic data by purchasing or otherwise getting the use of existing data, and **reprocessing** existing data[5].

It is made clear in the application guidance that a Production Licence does not allow a licensee to carry out all petroleum-related activities from then on (this includes those activities outlined in initial work programmes). Field activities, associated with seismic survey or drilling, are subject to further individual controls by DECC (see Figures 2.3-2.4), and a licensee also remains subject to controls by other bodies such as the Health and Safety Executive. It is the licensee's responsibility to be aware of, and comply with, all regulatory controls and legal requirements.

The proposed work programmes for the first four-year period are detailed in the licence applications. For some activities, such as seismic survey, and accidental events such as oil spills, the impacts can occur some distance from the licensed Blocks and the degree of activity is not necessarily proportional to the size or number of Blocks in an area. In the case of direct physical disturbance, the licence Blocks being applied for are relevant.

On past experience, less activity actually takes place than is bid at the licence application stage. A proportion of Blocks awarded may be relinquished without any field activities occurring. Activity after the initial term is much harder to predict, as this depends on the results of the initial phase, which is, by definition, exploratory. Typically less than half the wells drilled reveal hydrocarbons, and of that half less than half again will yield an amount significant enough to warrant development. Depending on the expected size of finds, there may be further drilling to appraise the hydrocarbons (appraisal wells). For context, Figure 2.1 shows the total number of exploration and appraisal wells started in the Irish Sea each year since 2000 and the number of significant discoveries made (associated with exploration activities).

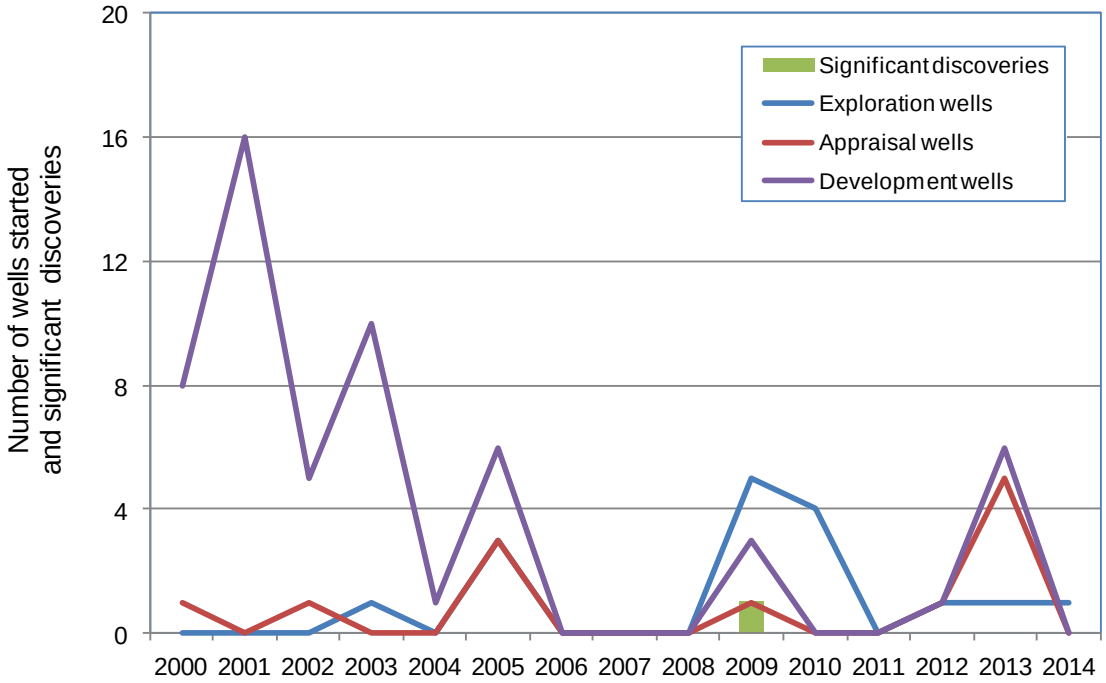
Discoveries that are developed may require further drilling, wellhead infrastructure, pipelines and possibly production facilities such as platforms, although recent developments are mostly subsea tiebacks to existing production facilities rather than stand alone developments. For example, of the 2 current projects identified by DECC's Project Pathfinder (as of February 2015)[6] for Blocks within the Irish Sea, 1 is planned as a subsea tie-back development to existing infrastructure. The other project is a gas storage project. The nature, extent and timescale of development, if any, which may ultimately result from the licensing of the Irish Sea and St George's Channel Blocks is uncertain; Figure 2.1 shows the number of development wells drilled since 2000. It is therefore regarded that, at this stage, a meaningful assessment of development level activity (e.g. pipelay, placement of jackets, subsea templates or floating installations) cannot be made. Moreover, once project plans are in place, subsequent permitting processes relating to exploration, development and decommissioning, would require assessment (including HRA) as appropriate, allowing the opportunity for further mitigation measures to be identified as necessary. In this way the opinion of the Advocate General in ECJ (European Court of Justice) case C-6/04, effects on Natura sites, *"must be assessed at every relevant stage of the procedure to the extent possible on the basis of the precision of the*

5 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/274621/28R_Technical_guidance.pdf

6 https://itportal.decc.gov.uk/eng/fox/path/PATH_REPORTS/pdf

plan. This assessment is to be updated with increasing specificity in subsequent stages of the procedure" is addressed.

Figure 2.1: Number of exploration, appraisal and development wells started and significant discoveries in the Irish Sea since 2000



Note: "Significant" generally refers to the flow rates achieved (or would have been reached) in well tests (15 mmcfgd or 1000 BOPD). It does not indicate the commercial potential of the discovery.
Source: https://www.gov.uk/oil-and-gas-wells#drilling-activity, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/278780/Significant_Discoveries_Jan_2014.pdf

The approach used here has been to take the proposed activity for the Block as being the maximum of any application for that Block, and to assume that all activity takes place. The Blocks comprising individual licences and estimates of work commitments for the Blocks derived by DECC from the applications received are as follows:

Blocks	Initial term work programme	Licence type
103/2, 103/3, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28 & 106/29	Drill or drop well, shoot 3D seismic, obtain 2D and 3D, and reprocess 2D	**Traditional:** work programme must be carried out and 50% of block acreage relinquished within 4 years, otherwise licence will not continue to second term.
106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 107/11 & 107/16	Drill or drop well, shoot 3D seismic, obtain 2D and 3D, and reprocess 2D	
110/12b, 110/13c, 110/14b, 110/15b, 110/17 & 110/18b	Drill or drop well	
110/13e	Drill or drop well	

Note: Reprocessing or obtaining seismic refers to use of existing seismic data rather than undertaking new seismic survey[7].

[7] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/274621/28R_Technical_guidance.pdf

Figure 2.2 provides an overview of the plan process associated with the 28th Licensing Round and the various environmental requirements including HRA. Figures 2.3 and 2.4 outline the stages for subsequent activities and environmental requirements for the work programmes (drilling and seismic survey) indicated by applicants for the Blocks subject to assessment. These simplified flow diagrams highlight the regulatory requirements and environmental responsibilities at various stages in the development of the plan or exploration level activity, and further requirements for project level environmental assessment and HRA. All activities which could give rise to significant effects on the integrity of relevant sites are subject to regulatory control, including HRA as necessary with consultation with statutory nature conservation bodies. There are high level controls to prevent significant impacts and site specific mitigation would be defined at the project level once the location and nature of activity were defined. High level controls are outlined in Table 2.1 against those sources of potential effect from activities associated with 28th Round licensing that were already identified in the HRA screening (DECC 2014a) – also see Appendix B.

Table 2.1: High level controls identified for potential sources of effect

Source of effect	High level controls
Physical disturbance	There is a mandatory requirement to have sufficient recent data to characterise the seabed in areas where activities are due to take place (e.g. rig placement). Survey information must be made available to the relevant statutory bodies on submission of a relevant permit application or Environmental Statement for the operation to be undertaken, and the identification of sensitive habitats by such survey (including those under Annex I of the Habitats Directive) may affect DECC's decision with regards to the application. Further mitigation (e.g. alternative well location or rig positioning) may need to be identified and implemented where necessary.
Marine discharges	Discharges from offshore oil and gas facilities have been subject to increasingly stringent regulatory controls over recent decades (see review in DECC 2011, Appendices 4 and 5), and oil and other contaminant concentrations in the major streams (drilling wastes and produced water) have been substantially reduced or eliminated (e.g. the discharge of oil based muds and contaminated cuttings is effectively prohibited), with discharges of chemicals and oil outside of regulatory standards or permit conditions constituting an offence. These are effectively controlled through permitting, monitoring and reporting (e.g. through the mandatory Environmental and Emissions Monitoring System (EEMS) and annual environmental performance reports). At the project level, discharges would be considered in project-specific Environmental Statements and evaluated in further detail within subsequent chemical permit applications, using chemical risk assessments. HRAs (where necessary) may also be undertaken at each stage.

Source of effect	High level controls
Underwater noise	Seismic operators are required to submit an application for consent to carry out a geological survey. As part of the application process, operators must justify that their proposed activity is not likely to cause a disturbance etc. under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended) and *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007* (as amended). It is a condition of consents issued under Regulation 4 of the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (& 2007 amendments) for oil and gas related seismic surveys that the JNCC, *Guidelines for minimising the risk of disturbance and injury to marine mammals from seismic surveys,* are followed. Passive acoustic monitoring (PAM) may be required as a mitigation tool. DECC will take account of the advice provided by the relevant statutory nature conservation body in determining any consent conditions. Potential disturbance of certain species may be avoided by the seasonal timing of noisy activities, and periods of seasonal concern for individual Blocks on offer have been highlighted (see Section 2 of DECC's Other Regulatory Issues[8] which accompanied the 28th Round offer) for which licensees should expect to affect DECC's decision whether or not to approve particular activities. Licensees should therefore appropriately plan operations to avoid these sensitivities.
Accidental spills	Oil Pollution Emergency Plans (OPEPs): regulatory requirements on operators to prepare spill prevention and containment measures, risk assessment and contingency planning – these are reviewed by DECC, Maritime and Coastguard Agency (MCA), JNCC and other relevant SNCBs/organisations. Additional conditions may be imposed by DECC through block-specific licence conditions (i.e. "Essential Elements"), and seasonal periods of concern for drilling (see Section 2 of DECC's Other Regulatory Issues which accompanied the 28th Round offer), within which there is a presumption for drilling activity to be refused unless appropriate further mitigation measures can be agreed which are defined at the project level. MCA is responsible for a National Contingency Plan and maintains a contractual arrangement for provision of aerial spraying, with aircraft based at Birmingham International and East Midlands airports, and counter-pollution equipment (booms, adsorbents etc.). The UK Government announced in 2012 that an Emergency Towing Vessel for the waters around the Northern and Western Isles will be stationed in Orkney up to 2015 (the contract has now been extended to March 2016)[9]. The government has also been in discussions with the oil industry on the potential of a commercial call-out arrangement to use their vessels and BP have agreed to volunteer a vessel to help in an emergency should the MCA deem it appropriate[10].

8 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283487/28R_other_reg_issues.pdf

9 http://www.shetnews.co.uk/news/9565-sic-retaining-northern-isles-emergency-vessel-is-crucial

10 https://www.gov.uk/government/news/moore-welcomes-bp-and-north-star-support-for-second-support-vessel

Figure 2.2: Stages of plan level environmental assessment

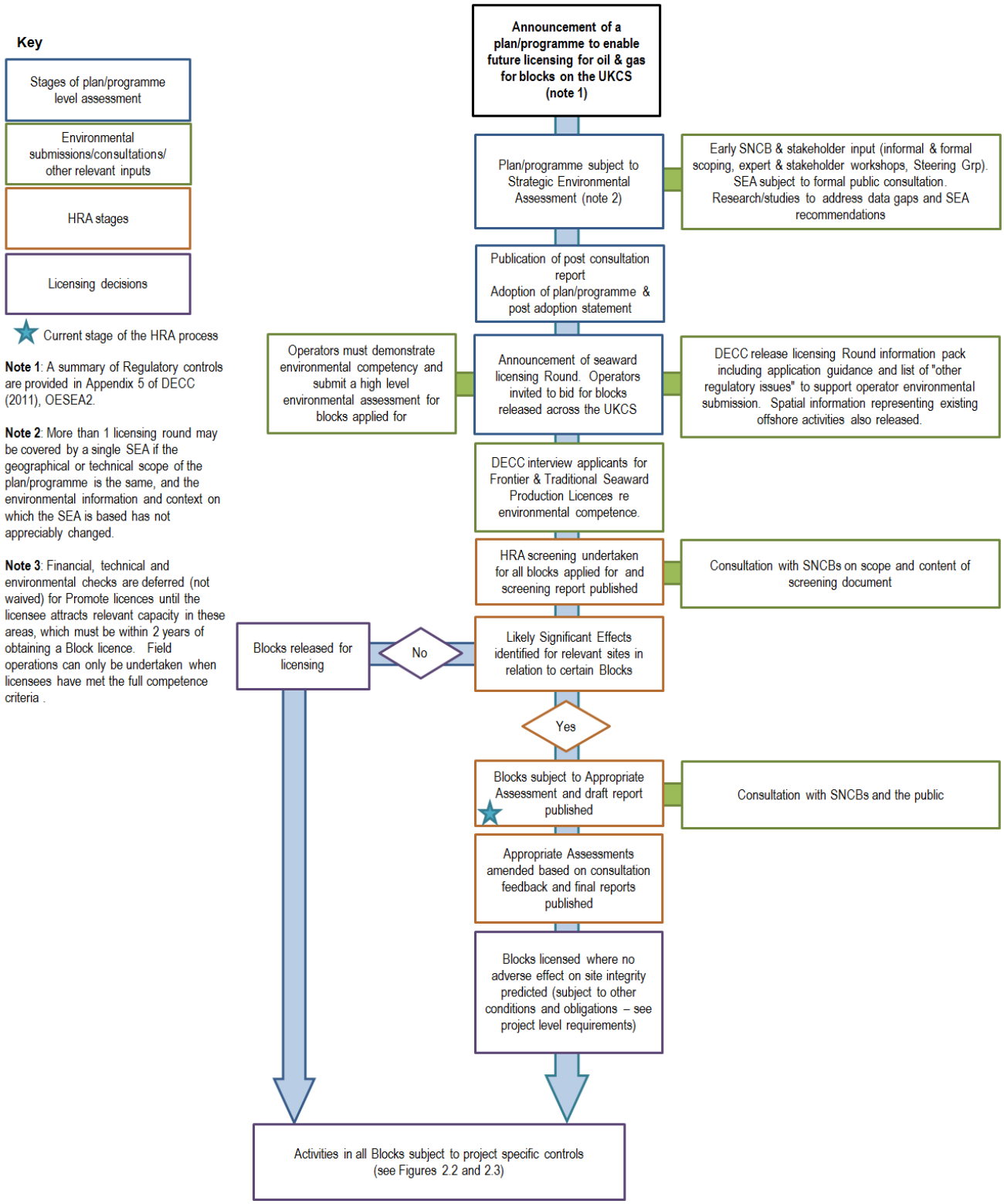
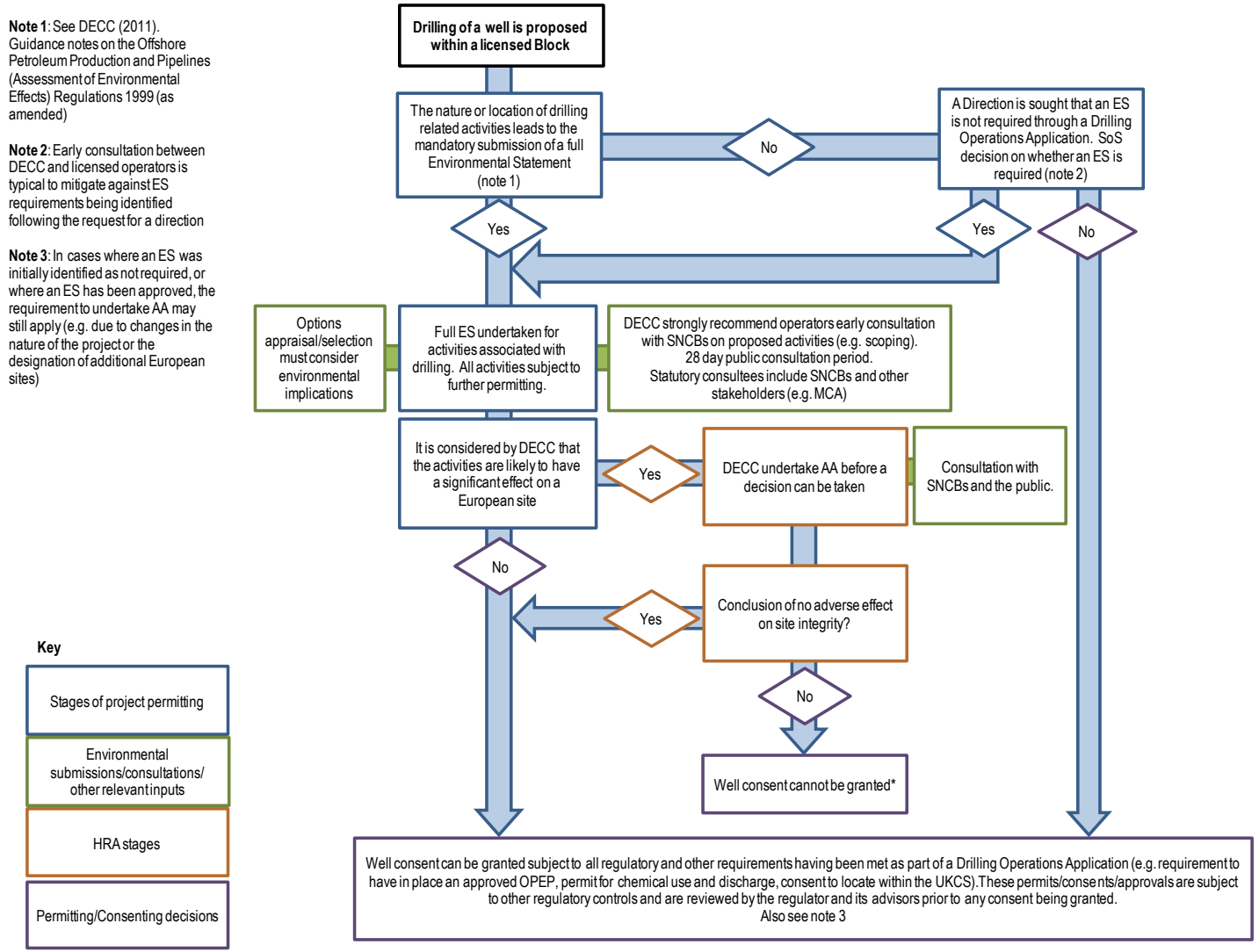
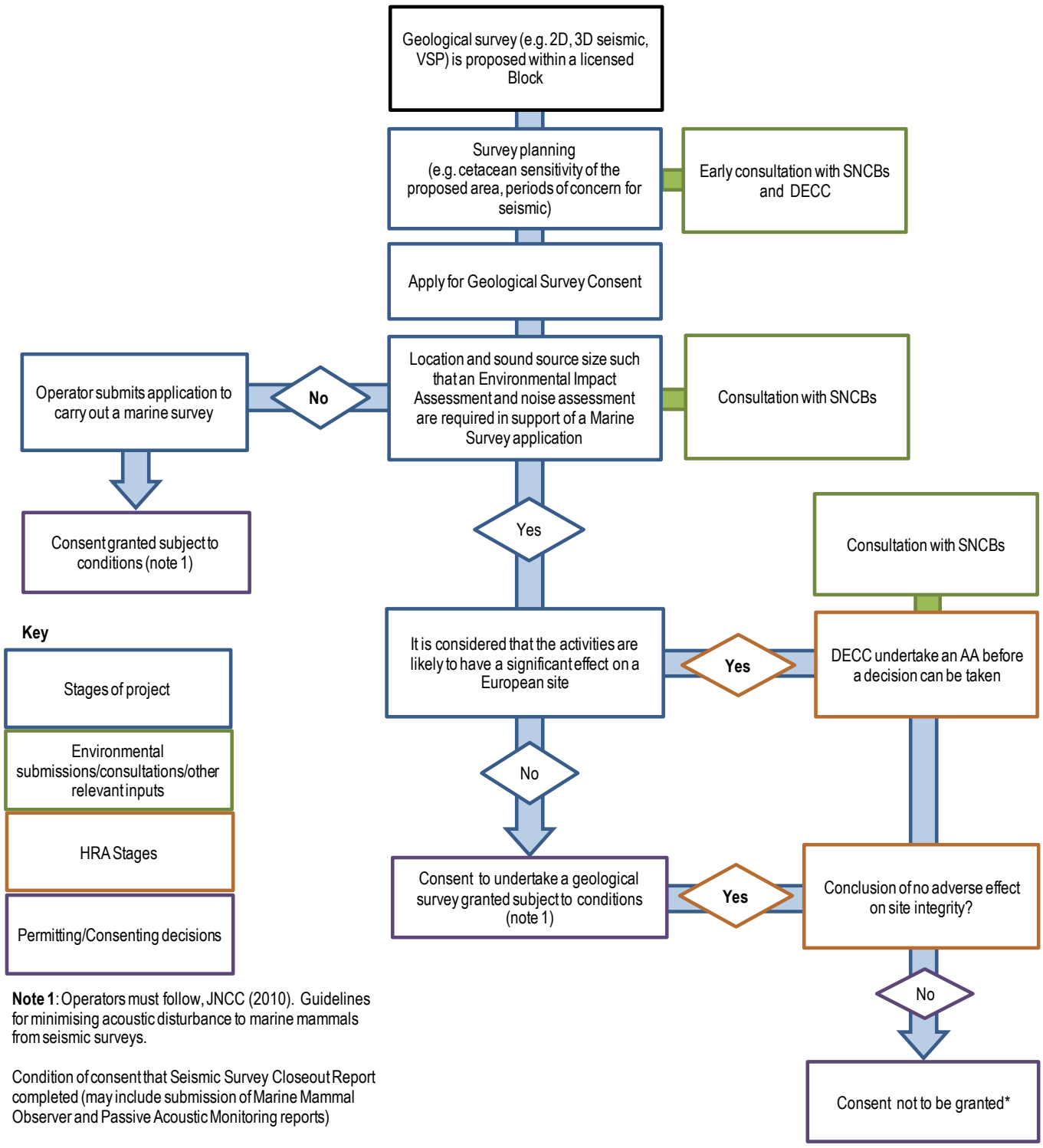


Figure 2.3: High level overview of exploration drilling environmental requirements



** Article 6(4) of the Habitats Directive provides a derogation which would allow a plan or project to be approved in limited circumstances even though it would or may have an adverse effect on the integrity of a European site (see: Defra 2012)*

Figure 2.4: High level overview of seismic survey environmental requirements



Note 1: Operators must follow, JNCC (2010). Guidelines for minimising acoustic disturbance to marine mammals from seismic surveys.

Condition of consent that Seismic Survey Closeout Report completed (may include submission of Marine Mammal Observer and Passive Acoustic Monitoring reports)

3 Appropriate assessment process

3.1 Process

In carrying out this AA so as to determine whether it is possible to grant licences in accordance with Regulation 5(1) of *The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended), DECC has:

- Considered, on the basis of the precautionary principle, whether it could be concluded that the integrity of relevant European Sites would not be affected. This impact prediction involved a consideration of the cumulative and in-combination effects.

- Examined, in relation to elements of the plan where it was not possible to conclude that the integrity of relevant sites would not be affected, whether appropriate mitigation measures could be designed which negated or minimised any potential adverse effects identified.

- Drawn conclusions on whether or not it is possible to go ahead with the plan.

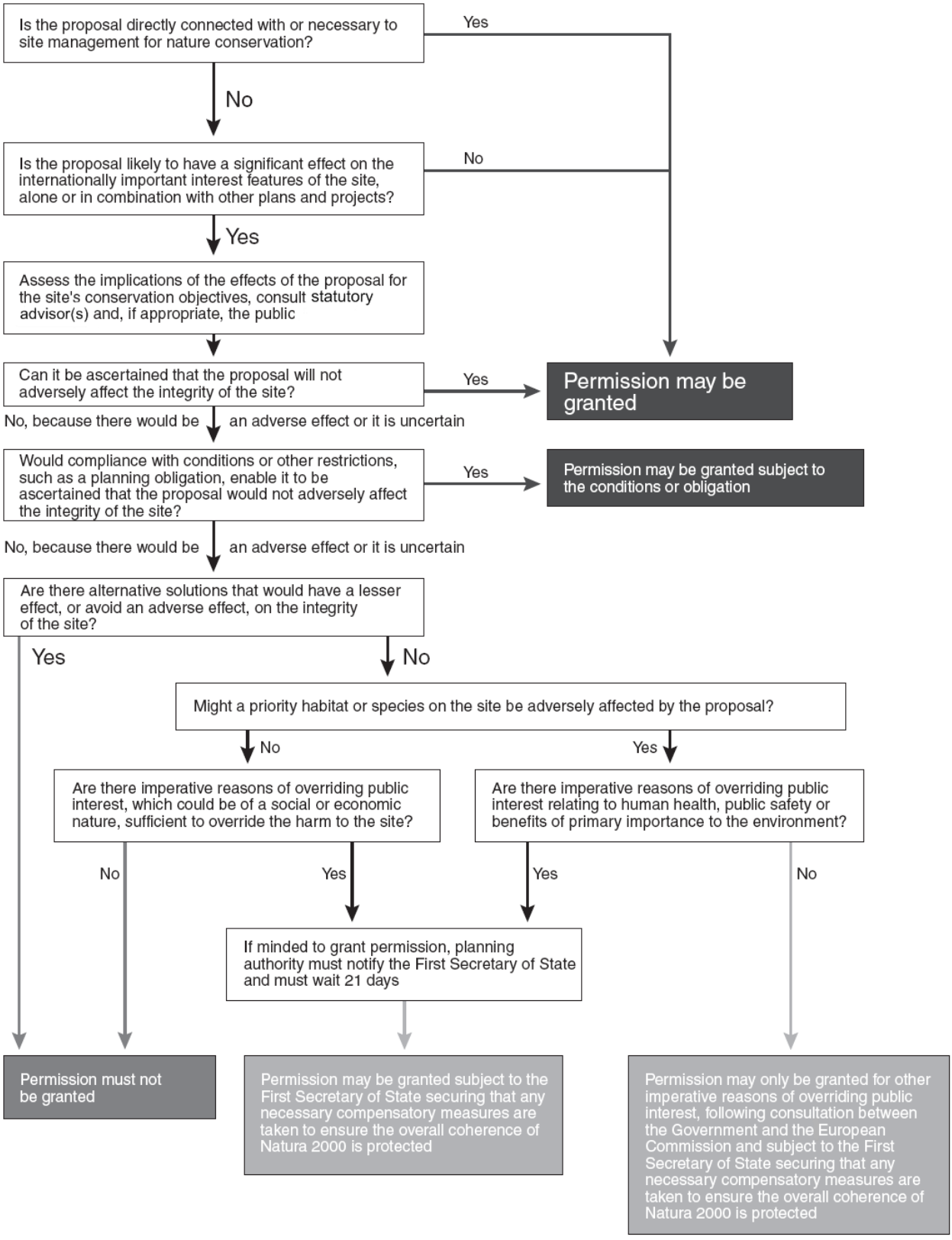
In considering the above, DECC used the clarification of the tests set out in the Habitats Directive in line with the ruling of the ECJ in the *Waddenzee* case (Case C-127/02), so that:

- Prior to the grant of any licence all activities which may be carried out following the grant of such a licence, and which by themselves or in combination with other activities can affect the site's conservation objectives, are identified in the light of the best scientific knowledge in the field.

- A licence can only be granted if DECC has made certain that the activities to be carried out under such a licence will not adversely affect the integrity of that site (i.e. cause deterioration to a qualifying habitat or habitat of qualifying species, and/or undermine the conservation objectives of any given site). That is the case where no reasonable scientific doubt remains as to the absence of such effects.

A flowchart summarising the process is shown in Figure 3.1.

Figure 3.1: Summary of procedures under the Habitats Directive for consideration of plans or projects affecting Natura 2000 sites



Note: 'First Secretary of State' in this case is the Secretary of State for DECC. 'Statutory advisor(s)' refers to the relevant statutory Government advisor(s) on nature conservation issues. Source: ODPM (2005).

3.2 Site integrity

The integrity of a site is defined by government policy (Circular 06/2005, ODPM 2005) and in the Commission's guidance as being: *"the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified"*. This is consistent with the definitions of favourable conservation status in Article 1 of the Directive (JNCC 2002). As clarified by the European Commission (2000), the integrity of a site relates to the site's conservation objectives. These objectives are assigned at the time of designation to ensure that the site continues, in the long-term, to make an appropriate contribution to achieving favourable conservation status for the qualifying interest features. An adverse effect would be something that impacts the site features, either directly or indirectly, and results in disruption or harm to the ecological structure and functioning of the site and/or affects the ability of the site to meet its conservation objectives. For example, it is possible that a plan or project will adversely affect the integrity of a site only in a visual sense or only with respect to habitat types or species other than those listed in Annex I or Annex II. In such cases, the effects do not amount to an adverse effect for purposes of Article 6(3) of the Habitats Directive, provided that the coherence of the network is not affected. The AA must therefore conclude whether the proposed activity adversely affects the integrity of the site, in the light of its conservation objectives.

3.3 Assessment of effects on site integrity

The approach to ascertaining the absence or otherwise of adverse effects on the integrity of a relevant site is set out in Section 3.1 above. This assessment has been undertaken in accordance with the European Commission Guidance (EC 2000), and with reference to various other guidance and reports including the National Planning Policy Framework (DCLG 2012), Circular 06/2005 (ODPM 2005) and Tyldesley (2011).

Appendix A lists and summarises the relevant sites as defined in Section 1.3. Appendix B then presents the results of a re-screening exercise of these sites to identify the potential for activities that could follow the licensing of the 24 Blocks in question to result in a likely significant effect. The DECC (2014) screening exercise considered generic exploration activity levels for each Block applied for (e.g. drilling and shooting seismic survey in every Block) in the 28th Round in advance of Block work programmes (Section 2.2) being confirmed. Appendix B presents a re-screening exercise in light of these work programmes. It should be noted that as work programme activity levels can only either be equal to or less than that used in the original screening process, the re-screening did not identify any additional sites to DECC (2014) for which likely significant effect should be considered. Where potential effects are identified in Appendix B, more detailed information on the relevant sites including their conservation objectives is provided in Appendix C.

For those sites where re-screening identified potential effects, detailed assessment is made in the following sections of the implications for the integrity of the relevant sites (in terms of their qualifying features, and the site's conservation objectives) were a licence (or licences) to be granted for the relevant Blocks. The assessment is based on the potential work programmes for the Blocks and likely hydrocarbon resources, along with the characteristics and specific environmental conditions of the relevant sites as described in Appendix C. As noted in Section 2.2, the proposed work programme is taken as the maximum of any application for the Blocks. Activities which may be carried out following the grant of a licence, and which by themselves or in combination with other activities can affect the conservation objectives of relevant sites are discussed under the following broad headings:

- Physical disturbance and drilling effects (Section 4)
- Underwater noise (Section 5)
- Accidental spills (Section 6)
- Cumulative and in-combination effects (Section 7)

Use has been made of advice prepared by the conservation agencies under Regulation 35[11] (formerly Regulation 33), since this typically includes advice on operations that may cause deterioration or disturbance to relevant features or species. The future provision of conservation advice may be informed by an ongoing JNCC project linking human activities and marine pressures[12]. A matrix of potential interactions identified by previous studies has been produced[13] as a guide. In the matrix, several of the pressures listed for 'marine hydrocarbon extraction (not including pipelines)' are not inevitable consequences of oil and gas exploration (or production), since through the regulatory Environmental Impact Assessment (EIA) and permitting processes they are routinely mitigated by timing, siting (e.g. of rigs) or technology requirements (or a combination of one or more of these).

The conservation objectives for SAC and SPA features for sites where a likely significant effect has been identified are listed in Appendix C. These objectives and site conservation status have been considered during this AA, including a site-specific consideration of conservation objectives in relation to potential activities which may follow licensing of the Blocks.

[11] *The Conservation of Habitats and Species Regulations 2010*
[12] http://jncc.defra.gov.uk/page-6516
[13] http://jncc.defra.gov.uk/docs/Combined_P_A_Matrix_Annex2_HBDSEG_Paper_28b(1).xlsx

4 Assessment of physical disturbance and drilling effects

4.1 Introduction

With respect to physical disturbance and drilling effects, the re-screening process (Appendix B) identified a number of sites where there was the potential for likely significant effects associated with proposed activities that could follow licensing of the Irish Sea and St George's Channel Blocks (Figure 4.1). The potential effects are summarised below (Section 4.2), and considered against the conservation objectives of the relevant sites to determine whether they could adversely affect site integrity (Section 4.3).

4.2 Potential physical disturbance and drilling effects

4.2.1 Physical damage at the seabed

The main sources of physical disturbance of the seabed from oil and gas exploration and appraisal activities are:

- **Anchoring of semi-submersible rigs**. Semi-submersible rigs are generally used in deeper waters (>90m), and typically use between 8 and 12 anchors to hold position, the radius of which depends on the water depth, seabed conditions and anticipated metocean conditions. The seabed footprint associated with semi-submersible rig anchoring results from a combination of anchor scars caused by anchors dragging before gaining a firm hold, and scraping by the cable and/or chain linking the anchor to the rig, where these touch the seabed (the catenary contact). For example, Marathon Oil UK Limited (2005) estimated that a semi-submersible rig using 8 anchors in 93m water depth[14] (Block 103/1a) might impact a seabed area of *ca*. 0.009km^2 as a result of anchor drag during tensioning and catenary contact of 990m of anchor chain along an overall anchor spread of 1,200m. Rig siting is informed by site survey which provides information on seabed topography and habitats, within the expected seabed footprint, allowing potentially sensitive features to be identified and taken account of in the mooring analysis (when anchor locations are selected).

- **Placement of jack-up rigs**. Jack-up rigs, normally used in shallower water (<120m)[14], leave three or four seabed depressions from the feet of the rig (the spud cans) around 15-20m in diameter. A four-legged rig with 20m diameter spud cans would have an approximate seabed footprint of 1,250m^2 within a radius of *ca*. 50m of the rig centre. Smaller rigs will have a comparatively smaller footprint, (e.g. 462m^2 for a three-legged jack-up with 14m diameter spud cans, as estimated by Venture North Sea Gas Ltd

[14] Note that the Blocks considered in this assessment have water depths ranging from *ca.* 65-110m (St George's Channel Blocks) and *ca.* 10-35m (Irish Sea Blocks).

2008). In locations with an uneven seabed, material such as grout bags may be placed on the seabed to stabilise the rig feet. Within the seabed footprint, the benthic assemblage would likely be killed by crushing or by the effects of reduced water exchange. Rig siting is informed by site survey which provides information on seabed topography and habitats, within the expected seabed footprint, allowing potentially sensitive features to be identified and taken account of in the location selection.

Rock placement may be undertaken to protect against scour in areas of strong tidal currents for rig stability. The introduction of rock (as well as steel or concrete structures) into an area with a seabed of sand and/or gravel can provide "stepping stones" which might facilitate biological colonisation including by non-indigenous species by allowing species with short lived larvae to spread to areas where previously they were effectively excluded. However, on the UK continental shelf such "stepping stones" are already widespread and numerous as a result of, for example; rock outcrops, glacial dropstones and moraines, relicts of periglacial water flows, accumulations of large mollusc shells, carbonate cemented rock etc. Rig site surveys in UK waters typically reveal the presence of such natural "stepping stones". Those exploration activities that could follow licensing of the Blocks (e.g. drilling of wells) are unlikely to result in significant introduction of rock or structures to the marine environment, and are therefore unlikely to undermine the conservation objectives of SACs in the area.

- **Drilling of wells and wellhead removal**. The surface hole sections of exploration wells are typically drilled riserless, producing a localised (and transient) pile of surface-hole cuttings around the surface conductor. After installation of the surface casing (which will result in a small quantity of excess cement returns being deposited on the seabed), the blowout preventer (BOP) is positioned on the wellhead housing. These operations (and associated activities such as ROV operations) may result in physical disturbance of the immediate vicinity (a few metres) of the wellhead. When an exploration well is abandoned, the conductor and casing are plugged with cement and cut below the mudline (sediment surface) using a mechanical cutting tool deployed from the rig and the wellhead assembly is removed. The seabed "footprint" of the well is temporary in nature due to the mobile nature of the seabed sediments within the eastern Irish Sea (see Holmes & Tappin 2005) and the impacted area can be expected to recover quickly once the well is plugged and cut and the rig has moved off location.

4.2.2 Drilling discharges

The extent and potential impact of drilling discharges have been reviewed by OESEA and OESEA2 (DECC 2009, 2011).

In contrast to historic oil based mud discharges[15], effects on seabed fauna of the discharge of cuttings drilled with water based muds (WBM) and of the excess and spent mud itself are usually subtle or undetectable, although the presence of drilling material at the seabed close to the drilling location (<500m) is often detectable chemically (see e.g. Daan & Mulder 1996). Modelling of WBM cuttings discharges generally indicate that most sediment is deposited in proximity to the well, with finer fractions being carried away in suspension for some kilometres.

[15] OSPAR Decision 2000/3 on the Use of Organic-Phase Drilling Fluids (OPF) and the Discharge of OPF-Contaminated Cuttings came into effect in January 2001 and effectively eliminated the discharge of cuttings contaminated with oil based fluids (OBF) greater than 1% by weight on dry cuttings.

Specific modelling in the eastern Irish Sea (Block 110/14b in *ca.* 19m water depth, see EOG Resources 2008) indicated that 90% of cuttings (446 tonnes) were deposited within 550m of the well, and that the maximum depth of deposited cuttings was 16.2mm. The remaining 10% of cuttings were estimated to travel up to 5,500m from the well and were not considered likely to be detectable. The cuttings "footprint" of the well is temporary in nature due to the mobile nature of the seabed sediments within the eastern Irish Sea (see Holmes & Tappin 2005) and the impacted area can be expected to recover quickly.

OSPAR (2009) concluded that the discharge of drill cuttings and water-based fluids may cause some smothering in the near vicinity of the well location. Field experiments on the effects of water-based drill cuttings on benthos by Trannum *et al*. (2011) found after 6 months only minor differences in faunal composition between the controls and those treated with drill cuttings indicating a relatively rapid recovery process. This corresponds with the results of field studies where complete recovery was recorded within 1-2 years after deposition of water-based drill cuttings (Daan & Mulder 1996, Currie & Isaacs 2005). Factors determining the colonisation process include the scale of disturbance, hydrographic factors, larval supply, sediment characteristics, seasonal variations in temperature, input of organic matter, abundance of predators and contamination history (see Trannum *et al.* 2011). Project-level site survey will provide information on the habitats and benthic communities which may be affected by drilling discharges and allow assessment of their recovery.

The chemical formulation of WBM avoids or minimises the inclusion of toxic components, and the materials used in greatest quantities (barite and bentonite) are of negligible toxicity. The bulk of WBM constituents (by weight and volume) are on the OSPAR List of Substances/ Preparations Used and Discharged Offshore Which are Considered to Pose Little or No Risk to the Environment (PLONOR).

4.2.3 Other effects

Non-physical disturbance of seaduck and other waterbird flocks by vessel and aircraft traffic associated with hydrocarbon exploration and production is possible, particularly in SPAs established for shy species. Such disturbance can result in repeated disruption of bird feeding, loafing and roosting. Red-throated divers and common scoters within the Liverpool Bay SPA are sensitive to disturbance by moving vessels – large flocks of common scoter were observed being put to flight at a distance of 2km from a 35m vessel, though smaller flocks were less sensitive and put to flight at a distance of 1km (Kaiser *et al*. 2005). Larger vessels would be expected to have an even greater disturbance distance (Kaiser *et al*. 2005). With respect to the disturbance and subsequent displacement of seabirds in relation to offshore windfarm (OWF) developments, Natural England & JNCC (2014) interim advice recommends a generic displacement buffer of 2km to be added to the OWF footprint for all species with the exception of divers and seaducks, for which a 4km buffer was recommended due to their increased sensitivity.

Wintering red-throated divers occur throughout the Liverpool Bay SPA with highest recorded densities off the Ribble Estuary, North Wales and the North Wirral Foreshore (Webb *et al.* 2006). They are associated with shallow (between 0-20m deep) inshore waters and are known to be associated with supporting sandbank habitat features. The link between the birds and benthic habitats is not well understood but it probably reflects the association between some of their prey species (small fish such as gadoids, sprat, herring and sandeel) and sandbanks (e.g. Durinck *et al*. 1994, cited by Natural England & CCW 2012). It is noted that the Liverpool Bay SPA site is functionally linked to the Shell Flat & Lune Deep SCI, with sandbanks supporting populations of prey species for qualifying features of the SPA.

The over-wintering common scoter tend to aggregate in shallow waters (depth range of 2-20m), with the observed distribution strongly associated with the distribution of its benthic prey species (Kaiser *et al*. 2006). They have a more clustered distribution within Liverpool Bay than red-throated divers, with highest concentrations recorded from three broad areas (Webb *et al.* 2006): Red Wharf Bay (Anglesey) and Conwy Bay; Great Orme's Head to the North Wirral Foreshore, and Formby Point to Shell Flat (off Blackpool). A number of Blocks wholly or partly overlap with the Liverpool Bay SPA and these are considered in Section 4.3 below.

Since 2008, a number of dead seals (>76 animals) displaying corkscrew injuries (Bexton *et al*. 2012) around the UK; the majority are adult harbour seals or juvenile grey seals (Thompson *et al*. 2010). In the first instance concern focused on the potential for ship propellers to cause such injuries, and spiral lacerations consistent with those observed on carcasses were reproduced in scale model tests using ducted propulsion systems (Onoufriou & Thompson 2014). SNCB advice on the issue was produced (SNCB 2012). In December 2014, direct observations on the Isle of May of an adult grey seal attacking grey seal pups and post-mortem analyses of 11 carcasses gave incontrovertible evidence that such injuries can be caused by predation (Thompson *et al.* 2015). This follows observations in Germany of spiral-cut injuries inflicted by a male grey seal on young harbour seals (van Neer *et al.* 2015). Accordingly, the SNCBs' advice was updated (SNCB 2015). While further research may be necessary before interactions from ducted propellers can be entirely discounted, it is now considered very likely that the use of such vessels may not pose any increased risk to seals over and above normal shipping activities.

Through the transport and discharge of vessel ballast waters (and associated sediment), and to a lesser extent fouling organisms on vessel/rig hulls, non-native species may be introduced to the marine environment. Should these introduced species survive and form established breeding populations, they can exert a variety of negative effects on the environment. These include: displacing native species by preying on them or out-competing them for resources such as prey and habitat; irreversible genetic pollution through hybridisation with native species; increased occurrence of toxic algal blooms. The economic repercussions of these ecological effects can also be very significant. In response to these risks, a number of technical measures have been proposed such as the use of ultraviolet radiation to treat ballast water or procedural measures introduced such as a mid-ocean exchange of ballast water (the most common mitigation against introductions of non-native species). International management of ballast waters is addressed by the International Maritime Organisation (IMO) through the International Convention for the Control and Management of Ships Ballast Water & Sediments, which was ratified in 30 States in 2005. The Convention includes Regulations with specified technical standards and requirements (IMO Globallast website). Further oil and gas activity is unlikely to change the risk of the introduction of non-native species as the vessels typically operate in a geographically localised area (rigs currently move between the Irish Sea to the North Sea and vice versa), and the risk from hull fouling is low, given the geographical working region and scraping of hulls for regular inspection.

4.3 Implications for site integrity of relevant sites

Table 4.1 below provides a consideration of potential physical and drilling impacts associated with the Block work programmes and the conservation objectives of relevant sites (identified by the re-screening process in Appendix B, see Figure 4.1).

Figure 4.1: Relevant sites and Blocks for physical disturbance and drilling effects

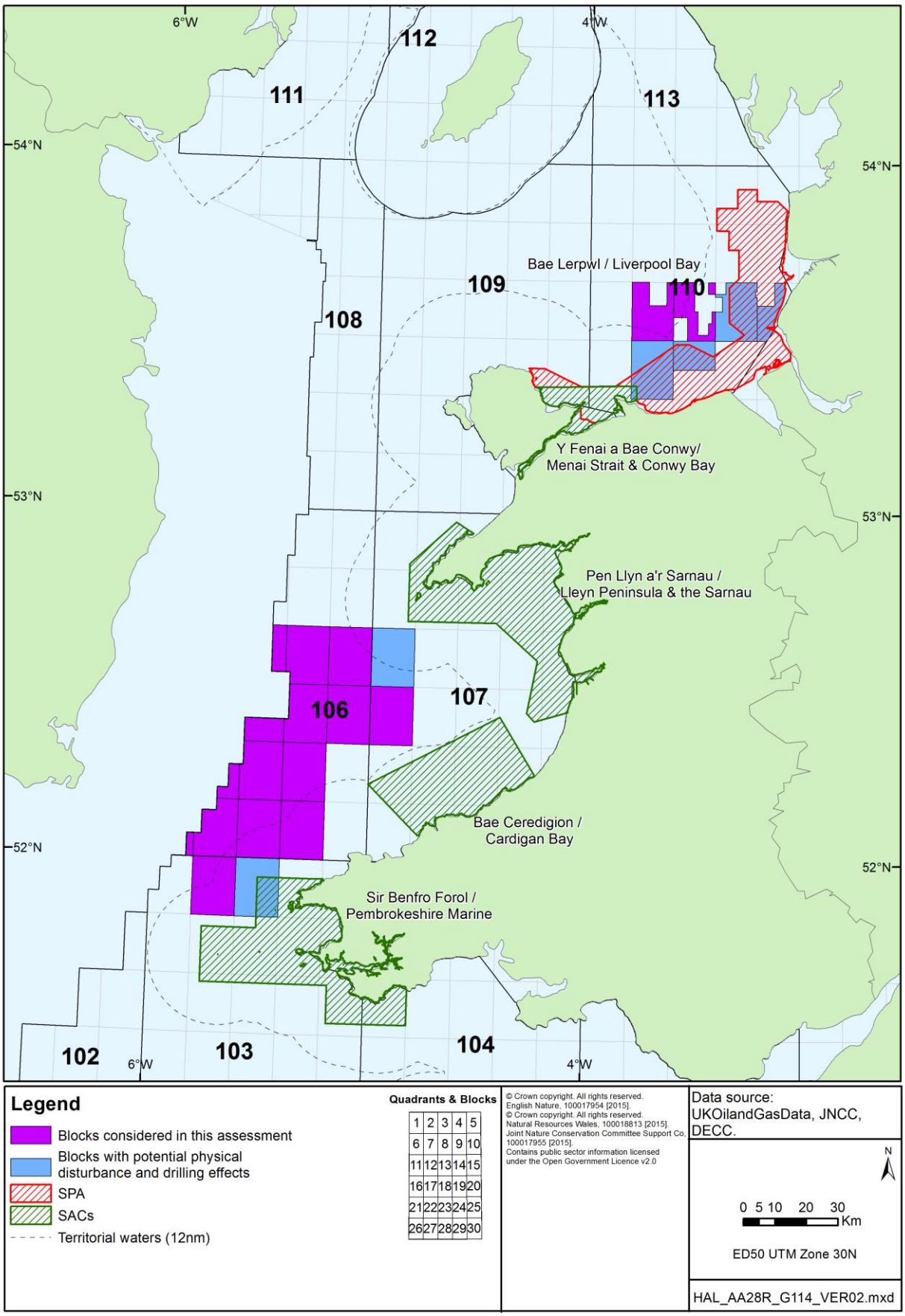


Table 4.1: Consideration of potential physical disturbance and drilling effects and relevant site conservation objectives

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
SPAs		
Liverpool Bay/Bae Lerpwl	Overwintering red-throated diver, common scoter and waterfowl assemblage	**Conservation objectives:** Subject to natural change, maintain or enhance the qualifying features populations and their supporting habitats in favourable condition. The interest features will be considered to be in favourable condition only when both of the following two conditions are met: • The size of the feature population is at, or shows only non-significant fluctuation around the mean population at the time of designation of the SPA. to account for natural change; • The extent of the supporting habitat within the site is maintained. **Rig installation/placement** Blocks 110/14b, 110/15b, 110/17 and 110/18b partly or wholly overlap with the site. Blocks are part of a single licence application which includes another 2 Blocks with one drill or drop well proposed between them. Qualifying features and supporting habitats are moderately sensitive to physical damage through abrasion (e.g. rig placement)[16]. Benthic sandbank communities are in general relatively resilient to physical damage. However, repeated damage to the habitats (through physical disturbance such as anchoring) could adversely affect the ability of the habitats to recover, leading to permanent damage and ultimately lead to loss of prey species. This may result in a reduction in the value of supporting habitats as foraging sites for the overwintering population of red-throated divers and common scoters. Seabed footprint associated with placement of jack up rig small (see Section 4.2.1) but could cause some minor loss or deterioration of supporting habitats in those Blocks within site boundaries. The likelihood and scale of impact will be determined by the proposed location of drilling activities and mitigation measures (see Section 4.4) are available to ensure site conservation objectives are not undermined. **Drilling discharges** Sensitivity of qualifying features and supporting habitats to physical loss through smothering is moderate to high. Red-throated divers are known to be associated with supporting habitat features, which probably reflects the association between some of their prey species (e.g. gadoids, sprat, herring and sandeel) and sandbanks (see Natural England & CCW site advice). Supporting habitats may have a functional role (as nursery, spawning or feeding grounds or in providing shelter) in supporting these fish species. Physical loss by removal or by smothering of any of the habitats on which red-throated divers (and common scoter) depend may result in the loss of foraging sites and therefore the reduction of the food resource for the overwintering population. Discharge of drill cuttings and water-based fluids may cause smothering of habitats in the near vicinity of the well location. The impacts from such discharges are localised (see Section 4.2.2) but could cause some minor loss or deterioration of supporting habitats. The likelihood and scale of impact will be determined by the proposed location of drilling activities and mitigation measures (see Section 4.4) are available to ensure site conservation objectives are not undermined.

[16] http://publications.naturalengland.org.uk/file/4413148

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		Rig/vessel presence and movement Sensitivity of qualifying features to non-physical disturbance (noise, visual presence) is high. The presence and movement of vessels has the potential to disturb aggregations of divers and scoters, and waterfowl and seabirds at feeding and resting sites, and impede the movement of birds between feeding and resting areas. The likelihood and scale of impact will be determined by the proposed location and timing of drilling activities and mitigation measures (see Section 4.4) are available to ensure site conservation objectives are not undermined.
SACs		
Y Fenai a Bae Conwy / Menai Strait and Conwy Bay	Sandbanks, mudflats and sandbanks, reefs, inlets and bays and sea caves	**Conservation objectives**: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status. Habitat features • The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing. • The physical, biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. • The presence, abundance, condition and diversity of typical species are such that habitat quality is not degraded. **Rig installation/placement** Block 110/17 partially overlaps with the site and is part of a single licence application which includes 6 Blocks with one drill or drop well proposed between them. Potential for physical disturbance and drilling effects with respect to the reef, subtidal sandbanks, inlets and bays and sea caves qualifying features given that they may be present in relative proximity to the Block. Seabed footprint associated with placement of jack up rig small (see Section 4.2.1) but could cause some minor loss or deterioration of habitats where located close to or within site boundaries. The likelihood and scale of impact will be determined by the proposed location of drilling activities and mitigation measures (see Section 4.4) are available to ensure site conservation objectives are not undermined. **Drilling discharges** Discharge of drill cuttings and water-based fluids may cause smothering of habitats in the near vicinity of the well location with relevant qualifying features including reef, subtidal sandbanks, inlets and bays and sea caves. The impacts from such discharges are localised (see Section 4.2.2) but could cause some minor loss or deterioration of habitats. The likelihood and scale of impact will be determined by the proposed location of drilling activities and mitigation measures (see Section 4.4) are available to ensure site conservation objectives are not undermined.
Pen Llŷn a`r Sarnau/ Lleyn Peninsula and the Sarnau	Sandbanks, estuaries, coastal lagoons, inlets and bays, reefs, mudflats and sandflats, salt marshes and salt	**Conservation objectives:** To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status. Species features • The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production, and condition of the species within the site. • The species population within the site is such that the natural range of the population is not being reduced or likely to be

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
	meadows, sea caves, bottlenose dolphin, otter, grey seal	reduced for the foreseeable future. • The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. **Rig/vessel presence and movement** Vessel presence and movement have the potential to cause non-physical disturbance (noise and visual disturbance) to site qualifying features[17] (bottlenose dolphin and grey seal – see Section 5.3.1 for an overview of grey seal distribution). Bottlenose dolphin numbers peak in summer and are most commonly seen in Cardigan Bay within 10 miles of the coast, primarily within 2 miles near headlands and estuaries. Bottlenose dolphins from the Lleyn Peninsula and the Sarnau SAC interact with dolphins in the Cardigan Bay SAC, and probably with animals in the waters of southwest UK and Ireland. Vessel surveys in North Wales (particularly from Anglesey eastwards towards Liverpool Bay) during 2007-08 revealed that a sizeable portion of the Cardigan Bay population spends at least part of the winter in this area. Furthermore, bottlenose dolphins regularly use the waters around North Wales northwards to at least the Isle of Man and Cumbrian coast in summer. Given the low level and temporary nature of the proposed activities (2 drill or drop wells between the two licence applications covering 17 Blocks in Quadrants 103, 106 and 107) significant effects are unlikely. However, the likelihood and scale of impact will be determined by the proposed location and timing of drilling activities and mitigation measures are available to ensure site conservation objectives are not undermined.
Cardigan Bay/ Bae Ceredigion	Sandbanks, reefs, sea caves, bottlenose dolphin, sea and river lamprey, grey seal	**Conservation objectives:** As above. **Rig/vessel presence and movement** Vessel presence and movement have the potential to cause non-physical disturbance to site qualifying features (bottlenose dolphin and grey seal)[18]. Information on the range and distribution of bottlenose dolphin is as given above for Pen Llŷn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC (grey seal movements are described in Section 5.3.1). Given the low level and temporary nature of the proposed activities (2 drill or drop wells between the 17 Blocks in Quadrants 103, 106 and 107, and 2 drill or drop wells in the 7 Blocks in Quadrant 110), significant effects are unlikely. However, the likelihood and scale of impact will be determined by the proposed location and timing of drilling activities and mitigation measures are available to ensure site conservation objectives are not undermined.
Pembrokeshire Marine/ Sir Benfro Forol	Estuaries, inlets and bays, reefs, sandbanks,	**Conservation objectives:** To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

[17] http://www.ccgc.gov.uk/landscape--wildlife/managing-land-and-sea/marine-policies/policy--legislation--guidance/idoc.ashx?docid=6912ad5e-6ec0-4a0d-bf0b-545f03b33452&version=-1

[18] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=895011fb-b3f2-47a0-bc0c-b142279e7f83&version=-1

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
	mudflats and sandflats, coastal lagoons, salt marshes and salt meadows, sea caves, grey seal, shore dock, sea and river lamprey, allis and twaite shad, otter	Habitat features: • The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing. • The physical, biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. • The presence, abundance, condition and diversity of typical species are such that habitat quality is not degraded. Species features: • The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production, and condition of the species within the site. • The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future. • The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. **Rig installation/ placement** With respect to potential physical disturbance, the reef and subtidal sandbanks qualifying features[19] are the most relevant as they may be present in the area of Block 103/3. Block 103/3 is part of a single licence application that includes another 8 Blocks for which 1 drill or drop well is proposed. Seabed footprint associated with placement of jack up rig or anchoring of a semi-submersible rig is small (see Section 4.2.1) and temporary, particularly given the exposed nature of Block 103/3. The likelihood and scale of impact will be determined by the proposed location of drilling activities and mitigation measures (see Section 4.4) are available to ensure site conservation objectives are not undermined. **Drilling discharges** Discharge of drill cuttings and water-based fluids may cause smothering of habitats (potentially reef and sandbanks) in the near vicinity of the well location. The impacts from such discharges are localised (see Section 4.2.2) and transient, particularly given the exposed nature of Block 103/3. The likelihood and scale of impact will be determined by the proposed location of drilling activities and mitigation measures (see Section 4.4) are available to ensure site conservation objectives are not undermined. **Rig/vessel presence and movement** Vessel presence and movement have the potential to cause non-physical disturbance to

[19] http://www.ccgc.gov.uk/landscape--wildlife/managing-land-and-sea/marine-policies/policy--legislation--guidance/idoc.ashx?docid=1b72e681-cf1f-4006-b65a-d38bd3e17642&version=-1

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		site qualifying features (grey seal). Given the low level and temporary nature of the proposed activities (1 drill or drop well between the 9 Blocks in the licence application that includes Block 103/3), significant effects are unlikely. However, the likelihood and scale of impact will be determined by the proposed location and timing of drilling activities and mitigation measures are available to ensure site conservation objectives are not undermined.

4.4 Mitigation

4.4.1 Mandatory requirements

The routine sources of potential physical disturbance and drilling effects associated with exploration are assessed and controlled through a range of regulatory processes, such as EIA as part of the Drilling Operations Application (formerly PON15B) through the Portal Environmental Tracking System (PETS) and, where relevant, HRA to inform decisions on those applications (see also Table 2.1 and Figure 2.3).

Drilling chemical use and discharge is subject to strict regulatory control. The use and discharge of chemicals must be risk assessed as part of the permitting process (e.g. Drilling Operations Application), and the discharge of chemicals which would be expected to have a significant negative impact would not be permitted.

4.4.2 Further mitigation measures

Further mitigation measures are available which are identified through the operator's environmental management and the DECC permitting processes. These considerations are informed by specific project plans and the nature of the sensitivities identified from detailed seabed information collected in advance of field activities taking place. Site surveys are required to be undertaken before drilling rig placement (for safety and environmental reasons) and the results of such surveys (survey reports) allow for the identification of further mitigation including the relocation or resiting of the location of activities (e.g. wellhead, rig leg or anchor positions) to ensure sensitive seabed surface or subsurface features are avoided. Such survey reports are used to underpin operator environmental submissions (e.g. Drilling Operations Applications, Environmental Statements) and survey information is made available to nature conservation bodies during the consultation phases of these assessments[20].

If the scale and location of the proposed drilling discharges could lead to significant smothering effects on sensitive features, DECC will expect the application of additional mitigation such as discharge near the seabed rather than near sea surface or zero discharge where appropriate.

For those Blocks where proposed activities could result in the physical disturbance of overwintering divers or marine mammals by vessels and aircraft traffic, available mitigation measures include strict use of existing shipping and aircraft routes, timing controls on temporary activities to avoid sensitive periods.

In all instances, consent for project-level activities will not be granted unless the operator can demonstrate that the proposed exploration activities will not have an adverse effect on the integrity of relevant sites. The information provided by operators in their applications must be detailed enough for DECC (and its advisors) to make a decision on whether the activities could lead to a likely significant effect.

4.5 Conclusions

Likely significant effects identified with regards to physical effects on the seabed, marine discharges and other disturbance effects, when aligned with project level mitigation and relevant activity permitting, will not have an adverse effect on the integrity of the Natura 2000

[20] Whether within or outside an SAC, rig site survey typically includes a consideration of the presence of, amongst other sensitivities, Annex I habitats.

sites considered in this assessment. There is a legal framework through the implementation of the EIA regulations and the Habitats Directive, to ensure that there are no adverse effects on the integrity of Natura 2000 sites. These would be applied at the project level, at which point there will be sufficient definition to make an assessment of likely significant effects, and for applicants to propose project specific mitigation measures.

Taking into account the information presented above and in the Appendices, it is concluded that with mitigation, activities arising from the licensing of Blocks 103/2, 103/3, 106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28, 106/29, 107/11, 107/16, 110/12b, 110/13c, 110/13e, 110/14b, 110/15b, 110/17 and 110/18b will not cause an adverse effect on the integrity of relevant sites, in so far as they may generate physical disturbance effects, though consent for activities will not be granted unless the operator can demonstrate that the proposed activities, which may include the drilling of a number of wells and any related activity including the presence of a mobile rig and support vessels, will not have an adverse effect on the integrity of relevant sites.

5 Assessment of underwater noise effects

5.1 Introduction

With respect to underwater noise effects, the re-screening process (Appendix B) identified a number of sites where there was the potential for likely significant effects associated with proposed activities that could follow licensing of the Irish Sea and St George's Channel Blocks (Figure 5.1). The potential effects are summarised below (Section 5.2), and considered against the conservation objectives of the relevant sites to determine whether they could adversely affect site integrity (Section 5.3).

5.2 Underwater noise effects

Potential effects of anthropogenic noise on receptor organisms range from acute trauma to subtle behavioural and indirect ecological effects, for example on prey species, complicating the assessment of significant effects. The sources, measurement, propagation, ecological effects and potential mitigation of noise associated with hydrocarbon exploration and production have been extensively reviewed and assessed in successive Offshore Energy SEAs (see DECC 2009, 2011).

5.2.1 Noise sources

Of those activities which could follow licensing, deep geological seismic survey (2D or 3D) is of primary concern for underwater noise effects:

- 2D seismic involves a survey vessel with a single source and a towed hydrophone streamer. The reflections from the subsurface strata provide an image in two dimensions (horizontal and vertical). Repeated parallel lines are typically run at intervals of several kilometres (minimum *ca*. 0.5km) and a second set of lines at right angles to the first to form a grid pattern. This allows imaging and interpretation of geological structures and identification of potential hydrocarbon reservoirs.

- 3D seismic survey is similar but uses more than one source and several hydrophone streamers towed by the survey vessel. Thus closely spaced 2D lines (typically between 25 and 50m apart) can be achieved by a single sail line. 3D survey airgun arrays are normally larger[21], with source sizes commonly between 1,000 and 8,000 cubic inches, with typical broadband source pressure levels of 248-259db re 1µPa.

Typical sound sources for 2D and 3D seismic surveys consist of large airgun arrays made up of sub-arrays or single strings of multiple airguns. Total energy source volumes vary between surveys, most commonly between 1,000 and 8,000 cubic inches, with typical broadband source levels of 248-259db re 1µPa (OGP 2011). In the UKCS for the period 1998-2010, Stone (2015a) reported a yearly median airgun volume between 2,000-4,000 cubic inches; maximum volume was commonly between 4,000 and 7,000 cubic inches, with the largest volume of 10,170 cubic inches used on a 2D survey in 2006.

[21] OGP 2011 – An overview of marine seismic operations.

Airgun noise is impulsive (i.e. non-continuous), with a typical duty cycle of 0.3% (i.e. one 25ms pulse every 10s) and slow rise time (in comparison to explosive noise). These characteristics complicate both the measurement of seismic noise "dose" and the assessment of biological effects (many of which have been studied in relation to continuous noise). Most of the energy produced by airguns is below 200Hz, although some high frequency noise may also be emitted (Goold 1996). Peak frequencies of seismic arrays are generally around 100Hz; source levels at higher frequencies are low relative to that at the peak frequency but are still loud in absolute terms and relative to background levels.

Other noise sources associated with activities potentially resulting from licensing of the Blocks which are of a considerably lower magnitude include:

- Rig site surveys undertaken to identify seabed and subsurface hazards to drilling, such as wrecks and the presence of shallow gas. These use a range of techniques, including multibeam and side scan sonar, sub-bottom profiler[22], magnetometer and small airgun and shorter hydrophone streamer (with source sizes of 40-400 cubic inches[19]). The surveys typically cover 2-3km^2. The rig site survey vessel may also be used to characterise seabed habitats, biota and background contamination. Survey durations are usually of the order of four or five days.

- Vertical Seismic Profiling (VSP) sometimes conducted to assist with well evaluation by linking rock strata encountered in drilling to seismic survey data. A seismic source (airgun array, typically with a source size of up to ~500 cubic inches[19] and a maximum of 1,200 cubic inches (Stone 2015b)) is deployed from the rig, and measurements are made using a series of geophones deployed inside the wellbore. VSP surveys are of short duration (one or two days at most).

- Available measurements indicate that drilling activities produce mainly low-frequency continuous noise from several separate sources on the drilling unit (Richardson *et al*. 1995, Lawson *et al*. 2001). The primary sources of noise are various types of rotating machinery, with noise transmitted from a semi-submersible rig to the water column through submerged parts of the drilling unit hull, risers and mooring cables, and (to a much smaller extent) across the air-water interface. Noise transmission from jack-up drilling units used in shallower water is less because of reduced surface area contact between the water column and submerged parts of the drilling unit. Under some circumstances, cavitation of thruster propellers is a further appreciable noise source, as may be the use of explosive cutting methods (e.g. for conductor removal). Sound pressure levels of between 120dB re 1µPa in the frequency range 2-1,400Hz (Todd & White 2012) are probably typical of drilling from a jack-up rig, and is of the same order and dominant frequency range as that from large merchant vessels (e.g. McCauley 1994).

The potential for significant effect is largely related to the anticipated type, extent and duration of seismic survey associated with proposed licensing. In the UKCS, surveys with 'small arrays' (<500 cubic inches) are generally of short duration, with 46% lasting less than one week and only 17% lasting three or more weeks. Surveys with large arrays (>500 cubic

[22] Note that in advance of more information on the potential for noise effects from sub-bottom profilers, surveys should be mitigated in the manner currently applied to seismic surveys with an airgun volume of180 cu in or less, as set out in JNCC seismic guidelines.

inches) commonly cover a wide area over several weeks so that temporal variation in the precise location of firing exists throughout the survey (Stone 2015a). Site surveys and VSP operations recently make up the larger proportion of seismic surveys by number (Stone 2015b).

5.2.2 Noise receptors and effects thresholds

This assessment only considers Annex II species for the purposes of Article 6(3) of the Habitats Directive (see Section 3.2) in so far as activities could undermine conservation objectives and result in adverse effects on site integrity, for instance by threatening the long-term viability of populations. Disturbance of European Protected Species (EPS) (i.e. those listed in Annex IV) is a separate consideration under Article 12 of the Habitats Directive, and is not considered in this assessment.

Marine mammals are regarded as the most sensitive to acoustic disturbance. This is due to their use of acoustics for echolocation and vocal communication and their possession of lungs which are sensitive to rapid pressure changes. Most concern in relation to seismic noise disturbance has been related to cetacean species. However, some pinnipeds are known to vocalise at low frequencies (100-300Hz) (Richardson *et al*. 1995), suggesting that they have good low frequency hearing and are therefore sensitive to acoustic disturbance.

Precautionary noise exposure criteria were developed by Southall *et al*. (2007) after a thorough review of best available science on marine mammal hearing. Injury criteria were defined as received levels of sound that corresponded to the estimated onset of permanent shift in hearing threshold or PTS. A dual-criterion approach based on both pressure[23] and energy[24] (whichever is exceeded first) was proposed. To incorporate consideration of differences between species in hearing bandwidth, the authors divided marine mammals into low, mid, high frequency cetaceans and pinnipeds and criteria were identified for each[25]. Based on these criteria, indicative spatial ranges of injury can then be estimated from sound propagation modelling. Sound from seismic surveys is commonly estimated to drop below threshold criteria for marine mammal injury (PTS) within the first 200m from the source (e.g. 22-130m in Kongsberg 2010); this is also reflected in the mitigation guidelines (JNCC 2010) with the requirement for a Marine Mammal Observer(s) to make a visual assessment within 500 metres of the centre of the airgun.

Broadly applicable behavioural response criteria based on exposure alone have been much more difficult to extrapolate, mainly because behavioural responses are often found to be affected by individual history and by exposure context. For single pulses, Southall *et al*. (2007) assumed that significant behavioural disturbance could occur if noise exposure was sufficient to elicit a measurable transient effect on hearing or temporary threshold shift (TTS) onset. For multiple pulses (e.g. seismic survey), the expectation was that behaviour might be affected below TTS onset but given the high variability observed, no threshold could be identified.

[23] pressure measurements are based on peak sound pressure levels or SPL expressed as dB re 1 µPa (peak)(flat)

[24] energy measurements are based on sound exposure level or SEL expressed as dB re 1 $\mu Pa^2 s$

[25] More recent studies on harbour porpoises (Lucke *et al.* 2009, Kastelein *et al.* 2012) have provided new evidence to suggest that this species and by extrapolation the high-frequency category, may have the lowest thresholds for injury.

Instead, they ranked behaviour along a behavioural response severity scale and recommended its use to interpret actual observed behavioural responses[26].

Many species of fish are highly sensitive to sound and vibration (review in MMS 2004). Exposure to high sound pressure levels has been shown to cause long-term (>2 months) damage to sensory cells in fish ears (Hastings *et al*. 1996, McCauley *et al*. 2003). Other reported effects include barotrauma injuries (Halvorsen *et al.* 2012) and auditory threshold shifts (hearing loss), stress responses and other behaviour alterations (review in Popper *et al*. 2003). A number of field studies have observed displacement of fish and reduced catch rates, suggested to be attributable to behavioural responses to seismic exploration (e.g. Skalski *et al*. 1992, Engås *et al*. 1996, Hassel *et al*. 2004, Slotte *et al*. 2004). Atlantic salmon *Salmo salar* have been shown through physiological studies to respond to low frequency sounds (below 380Hz), with best hearing at 160Hz (threshold 95 dB re 1 µPa). Hence, their ability to respond to sound pressure is regarded as relatively poor with a narrow frequency span, a limited ability to discriminate between sounds, and a low overall sensitivity (Hawkins & Johnstone 1978, cited by Gill & Bartlett 2010). However, the gaps in understanding of the effects of impulsive sounds on fish are still substantial but relevant research is underway or in planning[27] (see Section 5.3.2, Malcolm *et al.* 2013, Hawkins *et al.* 2015).

Direct effects from seismic exploration noise on seabirds could occur through physical damage, or through disturbance of normal behaviour. Diving seabirds (e.g. auks) may be most at risk of acute trauma. The physical vulnerability of seabirds to sound pressure is unknown, although McCauley (1994) inferred from vocalisation ranges that the threshold of perception for low frequency seismic in some species (e.g. penguins, considered as a possible proxy for auk species) would be high, hence only at short ranges would individuals be adversely affected. Mortality of seabirds has not been observed during extensive seismic operations in the North Sea and elsewhere. A study investigated seabird abundance in Hudson Strait (Atlantic seaboard of Canada) during seismic surveys over three years (Stemp 1985). Comparing periods of shooting and non-shooting, no significant difference was observed in abundance of fulmar, kittiwake and thick-billed murre (Brünnich's guillemot).

5.3 Implications for site integrity of relevant sites

5.3.1 Special Areas of Conservation for marine mammals

Appendix B indicated that there was potential for likely significant effects with respect to underwater noise associated with proposed seismic activities in Blocks 103/2, 103/3, 106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28, 106/29, 107/11 & 107/16 (Blocks where new seismic proposed), on a number of sites with marine mammal qualifying features (Figure 5.1), including:

- Pen Llŷn a`r Sarnau/Lleyn Peninsula and the Sarnau SAC (grey seal and bottlenose dolphin qualifying features) which is 2km from the closest Block (107/11).

- Cardigan Bay/Bae Ceredigion SAC (grey seal and bottlenose dolphin qualifying features) which is 4km from the closest Block (107/16).

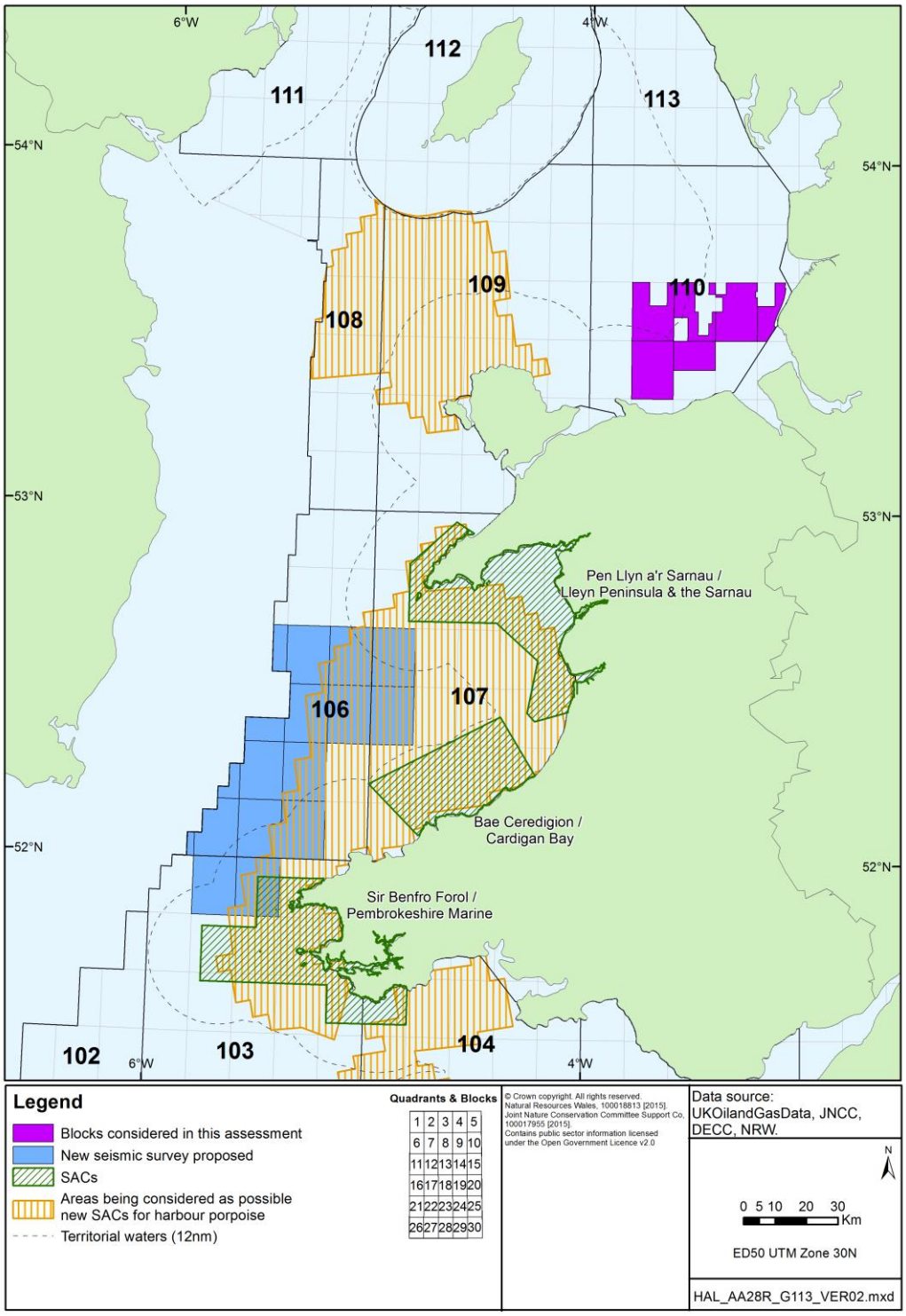
[26] In the UK, such an approach has been adopted in the guidance on the protection of marine European Protected Species (EPS) (JNCC 2010) where disturbance is interpreted as sustained or chronic disruption of behaviour scoring 5 or more.

[27] http://www.gov.scot/Topics/marine/marineenergy/Research/NatStrat/Theme1

- Pembrokeshire Marine/Sir Benfro Forol SAC (grey seal qualifying feature) which partly overlaps with Block 103/3.

A consideration of the potential implications for site integrity of relevant sites is provided below.

Figure 5.1: Relevant sites and Blocks for underwater noise effects



Recent field research on bottlenose dolphins (and harbour porpoise) in the Cardigan Bay and Lleyn Peninsula and the Sarnau SACs is reported by Feingold & Evans (2014a). Bottlenose dolphin abundance in Cardigan Bay SAC was estimated at 133 individuals (CV[28] = 29.5) in 2011, 70 (CV = 33.0) in 2012, and 90 (CV = 35.6) in 2013, concentrated primarily in the coastal zone, between Aberaeron and Cardigan. Other centres of activity within the wider bay included Tremadog Bay and around the reefs and sandbanks of the Pen Llŷn a'r Sarnau SAC. Abundance estimates for the entire Cardigan Bay were 309 (CV = 28.3) in 2011, 390 (CV = 24.9) in 2012, and 254 (CV = 26.8) in 2013. Wider survey coverage between 2011-13 resulted in twelve sightings (4%) of bottlenose dolphins recorded outside of the two designated SACs. Four of these were recorded in the gap between the two SACs, two on the edge of Cardigan Bay SAC, one just outside the Pen Llŷn a'r Sarnau SAC, and five offshore outside the Pen Llŷn a'r Sarnau SAC. Despite offshore effort in 2011, particularly beyond the Pen Llŷn a'r Sarnau SAC, only one bottlenose dolphin sighting was spotted just outside the northern SAC that year. All other sightings were observed in 2012 and 2013 emphasising the difference in how the dolphins appear to have been using the bay, and possibly serving to explain the low estimates within Cardigan Bay SAC in 2012 and 2013. Offshore sightings within the bay were largely within *ca*. 10nm (18.5km) of the coast (Feingold & Evans 2014a).

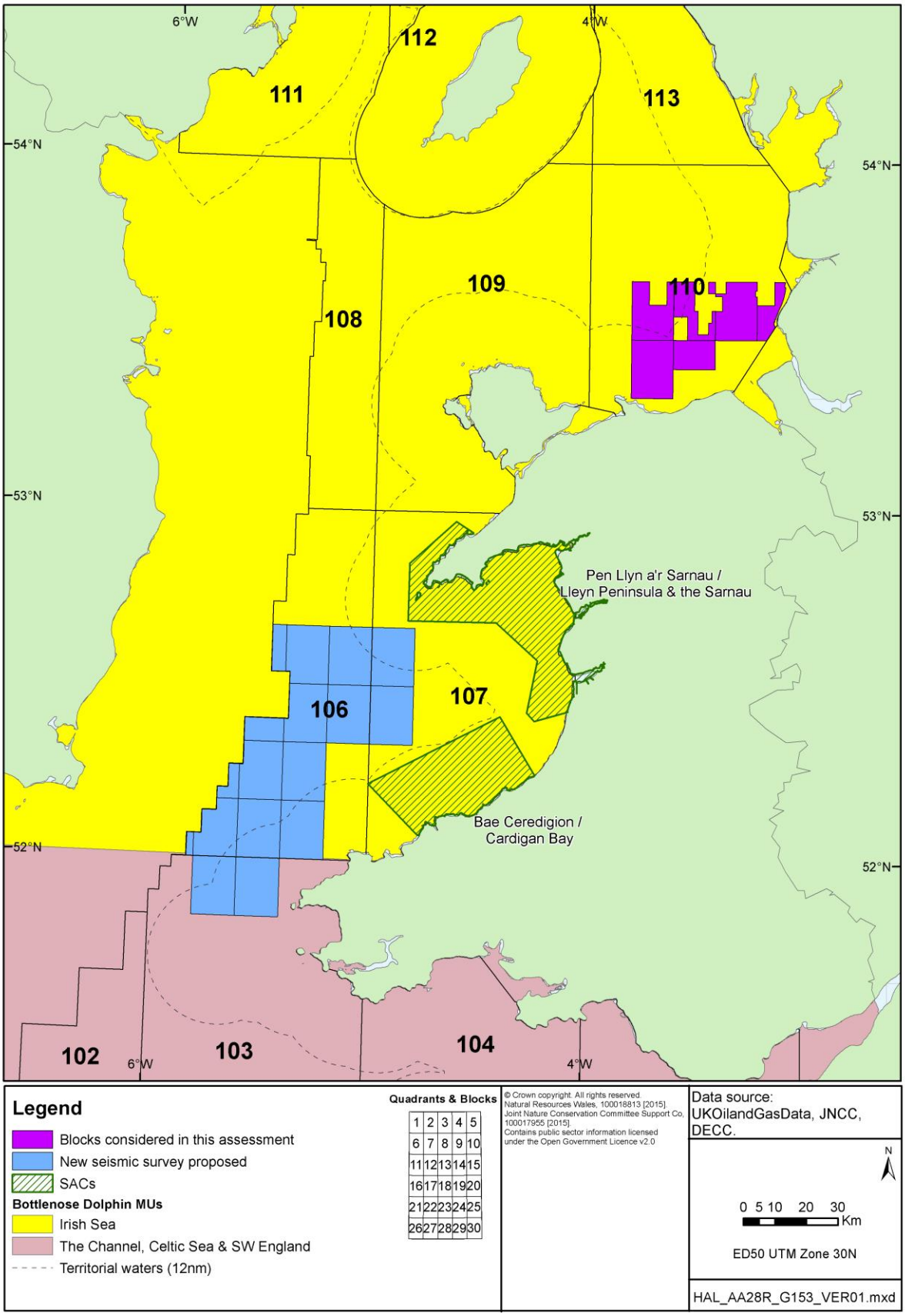
Photo-identification surveys off the coast of Anglesey commenced in 2007, and along with data provided from the Isle of Man and Liverpool Bay, have provided evidence that bottlenose dolphin from Cardigan Bay extend their home ranges, particularly in winter, to the northern Irish Sea at least as far as the Isle of Man (Feingold & Evans 2014a). The geographic range of the population may include all of the coastal waters of west and north Wales, and possibly the entire Irish Sea (Feingold & Evans 2014a).

The overall distribution of the population may be changing, with increased summer activity in north Wales observed in recent years. In 2011 and 2012, groups of dolphins were recorded in that region several times during the summer months, and included individuals that have previously shown a strong site fidelity to Cardigan Bay at this time of year (Feingold & Evans 2014b). It may be the case that prey availability has improved off the waters off north Wales, and so dolphins do not make the journey into Cardigan Bay. Alternatively, there could be a prey shortage in Cardigan Bay, resulting in dolphins needing to travel more widely in order to find food. The decline in population estimates for the entire bay suggests that the shift may be pronounced over the wider area and not only in Cardigan Bay SAC itself. Cardigan Bay SAC and the north-eastern part of Pen Llŷn a'r Sarnau SAC are also considered a high-pressure area for boat traffic, with recreational boat activities increasing each year, which may be affecting bottlenose dolphin presence in the area (Feingold & Evans 2014a).

A series of management units for bottlenose dolphins around the UK have been finalised by the Interagency Marine Mammal Working Group (IAMMWG, 2015). These units offer a mechanism to take account of the likely range of bottlenose dolphin movements from relevant SACs. Of relevance to the Irish Sea and St George's Channel AA are the Irish Sea and English Channel/Celtic Sea units (Figure 5.2).

[28] Coefficient of variation – a smaller value indicates a more precise abundance estimate. Feingold & Evans (2014a) indicate that they are working to minimise CV values ideally to 15-20%.

Figure 5.2: Proposed bottlenose dolphin management units relevant to the Irish Sea and St George's Channel Blocks



An extensive 3 year study to examine the potential impact of seismic survey operations on cetaceans in the Moray Firth (Thompson *et al.* 2013), is of particular relevance to the proposed seismic surveys in the 28th Round Blocks and proximity of SACs for sensitive bottlenose dolphin qualifying features. Thompson *et al*. (2013) report that seismic survey was conducted over two areas licensed for oil and gas exploration in the central Moray Firth between 1st and 11th September 2011. The vessel used a 470 cu inch air-gun array with a shot point interval of 5-6 seconds, producing peak-to-peak source levels that were estimated to be 242-253 dB re 1µPa@1m. Passive acoustic monitoring (PAM) studies indicated some evidence of short-term behavioural responses with the occurrence of bottlenose dolphins at PAM sites on the southern Moray Firth coast increasing during the 10 day seismic survey, most likely as a result of animals being displaced inshore, away from the survey vessel. Peak to peak levels at these sites (*ca*. 24 and 21km from the vessel) averaged 156.9 and 155.7 dB re 1 µPa, and would be expected to be detectable above background noise for bottlenose dolphins. Thompson *et al.* (2013) indicated that this relatively short seismic survey would not have a major impact on the number of animals using the SAC, with data suggesting the survey was associated with a finer-scale re-distribution of individuals or change in behaviour that could incur some energetic costs. Where such changes occur during longer periods of disturbance, there could be potential impacts on individual vital rates (Currey *et al.* 2011, New *et al.* 2013).

A number of the 28th Round Blocks in the Irish Sea and St George's Channel area where new seismic is proposed are close to the boundaries of SACs with bottlenose dolphin qualifying features (for example, Block 107/11 is 2km from Pen Llŷn a`r Sarnau/Lleyn Peninsula and the Sarnau SAC and Block 107/16 is 4km from Cardigan Bay/Bae Ceredigion SAC). If the Irish Sea management unit (Figure 5.2) is taken as representative of the natural range of the dolphin population in the area, the potential for seismic survey in any of the proposed Blocks to significantly affect the population and relevant site conservation objectives is not considered likely, particularly in the light of studies of seismic effects in the Moray Firth (Thompson *et al*. 2013) and the potential for survey specific mitigation on the location, timing and nature of the survey.

A number of sea areas around the UK are currently being considered for designation as SACs for harbour porpoise. These persistent high density areas have been identified through assessment of both effort related sea- (Heinänen & Skov 2015) and land-based sightings (Evans et al. 2015). This advice suggests there are eight potential sites in UK waters. Of relevance to the AA are a number of areas including three coastal areas off west Wales (Pembrokeshire and Cardigan Bay), and north-west Wales (Anglesey, Lleyn Peninsula), and part of the Bristol Channel (Carmarthen Bay). Smaller areas north of Isle of Man (winter) and on the Northern Irish coast near Strangford Lough were also identified (Heinänen & Skov 2015). A number of these areas are under consideration by NRW as possible SACs for harbour porpoise including; an area north of Anglesey, Cardigan Bay and Pembrokeshire seas, and seas from Carmarthen Bay down to Cornwall[29] (see Figure 5.1. for indicative areas). However, further work is needed to refine these areas, gather information and develop relevant documentation in preparation for a formal consultation. JNCC expects this formal consultation to be launched in summer 2015.

Thompson *et al.* (2013) also described changes in the occurrence of harbour porpoises in the Moray Firth during the seismic survey. Both acoustic and visual data provided evidence of

[29] http://naturalresources.wales/media/3135/possible-new-marine-special-areas-of-conservation-and-special-protection-areas-in-wales.pdf

fine-scale behavioural responses to seismic survey noise within 5-10km, at received peak-to-peak sound pressure levels of 165-172 dB re 1 µPa and sound exposure levels of 145-151 dB re 1µPa^2 s. However, animals were typically detected again at affected sites within a few hours, and the level of response declined through the 10 day survey. Overall, there was a significant decrease in acoustic detections over the survey period in the impact area compared to a control area. However, this effect was small in relation to natural variation, and porpoises were detected in the impact area for a median of 10 hours per day throughout the seismic survey period. These results demonstrated that prolonged seismic survey noise did not lead to broader-scale displacement into sub-optimal or higher-risk habitats (Thompson *et al*. 2013).

Maps showing the at-sea distribution of grey seals around the UK have been produced (Marine Scotland website[30]). Figure 5.3 indicates that defined areas of the Irish Sea and St George's Channel may be important for grey seals. Usage of coastal areas within SACs for which grey seal are qualifying features are noted in the data, with coastal waters off north Wales appearing to have the highest usage. A degree of caution must be used when interpreting the seal density data as it is based on limited telemetry data covering the period 1991-2011. However, the seal distribution accords with Baines & Evans (2012) who indicated that the highest sighting rates of grey seal occurred in the north-east of Wales towards Hilbre Island in the mouth of the River Dee, reflecting the distribution of moulting and feeding haul-out sites during the non-breeding season, and the presence of grey seal in both inshore and offshore waters of Cardigan Bay was observed by Feingold & Evans (2013).

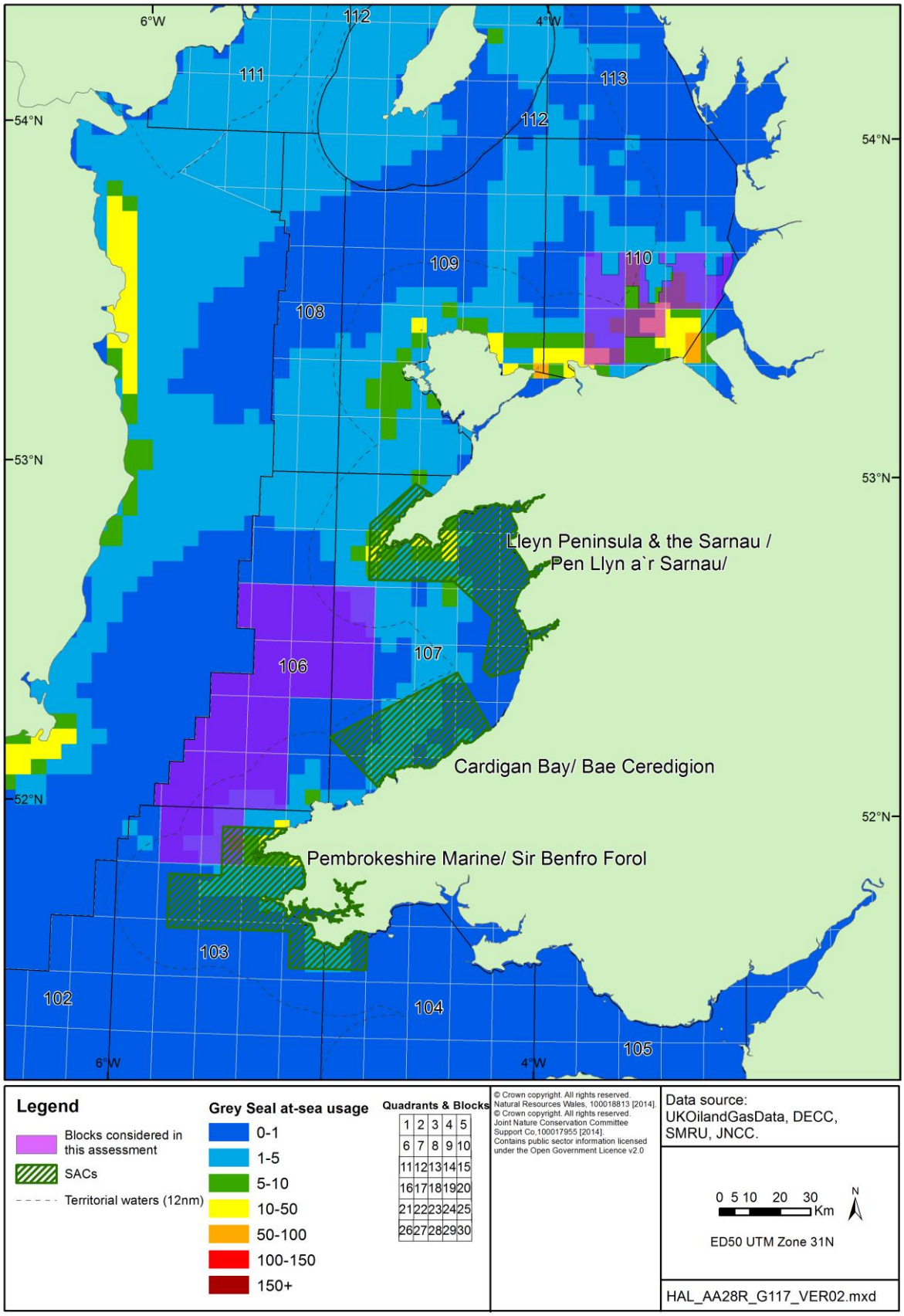
With respect to the bottlenose dolphin and grey seal qualifying features, if significant ecological effects on prey species were to occur, even at considerable distances from designated sites, these could influence the population of the qualifying feature. The potential for impact will be determined by project-specific factors including the location, source size and timing of seismic survey as well as the fish species present, their numbers and location with respect to the seismic survey (see Section 5.3.2).

DECC will expect the operators to provide sufficient information on the potential impact of the proposed activities on relevant sites and their qualifying features (including relevant prey species) in their applications for 3D seismic survey operations in Blocks 103/2, 103/3, 106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28, 106/29, 107/11 & 107/16. DECC may undertake an HRA to determine whether the proposals will have an adverse impact on the site integrity that would undermine the site conservation objectives. Depending on the outcome of the assessment DECC may require additional mitigation measures, or where this is not possible, refuse consent.

Noise levels associated with other activities potentially resulting from licensing of the Blocks such as rig site survey, VSP, drilling and vessel movements, are of a considerably lower magnitude (see Section 5.2.1) than those resulting from a deep geological seismic survey, and are not expected to have an adverse effect on the integrity of the sites.

[30] http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/seal-density

Figure 5.3: Estimated at sea usage by grey seals of the Eastern Irish Sea and St George's Channel area



5.3.2 Special Areas of Conservation for migratory fish

Re-screening of relevant SACs in light of the proposed Block work programmes (Appendix B) did not identify any where significant underwater noise effects were likely. However, the NRW response to the 28th Round AA consultation indicated that future project level assessments must ensure that all pathways with potential to impact Annex II fish species (including their prey species) such as noise are fully considered using best available evidence[31].

5.3.3 Special Protection Areas

Re-screening of relevant SPAs in light of the proposed Block work programmes (Appendix B) did not identify any where significant underwater noise effects were likely.

5.4 Mitigation

5.4.1 Mandatory requirements

Controls are currently in place to cover all significant noise generating activities on the UKCS, specifically including geophysical surveying. All seismic surveys (including Vertical Seismic Profiling and high-resolution site surveys), sub-bottom profile surveys and shallow drilling activities require an application for consent and cannot proceed without it. These applications are supported by an EIA, which includes a noise assessment. Applications are made through DECC's Portal Environmental Tracking System (PETS) using a standalone Master Application Template (MAT) and Geological Survey Subsidiary Application Template (SAT) (see Figure 2.4). DECC circulates each application to the relevant statutory consultees for advice and a decision on whether to grant consent is only made after careful consideration of their comments. Statutory consultees may request additional information or risk assessment, specific additional conditions to be attached to consent (such as specify timing or other specific mitigation measures), or advise against consent.

It is a condition of consents issued under Regulation 4 of the *Petroleum Activities (Conservation of Habitats) Regulations 2001* (& 2007 Amendments) for oil and gas related seismic and sub-bottom profile surveys that the JNCC Seismic Guidelines are followed. Where appropriate, European Protected Species (EPS) disturbance licences may also be required under the *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007* (as amended)[32].

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[31] Relevant research as part of the Marine Scotland Science (MSS) National Research and Monitoring Strategy for Diadromous Fish (NRMSD) aims to address knowledge gaps in the interactions of diadromous fish with offshore marine renewable energy developments (OMRE), in particular the potential impacts of noise from installation and operation of OMRE generators on salmon. MSS has worked with the University of Exeter to establish sound detection threshold curves in wild post-smolts, captive post-smolts and captive adults using the established auditory-evoked potential technique for comparison with existing data from behavioural methods. Models have been prepared of the acoustic outputs of operational offshore wind turbines mounted on jackets, monopiles and gravity bases, and their dispersion in the sea. These outputs will be compared with acoustic frequency-hearing threshold curves for salmon and future research will observe the behavioural (avoidance, swimming behaviour) and physiological (ventilation rate, metabolic rate) responses of salmon to playback of pile driving noise in laboratory tanks, with validation through measuring physiological responses of fish caged at a range of distances from pile driving in the wild. This research may provide a better understanding the potential impact of noise generated by activities which could result from licensing of the Blocks.
http://www.gov.scot/Topics/marine/marineenergy/Research/NatStrat/Theme1

[32] Disturbance of European Protected Species (EPS) (i.e. those listed in Annex IV) is a separate consideration under Article 12 of the Habitats Directive, and is not considered in this assessment.

In their latest guidelines, JNCC (2010) advise that operators adopt mitigation measures which are appropriate to minimise the risk of an injury or disturbance offence and stipulate, whenever possible, the implementation of several best practice measures, including:

- If marine mammals are likely to be in the area, only commence seismic activities during the hours of daylight when visual mitigation using Marine Mammal Observers (MMOs) is possible.

- Only commence seismic activities during the hours of darkness, or low visibility, or during periods when the sea state is not conducive to visual mitigation, if a Passive Acoustic Monitoring (PAM) system is used to detect marine mammals in the area, noting the limitations of available PAM technology (seismic surveys that commence during periods of darkness, or low visibility, or during periods when the observation conditions are not conducive to visual mitigation, could pose a risk of committing an injury offence) – the use of PAM as a mitigation tool will be required where JNCC and other SNCBs deem it appropriate.

- Plan surveys so that the timing will reduce the likelihood of encounters with marine mammals. For example, this might be an important consideration in certain areas/times, e.g. during seal pupping periods near Special Areas of Conservation for harbour seals or grey seals.

- Provide trained MMOs to implement the JNCC guidelines.

- Use the lowest practicable power levels to achieve the geophysical objectives of the survey.

- Seek methods to reduce and/or baffle unnecessary high frequency noise produced by the airguns (this would also be relevant for other acoustic energy sources).

5.4.2 Further mitigation measures

Proposed activities with a potentially significant acoustic impact on a designated SAC or SPA will be subject to the requirement for HRA. DECC require operators to provide sufficient information on the potential impact of proposed activities on relevant sites and their qualifying features as well as proposed further mitigation measures in their applications for a Geological Survey consent. In all instances, DECC will expect strict implementation of the JNCC seismic guidelines. The information provided by operators must be detailed enough for DECC (and its advisors) to make a decision on whether the activities could lead to a likely significant effect. Depending on the nature and scale of the proposed activities (e.g. area of survey, source size, timing and proposed mitigation measures) and likely effects, DECC may undertake HRA to assess the potential for adverse effects on the integrity of sites.

Consent for project-level activities will not be granted unless the operator can demonstrate that the proposed activities, which may include seismic survey and other activities such as rig site survey, VSP, drilling and vessel movements, will not have an adverse effect on the integrity of relevant sites.

5.5 Conclusions

Significant effects arising from underwater noise were only considered possible for SACs with marine mammals as a qualifying feature. Although seismic survey, drilling and other oil industry noise is detectable by marine mammals, waterbirds and their prey, there is no evidence that such noise presents a risk to the viability of populations in UK waters and specifically not within designated Natura 2000 sites (see Defra 2010). An adverse effect on site integrity would require disturbance to the qualifying species and/or the distribution and viability of the population of the site which may arise from direct mortality, behavioural response with implications for reproductive success (e.g. disturbance at fixed breeding locations) or reduced long-term ecological viability (e.g. sustained displacement from foraging grounds). In the localised areas of Natura 2000 sites designated for marine mammals (and where marine mammals utilise space outside such sites), acoustic disturbance from seismic survey activity resulting from proposed licensing would be intermittent and there is no evidence that cumulative effects of previous survey effort have been adverse. Despite considerable scientific effort including an extensive 3 year study to examine the potential impact of seismic survey operations on cetaceans in the Moray Firth, no causal link, or reasonable concern in relation to population viability has been found.

Bearing in mind the information presented above and in the Appendices, it is concluded at the currently available level of definition, the proposed licensing of the Blocks would not be expected to cause an adverse effect on the integrity of the relevant sites by undermining the conservation objectives relating to any specific qualifying feature, taking account of the following:

- Should a 3D seismic survey be proposed in Blocks 103/2, 103/3, 106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28, 106/29, 107/11 & 107/16 (as indicated by the work programmes), further HRA may be required to assess the potential for adverse effects on the integrity of sites once the area of survey, source size, timing and proposed mitigation measures are known and can form the basis for a definitive assessment.

- The utilisation of areas outside the designated SAC boundaries is not well understood, but the known extensive range of seals and bottlenose dolphins, and available population monitoring indicates that neither previous activities, nor those associated with proposed licensing will undermine the conservation objectives for qualifying species.

- Individual activities (e.g. drilling, seismic) require individual consents which will not be granted unless the operator can demonstrate that the proposed activities which may include 3D seismic surveys will not adversely affect the site integrity of relevant sites. These activities will be subject to activity level EIA and HRA (where appropriate).

6 Assessment of accidental spill effects

6.1 Introduction

With respect to accidental spill effects, the re-screening process (Appendix B) identified a number of sites where there was the potential for likely significant effects associated with proposed activities that could follow licensing of the Irish Sea and St George's Channel Blocks (Figure 6.1). The potential effects are summarised below (Section 6.2), and considered against the conservation objectives of the relevant sites to determine whether they could adversely affect site integrity (Section 6.3).

Oil spills can have potentially adverse environmental effects and are accordingly controlled by a legal framework aimed at minimising their occurrence, providing for contingency planning, response and clean up, and which enables prosecutions. It is not credible to conclude that an oil spill will never occur as a result of 28th Round licensing, in spite of the regulatory controls and other preventative measures in place.

The potential for oil spills associated with exploration and production, the consequences of accidental spillages, and the prevention, mitigation and response measures implemented have been assessed and reviewed in successive SEAs covering the UKCS area under consideration in the 28th Round, including the Offshore Energy SEA2 (DECC 2011)[33]. Previous SEAs have concluded that given the UK regulatory framework and available mitigation and response, in relation to objective risk criteria (such as existing exposure to risk as a result of shipping), the incremental risk associated with exploration and production (E&P) is moderate or low.

The following section provides a high-level overview of risks, regulation, contingency planning and response capabilities; followed by an assessment of risks presented to relevant sites (Section 6.3) by activities likely to result from the proposed licensing of the 24 Irish Sea and St George's Channel Blocks in the 28th Round.

6.2 Spill risk and potential ecological effects

Risk assessment, under the terms of OPRC, includes considerations of probability and consequence, generally comprising an evaluation of: historical spill scenarios and frequency, fate of spilled oil, trajectory of any surface slick, and potential ecological effects. These considerations are discussed below.

6.2.1 Historical spill frequency

Oil spills on the UKCS have been subject to statutory reporting since 1974 under PON1 (formerly under CSON7); annual summaries of which were initially published in the "Brown

[33] Note that a large number of site- and activity-specific risk assessments have also been carried out as a component of Environmental Assessments and under the relevant legislation implementing the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) (see the *Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation Convention) Regulations 1998*).

Book" series, now superseded by on-line data available from the DECC website. Discharges, spills and emissions data from offshore installations are also reported by OSPAR (e.g. OSPAR 2009). DECC data indicates that the most frequent types of spill from mobile drilling rigs have been organic phase drilling fluids (and base oil), diesel and crude oil. Topsides couplings, valves and tank overflows; and infield flowlines and risers are the most frequent sources of spills from production operations, with most spills being <1 tonne.

Since the mid-1990s, the reported number of spills has increased consistent with more rigorous reporting of very minor incidents (e.g. the smallest reported spill in 2013 was 0.000001 tonnes). However, the underlying trend in spill quantity (excluding specifically-identified large spills) suggests a consistent annual average of around 100 tonnes. In comparison, oil discharged with produced water from the UKCS in 2013 totalled 2,177 tonnes (DECC website[34]).

An annual review of reported oil and chemical spills in the UKCS is made on behalf of the Maritime and Coastguard Agency (MCA) by the Advisory Committee on Protection of the Sea (e.g. Dixon 2013). This includes all spills reported by POLREP reports[35] by the MCA and PON1 reports to DECC – the latter are published monthly on the DECC website[36]. In 2012 a total of 246 releases were attributed to oil and gas installations operating in the open sea. The 2012 annual total was the lowest recorded since 2004 and 33 fewer than the mean annual total of 279 releases reported between 2000 and 2011. Analysis of oil types showed that 37% of reported releases were lubrication and hydraulic oils, followed by fuel oils at 24% and crude oils at 17%. The corresponding statistics from the 2011 survey were 32%, 33% and 23% respectively. The majority of spills were small, with some 94% of releases being less than 455 litres (100 gallons).

Well control incidents (i.e. "blowouts" involving uncontrolled flow of fluids from a wellbore or wellhead) have been too infrequent on the UKCS for a meaningful analysis of frequency based on UK data. A review of blowout frequencies cited in UKCS Environmental Statements as part of the OESEA2 gives occurrence values in the range 1/1,000-10,000 well-years. Analysis of the SINTEF Offshore Blowout Database which is based on blowout data from the US Gulf of Mexico, UKCS and Norwegian waters for period 1980 to 2005, provided blowout frequencies (per drilled well) for exploration drilling of normal oil[37] (2.5×10^{-4}) and gas[38] wells (3.6×10^{-4}), as well as deep high pressure high temperature[39] oil (1.5×10^{-3}) and gas (2.2×10^{-3}) wells (OGP 2010). Accident statistics for offshore units on the UKCS estimated an annual average frequency of blowouts[40] for mobile drilling units of 6.6×10^{-3} per unit year for the period between 2000 and 2007 (based on analysis of a total of 455 unit years, Oil and Gas UK 2009).

[34] https://www.gov.uk/oil-and-gas-uk-field-data#oil-discharged-with-produced-water
[35] POLREP (pollution reports) relate to those issued in accordance with the Bonn Agreement, to alert Contracting Parties to relevant pollution events.
[36] https://www.gov.uk/oil-and-gas-environmental-data
[37] A well where the formation has an estimated gas/oil ratio less than 1,000.
[38] A well where the formation has an estimated gas/oil ratio exceeding 1,000.
[39] A well with an expected shut-in pressure equal to or above 690 bar (10,000psi) and/or bottom hole temperatures equal to or above 150°C.
[40] An uncontrolled flow of gas, oil or other fluids from the reservoir, i.e. loss of 1.barrier (i.e. hydrostatic head) or leak and loss of 2. barrier, i.e. BOP/ Down Hole Safety Valve (DHSV).

6.2.2 Trajectory and fate of spilled oil

Commercial quantities of oil and gas are currently produced only from the East Irish Sea Basin (DECC 2014b), with production from the basin dominated by gas. Oil is currently only produced from the Douglas Field (Block 110/13b). The Douglas production wells utilise electrical submersible pumps (ESP) as a form of artificial lift. At current reservoir pressures the Douglas wells are generally unable to free flow with the ESPs turned off with the exception of wells D07, D16z and D08. These wells are the recipients of nearby off-gas injection and therefore have elevated gas rates which act as gas lift thus enabling the wells to free-flow liquids without ESP support. Lennox Field wells (Block 110/15a) are being converted to gas production and none of the wells at Lennox can free flow liquid hydrocarbons (BHP Billiton Petroleum Ltd 2013). Therefore, a large blowout of oil from any of the Irish Sea Blocks is very unlikely from existing fields given reservoir pressures and flow rates. However, Table 6.1 describes a blowout scenario for Block 110/13 which assumes a maximum absolute open flow for the Douglas D07 well, without any intervention during the 90 days required to drill a relief well. The model assumes peak flow throughout the release period but in reality flow would most likely decrease over time as reservoir pressure decreased (BHP Billiton Petroleum Ltd 2013).

Though small quantities of oil have been produced from the East Irish Sea Basin, all the present significant discoveries are of gas, and the anticipated reservoir hydrocarbon type in the Irish Sea and St George's Channel Blocks is gas. Spill risk is therefore mainly associated with small amounts of crude oil or the transfer and storage of diesel fuel and lubricating oils, although condensate blowouts have also been considered (see Table 6.1). However, the worst case crude blowout scenario described by BHP Billiton for the Douglas Field (see Table 6.1), has been used to inform the assessment of Quadrant 110 Blocks.

To date, no commercial oil or gas production has taken place in the St George's Channel area, and exploration drilling has been relatively limited. DECC (2014b) indicates that prospectivity within the area is likely to be gas. A single gas discovery (Dragon) has been made in Block 103/1 and spills of oil (including all liquid phase hydrocarbons) are likely to be restricted to those used in the operation of any rig and associated support vessels. Therefore, for Blocks within Quadrants 103, 106 and 107, the worst case scenario is likely to be associated with the complete loss of the diesel inventory of a drilling rig. This is reflected in the majority of the scenarios described in Table 6.1.

The main oil weathering processes following a surface oil spill are spreading, evaporation, dispersion, emulsification, dissolution, oxidation, sedimentation and biodegradation. The persistence of spilled crude oil depends on the characteristics of the oil, but typically is of the order of days to weeks. A major diesel spill of *ca*. 1,000 tonnes (i.e. the typical inventory of a drilling rig) would disperse naturally in about 8 hours and travel some 24km in conditions of a constant unidirectional 30 knot wind. Large condensate spills are likely to behave in a similar manner as diesel.

Coincident with these weathering processes, surface and dispersed oil will be transported as a result of tidal (and other) currents, wind and wave action. Generally, the slick front will be wind-driven on a vector equivalent to current velocity plus approximately 3% of wind velocity. Although strong winds can come from any direction and in any season, the predominant winds in the UK are from the southwest which for the Irish Sea and St George's Channel Blocks would push spilled oil towards the coast.

To support environmental assessments of individual drilling or development of oil and gas projects, modelling is carried out for crude and condensate blowouts, and for diesel oil

releases where relevant. Representative modelling cases from various parts of the UKCS have been reviewed by successive SEAs. A collation of recent spill modelling completed for exploration and development projects in the Irish Sea and St George's Channel is provided in Table 6.1. It should be noted that the estimates in Table 6.1 are from worst case scenarios of unconstrained blowouts and large diesel spills with no intervention, combined with constant winds from one direction over a significant period of time (deterministic modelling[41]), which is improbable. With respect to stochastic modelling[42] requirements, the most recent draft OPEP guidance (DECC 2015)[43] indicates that:

- A minimum two year data-set of hydrodynamic and meteorological parameters must be used.

- A minimum of 100 model runs should be performed (a lower number of runs may be acceptable when accompanied by sound scientific or statistical justification).

- The duration of the model period must be appropriate to the scenario (e.g. if modelling an instantaneous release the minimum duration should be 10 days or until the oil impacts coastlines. If modelling an on-going release the minimum duration should be 10 days). The duration of the release period must be justifiable and should consider any discrepancy between the duration of the modelling and the identified time period required to stop the release (which may include the drilling of a relief well and/or use of a well capping device).

- For temporary operations e.g. drilling/well intervention; the season(s) during which the operation is to be undertaken must be used for modelling purposes. For operations which could be subject to change it is recommended that all four seasons are modelled.

[41] Assumes that a continuous 30 knot onshore wind occurs throughout the spill event - – note that this type of modelling will no longer be a requirement on adoption of the latest OPEP guidance.
[42] Stochastic modelling utilises metocean and meteorological inputs to determine likelihood of beaching and possible areas affected
[43] Any applicable new OPEP submissions, five year reviews or new worst case scenario models submitted post 2015 amendments to the OPRC Regulations (see Section 6.4.1) must comply with this Guidance - http://www.hse.gov.uk/osdr/assets/docs/guidance-notes-opeps-rev1-may-2015.pdf

Table 6.1: Review of representative worst case deterministic and stochastic oil spill modelling for Eastern Irish Sea and St George's Channel exploration wells and developments

Block	Water depth (m)	Spill type	Spill size	Model used & conditions	Time to beach (deterministic modelling)	Likelihood of beaching (stochastic modelling)	Date of model run
103/1a	93	Diesel – Rig loss	1,000t (1,177m³)	OSIS 3.1, 30 knot onshore wind	Evaporation and dispersion levels remain high for the duration of the spill. The spill at sea becomes insignificant after 8 hours having travelled 25km towards either the Welsh or Irish coasts	Low probability (0-<1%) of oil beaching on either the Welsh or Irish coasts.	2005
110/3b	18	Diesel – Rig loss	968t (1,075.6m³)	OSIS 4.1, 30 knot onshore wind	Oil weathers offshore over 8 hours	Oil beaches at 3 sites. Probability of oil beaching very low (0.1-0.3%).	2008
110/3c	16-17	Diesel – Rig loss	968t (1,075.6m³)	OSIS 4.1, 30 knot onshore wind	The spill disperses after 8 hours, 5km from the coastline	0% probability of oil beaching	2009
110/4	11	Diesel – Rig loss	968t (1,075.6m³)	OSIS 4.1, 30 knot onshore wind	Oil weathers offshore over 8 hours	Oil beaches at 4 sites. Probability of oil beaching very low (0.1-0.3%).	2008
110/8	35	Crude – Loss of storage	146,242m^3	OSCAR	Spill reaches shoreline in 10 hours.	Oil beaches on the English (12-94% probability), Welsh (1-30%), Northern Irish (14%), Scottish (3-61%), Eire (2%) and Isle of Man (74%) coasts.	2013
110/12 & 110/13	32.4	Blowout, 44.1° API crude	1,582m^3 (1,282t) per day for 2 days	OSIS 4.2.2, 30 knot onshore wind	Spill reaches UK shoreline after 18 hours.	Oil beaches on the English, Welsh, Northern Irish, Scottish, Eire and Isle of Man coasts. Total combined probability of beaching of *ca*. 75%,	2010
110/12 & 110/13	32.4	Diesel – Rig loss	968t (1075.6m³)	OSIS 4.2.2, 30 knot onshore wind	The spill disperses after 8 hours, 16km from the coastline	0% probability of oil beaching	2010
110/13	29	Blowout, 41.8° API crude	347m^3 per day for 90 days	OSCAR	Spill reaches UK shoreline within 24 hours.	Oil beaches on the English (34-100% probability), Welsh (2-100%), Northern Irish (26%), Scottish (44-96%), Eire (10%) and Isle of Man (100%) coasts.	2013
110/14b	18.7	Diesel – Rig loss	200t (222.2m³)	OSIS 4.0, 30 knot onshore wind	Spill fully dispersed after 7 hours, approximately 15km from the nearest coastline	Oil stays largely centred around spill point. Probability of spill beaching of <1%	2008
110/15	7	Diesel – Rig loss	208m^3	OSCAR	Spill reaches UK shoreline in 3 hours.	Oil beaches on English (<5-50%) and Welsh (<5%) coasts.	2013

Block	Water depth (m)	Spill type	Spill size	Model used & conditions	Time to beach (deterministic modelling)	Likelihood of beaching (stochastic modelling)	Date of model run
113/27b	27-31	Diesel – Vessel loss	1,500t (1,666.7m³)	OSIS 4.2, 30 knot onshore wind	The spill disperses offshore in 9 hours. Slick endpoint is 3km from coast	Diesel beaches at three sites. Probability of diesel beaching is 0.7 percent	2011
113/27b	27-31	Blowout, 70º API condensate	15t (21.4m³) per day for 28 days	OSIS 4.2, 30 knot onshore wind	The spill disperses. Slick endpoint is 23km from the English coast	0% probability of beaching	2011
113/27b	31	Diesel – Rig loss	600t (666.7m³)	OSIS 4.1, 30 knot onshore wind	The spill disperses offshore in 8 hours. The slick travels approx. 18km, endpoint 9km from the coast	Oil spill drifts westwards, 0% probability of oil beaching	2010
113/27b	30.1	Diesel – Rig loss	968t (1,075.6m³)	OSIS 4.1, 30 knot onshore wind	The spill disperses after 9 hours, 9km from the coastline	Oil beaches at two sites along the adjacent coastline. Volumes of oil that beach are small: 7 and 6 tonnes of emulsified oil. Total probability of oil beaching is very low: 0.5%	2009
113/27c	27.9	Diesel – Rig loss	968t (1,075.6m³)	OSIS 4.1, 30 knot onshore wind	The spill disperses after 9 hours, 2km from the coastline	Oil beaches at four sites along the adjacent coastline. Volumes of oil that beach are small: 5-7 tonnes of emulsified oil. Total probability of oil beaching very low: 0.7 %	2009
113/27c	40	Diesel – Rig loss	1,000t (1,111.1m³)	OSIS 4.1, 30 knot onshore wind	The spill disperses after 8 hours, 2km from the coastline	Oil does not beach	2009

Note: API is a measure of oil density relative to water. Lower API values indicate heavier and more persistent oils. A liquid with an API gravity of 50° API or higher, can be characterised as a condensate (International Energy Agency 2010 – Natural Gas Liquids Supply Outlook 2008-2015.

6.2.3 Potential ecological effects

The most vulnerable components of the ecosystem to oil spills in offshore and coastal environments are seabirds and marine mammals due to their close association with the sea surface. Seabirds are affected by oil pollution in several ways, including oiling of plumage resulting in the loss of insulating properties and the ingestion of oil during preening. Pollution of the sea by oil, predominantly from merchant shipping, can be a major cause of seabird mortality. Although locally important numbers of birds have been killed on the UKCS directly by oil spills from tankers, for example common scoter off Milford Haven following the *Sea Empress* spill in 1996, population recovery has generally been rapid (Banks *et al*. 2008).

As the major breeding areas for most wildfowl and wader species are outside the UK (in the high Arctic for many species), population dynamics are largely controlled by factors including breeding success (largely related to short-term climate fluctuations, but also habitat loss and degradation) and migration losses. Other significant factors include lemming abundance on Arctic breeding grounds (e.g. white-fronted goose). Variability in movements of wintering birds, associated with winter weather conditions in continental Europe, can also have a major influence on annual trends in UK numbers, as can variability in the staging stops of passage migrants.

Oil spill risks to marine mammals have been reviewed by successive SEAs[44] for previous licensing Rounds and their supporting technical reports (e.g. Hammond *et al*. 2004, Hammond *et al*. 2008).

Generally, marine mammals are considered to be less vulnerable than seabirds to fouling by oil, but they are at risk from hydrocarbons and other chemicals that may evaporate from the surface of an oil slick at sea within the first few days, and any accidental ingestion or breathing of oily fumes could cause physiological stress (Law *et al.* 2011). Symptoms from acute exposure to volatile hydrocarbons include irritation to the eyes and lungs, lethargy, poor coordination and difficulty with breathing. Individuals may then drown as a result of these symptoms (Hammond *et al*. 2002).

Grey seals come ashore regularly throughout the year between foraging trips and additionally spend significantly more time ashore during the moulting period (February-April) and particularly the pupping season (October-December). Animals most at risk from oil coming ashore on seal haulout sites and breeding colonies are neonatal pups, which rely on their prenatal fur and metabolic activity to achieve thermal balance during their first few weeks of life, and are therefore more susceptible than adults to external oil contamination.

Coastal otter populations are also vulnerable to fouling by oil, should it reach nearshore habitats. They are closely associated with the sea surface and reliant upon fur, rather than blubber, for insulation.

Fish are at greatest risk from contamination by oil spills when the water depth is very shallow. In open waters deeper than 10m, the likelihood that contaminant concentrations will be high enough to affect fish populations is very small, even if chemical dispersants are used. In shallow or enclosed waters (note that chemical dispersants are not generally appropriate for use in such areas), high concentrations of freshly dispersed oil may kill some fish and have sublethal effects on others. Juvenile fish, larvae and eggs are most sensitive to the oil toxicity

[44] See: Offshore Energy Strategic Environmental Assessment (SEA): An overview of the SEA process.

(Law *et al.* 2011). In the River Dee, the main salmon smolt runs occur throughout late March to early June, with the peak in most rivers occurring in May (Brown & May Marine Ltd 2013). As with the ocean migration of post smolts, there is little directed research describing the return migration routes of adult Atlantic salmon from their feeding grounds to inshore habitats of the Liverpool Bay area. The number of fish potentially transiting the area is not possible to determine, although is likely to increase through spring and summer as the peak of river entry (August and September) is approached (Brown & May Marine Ltd 2013). In general, swimming behaviour during homeward migration appears similar that of outward post smolt migrations. It is an active, directed, process often occurring with the tide, close to the surface (1-6m in depth) with dives between 20-100m (Hawkins *et al.* 1979, Sturlaugsson & Thorisson 1997, Aas *et al*. 2011, cited by Brown & May Marine Ltd 2013, Malcolm *et al*. 2010). It should be noted that salmonids play a critical role in the life cycle of the freshwater pearl mussel.

Benthic habitats and species may be sensitive to deposition of oil associated with sedimentation, although based on hydrocarbon types present or used in operations, this is unlikely to be significant in the Irish Sea or St George's Channel. However, evidence from the Florida barge spill (Buzzards Bay, Massachusetts, September 1969, in which 700m^3 of diesel fuel were released) suggests that in certain circumstances, contamination from oil spills could be long-term. Monitoring immediately following the spill suggested rapid recovery (reviewed by Teal & Howarth 1984), while subsequent studies (sampling in 1989) indicated that substantial biodegradation of aromatic hydrocarbons in saltmarsh sediments had occurred (Teal *et al.* 1992). However, thirty years after the spill, significant oil residues remain in deep anoxic and sulphate-depleted layers of local salt marsh sediments (Reddy *et al*. 2002, Peacock *et al*. 2005). The ecological consequences of this residual contamination are unclear, although there is potential for remobilisation of sediment-bound contaminants through bioturbation or storm events (in which case, aerobic biodegradation would be expected to be rapid).

6.3 Implications for site integrity of relevant sites

Table 6.2 gives a consideration of potential accidental spill impacts associated with the Block work programmes and the conservation objectives of relevant sites in the Irish Sea and St George's Channel (identified by the re-screening process in Appendix B, see Figure 6.1). The potential for an accidental spill to impact the qualifying features of any site will be determined by the location and timing of drilling activities, which are presently unknown, and will be subject to further detailed assessment as part of project-level EIA.

Figure 6.1: Relevant sites and Blocks for accidental spill effects

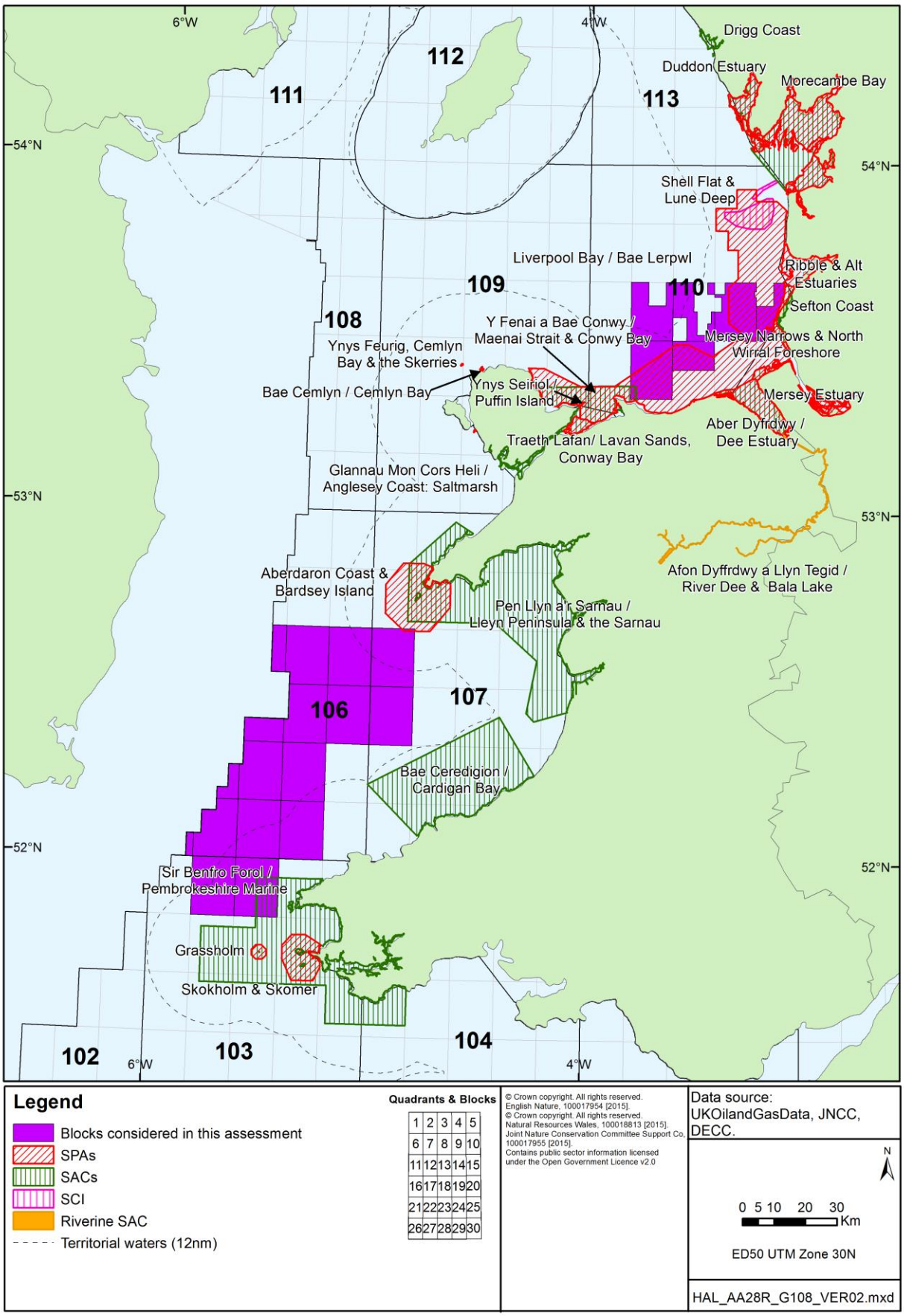


Table 6.2: Consideration of potential accidental spill impacts and relevant site conservation objectives

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
SPAs		
Relevant worst case spill modelling (Table 6.1): A crude blowout in Block 110/13 would reach shore within 24 hours with stochastic modelling indicating a 94% chance of beaching. A large diesel spill in Block 110/14b would disperse naturally after 7 hours with stochastic modelling indicating a very low (<1%) likelihood of beaching. A large diesel spill in Block 110/15 would reach the UK shoreline in 3 hours with stochastic modelling indicating a <5-50% likelihood of beaching.		
Duddon Estuary SPA	Breeding tern, on passage overwintering waterbirds and waders	**Conservation objectives:** Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features, and, • The distribution of the qualifying features within the site. **Consideration** The closest Block (110/14b) is *ca*. 49km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Qualifying features are moderately sensitive to the introduction of non-synthetic toxic compounds (e.g. hydrocarbons)[45]. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill, and that a significant diesel spill would disperse naturally with a very low (<1%) probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. The potential for an accidental spill to impact the populations of the qualifying features, their distributions or cause disturbance will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Morecambe Bay SPA	Breeding terns, gulls and seabirds, on passage and overwintering waterbirds and waders	**Conservation objectives:** As above. **Consideration** The closest Block (110/15b) is *ca*. 31km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Qualifying features are moderately sensitive to the introduction of non-synthetic toxic compounds (e.g. hydrocarbons)[46]. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching and a significant diesel spill in Block 110/15 could reach shore in 3 hours with a high probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. The potential for an accidental spill to impact the populations of the qualifying features, their

[45] http://publications.naturalengland.org.uk/file/3952436
[46] http://publications.naturalengland.org.uk/file/3305927

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		distributions or cause disturbance will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Ribble and Alt Estuaries SPA	Breeding tern, gulls, ruff and seabirds, on passage and overwintering waterbirds and waders	**Conservation objectives:** As above **Consideration** Block 110/15b is adjacent to the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Qualifying features are moderately sensitive to the introduction of non-synthetic toxic compounds (e.g. hydrocarbons)[47]. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching and a significant diesel spill in Block 110/15 could reach shore in 3 hours with a high probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. The potential for an accidental spill to impact the populations of the qualifying features, their distributions or cause disturbance will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Mersey Narrows and North Wirral Foreshore SPA	Breeding tern, on passage gulls, overwintering waders and waterfowl	**Conservation objectives:** As above. **Consideration** Closest Block (110/15b) is *ca*. 9km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. High vulnerability of common tern and little gull qualifying features to surface pollution (Williams *et al.* 1994). Breeding and on passage common terns use the site primarily as nesting/roosting habitat and feed in nearby estuaries and the Liverpool Bay SPA. Little gull roost on the sea in Liverpool Bay SPA[48]. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching and a significant diesel spill in Block 110/15 could reach shore in 3 hours with a high probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. The potential for an accidental spill to impact the populations of the qualifying features, their distributions or cause disturbance will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Mersey Estuary SPA	Overwintering and passage waders, and waterfowl	**Conservation objectives:** As above. **Consideration** Closest Block (110/15b) is *ca*. 19km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Qualifying features are highly sensitive to toxic contamination caused by the introduction of non-synthetic compounds (e.g. hydrocarbons)[49]. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching and a significant diesel spill in Block 110/15 could reach shore in 3 hours with a high probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. The potential for an accidental spill to impact the populations of the qualifying

[47] http://publications.naturalengland.org.uk/file/4038157
[48] http://www.naturalengland.org.uk/Images/mersey-narrows-departmental-brief_tcm6-27628.pdf
[49] http://publications.naturalengland.org.uk/file/3968461

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		features, their distributions or cause disturbance will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Liverpool Bay / Bae Lerpwl SPA	Overwintering red-throated diver, common scoter and waterfowl assemblage	**Conservation objectives:** Subject to natural change, maintain or enhance the qualifying features populations and their supporting habitats in favourable condition. The interest features will be considered to be in favourable condition only when both of the following two conditions are met: • The size of the feature population is at, or shows only non-significant fluctuation around the mean population at the time of designation of the SPA. to account for natural change; • The extent of the supporting habitat within the site is maintained. **Consideration** All of the Quadrant 110 Blocks overlap or are adjacent to the site. The Blocks are part of 2 licence applications – one for 6 Blocks and the other for Block 110/13e – for which a total of 2 drill or drop wells are proposed. The qualifying features are highly sensitive to toxic contamination from the introduction of non-synthetic compounds (e.g. hydrocarbons). Oil on the surface and in the water column would present a direct threat to diving and feeding seabirds particularly during their moulting times, when they are less mobile and remain at sea[50]. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. However, the likelihood of such occurrence (Section 6.2.1) is extremely low. Given the marine nature of the site, some of the site features are also vulnerable to a spill in offshore areas. The potential for an accidental spill to impact the size of the populations of the qualifying features or the extent of the supporting habitat will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
The Dee Estuary SPA	Breeding and passage terns, overwintering and passage waders and waterfowl	**Conservation objectives:** See: Natural England & CCW (2010)[51] **Consideration** Closest Block (110/18b) is *ca*. 8km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. The qualifying features generally considered moderately sensitive to contamination of their supporting habitats by non-synthetic toxic compounds. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. However, the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Traeth Lafan /	Overwintering	**Conservation objectives:**

[50] http://publications.naturalengland.org.uk/file/4413148
[51] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/the-dee-estuary-european-marin.aspx

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Lavan Sands, Conway Bay SPA	waders and on passage great crested grebe	See: CCW (2008)[52] **Consideration** Closest Block (110/17) is *ca*. 19km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. In late summer and early autumn, the inshore waters of the site support large numbers of great crested grebe that gather to moult (CCW 2008[35]) and are highly vulnerable to surface pollution (Williams *et al*. 1994). Overwintering waders have a relatively low vulnerability to the direct effects of oil spills (Law *et al*. 2011). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. However, the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Ynys Seiriol / Puffin Island SPA	Breeding cormorant	**Conservation objectives:** See: CCW (2008)[53] **Consideration** Closest Block (110/17) is *ca*. 16km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. High vulnerability of qualifying feature to surface pollution (Williams *et al.* 1994). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. However, the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Ynys Feurig, Cemlyn Bay and The Skerries SPA	Breeding terns	**Conservation objectives:** See: CCW (2008)[54] **Consideration** Closest Block (110/12b) is *ca*. 49km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Moderate vulnerability of the qualifying features to surface pollution (Williams et al. 1994). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. However, the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.

[52] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=dae16b88-02b1-45e6-bdea-e6358f2a92c0&version=-1
[53] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=3b507731-26e8-4b1f-9c9a-953c6fa813df&version=-1
[54] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=97094fcd-e49e-4a34-9e82-f8d1475ac10a&version=-1

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 103/1a would disperse naturally within 8 hours, having travelled 25km towards shore with stochastic modelling indicating a very low (0-<1%) likelihood of beaching.		
Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island SPA	Breeding and overwintering chough, breeding Manx shearwater	**Conservation objectives:** See: CCW (2008)[55] **Consideration** Block 107/11 partly overlaps the site and is part of a single licence application for 8 Blocks with 1 drill or drop well proposed between them. Manx shearwaters frequently settle on the water surface to rest, swim and dive for food, and are therefore, particularly vulnerable to oil pollution (CCW 2008[40]). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; diesel from Block 103/1a would disperse naturally within 8 hours having travelled 25km towards shore with a very low probability of beaching. However the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined. See also relevant text on mobile qualifying features following this table.
Grassholm SPA	Breeding gannet	**Conservation objectives:** See: CCW (2008)[56] **Consideration** Closest Block (103/3) is *ca*. 9km from the site and is part of a single licence application for 9 Blocks with 1 drill or drop well proposed between them. High vulnerability of the qualifying feature to surface pollution (Williams *et al.* 1994) and oil spills and other pollution episodes may damage the qualifying feature (CCW 200[41]). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; diesel oil from Block 103/1a would disperse naturally within 8 hours having travelled 25km towards shore with a very low probability of beaching. However the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined. See also relevant text on mobile qualifying features following this table.
Skokholm and Skomer SPA	Chough, short-eared owl, breeding seabirds. Seabird assemblage.	**Conservation objectives:** See: CCW (2008)[57] **Consideration** Closest Block (103/3) is *ca*. 8km from the site and is part of a single licence application for 9 Blocks with 1 drill or drop well proposed between them. High (e.g. Manx shearwater, auks) to moderate (e.g. lesser black backed gull) vulnerability of the qualifying features to surface pollution (Williams *et al.* 1994). CCW (2008[42]) indicates that an oil pollution incident during the breeding season could have a great impact on the adult storm petrel population. Rafting Manx shearwater at sea vulnerable to oil pollution and puffins also vulnerable to oil pollution incidents. Representative spill modelling (Table 6.1) indicates a theoretical risk

[55] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=c17e5e16-a93f-4e56-a8f9-5cfff3e30a4c&version=-1
[56] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=2fdd00e7-af4f-4ad1-add2-1a3fda8a46c2&version=-1
[57] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=352bffc8-1727-4ac8-969f-bafca3af5531&version=-1

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		to site features from an oil spill; diesel oil from Block 103/1a would disperse naturally within 8 hours having travelled 25km towards shore with a very low probability of beaching. The potential for an accidental spill to undermine the conservation objectives will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined. See also relevant text on mobile qualifying features following this table.
SACs		
Relevant worst case spill modelling (Table 6.1): A crude blowout in Block 110/13 would reach shore within 24 hours with stochastic modelling indicating a 94% chance of beaching. A large diesel spill in Block 110/14b would disperse naturally after 7-8 hours with stochastic modelling indicating a very low (<1%) likelihood of beaching. A large diesel spill in Block 110/15 would reach the UK shoreline in 3 hours with stochastic modelling indicating a <5-50% likelihood of beaching.		
Drigg Coast SAC	Estuaries, coastal dunes, mudflats and sandflats, salt marshes and salt meadows, coastal dunes.	**Conservation objectives:** Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • 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, and, • The distribution of qualifying species within the site. **Consideration** Closest Block (110/13c) is *ca*. 75km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. There is also an application for Block 110/13e with 1 drill or drop well proposed. The intertidal mudflat and sandflat communities and saltmarsh communities are highly sensitive to toxic contamination from the introduction of non-synthetic compounds[58]. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. However, the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to impact the extent and distribution, and structure and function of qualifying natural habitats, will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Morecambe Bay SAC	Estuaries, mudflats and sandflats, inlets and bays, vegetation of stony banks, salt	**Conservation objectives:** As above. **Consideration** Closest Block (110/15b) is *ca*. 29km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Marine qualifying features are highly sensitive to toxic contamination from the introduction of non-synthetic compounds[59]. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill;

[58] http://publications.naturalengland.org.uk/file/5923582905417728
[59] http://publications.naturalengland.org.uk/file/5923582905417728

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
	marshes & salt meadows, coastal dunes, sandbanks, coastal lagoons, reefs, coastal dunes, great crested newt.	oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching and a significant diesel spill in Block 110/15 could reach shore in 3 hours with a high probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. The potential for an accidental spill to impact the extent and distribution, and structure and function of qualifying natural habitats, will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Shell Flat and Lune Deep SCI	Sandbanks, reefs	**Conservation objectives:** Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • The extent and distribution of qualifying natural habitats • The structure and function (including typical species) of qualifying natural habitats, and • The supporting processes on which the qualifying natural habitats rely **Consideration** Closest Block (110/14b) is *ca.* 17km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Both the sandbank and reef habitats are of moderate sensitivity to toxic contamination[60]. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching and a significant diesel spill in Block 110/14b would disperse naturally after 7 hours with a very low (<1%) probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. The potential for an accidental spill to impact the extent and distribution, and structure and function of qualifying natural habitats will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Sefton Coast SAC	Coastal dunes, petalwort and great crested newt	**Conservation objectives:** Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • 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, and, • The distribution of qualifying species within the site.

[60] http://publications.naturalengland.org.uk/file/3268971

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		Consideration Block 110/15b partly overlaps site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Qualifying features largely above MHWS and not generally vulnerable to surface oil pollution. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; a crude blowout in Block 110/13 could reach shore within 24 hours with a high probability of beaching. and a significant diesel spill in Block 110/15 could reach shore in 3 hours with a high probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. Given the proximity of the Block to the site, the potential for an accidental spill to impact the extent and distribution, and structure and function of qualifying natural habitats will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Dee Estuary / Aber Dyfrdwy	Estuaries, mudflats and sandflats, salt marshes and salt meadows, vegetation of drift lines, sea cliffs and coastal dunes, sea and river lamprey, petalwort	**Conservation objectives:** See: Natural England & CCW (2010)[61] **Consideration** Closest Blocks (110/14b, 110/15b and 110/18b) are *ca*. 7-8km from the site and are part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Marine qualifying features are highly or moderately vulnerable to toxic contamination as a result of the introduction of non-synthetic compounds (e.g. crude oil, Natural England & CCW 2010). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. Table 6.1 also indicates that a significant diesel spill in Block 110/15 would reach shore in 3 hours with a high probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives of the qualifying features will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Y Fenai a Bae Conwy / Menai Strait and Conwy Bay	Sandbanks, mudflats and sandbanks, reefs, inlets and bays and sea caves	**Conservation objectives:** To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status. Habitat features • The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing. • The physical, biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. • The presence, abundance, condition and diversity of typical species are such that habitat quality is not degraded. **Consideration** Block 110/17 partly overlaps with the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Oil & gas exploration and accidental discharges could have an adverse effect on all of the relevant qualifying features (CCW 2009[62]). Qualifying features such as mudflats and sandflats and inlets and bays are highly sensitive to oil

[61] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/the-dee-estuary-european-marin.aspx
[62] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=a64f8bb6-41a1-4890-a5d4-7332ab162fb2&version=-1

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		pollution with the sandbank and reef features moderately sensitive. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. However, the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to impact the distribution and extent, and the physical, biological and chemical structure and functions of the qualifying habitats will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Bae Cemlyn / Cemlyn Bay	Coastal lagoons, vegetation of stony banks	**Conservation objectives:** CCW (2008)[63] **Consideration** Closest Block (110/12b) is *ca*. 49km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Qualifying features not considered particularly sensitive to marine spills (Law *et al.* 2011). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. However, the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives of the qualifying features will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 103/1a would disperse naturally within 8 hours, having travelled 25km towards shore with stochastic modelling indicating a very low (0-<1%) likelihood of beaching.		
Glannau Môn Cors heli/Anglesey Coast: Saltmarsh	Salt marshes and salt meadows, estuaries, mudflats and sandflats	**Conservation objectives:** CCW 2008[64] **Consideration** Closest Block (107/11) is *ca*. 67km from the site and is part of a single licence application for 8 Blocks with 1 drill or drop well proposed between them. Oil & gas exploration and accidental discharges could have an adverse effect on most of the qualifying features (CCW 2009[65]). Qualifying features habitats are likely to be moderately to highly sensitive to toxic contamination as a result of the introduction of non-synthetic compounds. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; diesel oil from Block 103/1a would disperse naturally within 8 hours having travelled 25km towards shore with a very low probability of beaching. However the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives of the qualifying features will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.

[63] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/aber-to--brecon-sac-list/idoc.ashx?docid=340f7132-12ee-4229-a4d2-c34bd667bb0d&version=-1

[64] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/glannau-to-gweunydd-sac-list/idoc.ashx?docid=56506484-5bb9-40ad-a3db-2f48e3e5ba04&version=-1

[65] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=6912ad5e-6ec0-4a0d-bf0b-545f03b33452&version=-1

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Pen Llŷn a`r Sarnau/ Lleyn Peninsula and the Sarnau	Sandbanks, estuaries, coastal lagoons, inlets and bays, reefs, mudflats and sandflats, salt marshes and salt meadows, sea caves, bottlenose dolphin, otter, grey seal	**Conservation objectives:** To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status. Habitat features • The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing. • The physical, biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. • The presence, abundance, condition and diversity of typical species are such that habitat quality is not degraded. Species features • The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production, and condition of the species within the site. • The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future. • The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. **Consideration** Closest Block (107/11) is *ca*. 2km from the site and is part of a single licence application for 8 Blocks with 1 drill or drop well proposed between them. Oil & gas exploration and accidental discharges could have an adverse effect on most of the qualifying features (CCW 2009[66]). Qualifying habitats present in offshore areas of the site (e.g. reefs, sandbanks) are likely to be moderately sensitive to oil spill with more coastal features (e.g. estuaries, inlets and bays, mudflats and sandflats, salt marshes), highly sensitive (Law *et al*. 2011). For bottlenose dolphin, while their skin is not thought to be particularly sensitive to oil, any accidental ingestion or breathing of oily fumes could cause physiological stress. However, current evidence does not suggest more than a low vulnerability although indirect impacts on prey species may be important. Seal pups are likely to be more sensitive than the adults, and grey seal pups trapped on beaches when oil comes ashore will be more vulnerable (Law *et al*. 2011). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; diesel oil from Block 103/1a would disperse naturally within 8 hours having travelled 25km towards shore with a very low probability of beaching. However the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives of the qualifying features will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined. See also relevant text on mobile qualifying features following this table.
Cardigan Bay/	Sandbanks,	**Conservation objectives:** As above.

[66] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=6912ad5e-6ec0-4a0d-bf0b-545f03b33452&version=-1

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Bae Ceredigion	reefs, sea caves, bottlenose dolphin, sea and river lamprey, grey seal	**Consideration** Closest Block (107/16) is *ca.* 4km from the site and is part of a single licence application for 8 Blocks with 1 drill or drop well proposed between them. Oil & gas exploration and accidental discharges could have an adverse effect on all of the qualifying features (CCW 2009[67]). As for Pen Llŷn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC above. Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; diesel oil from Block 103/1a would disperse naturally within 8 hours having travelled 25km towards shore with a very low probability of beaching. However the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives of the qualifying features will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined. See also relevant text on mobile qualifying features following this table.
Pembrokeshire Marine/ Sir Benfro Forol	Estuaries, inlets and bays, reefs, sandbanks, mudflats and sandflats, coastal lagoons, salt marshes and salt meadows, sea caves, grey seal, shore dock, sea and river lamprey, allis and twaite shad, otter	**Conservation objectives:** As above. **Consideration** Block 103/3 partly overlaps the site and is part of a single licence application for 9 Blocks with 1 drill or drop well proposed between them. Oil & gas exploration and accidental discharges could have an adverse effect on the majority of the qualifying features (CCW 2009[68]). Qualifying features in more exposed offshore areas of the site (e.g. reefs and sandbanks) are likely to be moderately sensitive to oil spill with more coastal features (e.g. estuaries, inlets and bays, mudflats and sandflats, salt marshes), highly sensitive (Law *et al*. 2011). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; diesel oil from Block 103/1a would disperse naturally within 8 hours having travelled 25km towards shore with a very low probability of beaching. However the likelihood of such an occurrence (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives of the qualifying features will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined. See also relevant text on mobile qualifying features following this table.
Riverine SACs		
Relevant worst case spill modelling (Table 6.1): A crude blowout in Block 110/13 would reach shore within 24 hours with stochastic modelling indicating a 94% chance of beaching. A large diesel spill in Block 110/14b would disperse naturally after 7-8 hours with stochastic modelling indicating a very low (<1%) likelihood of beaching. A large diesel spill in Block 110/15 would reach the UK shoreline in 3 hours with stochastic modelling indicating a <5-50% likelihood of beaching.		
River Dee and Bala Lake/Afon	Sea and river lamprey, Atlantic	**Conservation objectives:** CCW (2008)[69]

[67] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=895011fb-b3f2-47a0-bc0c-b142279e7f83&version=-1
[68] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=1b72e681-cf1f-4006-b65a-d38bd3e17642&version=-1
[69] http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/river-to-usk-sac-list/idoc.ashx?docid=601bc11b-69fc-4418-9235-5cb2fdcfed9c&version=-1

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Dyffrdwy a Llyn Tegid	salmon, brook lamprey, bullhead, otter	**Consideration** Closest Block (110/18b) is *ca*. 30km from the site and is part of a single licence application for 6 Blocks with 1 drill or drop well proposed between them. Qualifying features are not considered particularly sensitive to marine spills (Law *et al.* 2011). Representative spill modelling (Table 6.1) indicates a theoretical risk to site features from an oil spill; oil from Block 110/13 could reach shore within 24 hours with a high probability of beaching. However, the likelihood of such occurrences (Section 6.2.1) is extremely low. The potential for an accidental spill to undermine the conservation objectives of the qualifying features will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.

6.3.1 Consideration of mobile qualifying species

A number of the sites considered in Table 6.2 support qualifying features which may forage considerable distances from the site and could thus be vulnerable to accidental spills in 28th Round Blocks distant from the site. Relevant qualifying features include gannet, Manx shearwater and puffin.

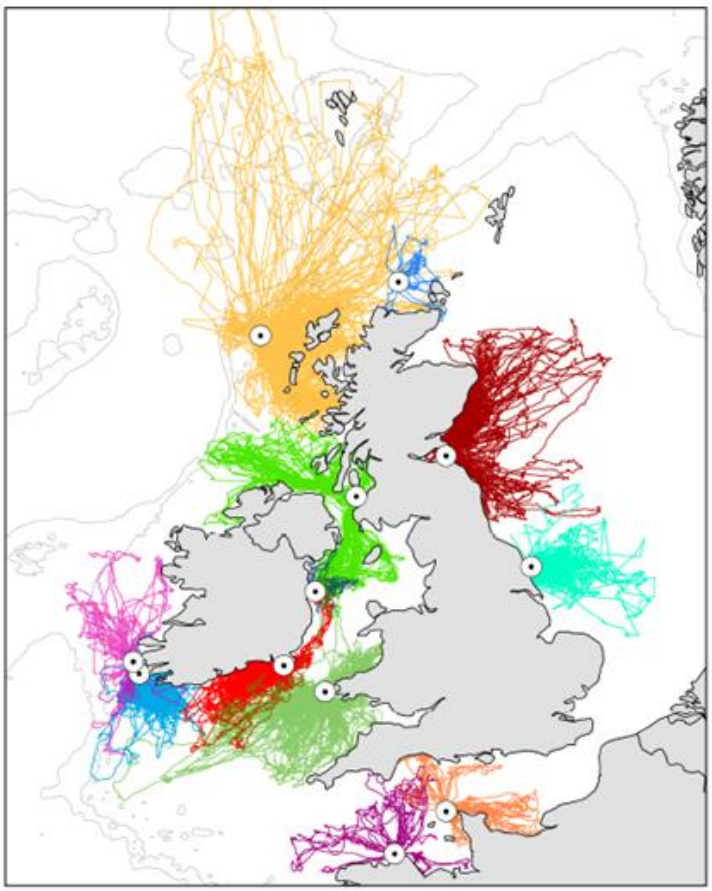
Moderate densities of gannets are found around the Grassholm colony (March to April), with low to moderate densities throughout the Celtic Sea. Between May and August, highest densities near Grassholm with gannets widespread at low densities over the Irish and Celtic Seas. By September and October, most chicks have fledged, although still concentrations of gannets around Grassholm, densities less than previous months. Moderate to high densities found in the south west Approaches with low densities over much of the Irish and Celtic Seas (Stone *et al*. 1995). With respect to gannet foraging during the breeding season, tracking data from Wakefield *et al*. (2013) indicated that gannets from Grassholm SPA (21 and 26 birds tagged in 2010 and 2011, respectively), may forage over the St George's Channel Blocks. Birds from the Great Saltee (part of the Saltee Islands SPA (17 and 18 birds tagged in 2010 and 2011)) did not appear to forage over the same Blocks (Figure 6.2a). Gannets from Ailsa Craig SPA (16 birds tagged in 2011) in the North Channel did not appear to forage extensively over relevant Blocks in Quadrant 110 (Wakefield *et al.* 2013).

Guilford *et al.* (2008) reported that foraging movements of breeding Manx shearwater from Skomer were concentrated northwards and westwards into the Irish Sea. This was true both during incubation (red), when birds were often away a week or longer, and during the shorter trips of chick-rearing birds (blue) (Figure 6.2b). Several areas of activity could be identified, with particularly dense activity around Skomer, in Cardigan Bay, and at locations in the Irish Sea further north (off Dundalk and the Mull of Galloway) (Guilford *et al.* 2008). Within the Irish Sea itself, observations at sea (e.g. Pollock *et al.* 1997) have shown that Manx shearwaters are not particularly abundant in March and April, become more common during May and June, and peak during July and August. Throughout the summer, large numbers of birds are found off Dundalk and are maintained into September, even after the numbers at the colonies have started to diminish. This area lies to the north and west of the Irish Sea front (Pollock *et al.* 1997) where high seabird density has been observed (Begg & Reid 1997), presumably in response to high marine productivity associated with the sea front and the stratified waters west of it (Guilford *et al.* 2008). Figure 6.2b indicates that Manx shearwater could be present over the Blocks particularly those close to relevant SPAs for breeding birds (Glannau Aberdaron and Ynys Enlli/Aberdaron Coast and Bardsey Island SPA and Skokholm and Skomer SPA).

Stone *et al.* (1995) reported high densities of puffins during the chick-rearing period (June to July) close to the Skomer colony. By August and September, birds had left the colony and low densities were found in the Irish Sea and St George's Channel. Tracking of post-breeding puffins from Skomer (Guildford *et al*. 2011), indicated that birds did not migrate to a single overwintering area, but followed a dispersive pattern of movements changing through the non-breeding period, showing great variability in travel distances and directions. This is emphasised by offshore surveys around Britain which indicate that between September and February the majority of puffin sightings involve solitary birds (81% of sighting events, 63% of birds sighted), with pairs or very small groups observed infrequently (Guildford *et al.* 2011).

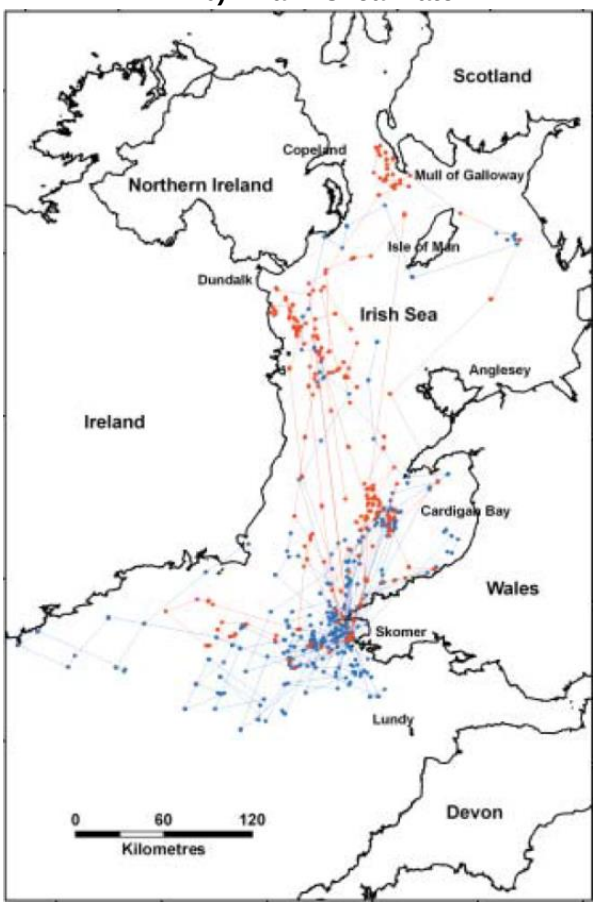
Figure 6.2: Foraging tracks of gannet (from major UK colonies) and Manx shearwater (from Skomer Island)

a) Gannet



Source: Wakefield et al. (2013)

b) Manx shearwater

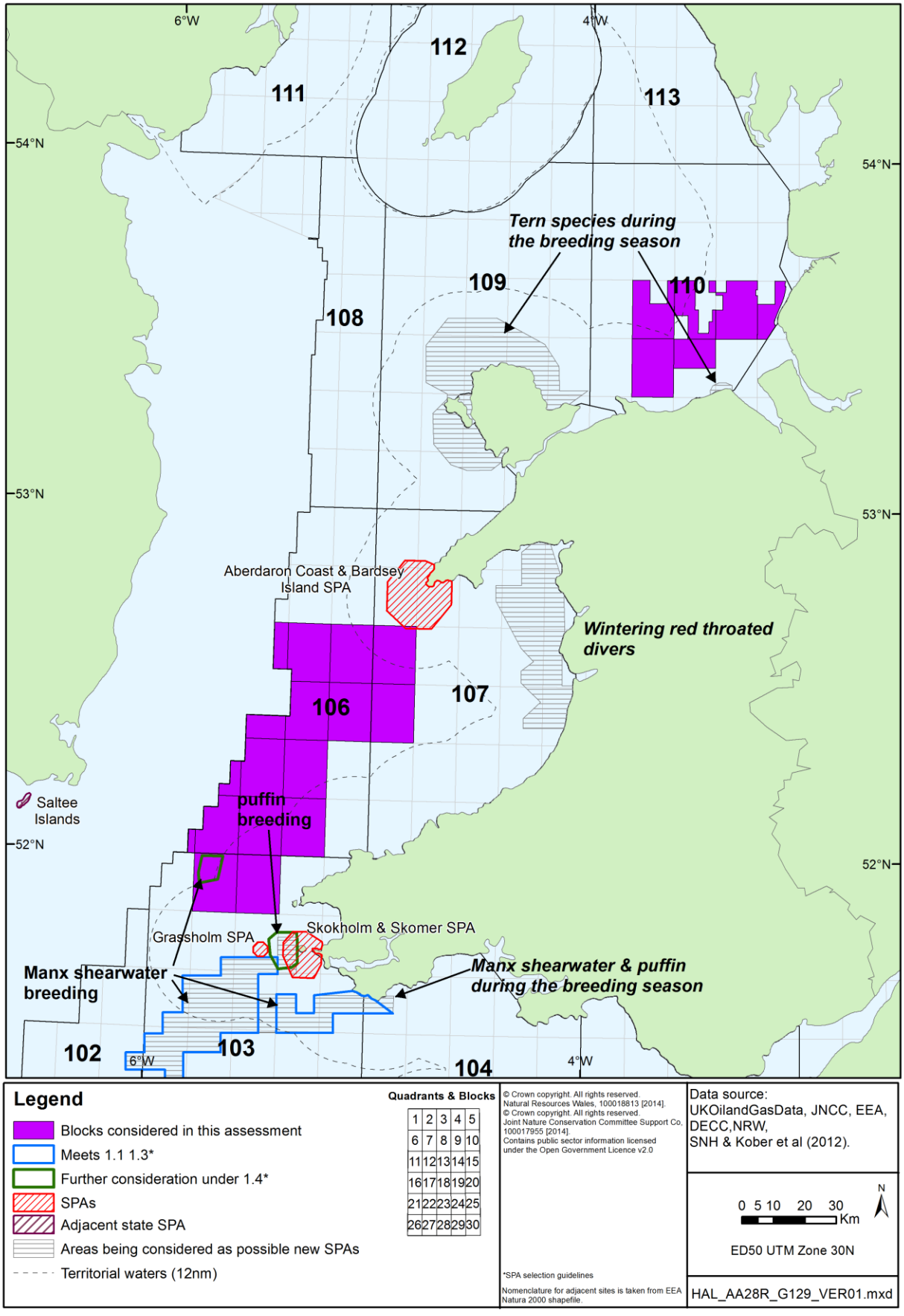


Source: Guilford et al. (2008)

Of particular relevance are important areas of seabird activity outside designated sites which have been identified around the UK coast as part of an ongoing process to identify possible marine SPAs (Kober *et al*. 2010, 2012). Important areas were identified through application of the UK SPA selection guidelines to the European Seabirds at Sea data (1980-2006, Figure 6.3, see Kober *et al*. 2012). Relevant offshore areas supporting important numbers of birds were identified for breeding Manx shearwater and puffin, with one of the areas for Manx shearwater coinciding with Block 103/2. NRW are currently considering a number of areas as possible new marine SPAs[70]. These include areas for breeding terns off the North Wales and Anglesey coast, wintering red throated divers in the northern part of Cardigan Bay (see O'Brien *et al.* 2015), and an area for breeding Manx shearwater and puffin off the Pembrokeshire coast (see indicative areas on Figure 6.3).

[70] http://naturalresources.wales/media/3135/possible-new-marine-special-areas-of-conservation-and-special-protection-areas-in-wales.pdf

Figure 6.3: Important seabird areas relevant to the Irish Sea and St George's Channel Blocks



Section 5.3.1 indicates that bottlenose dolphins (qualifying feature of the Pen Llŷn a`r Sarnau/Lleyn Peninsula and the Sarnau and Cardigan Bay/Bae Ceredigion SACs), with a primarily coastal distribution may also be present in offshore waters of the SACs and also in the wider Irish Sea area (as indicated by the bottlenose dolphin Irish Sea management unit shown in Figure 5.2). Densities in the Irish Sea are likely to be low (average of *ca*. 0.335 animals/km^2, Hammond *et al.* 2013) and current evidence does not suggest more than a low vulnerability to oil spills (Law *et al.* 2011). Similarly, Section 5.3.1 indicates that a number of possible SACs for harbour porpoise are being considered including an area north of Anglesey, Cardigan Bay and Pembrokeshire seas, and seas from Carmarthen Bay down to Cornwall. An accidental oil spill within any of the Blocks could impact bottlenose dolphins and harbour porpoise foraging and mitigation measures (see Section 6.4) may be required to ensure site conservation objectives (including those for possible future sites) are not undermined.

Figure 5.3 indicates that defined areas of the Eastern Irish Sea and St George's Channel may be important for grey seals. In addition to the coastal areas within SACs for which grey seal are qualifying features, coastal waters off north Wales appear to have the highest usage. Baines & Evans (2012) indicated that the highest sighting rates of grey seal occurred in the north-east of Wales, reflecting the distribution of moulting and feeding haul-out sites during the non-breeding season. IAMMWG (2015) indicate that a paper outlining seal management units is expected to be published in 2015. An accidental oil spill in any of the 28th Round Blocks could impact foraging seals and mitigation measures (see Section 6.4) may be required to ensure site conservation objectives are not undermined.

6.4 Mitigation

6.4.1 Mandatory requirements

Spill control and mitigation measures are implemented for offshore exploration and production *inter alia* through the *Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation) Regulations 1998* and the *Offshore Installations (Emergency Pollution Control) Regulations 2002*. The required measures include spill containment measures, risk assessment and contingency planning. Under the Regulations, all operators of an offshore installation or oil handling facility must have an Oil Pollution Emergency Plan (OPEP) in place. The plans are reviewed by DECC, MCA and relevant environmental consultees, such as the Joint Nature Conservation Committee, the relevant country statutory nature conservation body, e.g. Natural England, and other relevant organisations. An OPEP will only be approved by DECC following consultation and satisfactory operator response to any comments. Approval of an OPEP does not constitute approval of the operations covered by the plan. Operators are responsible for ensuring compliance with all other regulatory requirements. OPEPs set out the arrangements for responding to incidents with the potential to cause marine pollution by oil, with a view to preventing such pollution and minimising its effect. Additional requirements can be imposed by DECC through block-specific licence conditions (i.e. "Essential Elements"). Operators are required to follow international and UK best practice when responding to oil spills (i.e. consistent with DECC's OPEP requirements) and the OPEP must identify appropriate strategies to facilitate a prompt and effective response to a pollution event, including details of how and when they would be employed. These details must include strategies specific to the location which may include:

- Monitoring and surveillance (from installation, vessel, aircraft, satellite)
- Dispersion (natural or chemically/mechanically assisted)
- Containment and recovery (booming and mechanical recovery)

- Source control (well capping and relief well operations)

In June 2013 the EU published the Directive on the safety of offshore oil and gas operations. The objective of this Directive is to reduce as far as possible the occurrence of major accidents related to offshore oil and gas operations and to limit their consequences. DECC and HSE are jointly leading the transposition of the Directive as it contains requirements relating to licensing, environmental protection, emergency response and liability, in addition to safety. The Directive has to be implemented by 19th July 2015. While the required content of OPEPs remains largely consistent with existing guidance, there are a number of amendments introduced by the *Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation Convention) (Amendment) Regulations 2015*[71] and updates to OPEP[72] guidance to fulfil specific requirements of the Directive.

Offshore, primary responsibility for oil spill response lies with the relevant operator and their accredited third party pollution responders, although the Secretary of State's Representative may intervene if necessary. The MCA is responsible for a National Contingency Plan and maintains a contractual arrangement for provision of aerial spraying, with aircraft based at East Midlands and if necessary, Inverness. MCA holds counter-pollution equipment (booms, adsorbents etc.) which can be mobilised within 2-12 hours depending on incident location, in addition to a stockpile of chemical dispersant[73]. The UK Government announced in 2012 that an Emergency Towing Vessel for the waters around the Northern and Western Isles will be stationed in Orkney up to 2015 (the contract has now been extended to March 2016)[74]. The government has also been in discussions with the oil industry on the potential of a commercial call-out arrangement to use their vessels[75] and BP have agreed to volunteer a vessel to help in an emergency should the MCA deem it appropriate[76].

The most recent draft OPEP guidance (May 2015) indicates that the potential for shoreline contamination must be determined for all installations using appropriate worst case oil spill modelling. Where modelling indicates the potential for oil to beach, the OPEP must confirm that appropriate response resources are capable of reaching prioritised locations in sufficient time to allow response measures to be implemented to minimise the impact of any oil pollution. In sensitive locations where the risk of shoreline impact is likely to occur before the arrival of resources from existing Tier 2 or 3 stockpiles, consideration should be given to the establishment of dedicated pre-positioned resources.

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[71] http://www.legislation.gov.uk/uksi/2015/386/regulation/2/made

[72] Amendments to the guidance include: requirement for non-production installations to hold an approved OPEP, references to the inventory of response equipment and an assessment of the effectiveness of oil spill response measures, changes to who is required to hold an OPEP (e.g. well operator, installation operator), changes to the nomenclature of different OPEP types, amended worst case modelling requirements, the timeline associated with certain OPEP reviews – see: http://www.hse.gov.uk/osdr/guidance-regulations.htm

[73] Chemical dispersant use is generally inappropriate in shallow sheltered waters, in water depths of less than 20 metres and in waters extending up to 1.15 miles (equivalent to 1 nautical mile) beyond the 20 metre contour, or on refined oil products such as diesel, gasoline or kerosene which should disperse naturally prior to reaching the coast or any sensitive environments. The use of chemical dispersants will, therefore, be dependent upon several factors including the quantity of oil, oil type, sea temperature, time of year, prevailing weather and environmental sensitivities. There are strict controls on the use of dispersants, with only those on an approved list (https://www.gov.uk/government/publications/approved-oil-spill-treatment-products) permitted for use. All oil spill treatment products are tested for their efficacy (effectiveness) and for toxicological hazard.

[74] http://www.shetnews.co.uk/news/9565-sic-retaining-northern-isles-emergency-vessel-is-crucial

[75] Scotland Office website - http://www.scotlandoffice.gov.uk/scotlandoffice/17322.html

[76] https://www.gov.uk/government/news/moore-welcomes-bp-and-north-star-support-for-second-support-vessel\

A Shoreline Protection Plan (SPP) must also be developed for all installations (including pipelines) operating in Blocks wholly or partly within 40km of the coast. The OPEP arrangements for any installation (not pipelines) located within 40km of the coast should also confirm that:

- an appropriate dispersant[75] can be applied within 30 minutes of a pollution incident; and
- sufficient dispersant stocks are available to treat a minimum oil release of 25 tonnes,
- appropriate at sea and shoreline response resources can be available on scene within half the time taken for the oil to beach.

In addition to loss of well control, risk of oil and diesel loss resulting from collision is considered for drilling activities. A consent to locate a drilling rig is required in advance of drilling (see Figure 2.3), which is subject to consultation with relevant stakeholders (e.g. the MCA, MoD). Such consent requires vessel traffic surveys and where there is considered to be a significant navigational risk, collision risk assessment, and requires the movement and location of the rig to be notified to other users of the sea (e.g. through notices to mariners). A statutory 500m safety zone is established around the rig when in the field, and a standby and/or guard vessel is also located next to the rig during drilling operations to ensure that vessels do not enter the safety zone, and to provide emergency response.

6.4.2 Further mitigation measures

Activity specific management measures (e.g. implemented through the operator's accredited (and DECC required) Environmental Management System) can reduce the potential for spills of oil and chemicals of all sizes through, for instance, identification of environmentally critical equipment, related maintenance schedules, training and good practice. During onshore emergency pollution control exercises, DECC may request a list of personnel responsible for responding to oil pollution incidents and evidence of training. DECC Environmental Inspectors may conduct an offshore inspection of the installation and gather evidence to prove compliance with exercise requirements, and check training records for offshore personnel to ensure compliance with training requirements.

Whilst the indemnity and insurance group of OSPRAG concluded that the current Offshore Pollution Liability Association Limited (OPOL) level of US $250 million is appropriate in the majority of scenarios, in certain limited cases spill clean up and compensation costs could result in claims above this limit. Guidance issued by Oil & Gas UK (OGUK) in November 2012 outlined a new process by which operators assess the potential cost of well control, pollution remediation and compensation, with a subsequent requirement to demonstrate to DECC financial capability to address these potential consequences. DECC released a guidance note to industry[77] effective from January 1st 2013 on the demonstration of financial responsibility before consent may be granted for exploration and appraisal wells. It was noted in this document that, though not constituting DECC guidance, considerable weight would be given to operators who can show that they have met the criteria set out in the OGUK guidance. DECC require that an operator must demonstrate the cost of well control and the cost of financial remediation and compensation from pollution at the time of OPEP submission, and verify this

[77] DECC Guidance Note To UK Offshore Oil and Gas Operators On The Demonstration Of Financial Responsibility Before Consent May Be Granted for Exploration and Appraisal Wells On The UKCS (December 2012).

responsibility by, for instance: insurance, parent company guarantee, reliance on credit/financial strength rating of the operator.

Following licensing, specific exploration drilling activities require permitting (see Figure 2.3) and those considered to present a risk to relevant sites would be would be subject to HRA which will allow additional mitigation measures to be defined (including conditions attached to consents/permits or potentially consent/permit refusal). In all cases, rigorous spill prevention, response and other mitigation measures are required of operators and monitored by the regulator for offshore exploration and production. Detailed potential effects of such a release on Natura 2000 sites would be considered at the project level.

Consent for activities will not be granted unless the operator can demonstrate that the proposed activities, which may include the drilling of wells, will not have an adverse effect on the integrity of relevant Natura 2000 sites.

6.5 Conclusions

Individual relevant sites have been categorised in terms of potential vulnerability, based on location in relation to known hydrocarbon prospectivity (primarily gas) of proposed licence Blocks and therefore the nature and magnitude of credible risks. Two categories of vulnerability were identified:

- Those sites considered to be at potential risk (see Table 6.2), with the possibility of impacts in the event of a significant accidental spill of crude or diesel oil (i.e. where site conservation objectives are at risk of being undermined).

- Many sites are considered not to be at risk from oil spills associated with activities in the Blocks, due to their distance from the Blocks and relative sensitivity of the features.

The incremental risk associated with activities resulting from the proposed licensing (i.e. additional to existing risk; primarily associated with shipping and other maritime activities) is low. This results from the combination of low probability and low severity (since most spills would be relatively small and of diesel oil). The activities which could reasonably be expected to follow from the proposed licensing would not have a significant effect on the existing risks associated with other activities (see Section 7 for in-combination effects).

Oil spills can have potentially adverse effects, and are controlled in direct proportion to this by a legal framework that minimises their occurrence, provides for contingency planning, response and clean up, and which creates an offence of such spills to enable prosecutions. It is not possible to say that in spite of the regulatory controls and other preventative measures, an accidental spill will never occur as a result of 28th Round licensing in the Irish Sea and St George's Channel; however, given the nature of the hydrocarbons that may be encountered following licensing, and as such spills are not intended activities, a risk-based assessment is appropriate.

Following licensing, specific exploration drilling activities require permitting (see section above, Figure 2.3) and those considered to present a risk to relevant sites would be evaluated by DECC under mandatory contingency planning and permitting procedures which will allow mitigation measures to be defined (including conditions attached to consents/permits or potentially consent/permit refusal). In all cases, rigorous spill prevention, response and other mitigation measures are required of operators and monitored by the regulator for offshore exploration and production.

Given the availability of prevention and mitigation measures which are applied prior to consenting any activity including project specific safety, oil spill risk assessment, response, inspection and other monitoring, and the requirement for project specific permitting, DECC considers that exploration and production activities that could follow the licensing of Blocks 103/2, 103/3, 106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28, 106/29, 107/11, 107/16, 110/12b, 110/13c, 110/13e, 110/14b, 110/15b, 110/17, and 110/18b, in so far as they may result in accidental hydrocarbon releases, will not adversely affect the integrity of relevant sites.

Consent for activities will not be granted unless the operator can demonstrate that the proposed activities will not adversely affect the integrity of Natura 2000 sites.

7 Cumulative and in-combination effects

7.1 Introduction

Potential incremental, cumulative, synergistic and secondary effects from a range of operations, discharges, emissions (including noise), and accidents were considered in the Offshore Energy SEAs (DECC 2009, 2011; see also OSPAR 2000, 2010). There are a number of potential interactions between activities that may follow licensing and those existing or planned activities in the Irish Sea and St George's Channel area, for instance in relation to renewable energy, fishing, shipping and aggregate extraction. Many of these activities are subject to SEA and other strategic level and individual permitting or consenting mechanisms, and in future to marine spatial planning consistent with the Marine Policy Statement. The first Marine Plans (East Inshore and East Offshore) were published in June 2014[78] and set out objectives and policies to guide development in these areas of English waters over a 20-year period. Of relevance to the Irish Sea and St George's Channel area, a single Marine Plan will be prepared in the future covering the North West Inshore and Offshore areas[79] and a Welsh Marine Plan is currently in development[80].

7.2 Sources of potential effect

Table 7.1 and Figure 7.1 highlight projects which have recently been granted consent or may be granted in the near future, for which there is a potential for interaction with operations that could arise should the 28th Round Blocks be licensed.

The principal sources of cumulative effects are regarded to be related to noise, physical disturbance, and physical presence, primarily arising from offshore wind development. Offshore wind will introduce noise and disturbance sources (particularly during construction) and present an additional physical presence in the marine environment. Offshore wind zones (e.g. Round 3) have already been subject to SEA and HRA, and any related projects have been or will be subject to their own individual assessment and HRA processes. Figure 7.1 indicates the location of wind farms/wind farm zones in relation to the Blocks subject to this assessment and relevant Natura 2000 sites.

In March 2012, Centrica and Dong Energy announced they had formed a joint venture called Celtic Array Limited to develop offshore wind farms in the Round 3 Irish Sea Zone. The first project from this joint venture was the Rhiannon Wind Farm which was cancelled in July 2014[81].

There is currently no infrastructure deployed in the region associated with the extraction of wave and tidal energy although Tidal Energy Ltd are close to installing a single DeltaStream unit off the coast of Pembrokeshire at Ramsey Sound for twelve months. The project will be used to demonstrate the capability of DeltaStream as a tidal stream generator and provide

[78] https://www.gov.uk/government/publications/east-inshore-and-east-offshore-marine-plans
[79] https://www.gov.uk/government/publications/marine-plan-areas-in-england
[80] http://wales.gov.uk/topics/environmentcountryside/fisheries/marine/marine-planning/latest-news/?lang=en
[81] http://www.bbc.com/news/uk-wales-north-west-wales-28580683

evidence on how the device interacts with the environment[82]. The Welsh Government consented a small tidal energy scheme (10MW), the Skerries Tidal Stream Array, to consist of up to five 2MW turbines to be located between the Skerries and Carmel Head about 1km off the Anglesey coast (Figure 7.1), however, this project was suspended in September 2014[83]. In July 2014 the Crown Estate announced that it had agreed seabed rights for a number of wave and tidal current demonstrator (to enable locally-based organisations to manage and sub-let parts of the seabed to a range of wave and tidal stream developers), and project (to deliver between 10 and 30MW) sites[84]. Relevant sites are shown in Figure 7.1 and include Holyhead Deep tidal stream project site, West Anglesey tidal stream demonstration zone and South Pembrokeshire wave demonstration zone.

The UK Government believes that the oil & gas and wind industry can successfully co-exist, as stated in DECC's *Other Regulatory Issues* for the 28th Round, "…we [(DECC)] advise that potential applicants on such blocks [(areas where oil and gas licenses and proposed or actual wind farm sites exist and indeed overlap)] should make early contact with the holders of any relevant wind farm lease or Agreement for lease (AfL), or the relevant zone developer(s), and establish in good time a mutual understanding of the respective proposals and time frames envisaged (acknowledging that not all aspects of the future plans of either side will necessarily be definitively decided at that time)"[85]. Early discussions between the developers will ensure that any potential conflict can be mitigated so that both developments can proceed with minimal delay and without the need to determine any part of an existing Crown Estate Lease or Agreement for Lease. In addition to renewables activities, early engagement with other users (e.g. through fisheries liaison, vessel traffic surveys, consultation with the MoD[86] (e.g. in relation to Aberporth and Castlemartin firing ranges) or holders of other Crown Estate offshore interests)[85] where scheduling overlaps may occur should allow both for developer cooperation, and the mitigation of potential cumulative or in-combination effects.

There are a number of aggregate extraction licences held within the Irish Sea, the majority of which are in the Bristol Channel and not of relevance to this assessment. However, there are three licences held off the North Wales coast which overlap with Blocks in this assessment. Aggregate extraction Area 457 is positioned in Blocks 110/12b and 110/13c, while the joint Areas 392 and 393 are partially in Block 110/18b. In addition to these, there are a three beach replenishment projects on the coast of North Wales, at Kinmel Bay, Llandudno and Deganwy.

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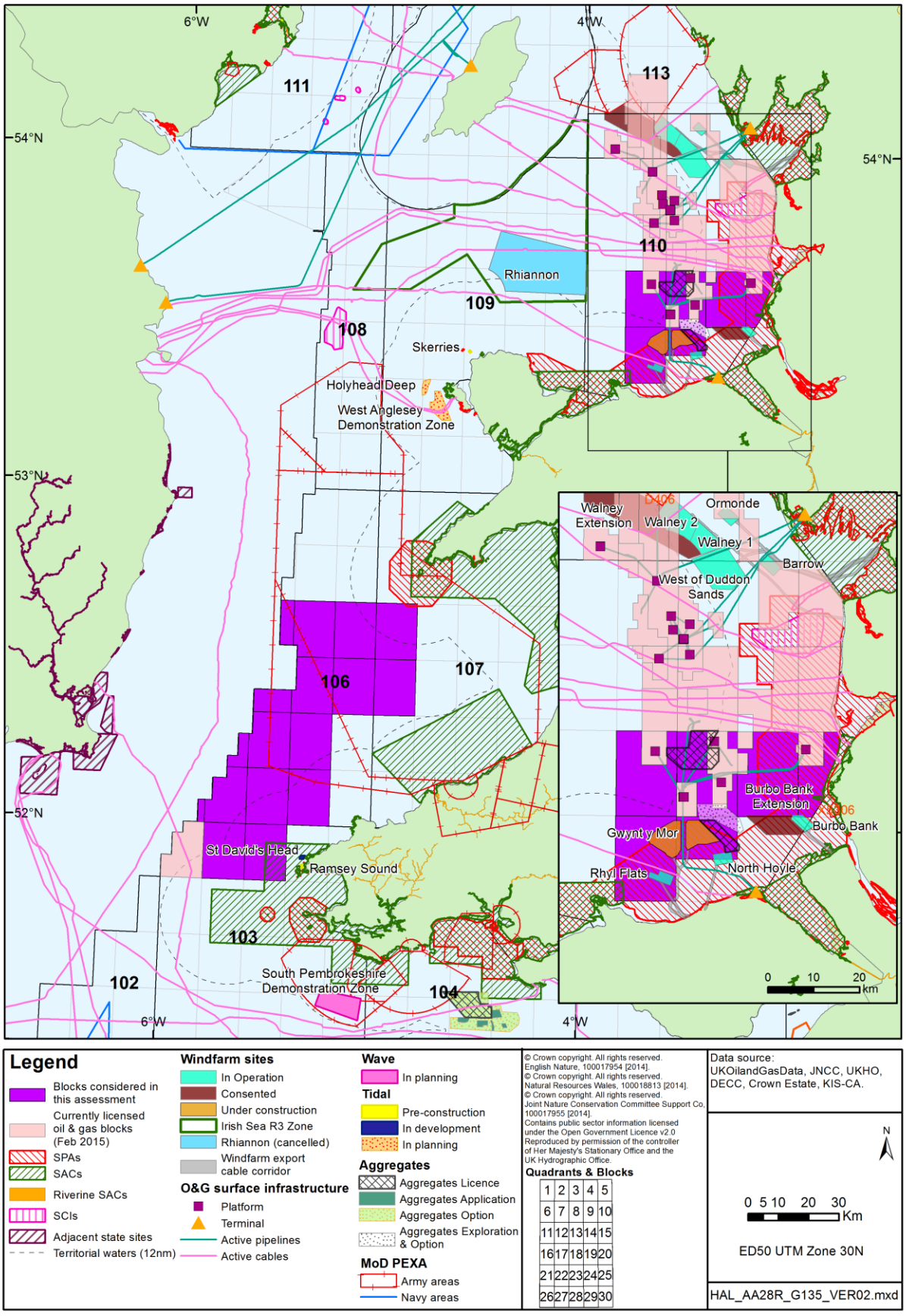
[82] http://www.tidalenergyltd.com/?page_id=650
[83] http://www.bbc.com/news/uk-wales-north-west-wales-29023425
[84] http://www.wavehub.co.uk/news/crown-estate-unlocks-further-uk-wave-and-tidal-current-opportunities/
[85] DECC 28th Round other regulatory issues
[86] Note that all Blocks within Cardigan Bay and St George's Channel are subject to special licence conditions in relation to MoD activity in these areas. At least 12 months notice is required prior to siting an installation (fixed or floating) in any of the Blocks, and due to the current and past usage of the area covering the Quad 106 and 107 Blocks, it cannot be assumed that the MoD will necessarily agree to operations or the presence of facilities at any given location, within this area, or at any given time.

Table 7.1: Projects relevant to the cumulative and in-combination assessment of the Irish Sea and St George's Channel Blocks

Relevant projects	Project summary	Project status	Proximity to Blocks
Walney Extension Offshore Wind Farm (DONG Energy Walney Extension (UK) Ltd)	Proposed offshore wind farm extension located to the north west of the existing Walney I and Walney II wind farm and 19km west of the Cumbrian coast. Development will have an upper generating capacity of 750MW and consist of up to 207 wind turbines[87].	Development consent granted November 2014.	Over 40km to the north of the Q110 Blocks
Burbo Bank Extension offshore wind farm (DONG Energy Burbo Extension (UK) Ltd	Proposed Burbo Bank Extension offshore wind farm covering an area of 40km² and consisting of up to 69 wind turbines with an estimated generating capacity of up to 259MW. Located west of the operational Burbo Bank offshore wind farm in Liverpool Bay, around 7km north of the North Wirral coast and 12.2km from the Point of Ayr on the Welsh coast[88].	Development consent granted September 2014	On southern boundary of Block 110/14b
Gwynt y Môr Offshore Wind Farm (RWE Innogy)	Gwynt y Môr offshore wind farm will consist of 160 turbines and have an installed capacity of 576MW. Located 16km from the North Wales coast.	Development consent granted December 2008[89]. Under construction and due to be fully operational end of 2014[90].	Overlaps with Blocks 110/17 and 110/18b

[87] http://infrastructure.planningportal.gov.uk/document/2809139
[88] http://infrastructure.planningportal.gov.uk/projects/north-west/burbo-bank-extension-offshore-wind-farm/
[89] https://www.og.decc.gov.uk/EIP/pages/projects/GwyntyMorDecisionConsent.pdf
[90] http://www.rwe.com/web/cms/en/1202906/rwe-innogy/sites/wind-offshore/under-construction/gwynt-y-mr/

Figure 7.1: Projects relevant to the cumulative and in-combination assessment of the Irish Sea and St George's Channel Blocks



7.3 Underwater noise

Seismic survey (proposed for 17 Blocks in Quadrants 103, 106 and 107 in St George's Channel although no information as to where within these Blocks new 3D survey may be undertaken) and other noise producing activities (e.g. rig site survey, VSP) that might follow the proposed licensing of the Irish Sea and St George's Channel Blocks are anticipated to be widely separated in space and time. Therefore, any acoustic disturbance to marine mammals with the potential to cause displacement from foraging areas will be short-term and infrequent. SMRU (2007) note that "*The effects of repeated surveys are not known, but insignificant transient effects may become important if potentially disturbing activities are repeated and/or intensified.*" There is the potential for cumulative noise impacts where concurrent and sequential activities result in long-term exposure to elevated noise levels within the wider area. During the period 1995-2010 reviewed by Stone (2015b), seismic activity in St George's Channel made up only a small proportion of all the surveys that took place in the UKCS. In 1995 surveys in this area made up ~14% of all surveys but this was the exception; thereafter numbers have been much reduced, making up <1% in 2000-2010[91], with no seismic surveys in some years. Seismic activity is also proportionally low in the Irish Sea; it was lowest in 1999-2006 (<1%) and reached ~8% in 2007-2009.

Other noise producing activities which are likely to occur within the Irish Sea and St George's Channel area include those associated with the development of offshore wind energy. Offshore wind energy is in the process of large-scale development in the region. In addition to the operational offshore wind farms (see Figure 7.1), applications have been made and consents granted for several substantial offshore wind energy developments in the region (see Table 7.1), and construction works are expected to begin in the near future at the Walney Extension and Burbo Bank Extension wind farms.

While the operation, maintenance and decommissioning of offshore wind energy developments will introduce noise into the marine environment, these are typically of low intensity. The greatest noise levels arise during the construction phase, and it is these which have the greatest potential for acoustic disturbance effects (see Faber Maunsell & Metoc 2007, DECC 2009, 2011). Pile-driving of mono-pile foundations is the principal source of construction noise, which will be qualitatively similar to pile-driving noise resulting from harbour works, bridge construction and oil and gas platform installation. Mono-pile foundations are the most commonly used for offshore wind farm developments at present.

In relation to offshore pile-driving, standard conditions on consents for Round 2 (and for the Round 3 projects consented to date e.g. Hornsea Project One) offshore wind farms include various protocols to reduce the risk of mortality and injury of marine life, including the use of soft start, Marine Mammal Observers and Passive Acoustic Monitoring. For future developments, additional measures are likely to be required in areas where EIA suggests that high cetacean densities or site fidelity may occur; these may include technical measures such as pile sleeves (see Nehls *et al*. 2007). The "Statutory nature conservation agency protocol for minimising the risk of disturbance and injury to marine mammals from piling noise" (August 2010) outlines a protocol for the mitigation of potential underwater noise impacts arising from pile driving during offshore wind farm construction. Noise sources which are likely to occur following 28th round licensing have been discussed in Section 6. Those Blocks within which significant noise sources may be generated (from proposed seismic survey), are within

[91] Stone (2015b) indicated that a total of *ca*. 100 seismic surveys were carried out on the UKCS in 2010 including 2D and 3D seismic surveys (10%), site surveys (60%) and VSP (20%).

relevant Blocks in Quadrants 103, 106 and 107 which are distant (see Figure 7.1) from the offshore wind farm projects where construction activities are likely in the near future (see Table 7.1). However, sensitive qualifying features from SACs in St George's Channel (e.g. bottlenose dolphin and grey seal (from Lleyn Peninsula and the Sarnau SAC, Cardigan Bay SAC and Pembrokeshire Marine SAC (grey seal only)), forage widely (see Section 5.3) and may be present in areas of the Irish Sea exposed to piling noise associated with offshore wind developments. However, given the limited and temporary nature of the proposed seismic surveys and mitigation measures available (including HRA), they are unlikely to result in significant in-combination effects with piling noise associated with offshore wind farm construction.

The audibility of operational wind farm noise was discussed in OESEA2 (DECC 2011), with available evidence suggesting that behavioural reactions in seals could not be excluded for up to a few hundred metres from turbine foundations, and that it was unlikely that noise reached dangerous levels or was capable of masking acoustic communication in porpoises. Guidance from JNCC on the potential for disturbance of EPS from operational noise states that there is presently no serious concern over the issue, but that further research would be required to understand any effects from the scaling up of wind farms. Other research (e.g. Teilmann & Carstensen 2012) suggested the potential for slow recovery of habitat use by harbour porpoise following construction and into the operational phase based on evidence from Nysted, a Danish offshore wind farm. The authors acknowledged that this was not representative of evidence from other wind farms (e.g. Horns Rev I and Egmond aan Zee) and concluded that until more information was available on the actual cause of the observed difference no generalisation of the results to other wind farms could be recommended (Teilmann & Carstensen 2012). Given the relatively discrete level of activity which could arise from the completion of the work programmes in the Irish Sea and St George's Channel Blocks, it is not expected that cumulative effects associated with wind farm operation would arise.

In addition to those activities which may follow licensing of the Blocks and the other potentially relevant developments listed in Table 7.1, there are a variety of other existing (e.g. oil and gas production (see Figure 7.1), fishing, shipping, military exercise areas, wildlife watching cruises) and planned (e.g. oil and gas exploration and production) noise-producing activities in overlapping or adjacent areas. Despite this, DECC is not aware of any projects or activities which are likely to cause cumulative and in-combination effects that, when taken in-combination with the likely number and scale of activities proposed by the work programmes (see Section 2.2), would adversely affect the integrity of the relevant sites. This is due to the presence of effective regulatory mechanisms which ensure that operators, DECC and other relevant consenting authorities take such considerations into account during activity permitting. These mechanisms generally allow for public participation in the process, and this will be strengthened by regulations amending the offshore EIA regime which may come into force 2015/2016. These will reflect Directive 2014/52/EU (amending the EIA Directive) which provides for closer co-ordination between the EIA and Habitats Directives, with a revised Article 3 indicating that biodiversity within EIA should be described and assessed "*with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC".*

With respect to the ongoing process to implement the Marine Strategy Framework Directive, the first stage (reported in previous 27th Round AA documents) was for Member States to carry out an initial assessment of the current status of their seas, determine specific characteristics of Good Environmental Status (GES) for their marine waters and set out specific environmental targets and indicators to underpin this (based on the 11 descriptors of GES given in the Directive). The UK completed this first stage in December 2012 with the

publication of the Marine Strategy Part One. The second stage required Member States to establish and implement monitoring programmes to measure progress towards GES. The final stage is the implementation of management measures to achieve GES by 2020. These have to be developed by 2015 and implemented by 2016. A consultation on the UK's proposed programme of measures closed in April 2015[92]. The UK Marine Strategy Part Two provides summaries of the UK Monitoring programmes for the 11 descriptors of GES that are now in place.

Of particular relevance are the proposed monitoring programmes for underwater noise (Descriptor 11). For context, the Marine Strategy Part One defined the UK characteristics of GES for noise (covering impulsive sound, caused primarily by activities such as oil and gas seismic activity and pile driving for wind farms) as:

- Loud, low and mid frequency impulsive sounds and continuous low frequency sounds introduced into the marine environment through human activities do not have adverse effects on marine ecosystems: Human activities potentially introducing loud, low and mid frequency impulsive sounds into the marine environment are managed to the extent that no significant long term adverse effects are incurred at the population level or specifically to vulnerable/threatened species and key functional groups. Continuous low frequency sound inputs do not pose a significant risk to marine life at the population level, or specifically to vulnerable/threatened species and key functional groups e.g. through the masking of biologically significant sounds and behavioural reactions.

Due to the high level of uncertainty about the effects of noise, it was not possible for experts to recommend a specific target for either impulsive sounds or ambient sounds which they believed to be equivalent to GES. Instead, an operational target was developed for impulsive sounds and a surveillance indicator developed for ambient sounds:

- To establish a 'noise registry' to record, assess and manage the distribution and timing of anthropogenic sound sources measured over the frequency band 10Hz to 10kHz, exceeding the energy source level 183 dB re 1 μPa^2 m^2s; or the zero to peak source level of 224 dB re 1 μPa^2 m^2 over the entire UK hydrocarbon licence block area.

- Surveillance indicator to monitor trends in the ambient noise level within the 1/3 octave bands 63 and 125 Hz (centre frequency) (re 1µPa RMS; average noise level in these octave bands over a year) measured by observation stations.

Marine Strategy Part Two indicates that with respect to impulsive sounds, a noise registry is being developed that will record in space and time noise generating activities such as seismic surveys and pile driving.

DECC is cognisant of the ongoing efforts to implement the MSFD. DECC will review the results of the ongoing process closely with respect to the consenting of relevant activities which may result from future licensing, as well as other activities which generate noise in the marine environment.

[92] https://consult.defra.gov.uk/marine/msfd-programme-of-measures

7.4 Other potential in-combination effects

7.4.1 Physical damage/change to features and habitats

Potential sources of physical disturbance to the seabed, and damage to biotopes, associated with oil and gas activities that could result from licensing were described in Section 4.2 and include the anchoring of semi-submersible rigs, placement of jack-up drilling rigs and wellhead placement and recovery.

The southern boundary of Block 110/14b partly overlaps with the Burbo Bank offshore wind farm extension area (see Table 7.1 and Figure 7.1), both of which coincide with the Liverpool Bay SPA. Similarly, an aggregate licence area is present in Block 110/18b which also coincides with Liverpool Bay SPA. The site's qualifying features and supporting habitats are highly sensitive to physical loss through abrasion (e.g. rig placement) and moderately to highly sensitive to smothering (from drill cuttings)[93]. Both Block 110/14b and 110/18b are part of a single licence application which includes another 4 Blocks with one drill or drop well proposed between them. The seabed footprint associated with placement of a jack up rig is small (see Section 4.2.1) but could cause some minor and temporary loss or deterioration of supporting habitats in those Blocks within the site boundaries. Therefore given the low level of proposed activity, the small and temporary footprint associated with drilling activities, significant in-combination effects with other activities such as offshore wind farm construction and aggregate extraction are unlikely.

With regards to the Irish Sea, existing oil and gas surface infrastructure is widespread particularly in the southern part (Figure 7.2) and there may be the potential for in-combination effects with respect to current oil and gas projects. A review of current oil and gas projects (as of February 2015) published by DECC's Project Pathfinder[94] indicates two projects for Blocks within the Irish Sea; 1 in Block 110/12a is planned as a subsea tie-back development to existing infrastructure, the other project is a gas storage project in Block 110/3b. Whilst Block 110/12a is adjacent to the 28th Round Block 110/12b, it does not coincide with the Liverpool Bay SPA and significant in-combination effects are not likely given the small and temporary footprint associated with drilling activities. Block 110/3b is not adjacent to or overlap any 28th Round Blocks or Natura 2000 sites and significant in-combination effects are unlikely. No relevant decommissioning projects were identified by Project Pathfinder.

Given the spatial separation of the various potential energy developments within the Irish Sea and St George's Channel area, cumulative impacts on habitats which are also foraging grounds for qualifying species (e.g. birds and marine mammals) directly connected to the incremental activity associated with the 28th Round is not considered likely. When greater project definition is available for the Blocks (e.g. specific rig siting and timing of activities) then further assessment will be undertaken (e.g. individual rig site survey to inform environmental assessment as part of an EIA and project level HRA where appropriate – see Figure 2.3).

7.4.2 Physical presence

Physical presence of offshore infrastructure and support activities may also potentially cause behavioural responses in fish, birds and marine mammals. Previous SEAs have considered the majority of such behavioural responses resulting from interactions with offshore oil and gas infrastructure (whether positive or negative) to be insignificant; in part because the number of

[93] http://publications.naturalengland.org.uk/file/4413148
[94] https://itportal.decc.gov.uk/eng/fox/path/PATH_REPORTS/pdf

surface facilities is relatively small (of the order of a few hundred) and because the majority are at a substantial distance offshore. The larger numbers of individual surface or submerged structures associated with offshore wind developments, the presence of rotating turbine blades and considerations of their location and spatial distribution (e.g. in relation to coastal breeding or wintering locations for waterbirds and important areas for marine mammals), indicate a higher potential for physical presence effects. The HRA for the proposed Burbo Bank Extension indicated that the presence of the site in-combination with other offshore wind farm developments in the area (e.g. Burbo Bank, Rhyl Flats and Gwynt y Môr) had the potential to have a likely significant effect upon a number of Natura 2000 sites including Liverpool Bay SPA, Mersey Narrows and Wirral Foreshore SPA and Ribble and Alt Estuaries SPA, primarily through displacement and barrier effects. The Secretary of State undertook an appropriate assessment in respect of these sites and determined that the Burbo Bank Extension would not have an adverse effect upon the sites' integrity either alone or in-combination with other plans and projects[95]. Though representing a small incremental source of activity in and around offshore wind farm areas (1 drill or drop well proposed between the relevant Quadrant 110 Blocks), it is anticipated that cumulative impacts with respect to the 28th Round Blocks can be avoided through early engagement with lease holders, and that due to the spatially limited and transient nature of exploration drilling that timing of OWF construction activities and any activity associated with the work programmes could be phased in such a way as to avoid cumulative effects from physical presence on any European species.

Shipping densities over the licence Blocks are predominantly low to moderate (although high to very high densities present in parts of Liverpool Bay and St George's Channel), and any additional vessels associated with drilling will represent a small incremental increase to existing traffic. For instance typical supply visits to rigs while drilling may be in the order of 2 to 3 per week. At this stage, any increased probability of a shipping collision associated with this modest increase in traffic cannot be assessed in a meaningful way (e.g. due to a lack of knowledge of individual rig location, ports to be used for supply and vessel traffic at individual rig locations). The siting of any rig will require individual consenting at the activity level (including vessel traffic survey and a collision risk assessment where there is considered to be a significant navigational risk), charting, advertising through notices to mariners, and fisheries liaison. Activities are typically restricted to within a statutory 500m safety zone around the rig, and the presence of the rig and standby vessel would be temporary (days to a few months).

7.4.3 Marine discharges

Previous discharges of WBM cuttings in the UKCS have been shown to disperse rapidly and to have minimal ecological effects (Section 4.3). Dispersion of further discharges of mud and cuttings could lead to localised accumulation in areas where reduced current allows the particles to accumulate on the seabed. However, in view of the scale of the proposed activity, extent of the region, the water depths and currents, this is considered unlikely to be detectable and to have negligible cumulative ecological effect (DECC 2011).

7.5 Conclusions

Available evidence (see e.g. UKBenthos database and OSPAR 2000) for the Irish Sea indicates that past oil and gas activity and discharges has not led to adverse impacts on the

[95] http://infrastructure.planningportal.gov.uk/wp-content/ipc/uploads/projects/EN010026/3.%20Post%20Decision%20Information/Decision/Secretary%20of%20State%20for%20Energy%20and%20Climate%20Change%E2%80%99s%20HRA%20report.pdf

integrity of European sites in the area. Any activities relating to the work programmes, and any subsequent development that may occur if site appraisal is successful, will be judged on its own merits and in the context of wider development in the Irish Sea and St George's Channel area (i.e. any potential incremental effects). The current controls on terrestrial and marine industrial activities, including oil and gas operations that could follow licensing, can be expected to prevent significant in-combination effects affecting relevant European sites.

The competent authorities will assess the potential for in-combination effects during HRA of project specific consent applications; this process will ensure that mitigation measures are put in place such that subsequent to licensing, specific projects (if consented) will not result in adverse effects on integrity of European sites. Therefore it is concluded that the in-combination effects from activities arising from the licensing of Blocks 103/2, 103/3, 106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28, 106/29, 107/11, 107/16, 110/12b, 110/13c, 110/13e, 110/14b, 110/15b, 110/17, and 110/18b with those from existing and planned activities in the Irish Sea and St George's Channel will not adversely affect the integrity of relevant European Sites.

8 Overall conclusion

Taking account of the evidence and assessment presented above, the report determines that the plan/programme will not have an significant adverse effect on the integrity of the relevant sites (identified in Section 1.3), and recommends the granting of consent by the Secretary of State for the award of licences covering Blocks 103/2, 103/3, 106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28, 106/29, 107/11, 107/16, 110/12b, 110/13c, 110/13e, 110/14b, 110/15b, 110/17, and 110/18b. This is because there is certainty, within the meaning of the ECJ Judgment in the *Waddenzee* case, that implementation of the plan will not adversely affect the integrity of relevant European Sites (as described in Section 4.3, 5.3 and 6.3), taking account of the mitigation measures that can be imposed through existing permitting mechanisms on the planning and conduct of activities (as described in Section 4.4, 5.4 and 6.4).

These mitigation measures are incorporated in respect of habitat, diadromous fish, bird and marine mammal interest features through the range of legislation and guidance (see https://www.gov.uk/oil-and-gas-offshore-environmental-legislation) which apply to developer activities which could follow plan adoption. Where necessary, project-specific HRA based on detailed project proposals would be undertaken by the competent authority before the granting of a permit/consent. The competent authority needs to be satisfied that the proposed activity will not result in adverse effects on integrity of relevant sites.

Even where a site/interest feature has been screened out in the plan level assessment, or where a conclusion of no adverse effect on integrity has been reached at plan level, project level HRA will be necessary if, for example, new relevant sites have been designated after the plan level assessment; new information emerges about the nature and sensitivities of interest features within sites, new information emerges about effects including in-combination effects; or if plan level assumptions have not been met at the project level.

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Appendix A – The Sites

A1 Introduction

The following maps and tables show the locations of potentially relevant European sites and their qualifying features with respect to the Blocks applied for as part of the 28th Licensing Round.

The primary sources of site data were the latest JNCC SAC[96] (version as of 1st September 2014) and SPA[97] (version as of 1st September 2014) summary data and interest features and site characteristics were filtered for their coastal and marine relevance. The Natural Resources Wales[98] website was also reviewed to verify and augment site information.

The sites in this Appendix are ordered thus:

A2 Coastal and marine Special Protection Areas

A3 Coastal and marine Special Areas of Conservation

A4 Offshore Special Areas of Conservation

A5 Riverine Special Areas of Conservation

A6 Ramsar sites

A2 Coastal and Marine Special Protection Areas

Special Protection Areas (SPAs) are protected sites classified in accordance with Article 4 of the EC Birds Directive 2009/147/EC. Sites are classified for rare and vulnerable birds and for regularly occurring migratory birds. The SPAs included in this section are coastal sites which have been selected for the presence of one or more of the bird species listed in Box A.1 (below).

[96] Version as of 1st September 2014 - http://jncc.defra.gov.uk/page-1461
[97] Version as of 1st September 2014 - http://jncc.defra.gov.uk/page-1409
[98] http://www.ccw.gov.uk/landscape--wildlife/protecting-our-landscape/special-landscapes--sites/sites-search-results.aspx

Box A.1: Migratory and/or Annex I bird species for which SPAs are selected in the UK

Divers and grebes
Red-throated diver *Gavia stellata*
Black-throated diver *Gavia arctica*
Little grebe *Tachybaptus ruficollis*
Great crested grebe *Podiceps cristatus*
Slavonian grebe *Podiceps auritus*

Seabirds
Fulmar *Fulmarus glacialis*
Manx shearwater *Puffinus puffinus*
Storm petrel *Hydrobates pelagicus*
Leach's petrel *Oceanodroma leucorhoa*
Gannet *Morus bassanus*
Cormorant *Phalacrocorax carbo carbo*
Shag *Phalacrocorax aristotelis*
Guillemot *Uria aalge*
Razorbill *Alca torda*
Puffin *Fratercula arctica*

Gulls, terns and skuas
Arctic skua *Stercorarius parasiticus*
Great skua *Catharacta skua*
Mediterranean gull *Larus melanocephalus*
Black-headed gull *Larus ridibundus*
Common gull *Larus canus*
Lesser black-backed gull *Larus fuscus*
Herring gull *Larus argentatus*
Great black-backed gull *Larus marinus*
Kittiwake *Rissa tridactyla*
Sandwich tern *Sterna sandvicensis*
Roseate tern *Sterna dougallii*
Common tern *Sterna hirundo*
Arctic tern *Sterna paradisaea*
Little tern *Sterna albifrons*

Crakes and rails
Spotted crake *Porzana porzana*
Corncrake *Crex crex*
Coot *Fulica atra*

Birds of prey and owls
Honey buzzard *Pernis apivorus*
Red kite *Milvus milvus*
Marsh harrier *Circus aeruginosus*
Hen harrier *Circus cyaneus*
Golden eagle *Aquila chrysaetos*
Osprey *Pandion haliaetus*
Merlin *Falco columbarius*
Peregrine *Falco peregrinus*
Short-eared owl *Asio flammeus*

Other bird species
Capercaillie *Tetrao urogallus*
Nightjar *Caprimulgus europaeus*
Woodlark *Lullula arborea*
Fair Isle wren *Troglodytes troglodytes fridariensis*
Aquatic warbler *Acrocephalus paludicola*
Dartford warbler *Sylvia undata*
Chough *Pyrrhocorax pyrrhocorax*
Scottish crossbill *Loxia scotica*

Waders
Oystercatcher *Haematopus ostralegus*
Avocet *Recurvirostra avosetta*
Stone curlew *Burhinus oedicnemus*
Ringed plover *Charadrius hiaticula*
Dotterel *Charadrius morinellus*
Golden plover *Pluvialis apricaria*
Grey plover *Pluvialis squatarola*
Lapwing *Vanellus vanellus*
Knot *Calidris canutus*
Sanderling *Calidris alba*
Purple sandpiper *Calidris maritima*
Dunlin *Calidris alpina alpina*
Ruff *Philomachus pugnax*
Snipe *Gallinago gallinago*
Black-tailed godwit *Limosa limosa* (breeding)
Black-tailed godwit *Limosa limosa islandica* (non-breeding)
Bar-tailed godwit *Limosa lapponica*
Whimbrel *Numenius phaeopus*
Curlew *Numenius arquata*
Redshank *Tringa totanus*
Greenshank *Tringa nebularia*
Wood sandpiper *Tringa glareola*
Turnstone *Arenaria interpres*
Red-necked phalarope *Phalaropus lobatus*

Waterfowl
Bewick's swan *Cygnus columbianus bewickii*
Whooper swan *Cygnus cygnus*
Bean goose *Anser fabalis*
Pink-footed goose *Anser brachyrhynchus*
Russian white-fronted goose *Anser albifrons albifrons*
Greenland white-fronted goose *Anser albifrons flavirostris*
Icelandic greylag goose *Anser anser*
Greenland barnacle goose *Branta leucopsis*
Svalbard barnacle goose *Branta leucopsis*
Dark-bellied brent goose *Branta bernicla bernicla*
Canadian light-bellied brent goose *Branta bernicla hrota*
Svalbard light-bellied brent goose *Branta bernicla hrota*
Shelduck *Tadorna tadorna*
Wigeon *Anas penelope*
Gadwall *Anas strepera*
Teal *Anas crecca*
Mallard *Anas platyrhynchos*
Pintail *Anas acuta*
Shoveler *Anas clypeata*
Pochard *Aythya ferina*
Tufted duck *Aythya fuligula*
Scaup *Aythya marila*
Eider *Somateria mollissima*
Long-tailed duck *Clangula hyemalis*
Common scoter *Melanitta nigra*
Velvet scoter *Melanitta fusca*
Goldeneye *Bucephala clangula*
Red-breasted merganser *Mergus serrator*
Goosander *Mergus merganser*

Map A.1: Location of SPAs

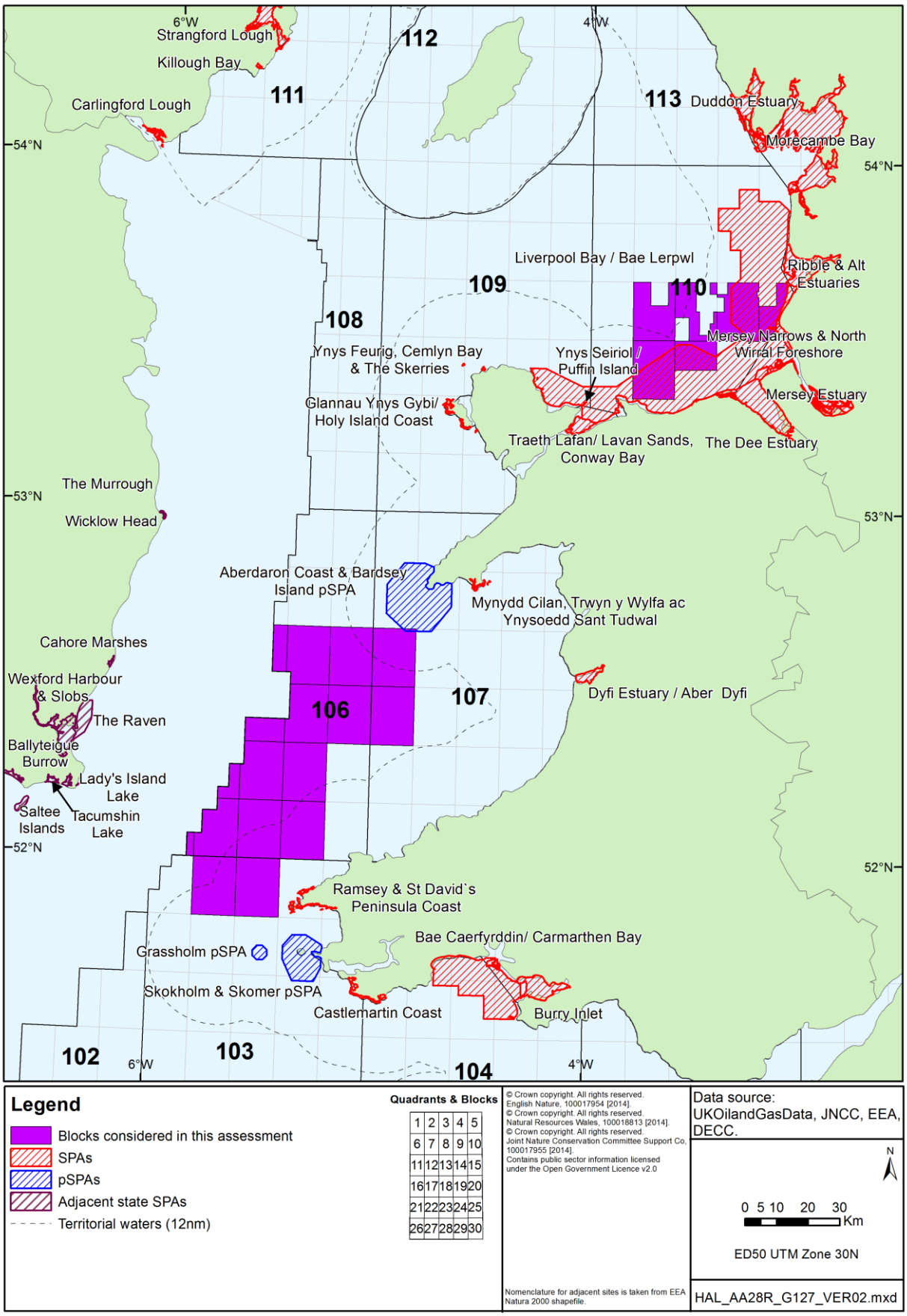


Table A.1: Coastal and marine SPAs and their Qualifying Features

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[99]
Duddon Estuary SPA	6806.3	Breeding: Sandwich tern	Over winter: Knot Pintail Redshank On passage: Ringed plover Sanderling	Over winter: Waterfowl
Morecambe Bay SPA	37404.6	Breeding: Sandwich tern Little tern Common tern Over winter: Bar-tailed godwit Golden plover	Breeding: Herring gull Lesser black-backed gull Eider On passage: Ringed plover Sanderling Over winter: Curlew Dunlin Grey plover Knot Oystercatcher Pink-footed goose Pintail Redshank Shelduck Turnstone	Over winter: Waterfowl
Ribble and Alt Estuaries SPA	12412.31	Breeding: Common tern Ruff Over winter: Bewick swan Whooper swan Bar-tailed godwit Golden plover	Breeding: Lesser black-backed gull Black-headed gull Over winter: Pintail Teal Wigeon Pink-footed goose Scaup Sanderling Dunlin Knot Oystercatcher Black-tailed godwit Common scoter Curlew Cormorant Grey plover Shelduck Redshank Lapwing	Breeding: Seabirds Over winter: Waterfowl

[99] - A seabird assemblage of international importance. The area regularly supports at least 20,000 seabirds. Or - A wetland of international importance. The area regularly supports at least 20,000 waterfowl.

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[99]
			On passage: Sanderling Ringed plover Whimbrel Redshank	
Mersey Estuary SPA	5023.35	Over winter: Golden plover	Over winter: Pintail Teal Wigeon Dunlin Black-tailed godwit Curlew Grey plover Great crested grebe Shelduck Redshank Lapwing On passage: Ringed plover Redshank	Over winter: Waterfowl
Mersey Narrows and North Wirral Foreshore SPA	2078.41	Breeding: Common tern Over winter: Bar-tailed godwit On passage: Common tern	Over winter: Knot On passage: Little gull	Over winter: Waterfowl
Liverpool Bay / Bae Lerpwl marine SPA	170292.94	Over winter: Red-throated diver	Over winter: Common scoter	Over winter: Waterfowl
The Dee Estuary / Aber Afon Dyfrdwy SPA	14291.56	Breeding: Common tern Little tern Over winter: Bar-tailed godwit On passage: Sandwich tern	Over winter: Pintail Knot Oystercatcher Shelduck Redshank Black-tailed godwit Curlew Dunlin Grey plover Teal On passage: Redshank	Over winter: Waterfowl
Glannau Ynys Gybi / Holy Island Coast SPA	608.04	Breeding: Chough Over winter: Chough	N/A	N/A
Traeth Lafan / Lavan Sands, Conway Bay SPA	2642.98	N/A	Over winter: Oystercatcher Curlew On passage: Great crested grebe	N/A
Ynys Feurig, Cemlyn	85.98	Breeding:	N/A	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[99]
Bay and the Skerries SPA		Roseate tern Common tern Arctic tern Sandwich tern		
Ynys Seiriol / Puffin Bay SPA	31.33	N/A	Breeding: Cormorant	N/A
Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island SPA	505.03	Breeding: Chough Over winter: Chough	Breeding: Manx shearwater	N/A
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal SPA	372.9	Breeding: Chough Over winter: Chough	N/A	N/A
Dyfi Estuary / Aber Dyfi SPA	2056.6	Over winter: Greenland white-fronted goose	N/A	N/A
Ramsey and St David's Peninsula Coast SPA	845.63	Breeding: Chough Over winter: Chough	N/A	N/A
Grassholm SPA	1744.42	N/A	Breeding: Gannet	N/A
Skokholm and Skomer SPA	14347.81	Breeding: Chough Short-eared owl Storm petrel	Breeding: Lesser black-backed gull Manx shearwater Puffin	Breeding: Seabirds
Castlemartin Coast SPA	1122.32	Breeding: Chough Over winter: Chough	N/A	N/A
Bae Caerfyddrin / Carmarthen Bay SPA	33410.03	N/A	Over winter: Common scoter	N/A
Burry Inlet SPA	6627.99	N/A	Over winter: Pintail Shoveler Teal Wigeon Dunlin Knot Oystercatcher Whimbrel Grey plover Shelduck Redshank	Over winter: Waterfowl
Northern Ireland				
Strangford Lough SPA	15580.79	Breeding: Arctic tern Common tern Sandwich tern Over winter:	Over winter: Knot Canadian light-bellied brent goose Redshank Shelduck	Over winter: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[99]
		Bar-tailed godwit Golden plover		
Killough Bay SPA	104.23	N/A	Over winter: Canadian light-bellied brent goose	N/A
Carlingford Lough SPA	827.12	Breeding: Common tern Sandwich tern	Over winter: Canadian light-bellied brent goose	N/A
Republic of Ireland				
The Murrough SPA	941.19	Breeding: Little tern Over winter: Black-throated diver	Over winter: Greylag goose Canadian light-bellied goose Wigeon Teal Black-headed gull Herring gull	Wetlands and waterbirds
Wicklow Head SPA	195.13	N/A	Breeding: Kittiwake	N/A
Cahore Marshes SPA	191.61	Over winter: Golden plover Greenland white-fronted goose	Over winter: Wigeon Lapwing	Wetlands and waterbirds
The Raven SPA	2610.43	Over winter: Red-throated diver Greenland white-fronted goose	Over winter: Cormorant Common scoter Grey plover Sanderling	Wetlands and waterbirds
Wexford Harbour & Slobs SPA	5996.11	Breeding: Little tern Over winter: Bewick's swan Whooper swan Golden plover Grey plover Bar-tailed godwit Greenland white-fronted goose On passage: Hen harrier	Over winter: Little grebe Great crested grebe Cormorant Grey heron Canadian light-bellied brent goose Shelduck Wigeon Teal Mallard Pintail Scaup Goldeneye Red-breasted merganser Coot Lapwing Knot Sanderling Dunlin Black-tailed godwit Curlew Redshank Black-headed gull Lesser black-backed gull	Wetlands and waterbirds
Lady's Island Lake SPA	478.81	Breeding: Sandwich tern Roseate tern	Over winter: Gadwall	Wetlands and waterbirds

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[99]
		Common tern Arctic tern	Breeding: Black-headed gull	
Tacumshin Lake SPA	528.8	On passage: Hen harrier Over winter: Bewick's swan Whooper swan Golden plover Grey plover	Over winter: Little grebe Wigeon Gadwall Teal Pintail Shoveler Tufted duck Coot Lapwing Black-tailed godwit	Wetlands and waterbirds
Ballyteigue Burrows SPA	660.53	Over winter: Golden Plover Grey plover Bar-tailed godwit	Over winter: Canadian light-bellied brent goose Shelduck Lapwing Black-tailed godwit	Wetlands and waterbirds
Saltee Islands SPA	871	N/A	Breeding: Fulmar Gannet Shag Kittiwake Guillemot Razorbill Puffin	N/A

A3 Coastal and Marine Special Areas of Conservation

This section includes coastal or nearshore marine (within 12nm boundary) Special Areas of Conservation (SAC) sites which contain one or more of the Annex I coastal habitats listed in Box A.2 (below) or examples of Annex II qualifying marine species. Offshore SACs are included on Map A.2 and considered in Section A4. Riverine/freshwater SACs which are designated for migratory fish are included on Map A.2 and considered in Section A5.

Abbreviations for the Annex 1 habitats used in SAC site summaries (Tables A.2 to A.4 and Map A.2) are listed in Box A.2.

Box A.2: Annex 1 Habitat Abbreviations Used in Site Summaries

Annex I Habitat (abbreviated)	Annex I Habitat(s) (full description)
Bogs	Active raised bogs * Priority feature
	Blanket bogs * Priority feature
	Bog Woodland * Priority feature
	Degraded raised bogs still capable of natural regeneration
	Depressions on peat substrates of the *Rhynchosporion*
	Transition mires and quaking bogs
Caves	Caves not open to the public
Coastal Dunes	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)
	Coastal dunes with *Juniperus* spp.
	Decalcified fixed dunes with *Empetrum nigrum*
	Dunes with *Hippophae rhamnoides*
	Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)
	Embryonic shifting dunes
	Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature
	Humid dune slacks
	Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`)
Coastal Lagoons	Coastal lagoons *Priority feature
Estuaries	Estuaries
Fens	Alkaline fens
	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* * Priority feature
	Petrifying springs with tufa formation (*Cratoneurion*) * Priority feature
Forest	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) * Priority feature
	Old sessile oak woods with *Quercus robur* on sandy plains
	Tilio-Acerion forests of slopes, screes and ravines * Priority feature
	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*) * Priority feature
Grasslands	Alpine and subalpine calcareous grasslands
	Calaminarian grasslands of the *Violetalia calaminariae*
	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
	Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) * Priority feature
	Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) * Priority feature

Annex I Habitat (abbreviated)	Annex I Habitat(s) (full description)
Heaths	Alpine and Boreal heaths
	Dry Atlantic coastal heaths with *Erica vagans*
	European dry heaths
	Northern Atlantic wet heaths with *Erica tetralix*
Inlets and bays	Large shallow inlets and bays
Limestone pavements	Limestone pavements * Priority feature
Machairs	Machairs
Mudflats and sandflats	Mudflats and sandflats not covered by seawater at low tide
Reefs	Reefs
Rocky slopes	Calcareous rocky slopes with chasmophytic vegetation
Running freshwater	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
Salt marshes and salt meadows	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
	Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)
	Salicornia and other annuals colonising mud and sand
	Spartina swards (*Spartinion maritimae*)
Sandbanks	Sandbanks which are slightly covered by sea water all the time
Scree	Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)
	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)
Scrub (mattoral)	*Juniperus communis* formations on heaths or calcareous grasslands
Sea caves	Submerged or partially submerged sea caves
Sea cliffs	Vegetated sea cliffs of the Atlantic and Baltic coasts
Standing freshwater	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
	Mediterranean temporary ponds
	Natural dystrophic lakes and ponds
	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation
	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*
Vegetation of drift lines	Annual vegetation of drift lines
Vegetation of stony banks	Perennial vegetation of stony banks

Map A.2: Location of coastal, marine and riverine SACs

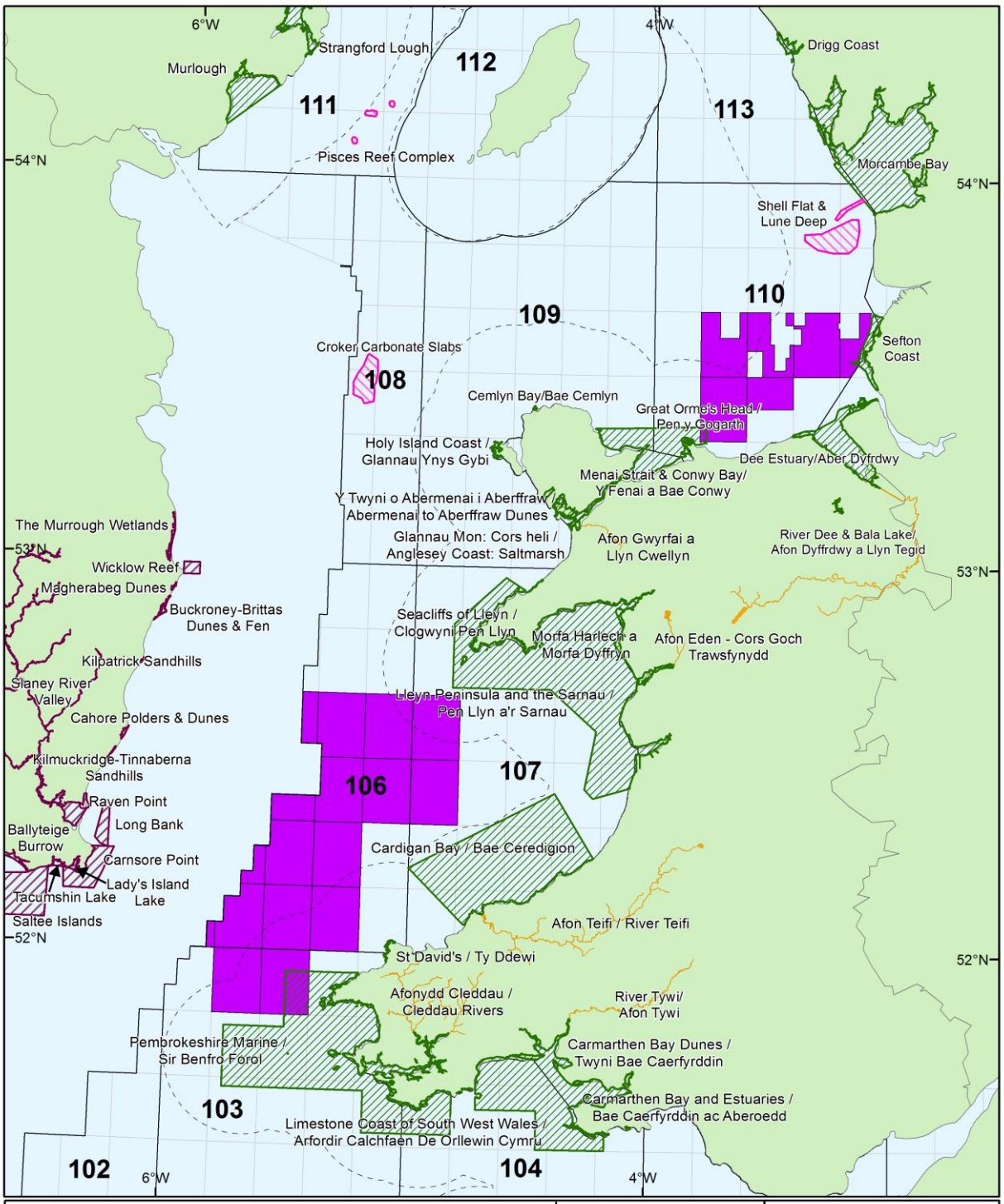


Table A.2: Coastal and marine SACs and their Qualifying Features

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Drigg Coast SAC	1397.44	Estuaries Coastal dunes	Mudflats and sandflats Salt marshes and salt meadows Coastal dunes	N/A	N/A
Morecambe Bay SAC	61506.22	Estuaries Mudflats and sandflats Inlets and bays Vegetation of stony banks Salt marshes and salt meadows Coastal dunes	Sandbanks Coastal lagoons Reefs Coastal dunes	Great crested newt *Triturus cristatus*	N/A
Shell Flat and Lune Deep SCI	10565	Sandbanks Reefs	N/A	N/A	N/A
Sefton Coast SAC	4563.97	Coastal dunes	Coastal dunes	Petalwort *Petalophyllum ralfsii*	Great crested newt *Triturus cristatus*
Dee Estuary / Aber Dyfrdwy SAC	15805.89	Mudflats and sandflats Saltmarshes and salt meadows	Estuaries Vegetation of drift lines Sea cliffs Coastal dunes	N/A	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis* Petalwort *Petalophyllum ralfsii*
Great Orme's Head / Pen y Gogarth SAC	302.63	Heaths Grasslands	Sea cliffs	N/A	N/A
Y Fenai a Bae Conwy / Menai Strait and Conway Bay SAC	26482.67	Sandbanks Mudflats and sandflats Reefs	Inlets and bays Sea caves	N/A	N/A
Bae Cemlyn / Cemlyn Bay SAC	43.43	Coastal lagoons	Vegetation of stony banks	N/A	N/A
Glannau Ynys Gybi / Holy Island Coast SAC	464.27	Sea cliffs Heaths	Heaths	N/A	N/A

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Y Twyni o Abermenai i Aberffraw/ Abermenai to Aberffraw Dunes SAC	1871.03	Coastal dunes	Standing freshwater	Petalwort *Petalophyllum ralfsii* Shore dock *Rumex rupestris*	N/A
Glannau Môn Cors heli / Anglesey Coast: Saltmarsh SAC	1058	Salt marshes and salt meadows	Estuaries Mudflats and sandflats	N/A	N/A
Clogwyni Pen Llŷn / Seacliffs of Lleyn SAC	1048.4	Sea cliffs	N/A	N/A	N/A
Pen Llŷn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC	146023.48	Sandbanks Estuaries Coastal lagoons Inlets and bays Reefs	Mudflats and sandflats Salt marshes and salt meadows Sea caves	N/A	Bottlenose dolphin *Tursiops truncatus* Otter *Lutra lutra* Grey seal *Halichoerus grypus*
Morfa Harlech a Morfa Dyffryn SAC	1062.57	Coastal dunes	N/A	Petalwort *Petalophyllum ralfsii*	N/A
Cardigan Bay/ Bae Ceredigion SAC	95860.36	N/A	Sandbanks Reefs Sea caves	Bottlenose dolphin *Tursiops truncatus*	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis* Grey seal *Halichoerus grypus*
St David's / Ty Ddewi SAC	935.47	Sea cliffs Heaths	N/A	Floating water-plantain *Luronium natans*	N/A
Pembrokeshire Marine/ Sir Benfro Forol SAC	138069.45	Estuaries Inlets and bays Reefs	Sandbanks Mudflats and sandflats Coastal lagoons Salt marshes and salt meadows Sea caves	Grey seal *Halichoerus grypus* Shore dock *Rumex rupestris*	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis* Allis shad *Alosa alosa* Twaite shad *Alosa fallax* Otter *Lutra lutra*

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Limestone Coast of South West Wales / Arfordir Calchfaen de Orllewin Cymru SAC	1594.53	Sea cliffs Coastal dunes	Heaths Grasslands Caves Sea caves	Greater horseshoe bat *Rhinolophus ferrumequinum* Early gentian *Gentianella anglica*	Petalwort *Petalophyllum ralfsii*
Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC	66101.16	Mudflats and sandflats Estuaries Sandbanks Inlets and bays Salt marshes and salt meadows	N/A	Twaite shad *Alosa fallax*	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis* Allis shad *Alosa alosa* Otter *Lutra lutra*
Carmarthen Bay Dunes / Twyni Bae Caerfyrddin SAC	1206.32	Coastal dunes	N/A	Narrow-mouthed whorl snail *Vertigo angustior* Petalwort *Petalophyllum ralfsii* Fen orchid *Liparis loeselii*	N/A
Northern Ireland					
Strangford Lough SAC	15398.54	Mudflats and sandflats Coastal lagoons Inlets and bays Reefs	Vegetation of drift lines Vegetation of stony banks Salt marshes and salt meadows	N/A	Harbour seal *Phoca vitulina*
Murlough SAC	11902.03	Coastal dunes	Sandbanks Mudflats and sandflats Salt marshes and salt meadows Coastal dunes	Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*	Harbour seal *Phoca vitulina*

Table A.3: Republic of Ireland coastal and marine SACs and their Qualifying Features

Site Name	Area (ha)	Annex I Habitat	Annex II Species
The Murrough Wetlands SAC	606.12	Vegetation of drift lines Vegetation of stony banks Salt marshes and salt meadows Fens	N/A
Wicklow Reef SAC	1533.22	Reefs	N/A
Magherabeg Dunes SAC	74.64	Vegetation of drift lines Coastal dunes Fens	N/A
Buckroney – Brittas Dunes & Fen SAC	320.78	Vegetation of drift lines Vegetation of stony banks Salt marshes and salt meadows Coastal dunes Fens	N/A
Kilpatrick Sandhills SAC	39.7	Vegetation of drift lines Coastal dunes	N/A
Cahore Polders and Dunes SAC	264.88	Vegetation of drift lines Coastal dunes	N/A
Kilmuckridge-Tinnaberna Sandhills SAC	85.74	Coastal dunes	N/A
Raven Point Nature Reserve SAC	594.52	Mudflats and sandflats Vegetation of drift lines Salt marshes and salt meadows Coastal dunes	N/A

Site Name	Area (ha)	Annex I Habitat	Annex II Species
Slaney River Valley SAC	6020.48	Estuaries Mudflats and sandflats Running freshwater Forest	Freshwater pearl mussel *Margaritifera margaritifera* Sea lamprey *Petromyzon marinus* Brook lamprey *Lampetra planeri* River lamprey *Lampetra fluviatilis* Twaite shad *Alosa fallax* Atlantic salmon *Salmo salar* Otter *Lutra lutra* Harbour seal *Phoca vitulina*
Long Bank SAC	3372.37	Sandbanks	N/A
Carnsore Point SAC	8735.86	Mudflats and sandflats Reefs	N/A
Lady's Island Lake SAC	540.31	Coastal lagoons Reefs Vegetation of stony banks	N/A
Tacumshin Lake SAC	558.82	Coastal lagoons Vegetation of drift lines Vegetation of stony banks Coastal dunes	N/A
Ballyteige Burrow SAC	703.4	Estuaries Mudflats and sandflats Vegetation of drift lines Vegetation of stony banks Salt marshes and salt meadows Coastal dunes	N/A
Saltee Island SAC	15809.17	Mudflats and sandflats Inlets and bays Reefs Sea cliffs Sea caves	Grey seal *Halichoerus grypus*

A4 Offshore Special Areas of Conservation

Table A.4: Offshore SACs in the Irish Sea and their Qualifying Features

Site Name	Area (ha)	Annex I Habitat	Annex II Species
Pisces Reef Complex SCI	873	Reefs	N/A
Croker Carbonate Slabs SCI	6591	Submarine structures made by leaking gases	N/A

A5 Riverine Special Areas of Conservation

Table A.3: Riverine SACs designated for migratory fish

Site Name	Freshwater pearl mussel *Margaritifera margaritifera*	Migratory fish[1]
River Eden	-	SL, RL, AS
River Derwent & Bassenthwaite Lake	-	SL, RL, AS
River Ehen	✓	AS
River Kent	✓	-
River Dee and Bala Lake/Afon Dyffrdwy a Llyn Tegid	-	AS, SL, RL
Afon Gwyrfai a Llyn Cwellyn	-	AS
Afon Eden – Cors Goch Trawsfynydd	✓	AS
Afon Teifi / River Teifi	✓	AS
Afonydd Cleddau / Cleddau Rivers	-	RL, SL
Afon Tywi / River Tywi	-	TW, SL, RL, ALS

Note: [1] SL - Sea lamprey Petromyzon marinus, RL - River lamprey Lampetra fluviatilis, AS - Atlantic salmon Salmo salar, TW - Twaite shad Alosa fallax, ALS – Allis shad Alosa alosa

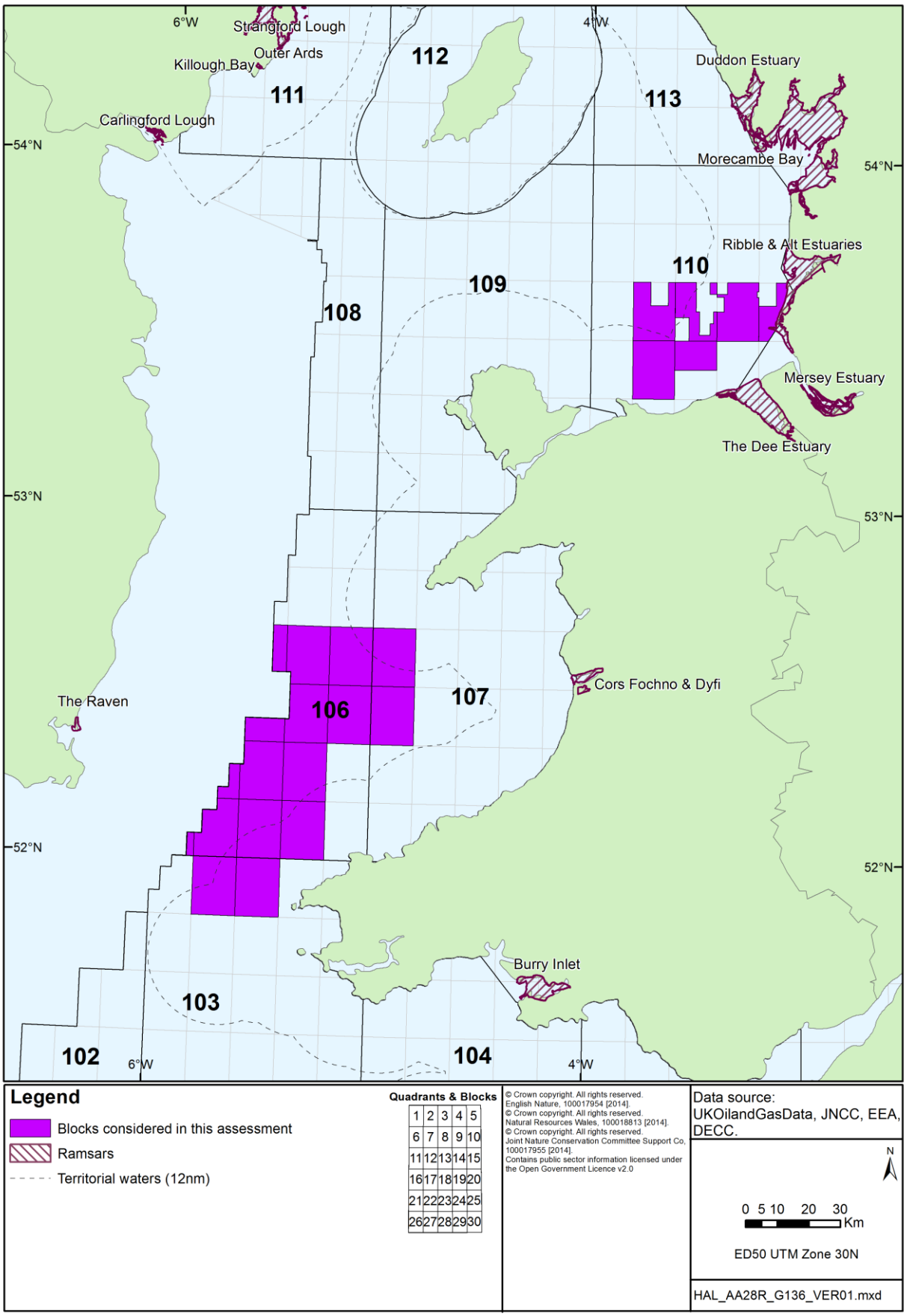
A6 Ramsar sites

The coastal Ramsar sites are also SPAs and/or SACs (although site boundaries are not always strictly coincident and a Ramsar site may comprise one or more Natura 2000 sites), see tabulation below.

Table A.4: Coastal Ramsar sites and corresponding Natura 2000 sites

Ramsar Name	SPA Name	SAC Name
Burry Inlet	Burry Inlet	Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd
Carlingford Lough	Carlingford Lough	
Cors Fochno and Dyfi	Dyfi Estuary / Aber Dyfi	Pen Llŷn a`r Sarnau/ Lleyn Peninsula and the Sarnau
		Cors Fochno
Duddon Estuary	Duddon Estuary	Morecambe Bay
	Morecambe Bay	
Killough Bay	Killough Bay	
Mersey Estuary	Mersey Estuary	
Morecambe Bay	Duddon Estuary	Morecambe Bay
	Morecambe Bay	
Outer Ards	Belfast Lough	Strangford Lough
	Outer Ards	
	Strangford Lough	
Ribble and Alt Estuaries	Ribble and Alt Estuaries	Sefton Coast
Strangford Lough	Outer Ards	
	Strangford Lough	Strangford Lough
The Dee Estuary	The Dee Estuary / Aber Afon Dyfrdwy	The Dee Estuary / Aber Afon Dyfrdwy
The Raven	The Raven	Raven Point Nature Reserve

Map A.3: Location of coastal Ramsar sites



Appendix B – Re-screening tables for the identification of likely significant effects on the sites

B1 Introduction

In the screening assessment (DECC 2014a), the implications of physical disturbance and drilling effects, underwater noise, accidental spills and in-combination and cumulative effects were considered in a generic way for all Blocks applied for in the 28th Round for sites where there was a foreseeable possibility of interactions. Proposed work programmes for the Blocks have now been confirmed by the applicant companies and are as follows:

- 103/2, 103/3, 106/22, 106/23, 106/24, 106/26, 106/27, 106/28 & 106/29 - Drill or drop well, shoot 3D seismic, obtain 2D and 3D, and reprocess 2D
- 106/13, 106/14, 106/15, 106/18, 106/19, 106/20, 107/11 & 107/16 - Drill or drop well, shoot 3D seismic, obtain 2D and 3D, and reprocess 2D
- 110/12b, 110/13c, 110/14b, 110/15b, 110/17 & 110/18b - Drill or drop well
- 110/13e – Drill or drop well

In light of the proposed work programmes, those sites initially identified in the screening document as having a foreseeable interaction with offshore oil and gas activities are re-screened below. The potential for likely significant effects on relevant Natura 2000 sites is considered in the tables below and where relevant, the location of further appropriate assessment is clearly signposted. Activities which may be carried out following the grant of a licence, and which by themselves or in combination with other activities can affect the conservation objectives of relevant sites are considered under the following broad headings:

- Physical disturbance and drilling effects
- Underwater noise
- Accidental spills
- Cumulative and in-combination effects

B2 Coastal and marine Special Protection Areas

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
Duddon Estuary	✓	✓	✓	✓	-	-	-	**Qualifying features** Breeding tern, on passage overwintering waterbirds and waders **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: Accidental spills: In the unlikely event of a major diesel or crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** N/A
Morecambe Bay	✓	✓	✓	✓	-	-	-	**Qualifying features** Breeding terns, gulls and seabirds, on passage and overwintering waterbirds and waders **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: Accidental spills: In the unlikely event of a major diesel or crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** N/A
Ribble and Alt Estuaries	✓	✓	✓	✓	-	-	✓	**Qualifying features** Breeding tern, gulls, ruff and seabirds, on passage and overwintering waterbirds and waders **Consideration of likely significant effects** Physical disturbance: Significant physical disturbance and drilling effects unlikely given the large size of the site, the low level of activity (1 drill or drop well proposed between 6 Blocks) and that Block 110/15b is adjacent to the site. Underwater noise: N/A

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. **Appropriate Assessment** See Sections 6.3 and 7.
Mersey Narrows and North Wirral Foreshore	-	✓	-	✓	-	-	✓	**Qualifying features** Breeding tern, on passage gulls, overwintering waders and waterfowl **Consideration of likely significant effects** Physical disturbance: Given that the closest Block (110/15b) is *ca*. 9km from the site; the qualifying features likely to be present offshore (little gull and common tern) are not particularly sensitive to disturbance by ship movements (Garthe & Hüppop 2004), and the low level of proposed activity (1 drill or drop well in Q110), not likely to have significant physical disturbance and drilling effects. Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. **Appropriate Assessment** See Sections 6.3 and 7.
Mersey Estuary	-	✓	✓	✓	-	-	-	**Qualifying features** Overwintering and passage waders, and waterfowl **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Liverpool Bay / Bae Lerpwl	-	✓	-	✓	✓	-	✓	**Qualifying features** Overwintering red-throated diver, common scoter and waterfowl assemblage **Consideration of likely significant effects** Physical disturbance: Potential for significant physical disturbance and drilling effects given that Quadrant 110 Blocks overlap or are adjacent to the site. Underwater noise: Qualifying features are not directly sensitive to underwater noise. Disturbance and displacement of prey species could cause disruption to red-throated diver lifecycles, as herring and sprat are to be a prey resource and are sensitive to noise[100]. However, no seismic proposed for Quadrant 110 Blocks and other noise producing activities potentially resulting from licensing such as rig site survey, VSP, drilling and vessel movements are of a considerably lower magnitude therefore no significant underwater noise effects. Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. **Appropriate Assessment** See Sections 4.3, 6.3 and 7.

[100] http://publications.naturalengland.org.uk/file/4413148

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
The Dee Estuary	✓	✓	✓	✓	-	-	✓	**Qualifying features** Breeding and passage terns, overwintering and passage waders and waterfowl **Consideration of likely significant effects** Physical disturbance: The closest Block (110/18b) is *ca*. 8km from the site. Whilst qualifying features have a high sensitivity to noise and visual presence associated with marine traffic, the low level of proposed activity (1 drill or drop well in Q110), is not likely to have significant physical disturbance and drilling effects. Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. **Appropriate Assessment** See Sections 6.3 and 7.
Traeth Lafan / Lavan Sands, Conway Bay	-	✓	-	✓	-	-	✓	**Qualifying features** Overwintering waders and on passage great crested grebe **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. **Appropriate Assessment** See Sections 6.3 and 7.
Ynys Seiriol / Puffin Island	✓	-	-	✓	-	-	✓	**Qualifying features** Breeding cormorant **Consideration of likely significant effects** Physical disturbance: N/A

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. **Appropriate Assessment** See Sections 6.3 and 7.
Ynys Feurig, Cemlyn Bay and The Skerries	✓	-	-	✓	-	-	-	**Qualifying features** Breeding terns **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** N/A
Glannau Ynys Gybi / Holy Island Coast	✓	✓	-	-	-	-	-	**Qualifying features** Breeding and overwintering chough **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from any of the Blocks, weathered oil is not likely is not likely to have a significant effect on the site's conservation objectives as limited interaction between qualifying feature and marine environment. Cumulative: N/A **Appropriate Assessment** N/A
Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island SPA	✓	✓	✓	✓	-	-	-	**Qualifying features** Breeding and overwintering chough, breeding Manx shearwater **Consideration of likely significant effects** Physical disturbance: Whilst Block 107/11 partly overlaps the site, the

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								relative insensitivity of the qualifying features present offshore (Manx shearwater) to disturbance by ship movements (Furness *et al*. 2013), and the low level of proposed activity (1 drill or drop well between 8 Blocks), means not likely to have significant physical disturbance and drilling effects. Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal SPA	✓	✓	-	-	-	-	-	**Qualifying features** Breeding and overwintering chough **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil is not likely to have a significant effect on the site's conservation objectives as limited interaction between qualifying feature and marine environment. Cumulative: N/A **Appropriate Assessment** N/A
Dyfi Estuary / Aber Dyfi	-	✓	✓	-	-	-	-	**Qualifying features** Overwintering geese **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (107/11) is *ca*. 50km from the site and the low sensitivity of the qualifying features to the direct effects of oil pollution (Law *et al.* 2011). Cumulative: N/A

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								Appropriate Assessment N/A
Ramsey and St David's Peninsula Coast SPA	✓	-	-	-	-	-	-	**Qualifying features** Breeding chough **Consideration of likely significant effects** Physical disturbance: Block 103/3 is *ca*. 4km from the site. Qualifying features do not forage offshore and given the potential limited and temporary nature of activities outside of the site boundaries, significant physical disturbance and drilling effects not likely. Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103, 106 and 107, weathered oil is not likely to have a significant effect on the site's conservation objectives as limited interaction between qualifying feature and marine environment. Cumulative: N/A **Appropriate Assessment** N/A
Grassholm SPA	✓	-	✓	✓	-	-	-	**Qualifying features** Breeding gannet **Consideration of likely significant effects** Physical disturbance: Block 103/3 is *ca*. 9km from the site. Qualifying features forage widely but given the potential limited (1 drill or drop well between the 9 closest Blocks) and temporary nature of activities outside of the site boundaries, significant physical disturbance and drilling effects not likely. Underwater noise: New seismic survey proposed for Blocks in Quadrants 103, 106 and 107. Given the limited sensitivity of the qualifying feature to underwater noise and the temporary nature of the survey, significant effects not likely. Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103, 106 and 107, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
Skokholm and Skomer SPA	✓	-	✓	✓	-	-	-	**Qualifying features** Chough, short-eared owl, breeding seabirds. Seabird assemblage. **Consideration of likely significant effects** Physical disturbance: Block 103/3 is *ca*. 8km from the site. Breeding seabirds may forage over Blocks but given the potential limited (1 drill or drop well between the 9 closest Blocks) and temporary nature of activities outside of the site boundaries, significant physical disturbance and drilling effects not likely. Underwater noise: New seismic survey proposed for Blocks in Quadrants 103, 106 and 107. Given the limited sensitivity of some of the qualifying features (e.g. auks) to underwater noise and the temporary nature of the survey, significant effects not likely. Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103, 106 and 107, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Castlemartin Coast SPA	✓	-	-	-	-	-	-	**Qualifying features** Breeding chough **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a crude oil spill from Blocks in Quadrants 103 (where only natural gas has been found), 106 and 107, weathered spilled crude oil is not likely to have a significant effect on the site's conservation objectives as limited interaction between qualifying feature and marine environment. Cumulative: N/A **Appropriate Assessment** N/A
Bae Caerfyddrin / Carmarthen Bay	-	✓	✓	-	-	-	-	**Qualifying features** Overwintering common scoter **Consideration of likely significant effects**

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given the geographic location of the site and that the closest Block (103/3) is *ca.* 75km from the site. Cumulative: N/A **Appropriate Assessment** N/A
Burry Inlet	-	✓	✓	-	-	-	-	**Qualifying features** Overwintering waders and waterfowl **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given the geographic location of the site and that the closest Block (103/3) is *ca.* 100km from the site. Cumulative: N/A **Appropriate Assessment** N/A
NORTHERN IRELAND								
Strangford Lough	✓	✓	-	-	-	-	-	**Qualifying features** Breeding terns, overwintering waterfowl and waders **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil is not likely to have a significant effect on the site's conservation objectives given the geographical location of the site with respect to the Blocks. Cumulative: N/A **Appropriate Assessment** N/A

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
Killough Bay	-	✓	-	-	-	-	-	**Qualifying features** Overwintering geese **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil is not likely to have a significant effect on the site's conservation objectives given the geographical location of the site with respect to the Blocks. Cumulative: N/A **Appropriate Assessment** N/A
Carlingford Lough	✓	✓	-	-	-	-	-	**Qualifying features** Breeding terns and overwintering geese **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil is not likely to have a significant effect on the site's conservation objectives given the geographical location of the site with respect to the Blocks. Cumulative: N/A **Appropriate Assessment** N/A
REPUBLIC OF IRELAND								
The Murrough	✓	✓	✓	-	-	-	-	**Qualifying features** Breeding tern, overwintering gulls, divers, waders and waterfowl **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (106/13) is *ca*. 54km from the site (see Table 6.1 for details of relevant oil spill modelling).

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								Cumulative: N/A **Appropriate Assessment** N/A
Wicklow Head	✓	-	-	-	-	-	-	**Qualifying features** Breeding kittiwake **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (106/13) is *ca*. 49km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Cahore Marshes	-	✓	-	-	-	-	-	**Qualifying features** Overwintering waders and waterfowl **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (106/18) is *ca*. 45km from the site and the limited marine access to the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
The Raven		✓	✓	-	-	-	-	**Qualifying features** Overwintering divers, cormorant, waders and waterfowl **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								significant effect on the site's conservation objectives given that the closest Block (106/22) is *ca*. 45km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Wexford Harbour & Slobs	✓	✓	✓	-	-	-	-	**Qualifying features** Breeding tern, overwintering gulls, cormorant, waders and waterfowl **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (106/27) is *ca.* 48km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Lady's Island Lake	✓	✓	✓	-	-	-	-	**Qualifying features** Breeding terns and gulls. Overwintering and passage waterfowl and waders. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (106/26) is *ca*. 41km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Tacumshin Lake	-	✓	✓	-	-	-	-	**Qualifying features** Overwintering waterfowl and waders **Consideration of likely significant effects**

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major crude oil spill from Blocks in Quadrants 103 and 106, weathered spilled crude oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (106/26) is *ca*. 45km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Ballyteigue Burrows	-	✓	-	-	-	-	-	**Qualifying features** Overwintering waterfowl and waders **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given that closest Block (106/26) is *ca*. 58km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Saltee Islands	✓	-	-	-	-	-	-	**Qualifying features** Breeding seabirds **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given that closest Block (106/26) is *ca*. 50km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A

B3 Coastal and marine Special Areas of Conservation

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
Strangford Lough	✓	✓	-	-	-	-	**Qualifying features:** Mudflats and sandflats, coastal lagoons, inlets and bays, reefs, vegetation of drift lines and stony banks, salt marshes and salt meadows, harbour seals **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 110, weathered oil is not likely to have a significant effect on the site's conservation objectives given that closest Block (110/12b) is *ca*. 135km from site. Cumulative: N/A **Appropriate Assessment** N/A
Murlough	✓	✓	-	-	-	-	**Qualifying features:** Coastal dunes, sandbanks, mudflats and sandflats, salt marshes and salt meadows, coastal dunes, marsh fritillary butterfly and harbour seal **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 110, weathered oil is not likely to have a significant effect on the site's conservation objectives given that closest Block (110/12b) is *ca*. 135km from site. Cumulative: N/A **Appropriate Assessment** N/A
Drigg Coast	✓	-	✓	-	-	-	**Qualifying features:** Estuaries, coastal dunes, mudflats and sandflats, salt marshes and salt meadows, coastal dunes. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Accidental spills: Accidental spills: In the unlikely event of a major diesel or crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** N/A
Morecambe Bay	✓	✓	✓	-	-	-	**Qualifying features:** Estuaries, mudflats and sandflats, inlets and bays, vegetation of stony banks, salt marshes and salt meadows, coastal dunes, sandbanks, coastal lagoons, reefs, coastal dunes, great crested newt. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills:Accidental spills: In the unlikely event of a major diesel or crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** N/A
Shell Flat and Lune Deep SCI	✓	-	✓	-	-	-	**Qualifying features:** Sandbanks, reefs **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Sefton Coast	✓	✓	✓	-	-	-	**Qualifying features** Coastal dunes, petalwort and great crested newt **Consideration of likely significant effects** Physical disturbance: Block 110/15b partly overlaps site. Significant physical disturbance and drilling effects not likely given terrestrial nature of qualifying

Site name	Features present			Potential for likely significant effects			Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							features. Underwater noise: N/A Accidental spills: Accidental spills: In the unlikely event of a major diesel or crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** N/A
Dee Estuary / Aber Dyfrdwy	✓	✓	✓	-	-	-	**Qualifying features** Estuaries, mudflats and sandflats, salt marshes and salt meadows, vegetation of drift lines, sea cliffs and coastal dunes, sea and river lamprey, petalwort **Consideration of likely significant effects** Physical disturbance: Closest Block (110/15b) is 7km from site. Significant physical disturbance and drilling effects not likely given distance from Blocks and low level of proposed activity (1 drill or drop well in Q110). Underwater noise: Significant underwater noise effects not likely given distance from Blocks and no seismic proposed in Quadrant 110 Blocks. Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered spilled oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Great Orme's Head / Pen y Gogarth	✓	-	-	-	-	-	**Qualifying features** Sea cliffs, heaths and grasslands **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered spilled crude oil is not likely to have a significant effect on the site's conservation objectives as qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011).

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Cumulative: N/A **Appropriate Assessment** N/A
Y Fenai a Bae Conwy / Menai Strait and Conwy Bay	✓	-	✓	✓	-	-	**Qualifying features** Sandbanks, mudflats and sandbanks, reefs, inlets and bays and sea caves **Consideration of likely significant effects** Physical disturbance: Potential for significant physical disturbance and drilling effects given that Block 110/17 partially overlaps the site. Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered spilled oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 4.3 and 6.3.
Bae Cemlyn / Cemlyn Bay	✓	-	✓	-	-	-	**Qualifying features** Coastal lagoons, vegetation of stony banks **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or crude oil spill from Blocks in Quadrants 110, weathered spilled oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** N/A
Glannau Ynys Gybi / Holy Island Coast	✓	-	-	-	-	-	**Qualifying features** Sea cliffs and heaths **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil is not likely to have a significant effect on the site's conservation objectives as qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011) and the

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							closest Block (107/11) is *ca*. 69km from the site. Cumulative: N/A **Appropriate Assessment** N/A
Y Twyni o Abermenai i Aberffraw/ Abermenai to Aberffraw Dunes	✓	✓	-	-	-	-	**Qualifying features** Coastal dunes, standing freshwater, petalwort, shoredock **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil is not likely to have a significant effect on the site's conservation objectives as qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011) and the closest Block (107/11) is *ca*. 65km from the site. Cumulative: N/A **Appropriate Assessment** N/A
Glannau Môn Cors heli/Anglesey Coast: Saltmarsh	✓	-	✓	-	-	-	**Qualifying features** Salt marshes and salt meadows, estuaries, mudflats and sandflats **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or crude oil spill from Blocks in Quadrants 106 and 107, weathered spilled oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** N/A
Clogwyni Pen Llŷn/ Seacliffs of Lleyn	✓	-	-	-	-	-	**Qualifying features** Sea cliffs **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil is not likely to have a

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							significant effect on the site's conservation objectives as qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
Pen Llŷn a`r Sarnau/ Lleyn Peninsula and the Sarnau	✓	✓	✓	✓	✓	✓	**Qualifying features** Sandbanks, estuaries, coastal lagoons, inlets and bays, reefs, mudflats and sandflats, salt marshes and salt meadows, sea caves, bottlenose dolphin, otter, grey seal **Consideration of likely significant effects** Physical disturbance: Closest Block (107/11) is *ca*. 2km from the site. Significant physical damage to or smothering of habitat qualifying features unlikely given location of Blocks outside of site. Potential significant disturbance of bottlenose dolphin associated with vessel movements and presence unlikely given limited (2 drill or drop wells in Quadrants 106 and 107) and temporary nature of drilling activities (see Section 4.3). Underwater noise: Potential for significant underwater noise effects given the sensitivity of the bottlenose dolphin and grey seal qualifying features and proposed seismic surveys in Quadrants 106 and 107. Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. **Appropriate Assessment** See Sections 4.3, 5.3, 6.3 and 7
Morfa Harlech a Morfa Dyffryn	✓	✓	-	-	-	-	**Qualifying features** Coastal dunes, petalwort **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil is not likely to have a significant effect on the site's conservation objectives as qualifying features

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							not considered particularly sensitive to marine spills (Law *et al*. 2011) and the closest Block (107/11) is *ca*. 47km from the site. Cumulative: N/A **Appropriate Assessment** N/A
Cardigan Bay/ Bae Ceredigion	✓	✓	✓	✓	✓	-	**Qualifying features** Sandbanks, reefs, sea caves, bottlenose dolphin, sea and river lamprey, grey seal **Consideration of likely significant effects** Physical disturbance: Closest Block (107/16) is *ca*. 4km from the site. Significant physical damage to or smothering of habitat qualifying features unlikely given location of Blocks outside of site. Potential significant disturbance of bottlenose dolphin associated with vessel movements and presence unlikely given limited (2 drill or drop wells in Quadrants 106 and 107) and temporary nature of drilling activities (see Section 4.3). Underwater noise: Potential for significant underwater noise effects given the sensitivity of the bottlenose dolphin and grey seal qualifying features and proposed seismic surveys in Quadrants 106 and 107. Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. **Appropriate Assessment** See Sections 4.3, 5.3, 6.3 and 7
St David`s / Ty Ddewi	✓	-	-	-	-	-	**Qualifying features** Sea cliffs **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011).

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Cumulative: N/A **Appropriate Assessment** N/A
Pembrokeshire Marine/ Sir Benfro Forol	✓	✓	✓	✓	✓	✓	**Qualifying features** Estuaries, inlets and bays, reefs, sandbanks, mudflats and sandflats, coastal lagoons, salt marshes and salt meadows, sea caves, grey seal, shore dock, sea and river lamprey, allis and twaite shad, otter **Consideration of likely significant effects** Physical disturbance: Block 103/3 partly overlaps the site. Potential for physical disturbance and drilling effects with respect to the reef and subtidal sandbanks qualifying features given that they may be present in Block 103/3. However significant effects unlikely given the low level of proposed activity (1 drill or drop well in relevant Blocks of Quadrants 103 and 106) and small physical footprint associated with jack up rig (see Section 4.3). Underwater noise: Potential for significant underwater noise effects given the sensitivity of the grey seal and migratory fish qualifying features and proposed seismic surveys in Quadrants 103 and 106. Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. **Appropriate Assessment** See Sections 4.3, 5.3, 6.3 and 7
Limestone Coast of South West Wales/ Arfordir Calchfaen de Orllewin Cymru	✓	-	-	-	-	-	**Qualifying features** Sea cliffs, coastal dunes, sea caves **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Appropriate Assessment N/A
Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd	✓	✓	-	-	-	-	**Qualifying features** Sandbanks, estuaries, mudflats and sandflats, inlets and bays, salt marshes and salt meadows, twaite and allis shad, sea and river lamprey, and otter **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given the geographic location of the site and that the closest Block (103/3) is *ca*. 70km from the site. Cumulative: N/A **Appropriate Assessment** See Section.6.3
Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin	✓	✓	-	-	-	-	**Qualifying features** Coastal dunes, narrow-mouthed whorl snail, petalwort, fen orchid **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major crude oil spill from Blocks in Quadrants 103 and 106, weathered spilled crude oil is not likely to have a significant effect on the site's conservation objectives given the geographic location of the site and the qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
REPUBLIC OF IRELAND							
The Murrough Wetlands	✓	-	-	-	-	-	**Qualifying features** Vegetation of stony banks, salt marshes and salt meadows, fens **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (106/13) is *ca*. 54km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Wicklow Reef	✓	-	-	-	-	-	**Qualifying features** Reefs **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106, weathered oil is unlikely to have a significant effect on the site's conservation objectives given that the closest Block (106/13) is *ca*. 47km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Magherabeg Dunes	✓	-	-	-	-	-	**Qualifying features** Coastal dunes, vegetation of drift lines **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/13) is *ca*. 48km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Buckroney – Brittas Dunes & Fen	✓	-	-	-	-	-	**Qualifying features** Coastal dunes, vegetation of drift lines and stony banks, fens **Consideration of likely significant effects**

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/13) is *ca*. 47km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Kilpatrick Sandhills	✓	-	-	-	-	-	**Qualifying features** Vegetation of drift lines, coastal dunes **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/13) is *ca*. 47km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Cahore Polders and Dunes	✓	-	-	-	-	-	**Qualifying features** Vegetation of drift lines, coastal dunes **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/18) is *ca*. 45km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Kilmuckridge-Tinnaberna Sandhills SAC	✓	-	-	-	-	-	**Qualifying features** Coastal dunes **Consideration of likely significant effects** Physical disturbance: N/A

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/18) is *ca*. 46km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Raven Point Nature Reserve	✓	-	-	-	-	-	**Qualifying features** Mudflats and sandflats, vegetation of drift lines, salt marshes and salt meadows, coastal dunes **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/27) is *ca*. 47km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Slaney River Valley	✓	✓	-	-	-	-	**Qualifying features** Freshwater pearl mussel, sea, brook and river lamprey, allis and twaite shad, Atlantic salmon, estuaries, mudflats and sandflats, otter, running freshwater, forest **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/27) is *ca*. 47km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
Long Bank	✓	-	-	-	-	-	**Qualifying features** Sandbanks **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/27) is *ca*. 36km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Carnsore Point	✓	-	-	-	-	-	**Qualifying features** Reefs, mudflats and sandflats **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/26) is *ca*. 33km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Lady's Island Lake	✓	-	-	-	-	-	**Qualifying features** Lagoons, reefs, vegetation of stony banks **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/26) *ca*. 41km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Appropriate Assessment N/A
Tacumshin Lake	✓	-	-	-	-	-	**Qualifying features** Lagoons, vegetation of drift lines and stony banks, coastal dunes **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as qualifying features as the closest Block (106/26) is *ca*. 46km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Ballyteige Burrow	✓	-	-	-	-	-	**Qualifying features** Estuaries, mudflats and sandflats, lagoons, vegetation of drift lines and stony banks, salt marshes and salt meadows, coastal dunes **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/26) is *ca*. 57km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A
Saltee Island	✓	-	-	-	-	-	**Qualifying features** Mudflats and sandflats, inlets and bays, reefs, sea cliffs, sea caves, grey seal **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel spill or small crude oil

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives as the closest Block (106/26) is *ca*. 45km from the site (see Table 6.1 for details of relevant oil spill modelling). Cumulative: N/A **Appropriate Assessment** N/A

Notes: 1 ✓denotes feature present; 2 ✓denotes vulnerability to effect

B4 Riverine Special Areas of Conservation

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
River Kent	-	✓	-	-	-	-	**Qualifying features** Freshwater pearl mussel **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered spilled crude oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (110/14b) is *ca*. 70km from site and the qualifying feature (through their Atlantic salmon host) is not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
River Dee and Bala Lake/Afon Dyffrdwy a Llyn Tegid	✓	✓	✓	-	-	-	**Qualifying features** Running freshwater, Sea and river lamprey, Atlantic salmon, brook lamprey, bullhead, otter **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: No seismic proposed for Q110 Blocks. Accidental spills: In the unlikely event of a major diesel or crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** N/A
Afon Gwyrfai a Llyn Cwellyn	-	✓	-	-	-	-	**Qualifying features:** Atlantic salmon **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (106/15) is *ca*. 70km from the site and the qualifying feature is not

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
Afon Eden - Cors Goch Trawsfynydd	-	✓	-	-	-	-	**Qualifying features** Freshwater pearl mussel, Atlantic salmon, otter **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (107/11) is *ca*. 65km from the site and the qualifying features are not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
Afon Teifi/ River Teifi	-	✓	-	-	-	-	**Qualifying features** Brook and river lamprey, Atlantic salmon, bullhead, otter **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 106 and 107, weathered oil is not likely to have a significant effect on the site's conservation objectives given that the closest Block (107/16) is *ca*. 26km from the site and the qualifying features are not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
Afonydd Cleddau/ Cleddau Rivers	-	✓	-	-	-	-	**Qualifying features** Brook, river and sea lamprey, bullhead, otter **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							significant effect on the site's conservation objectives given the limited marine access to the site and the qualifying features are not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
Afon Tywi/ River Tywi	-	✓	-	-	-	-	**Qualifying features** Twaite and allis shad, brook, river and sea lamprey, bullhead, otter **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrants 103 and 106, weathered oil is not likely to have a significant effect on the site's conservation objectives given the geographic location of the site with respect to the Blocks and the qualifying features are not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A

Notes: 1 ✓denotes feature present; 2 ✓denotes vulnerability to effect

B5 Offshore Special Areas of Conservation

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
Pisces Reef Complex	✓	-	-	-	-	-	**Qualifying features** Reefs **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: JNCC (2012)[101] indicates moderate sensitivity of the qualifying feature to toxic contamination (e.g. crude oil spills). Given distance of closest Block (110/12b, 107km) and depth of qualifying feature (*ca*. 100m), accidental spill is not likely to have a significant effect on the site's conservation objectives. Cumulative: N/A **Appropriate Assessment** N/A
Croker Carbonate Slabs	✓	✓	-	-	-	-	**Qualifying features** Submarine structures made by leaking gases **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: JNCC (2012)[102] indicates unknown sensitivity of the qualifying feature to toxic contamination (e.g. crude oil spills). However, given distance of closest Block (106/14, 84km) and depth of qualifying feature (*ca*. 70m), accidental spill is not likely to have a significant effect on the site's conservation objectives. Cumulative: N/A **Appropriate Assessment** N/A

Notes: [1] ✓denotes feature present; [2] ✓denotes vulnerability to effect; [3] including diesel and/or lube oil

[101] http://jncc.defra.gov.uk/PDF/PiscesReef_ConservationObjectives_AdviceOperations_V3.0.pdf
[102] http://jncc.defra.gov.uk/pdf/CrokerSlabs_ConservationObjectives_AdviceonOperations_V5.0%20final.pdf

Appendix C – Detailed information on sites where the potential for effects have been identified

C1 Coastal and marine Special Protection Areas

The following tables provide detailed information of the relevant sites, including full listing of their qualifying features.

Site Name: Duddon Estuary SPA	
Location	Latitude 54º 10'39"N Longitude 03º 15'24"W
Area (ha)	6806.3
Summary	The Duddon Estuary is located north-west of Morecambe Bay on the coast of Cumbria in north-west England. It is formed where the River Duddon and the smaller Kirkby Pool opens into the Irish Sea. It is a complex site, mostly consisting of intertidal sand and mud-flats, important for large numbers of wintering and passage waterbirds. A range of grazed and ungrazed saltmarsh habitats occurs around the edge of the estuary, especially the sheltered inner section. The site is the most important in Cumbria for sand-dune communities including large areas of calcareous dunes at Sandscale and Haverigg Haws and contrasting acid dunes on North Walney. There are a number of settlements and industrial areas on the periphery of the site. Artificial habitats include slag banks and a flooded iron-ore working known as Hodbarrow Lagoon forms the largest coastal lagoon in north-west England. The intertidal sand- and silt-flats contain abundant invertebrates that support important numbers of wintering waterbirds, especially waders, during the migration and winter periods. Saltmarshes, sand dunes and Hodbarrow Lagoon act as important high-tide roosts for wintering waders and wildfowl. High-tide roosts are also found outside the site boundary on the landward side. The site is also of importance for breeding terns which nest in dune areas and slag banks, and feed in the shallow waters of the estuary and surrounding waters. Hodbarrow Lagoon is a key high-tide roosting site for terns.
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **During the breeding season:** ***Sandwich tern Sterna sandvicensis, 210 pairs representing at least 1.5% of the breeding population in Great Britain (5 year mean, 1988-1992)*** ***Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:*** **On passage:** Ringed plover *Charadrius hiaticula*, 628 individuals representing at least 1.3% of the Europe/Northern Africa – wintering population (5 year peak mean 1991/2-1995/6) Sanderling Calidris alba, 1,055 individuals representing at least 1.1% of the Eastern Atlantic/Western & Southern Africa – wintering population (5 year peak mean 1991/2-1995/6) **Over winter:**	

Site Name: Duddon Estuary SPA
Knot *Calidris canutus*, 4,495 individuals representing at least 1.3% of the wintering Northeastern Canada/Greenland/ Iceland/Northwestern Europe population (5 year peak mean 1991/2 - 1995/6) Pintail *Anas acuta*, 1,636 individuals representing at least 2.7% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6) Redshank *Tringa totanus*, 2,289 individuals representing at least 1.5% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) ***The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl Assemblage qualification: A wetland of international importance.*** Over winter, the area regularly supports 78,415 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Curlew *Numenius arquata*, dunlin *Calidris alpina*, sanderling *Calidris alba*, oystercatcher *Haematopus ostralegus*, red-breasted merganser *Mergus serrator*, shelduck *Tadorna tadorna*, redshank *Tringa totanus*, knot *Calidris canutus*, pintail *Anas acuta*.
Conservation objectives:
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features, and, • The distribution of the qualifying features within the site
Likely significant effects associated with activities that could follow Block licensing:
• Accidental spills (see Section 6.3)

Site Name: Morecambe Bay SPA	
Location	Latitude 54º 07'19"N Longitude 02º 57'21"W
Area (ha)	37404.6
Summary	Morecambe Bay is located on the Irish Sea coast of north-west England. It is one of the largest estuarine systems in the UK and is fed by five main river channels (the Leven, Kent, Keer, Lune and Wyre) which drain through the intertidal flats of sand and mud. Mussel *Mytilus edulis* beds and banks of shingle are present, and locally there are stony outcrops. The whole system is dynamic, with shifting channels and phases of erosion and accretion affecting the estuarine deposits and surrounding saltmarshes. The flats contain an abundant invertebrate fauna that supports many of the waterbirds using the bay. The capacity of the bay to support large numbers of birds derives from these rich intertidal food sources together with adjacent freshwater wetlands, fringing saltmarshes and saline lagoons, as well as dock structures and shingle banks that provide secure roosts at high tide. The site is of European importance throughout the year for a wide range of bird species. In summer, areas of shingle and sand hold breeding populations of terns, whilst very large numbers of geese, ducks and waders not only overwinter, but (especially for waders) also use the site in spring and autumn migration periods. The bay is of particular importance during migration periods for waders moving up the west coast of Britain.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Sandwich tern *Sterna sandvicensis*, 290 pairs representing at least 2.1% of the breeding population in Great Britain (5 year peak mean for 1992 to 1996)

Little tern *Sterna albifrons*, 26 pairs representing at least 1.1% of the breeding population in Great Britain (count as at 1994).

Over winter:
Bar-tailed godwit *Limosa lapponica*, 2.6% of the Eastern Flyway population (5 year peak mean for 1991/92 to 1995/96)

Golden plover *Pluvialis apricaria*, 4,094 individuals representing at least 1.6% of the wintering population in Great Britain (5 year mean for 1991/92 to 1995/96)

Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

During breeding season:
Herring gull *Larus argentatus*, 11,000 pairs representing at least 1.2% of the breeding Northwestern Europe (breeding) and Iceland/Western Europe – breeding population (5 year mean 1992 to 1996).

Lesser black-backed gull *Larus fuscus*, 22,000 pairs representing at least 17.7% of the breeding Wesern Europe/Mediterranean/Western Africa population (5 year mean 1992 to 1996).

Over winter:
Curlew *Numenius arquata*, 13,620 individuals representing at least 3.9% of the wintering Europe - breeding population (5 year peak mean for 1991/92 to 1995/96)

Dunlin *Calidris alpina alpina*, 52,671 individuals representing at least 3.8% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean for 1991/92 to 1995/96)

Grey plover *Pluvialis squatarola*, 1,813 individuals representing at least 1.2% of the wintering Eastern Atlantic - wintering population (5 year peak mean for 1991/92 to 1995/96)

Knot *Calidris canutus*, 29,426 individuals representing at least 8.4% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean for 1991/92 to 1995/96)

Oystercatcher *Haematopus ostralegus*, 47,572 individuals representing at least 5.3% of the wintering Europe & Northern/Western Africa population (5 year peak mean for 1991/92 to 1995/96)

Pink-footed goose *Anser brachyrhynchus*, 2,475 individuals representing at least 1.1% of the wintering Eastern Greenland/Iceland/UK population (5 year peak mean for 1991/92 to 1995/96)

Pintail *Anas acuta*, 2,804 individuals representing at least 4.7% of the wintering Northwestern Europe population (5 year peak mean for 1991/92 to 1995/96)

Redshank *Tringa totanus*, 6,336 individuals representing at least 4.2% of the wintering Eastern Atlantic - wintering

Site Name: Morecambe Bay SPA

population (5 year peak mean for 1989/90 to 1993/94)

Shelduck *Tadorna tadorna*, 6,372 individuals representing at least 2.1% of the wintering Northwestern Europe population (5 year peak mean for 1991/92 to 1995/96)

Turnstone *Arenaria interpres*, 1,583 individuals representing at least 2.3% of the wintering Western Palearctic - wintering population (5 year peak mean for 1991/92 to 1995/96)

On passage:
Ringed plover *Charadrius hiaticula*, 693 individuals representing at least 1.4% of the Europe/Northern Africa – wintering population (5 year peak mean for 1991/92 to 1995/96)

Sanderling *Calidris alba*, 2,466 individuals representing at least 2.5% of the Eastern Atlantic/Western & Southern Africa – wintering population (count as at May 1995).

The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds
Assemblage qualification: A seabird assemblage of international importance.
During the breeding season, the area regularly supports 61,858 individual seabirds (5 year peak mean for 1991/92 to 1995/96) including: Herring gull *Larus argentatus*, lesser black-backed gull *Larus fuscus*, little tern *Sterna albifrons*, Sandwich tern *Sterna sandvicensis*.

The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
Assemblage qualification: A wetland of international importance.
Over winter, the area regularly supports 210,668 individual waterfowl (5 year peak mean for 1991/92 to 1995/96) including: Great crested grebe *Podiceps cristatus*, bar-tailed godwit *Limosa lapponica*, pink-footed goose *Anser brachyrhynchus*, shelduck *Tadorna tadorna*, pintail *Anas acuta*, oystercatcher *Haematopus ostralegus*, grey plover *Pluvialis squatarola*, knot *Calidris canutus*, dunlin *Calidris alpina alpina*, curlew *Numenius arquata*, golden plover *Pluvialis apricaria*, turnstone *Arenaria interpres*, black-tailed godwit *Limosa limosa islandica*, cormorant *Phalacrocorax carbo*, wigeon *Anas penelope*, teal *Anas crecca*, mallard *Anas platyrhynchos*, eider *Somateria mollissima*, goldeneye *Bucephala clangula*, red-breasted merganser *Mergus serrator*, ringed plover *Charadrius hiaticula*, lapwing *Vanellus vanellus*, sanderling *Calidris alba*, redshank *Tringa totanus*, whimbrel *Numenius phaeopus*.

Conservation objectives:

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features;
- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site

Likely significant effects associated with activities that could follow Block licensing:

- Accidental spills (see Section 6.3)

Site Name: Ribble and Alt Estuaries SPA	
Location	Latitude 53º 42'20"N Longitude 02º 59'14"W
Area (ha)	12,412.31
Summary	The Ribble and Alt Estuaries SPA lies on the coast of Lancashire and Merseyside in north-west England. It comprises two estuaries, of which the Ribble Estuary is by far the larger, together with an extensive area of sandy foreshore along the Sefton Coast. It forms part of the chain of western SPAs that fringe the Irish Sea. There is considerable interchange in the movements of wintering birds between this site and Morecambe Bay, the Mersey Estuary, the Dee Estuary and Martin Mere. A large proportion of the SPA is within the Ribble Estuary National Nature Reserve. The site consists of extensive sand- and mud-flats and, particularly in the Ribble Estuary, large areas of saltmarsh. There are also areas of coastal grazing marsh located behind the sea embankments. The intertidal flats are rich in invertebrates, on which waders and some of the wildfowl feed. The highest densities of feeding birds are on the muddier substrates of the Ribble, though sandy shores throughout are also used. The saltmarshes and coastal grazing marshes support high densities of grazing and seed-eating wildfowl and these, together with the intertidal sand- and mud-flats, are used as high-tide roosts. Important populations of waterbirds occur in winter, including swans, geese, ducks and waders. The SPA is also of major importance during the spring and autumn migration periods, especially for wader populations moving along the west coast of Britain. The larger expanses of saltmarsh and areas of coastal grazing marsh support breeding birds during the summer, including large concentrations of gulls and terns. These seabirds feed both offshore and inland, outside the SPA. Several species of waterbirds (notably Pink-footed Goose *Anser brachyrhynchus*) utilise feeding areas on agricultural land outside the SPA boundary.
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **During the breeding season:** Common tern *Sterna hirundo*, 182 pairs representing at least 1.5% of the breeding population in Great Britain (Count, as at 1996) Ruff *Philomachus pugnax*, 1 pairs representing at least 9.1% of the breeding population in Great Britain (Count as at late 1980's) **Over winter:** Bar-tailed godwit *Limosa lapponica*, 18,958 individuals representing at least 35.8% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6) Bewick's swan *Cygnus columbianus bewickii*, 229 individuals representing at least 3.3% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6) Golden plover *Pluvialis apricaria*, 4,277 individuals representing at least 1.7% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6) Whooper swan *Cygnus cygnus,* 159 individuals representing at least 2.9% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **During the breeding season:** Lesser black-backed gull *Larus fuscus*, 1,800 pairs representing at least 1.5% of the breeding Western Europe/Mediterranean/Western Africa population (Count as at 1993) **On passage:** Redshank *Tringa totanus*, 2.2% of the population (5 year mean, 1993-1997) Ringed plover *Charadrius hiaticula*, 995 individuals representing at least 2.0% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6) Sanderling *Calidris alba*, 6,172 individuals representing at least 6.2% of the Eastern Atlantic/Western & Southern Africa - wintering population (3 year mean May 1993 - 1995) Whimbrel *Numentius phaeopus*, 13.9% of the UK population (5 year mean 1993-1997) **Over winter:** Black-tailed Godwit *Limosa limosa islandica*, 819 individuals representing at least 1.2% of the wintering Iceland - breeding population (5 year peak mean 1991/2 - 1995/6)	

Site Name: Ribble and Alt Estuaries SPA

Common scoter *Melanitta nigra*, 2.7% of the UK population (5 year mean 1993-1997)

Cormorant *Phalacrocorax carbo*, 2.4% of the UK population (5 year mean 1993-1997)

Curlew *Numenius arquata*, 1.7% of the UK population (5 year mean 1993-1997)

Dunlin *Calidris alpina alpina*, 39,952 individuals representing at least 2.9% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6)

Grey Plover *Pluvialis squatarola*, 6,073 individuals representing at least 4.0% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)

Knot *Calidris canutus*, 57,865 individuals representing at least 16.5% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)

Lapwing *Vanellus vanellus*, 0.8% of the UK population (5 year mean 1993-1997)

Oystercatcher *Haematopus ostralegus*, 16,159 individuals representing at least 1.8% of the wintering Europe & Northern/Western Africa population (5 year peak mean 1991/2 - 1995/6)

Pink-footed Goose *Anser brachyrhynchus*, 23,860 individuals representing at least 10.6% of the wintering Eastern Greenland/Iceland/UK population (5 year peak mean 1991/2 - 1995/6)

Pintail *Anas acuta*, 3,333 individuals representing at least 5.6% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)

Redshank *Tringa totanus*, 2,708 individuals representing at least 1.8% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)

Sanderling *Calidris alba*, 2,859 individuals representing at least 2.9% of the wintering Eastern Atlantic/Western & Southern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Scaup *Aythya marila*, 1.0% of the UK population (5 year mean 1993-1997)

Shelduck *Tadorna tadorna*, 4,103 individuals representing at least 1.4% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)

Teal *Anas crecca*, 7,641 individuals representing at least 1.9% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)

Wigeon *Anas penelope*, 84,699 individuals representing at least 6.8% of the wintering Western Siberia/Northwestern/Northeastern Europe population (5 year peak mean 1991/2 - 1995/6)

The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds
Assemblage qualification: A seabird assemblage of international importance.
During the breeding season, the area regularly supports 29,236 individual seabirds (5 year peak mean 2001) including: Herring gull *Larus argentatus*, lesser black-backed gull *Larus fuscus*, black headed gull *Larus ridibundus*, common tern *Sterna hirundo*

The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
Assemblage qualification: A wetland of international importance.
Over winter, the area regularly supports 323,861 individual waterfowl (5 year peak mean for 2001) including: Great crested grebe Podiceps cristatus, bar-tailed godwit Limosa lapponica, pink-footed goose Anser brachyrhynchus, shelduck Tadorna tadorna, pintail Anas acuta, oystercatcher Haematopus ostralegus, grey plover Pluvialis squatarola, knot Calidris canutus, dunlin Calidris alpina alpina, curlew Numenius arquata, golden plover Pluvialis apricaria, turnstone Arenaria interpres, black-tailed godwit Limosa limosa islandica, cormorant Phalacrocorax carbo, wigeon Anas penelope, teal Anas crecca, mallard Anas platyrhynchos, eider Somateria mollissima, goldeneye Bucephala clangula, red-breasted merganser Mergus serrator, ringed plover Charadrius hiaticula, lapwing Vanellus vanellus, sanderling Calidris alba, redshank Tringa totanus, whimbrel Numenius phaeopus, Whooper swan Cygnus cygnus, Bewick's swan Cygnus columbianus, common scoter Melanitta nigra

Conservation objectives:

With regard to the individual species and/or assemblage of species for which the site has been classified (the Qualifying Features listed above), avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.

Subject to natural change, to maintain or restore:
- The extent and distribution of the habitats of the qualifying features

Site Name: Ribble and Alt Estuaries SPA
• The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The populations of the qualifying features • The distribution of the qualifying features within the site
Likely significant effects associated with activities that could follow Block licensing:
• Accidental spills (see Section 6.3) • Cumulative and in-combination effects (see Section 7)

Site Name: Mersey Narrows and Wirral Foreshore SPA	
Location	Latitude 53º 25'09"N Longitude 03º 07'43"W
Area (ha)	2078.41
Summary	The Mersey Narrows and North Wirral Foreshore SPA is located on the north-west coast of England at the mouths of the Mersey and Dee estuaries. The site comprises intertidal habitats at Egremont foreshore, man-made lagoons at Seaforth Nature Reserve and the extensive intertidal flats at North Wirral Foreshore. Egremont is most important as a feeding habitat for waders at low tide whilst Seaforth is primarily a high-tide roost site, as well as a nesting site for terns. North Wirral Foreshore supports large numbers of feeding waders at low tide and also includes important high-tide roost sites. The most notable feature of the site is the exceptionally high density of wintering Turnstone *Arenaria interpres*. Mersey Narrows and North Wirral Foreshore has clear links in terms of bird movements with the nearby Dee Estuary SPA, Ribble and Alt Estuaries SPA, and (to a lesser extent) Mersey Estuary SPA.
Qualifying features for which the site is designated:	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **Over winter:** Redshank *Tringa totanus*, 1,981 individuals representing at least 1.3% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) Turnstone *Arenaria interpres*, 1,138 individuals representing at least 1.6% of the wintering Western Palearctic - wintering population (5 year peak mean 1991/2 - 1995/6)	
The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl ***Assemblage qualification: A wetland of international importance.*** ***Over winter, the area regularly supports 20,269 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Dunlin Calidris alpina alpina, Knot Calidris canutus, Grey Plover Pluvialis squatarola, Oystercatcher Haematopus ostralegus, Cormorant Phalacrocorax carbo, Turnstone Arenaria interpres, Redshank Tringa totanus***	
Conservation objectives:	
With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features'), and subject to natural change; Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3) • Cumulative and in-combination effects (see Section 7)	

Site Name: Mersey Estuary SPA	
Location	Latitude 53º 19'39"N Longitude 02º 53'42"W
Area (ha)	5023.35
Summary	The Mersey Estuary is located on the Irish Sea coast of north-west England. It is a large, sheltered estuary which comprises large areas of saltmarsh and extensive intertidal sand- and mud-flats, with limited areas of brackish marsh, rocky shoreline and boulder clay cliffs, within a rural and industrial environment. The intertidal flats and saltmarshes provide feeding and roosting sites for large populations of waterbirds. During the winter, the site is of major importance for ducks and waders. The site is also important during the spring and autumn migration periods, particularly for wader populations moving along the west coast of Britain.
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **Over winter:** Golden Plover *Pluvialis apricaria*, 3,070 individuals representing at least 1.2% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **On passage:** Redshank *Tringa totanus*, 3,516 individuals representing at least 2.0% of the Eastern Atlantic - wintering population (5 year peak mean, 1987-1991) Ringed Plover *Charadrius hiaticula*, 1,453 individuals representing at least 2.9% of the Europe/Northern Africa - wintering population (Count, as at 1989) **Over winter:** Dunlin *Calidris alpina alpina*, 44,300 individuals representing at least 3.2% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6) Pintail *Anas acuta*, 2,744 individuals representing at least 4.6% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6) Redshank *Tringa totanus*, 4,689 individuals representing at least 3.1% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) Shelduck *Tadorna tadorna*, 5,039 individuals representing at least 1.7% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6) Teal *Anas crecca*, 11,667 individuals representing at least 2.9% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)	
The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl ***Assemblage qualification: A wetland of international importance.*** *Over winter, the area regularly supports 99,467 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Curlew Numenius arquata, Black-tailed Godwit Limosa limosa islandica, Lapwing Vanellus vanellus, Grey Plover Pluvialis squatarola, Wigeon Anas penelope, Great Crested Grebe Podiceps cristatus, Redshank Tringa totanus, Dunlin Calidris alpina alpina, Pintail Anas acuta, Teal Anas crecca, Shelduck Tadorna tadorna, Golden Plover Pluvialis apricaria*	
Conservation objectives:	
With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features'), and subject to natural change; Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring: • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features • The distribution of the qualifying features within the site	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Liverpool Bay / Bae Lerpwl SPA	
Location	Latitude 53º 36'10"N Longitude 03º 12'34"W
Area (ha)	170,292.94
Summary	Liverpool Bay is located in the south-eastern region of the northern part of the Irish Sea, bordering north-west England and north Wales. The SPA is a broad arc from Morecambe Bay to the east coast of Anglesey. The sea bed of the SPA consists of a wide range of mobile sediments. Large areas of muddy sand stretch from Rossall Point to the Ribble Estuary, and sand predominates in the remaining areas, with a concentrated area of gravelly sand off the Mersey Estuary and a number of prominent sandbanks off the English and Welsh coasts. The tidal currents throughout the SPA are generally weak, which combined with a relatively large tidal range facilitates the deposition of sediments. The seabed and waters of the site provide an important habitat in the non-breeding season for major concentrations of red-throated divers *Gavia stellata* and sea-ducks, notably common scoter *Melanitta nigra*, which visit the area to feed on the fish, mollusc and crustacean populations. The area is also a feeding ground for breeding and passage terns.
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **Over winter:** *Red throated diver Gavia stellata, 922 individuals representing at least 5.6% of the UK population (5 year mean, 2001-2006)*	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **Over winter:** Common scoter *Melanitta nigra*, 54,675 individuals representing 3.4% of the population in NW Europe (5 year mean, 2001-2006)	
The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl ***Assemblage qualification: A wetland of international importance.*** *Over winter, the area regularly supports 55,597 individual waterfowl (5 year peak mean 2001-2006)*	
Conservation objectives:	
Red-throated diver (*Gavia stellata*) Subject to natural change, maintain or enhance the red-throated diver population and its supporting habitats in favourable condition. The interest feature red-throated diver will be considered to be in favourable condition only when both of the following two conditions are met: • The size of the red-throated diver population is at, or shows only non-significant fluctuation around the mean population at the time of designation of the SPA. to account for natural change; • The extent of the supporting habitat within the site is maintained. **Common scoter (*Melanitta nigra*)** Subject to natural change, maintain or enhance the common scoter population and its supporting habitats in favourable condition. The interest feature common scoter will be considered to be in favourable condition only when both of the following two conditions are met: • The size of the common scoter population is at, or shows only non-significant fluctuation around the mean population at the time of designation of the SPA to account for natural change; • The extent of the supporting habitat within the site is maintained. **Non-breeding assemblage of over 20,000 waterbirds** Subject to natural change, maintain or enhance the waterbird assemblage and its supporting habitats in favourable condition. The interest feature waterbird assemblage will be considered to be in favourable condition only when each of the following two conditions is met: • The size of the waterbird assemblage population shows only non-significant fluctuation around the mean at the time of designation to allow for natural change; • The extent of the waterbird assemblage supporting habitat within the site is maintained.	
Likely significant effects associated with activities that could follow Block licensing:	
• Physical disturbance (see Section 4.3) • Accidental spills (see Section 6.3) • Cumulative and in-combination effects (see Section 7)	

Site Name: The Dee Estuary SPA	
Location	Latitude 53º 18'39"N Longitude 03º 11'06"W
Area (ha)	14,291.56
Summary	The Dee Estuary lies on the border between England and Wales on the north-west coast of Britain. It is a large, funnel-shaped, sheltered estuary, which supports extensive areas of intertidal sand and mudflats and saltmarsh. Where agricultural reclamation has not occurred, the saltmarshes grade into transitional brackish and swamp vegetation on the upper shore. The site also includes the three sandstone islands of Hilbre, with their important cliff vegetation and maritime heathland and grassland. The two shorelines of the estuary show a marked contrast between the industrialised usage of the coastal belt in Wales and residential and recreational usage in England. The site is of major importance for waterbirds; during the winter the intertidal flats, saltmarshes and fringing habitats including coastal grazing marsh/fields, provide feeding and roosting sites for internationally important numbers of ducks and waders; in summer the site supports nationally important breeding colonies of two species of tern. The site is also important during migration periods, particularly for wader populations moving along the west coast of Britain and for Sandwich terns post-breeding.
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **During the breeding season:** *Common Tern Sterna hirundo, 392 pairs representing at least 3.2% of the breeding population in Great Britain (5 year mean 1995-99)* Little Tern *Sterna albifrons*, 69 pairs representing at least 2.9% of the breeding population in Great Britain (5 year mean 1995-99) **On passage:** Sandwich Tern *Sterna sandvicensis*, 957 individuals representing at least 2.3% of the population in Great Britain (5 year mean 1995-99) **Over winter:** Bar-tailed Godwit *Limosa lapponica*, 1,150 individuals representing at least 2.2% of the wintering population in Great Britain (5 year peak mean 1994/5 - 1998/9)	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **On passage:** Redshank *Tringa totanus*, 8,795 individuals representing at least 5.9% of the Eastern Atlantic - wintering population (5 year peak mean 1994/5 - 1998/9) **Over winter:** Black-tailed Godwit *Limosa limosa islandica*, 1,747 individuals representing at least 2.5% of the wintering Iceland - breeding population (5 year peak mean 1994/5 – 1998/9) Curlew *Numenius arquata*, 3,899 individuals representing at least 1.1% of the wintering Europe - breeding population (5 year peak mean 1994/5 – 1998/9) Dunlin *Calidris alpina alpina*, 27,769 individuals representing at least 2.0% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1994/5 – 1998/9) Grey Plover *Pluvialis squatarola*, 1,643 individuals representing at least 1.1% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1994/5 – 1998/9) Knot *Calidris canutus*, 12,394 individuals representing at least 3.5% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean 1994/5 – 1998/9) Oystercatcher *Haematopus ostralegus*, 22,677 individuals representing at least 2.5% of the wintering Europe & Northern/Western Africa population (5 year peak mean 1994/5 – 1998/9) Pintail *Anas acuta*, 5,407 individuals representing at least 9.0% of the wintering Northwestern Europe population (5 year peak mean 1994/5 – 1998/9) Redshank *Tringa totanus*, 5,293 individuals representing at least 3.5% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1994/5 – 1998/9) Shelduck *Tadorna tadorna*, 7,725 individuals representing at least 2.6% of the wintering Northwestern Europe population (5	

Site Name: The Dee Estuary SPA
year peak mean 1994/5 - 1998/9) Teal *Anas crecca*, 5,251 individuals representing at least 1.3% of the wintering Northwestern Europe population (5 year peak mean 1994/5 - 1998/9)
The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl ***Assemblage qualification: A wetland of international importance.*** *In the non-breeding season, the area regularly supports 120,726 individual waterbirds (5 year peak mean 1994/95 - 1998/99), including: Great Crested Grebe Podiceps cristatus, Cormorant Phalacrocorax carbo, Shelduck Tadorna tadorna, Wigeon Anas penelope, Teal Anas crecca, Pintail Anas acuta, Oystercatcher Haematopus ostralegus, Grey Plover Pluvialis squatarola, Lapwing Vanellus vanellus, Knot Calidris canutus, Sanderling Calidris alba, Dunlin Calidris alpina, Black-tailed Godwit Limosa limosa islandica, Bar-tailed Godwit Limosa lapponica, Curlew Numenius arquata and Redshank Tringa totanus.*
Conservation objectives:
With regard to the individual species and/or assemblage of species for which the site has been classified (the Qualifying Features listed above), avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive. Subject to natural change, to maintain or restore: • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The populations of the qualifying features • The distribution of the qualifying features within the site
Likely significant effects associated with activities that could follow Block licensing:
• Accidental spills (see Section 6.3) • Cumulative and in-combination effects (see Section 7)

Site Name: Traeth Lafan / Lavan Sands, Conway Bay SPA	
Location	Latitude 53º 15'18"N Longitude 04º 02'31"W
Area (ha)	2,642.98
Summary	Traeth Lafan / Lavan Sands is located in Conway Bay close to Bangor in north-west Wales. It is a large intertidal area of sand- and mud-flats lying at the eastern edge of the Menai Straits. The area has a range of exposures and a diversity of conditions, enhanced by freshwater streams that flow across the flats. The site is of importance for wintering waterbirds, especially Oystercatcher *Haematopus ostralegus*. In conditions of severe winter weather, Traeth Lafan acts as a refuge area for Oystercatchers displaced from the nearby Dee Estuary.
Qualifying features for which the site is designated:	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **Over winter:** Oystercatcher *Haematopus ostralegus*, 4,931 individuals representing at least 0.5% of the wintering Europe & Northern/Western Africa population (5 year peak mean 1991/2 - 1995/6)	
Conservation objectives:	
Oystercatcher (*Haematopus ostralegus*) The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied: • The 5 year mean peak of the number of wintering oystercatchers is at least 4,000. • The abundance and distribution of cockles of 15mm or larger and other suitable food are maintained at levels sufficient to support the population with a 5 year mean peak of 4,000 individuals. • Oystercatchers are not disturbed in ways that prevent them spending enough time feeding for survival. • Roost sites, including high tide roost sites, remain suitable for oystercatchers to roost undisturbed. • The management and control of activities or operations likely to adversely affect the oystercatchers, is appropriate for maintaining the feature in favourable condition and is secure in the long term.	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3) • Cumulative and in-combination effects (see Section 7)	

Site Name: Ynys Feurig, Cemlyn Bay and The Skerries SPA	
Location	Latitude 53º 24'42"N Longitude 04º 30'43"W
Area (ha)	85.66
Summary	The SPA of Ynys Feurig, Cemlyn Bay and The Skerries is located on the north and west coasts of the island of Anglesey off north-west Wales. The SPA comprises three separate areas. Ynys Feurig lies on Anglesey's west coast close to Valley airfield, with Cemlyn Bay situated on the north coast about 20 km away. The Skerries lie 3 km off Carmel Head. Ynys Feurig consists of a series of low-lying islands extending about 1 km out to sea from a sandy shore. There is little vegetation, except on the highest outer islands. At Cemlyn Bay, a shingle storm beach forms a bar between a tidal lagoon and the open shore. The shingle habitats, together with saltmarsh developing around the lagoon and brackish pools further inland are an unusual combination of habitats. The Skerries are a group of sparsely vegetated islets, 17 ha in extent. They are protected by strong currents but are very exposed to strong westerly and northerly winds. The site is of importance for four species of breeding terns. The three separate areas are treated as a single site as a consequence of regular movement by birds between the component parts.
Qualifying features for which the site is designated:	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **During the breeding season:** Arctic Tern *Sterna paradisaea*, 1,290 pairs representing at least 2.9% of the breeding population in Great Britain (5 year mean, 1992-1996) Common Tern *Sterna hirundo*, 189 pairs representing at least 1.5% of the breeding population in Great Britain (5 year mean, 1992-1996) Roseate Tern *Sterna dougallii*, 3 pairs representing at least 5.0% of the breeding population in Great Britain (5 year mean, 1992-1996) Sandwich Tern *Sterna sandvicensis*, 460 pairs representing at least 3.3% of the breeding population in Great Britain (5 year mean, 1993-1997)	
Conservation objectives:	
Conservation Objective for Features 1-4: Breeding population of Terns Feature 1: Arctic Tern *Sterna paradisae* Feature 2: Common Tern *Sterna hirundo* Feature 3: Roseate Tern *Sterna dougallii* Feature 4: Sandwich Tern *Sterna sandvicensis* The vision for these features is for them to be in a favourable conservation status, where all the following conditions are satisfied: • The number of breeding terns within the SPA is stable or increasing. • The number of chicks successfully fledged in the SPA and beyond is sufficient to help sustain the population. • The range and distribution of terns within the SPA and beyond is not constrained or hindered. • The extent of supporting habitats used by terns is stable or increasing. • Supporting habitats are of sufficient quality to support the requirements of terns. • There are appropriate and sufficient food sources for terns within access of the SPA. • Actions or events likely to impinge on the sustainability of the population are under control	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Ynys Seiriol / Puffin Island SPA	
Location	Latitude 53° 31'69"N Longitude 04° 02'54"W
Area (ha)	31.6
Summary	Ynys Seiriol / Puffin Island is located just off the eastern tip of the Isle of Anglesey in North Wales. It is a Carboniferous limestone block rising to 55m with steep cliffs on all sides. A veneer of heavily guano-enriched soil masks the limestone over much of the surface, leading to an impoverished vegetation dominated by a dense mat of grasses (mainly Red Fescue *Festuca rubra* and Cock's-foot *Dactylis glomerata*), Common Nettle *Urtica dioica*, Bramble *Rubus fruticosus* and Alexanders *Smyrnium olusatrum*. It was heavily grazed by rabbits until the advent of myxomatosis. Dense woodland of Elder *Sambucus nigra* has developed, particularly in the past 40 years since the loss of rabbit grazing. The island has long been unoccupied. A large population of Common Rat *Rattus norvegicus* appears to have been eradicated by poisoning undertaken in 1998 to enhance its value for breeding seabirds. The site is of European importance for its breeding population of Cormorant *Phalacrocorax carbo, which* feed in the surrounding waters outside the SPA.
Qualifying features for which the site is designated:	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **During the breeding season:** Cormorant *Phalacrocorax carbo*, 776 pairs representing at least 1.9% of the breeding Northwestern Europe population (count as at 1996)	
Conservation objectives:	
Cormorant (*Phalacrocorax carbo*) The conservation objective for the Cormorant is to achieve and maintain favourable conservation status, in which all the following conditions are satisfied: • The number of breeding cormorants within the SPA are stable or increasing. • The abundance and distribution of prey species are sufficient to support this number of breeding pairs and for successful breeding. • The management and control of activities or operations likely to adversely affect the Cormorants, is appropriate for maintaining the feature in favourable condition and is secure in the long term."	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3) • Cumulative and in-combination effects (see Section 7)	

Site Name: Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island SPA	
Location	Latitude 52º 42'21"N Longitude 04º 47'21"W
Area (ha)	33,942.42
Summary	Glannau Aberdaron and Ynys Enlli, or Aberdaron Coast and Bardsey Island, is located at the tip of the Lleyn Peninsula in north-west Wales. The site consists of the island of Bardsey (Ynys Enlli) and part of the tip of the Lleyn Peninsula, together with two smaller islands – the Gwylans. The coastline is rocky, with many crags, screes and low cliffs. The Aberdaron coast consists of a series of heather-covered hills rising to about 190m, separated by valleys occupied by pastures. The maritime heaths are dominated by heather *Calluna vulgaris*, bell *heather Erica cinerea* and western gorse *Ulex gallii* and are exposed to strong westerly winds. The mountain on Ynys Enlli has similar heathland to the mainland, whilst the sheltered screes on the north-east of the island have a rich fern and bryophyte flora. The site supports a resident population of chough *Pyrrhocorax pyrrhocorax* which depend on the diverse mix of habitats present and their low-intensity agricultural management. The site also holds a large breeding colony of Manx shearwaters *Puffinus puffinus*. The shearwaters feed outside the SPA in the nearby waters as well as more distantly in the Irish Sea.
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **During the breeding season:** Chough *Pyrrhocorax pyrrhocorax*, 12 pairs representing at least 3.5% of the breeding population in Great Britain (Count, as at late 1990s) Over winter: Chough *Pyrrhocorax pyrrhocorax*, 24 pairs representing at least 3.5% of the wintering population in Great Britain (RSPB) ***Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:*** **During the breeding season:** Manx shearwater *Puffinus puffinus*, 6,930 pairs representing at least 2.6% of the breeding population (Count, as at 1996)	
Conservation objectives:	
Conservation Objective for Feature 1: Internationally important population (1% or more of the Great Britain population) of breeding and non-breeding season chough *Pyrrhocorax pyrrhocorax*. **Vision for feature 1: Chough** The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied: • The breeding population of chough is at least 14 pairs, or 5% of the GB population. • The wintering population of chough is at least 28 individuals, or 5% of the GB population. • Sufficient suitable habitat is present to support the populations. • Breeding population is stable or increasing. • Productivity is stable. • Non-breeding flocks are stable or increasing (summer and winter). • Breeding and non-breeding birds use Ynys Enlli for feeding throughout the year. • Chough feeding habitats are themselves in a favourable conservation status and that the specified and operational limits and grazing prescriptions for these habitats incorporate chough feeding requirements (i.e. sward height and bare ground). • Disturbance of breeding and feeding chough is minimal. • The factors affecting the feature are under control. Conservation Objective for Feature 2: Internationally important population (1% or more of the Great Britain population) of breeding Manx shearwaters *Puffinus puffinus.* **Vision for Feature 2: Manx shearwater** The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied: • Breeding population of Manx shearwater (confined to Ynys Enlli) is stable or increasing. • Reproductive rates remain stable. • Deaths from the lighthouse attractions, fencing and other infrastructure are minimal. • No ground predators are introduced. • Nesting birds are not disturbed by restoration works on boundary walls or recreational activities. • All factors affecting the achievement of these conditions are under control.	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Grassholm SPA	
Location	Latitude 51º 43'51"N Longitude 05º 28'47"W
Area (ha)	10.77
Summary	Grassholm is a small island which lies about 18km west of the mainland coast of Pembrokeshire in south-west Wales. It is a rather low, flat-topped basalt island with limited terrestrial vegetation owing to the effects of large numbers of breeding seabirds, together with the influence of salt spray and wind exposure. Grassholm is of major importance as a breeding site for gannet *Morus bassanus*. The seabirds feed outside the SPA in nearby waters, as well as more distantly elsewhere in the Irish Sea.
Qualifying features for which the site is designated:	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **During the breeding season:** Gannet *Morus bassanus*, 33,000 pairs representing at least 12.5% of the breeding North Atlantic population (Count as at 1994/5)	
Conservation objectives:	
Conservation Objective for Feature 1: Gannet **Vision for Gannet** The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied: • The population will not fall below 30,000 pairs in three consecutive years, • It will not drop by more than 25% of the previous year's figures in any one year. • There will be no decline in this population significantly greater than any decline in the North Atlantic population as a whole.	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Skokholm and Skomer SPA	
Location	Latitude 51º 43'08"N Longitude 05º 17'06"W
Area (ha)	14,347.81
Summary	Skomer, Skokholm and Middleholm are three islands lying off the extreme south-west tip of Pembrokeshire in south-west Wales. They are bounded by cliffs that reach 70m on Skomer. The plateau vegetation is much affected by salt spray, rabbit grazing and nutrient enrichment from seabirds. The islands have mixed grassland and maritime heath vegetation in varying proportions, and on Skomer especially there are now large stands of bracken *Pteridium aquilinum*. The coastal habitats of the SPA support an important resident population of chough *Pyrrhocorax pyrrhocorax*. These birds nest at high density in traditional locations within the cliffs and depend on the diverse mix of coastal habitats present and their low-intensity agricultural management. The islands also support a large number of breeding seabirds, especially petrels, gulls and auks. Especially notable is the high proportion (over half) of the world population of Manx shearwater *Puffinus puffinus* that nest here. The nesting seabirds using the site feed outside the SPA in surrounding marine areas, as well as more distantly.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Chough *Pyrrhocorax pyrrhocorax*, 4 pairs representing at least 1.2% of the breeding population in Great Britain

Short-eared owl *Asio flammeus*, 6 pairs representing at least 0.6% of the breeding population in Great Britain (Count as at 1998)

Storm petrel *Hydrobates pelagicus*, 3,500 pairs representing at least 4.1% of the breeding population in Great Britain (Count as at 1995)

Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

During the breeding season:
Lesser black-backed gull *Larus fuscus*, 20,300 pairs representing at least 16.4% of the breeding Western Europe/ Mediterranean/Western Africa population (Mean 1993 to 1997)

Manx shearwater *Puffinus puffinus*, 150,968 pairs representing at least 56.9% of the breeding population (Count, as at late 1990s)

Puffin *Fratercula arctica*, 9,500 pairs representing at least 1.1% of the breeding population (Count, as at mid-1980s)

The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds
Assemblage qualification: A seabird assemblage of international importance.
During the breeding season, the area regularly supports 67,278 individual seabirds (Count period ongoing) including: Razorbill *Alca torda*, guillemot *Uria aalge*, kittiwake *Rissa tridactyla*, puffin *Fratercula arctica*, lesser black-backed gull *Larus fuscus*, Manx shearwater *Puffinus puffinus*, storm petrel *Hydrobates pelagicus*.

Conservation objectives:

Conservation Objective for Feature 1: Chough *Pyrrhocorax pyrrhocorax*

Vision for feature 1
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The Skomer breeding population will be at least 3 pairs
- The Skokholm breeding population will be at least 1 pair
- The SPA breeding population will be 4 pairs, (this currently represents around 5 % of the Pembrokeshire chough population and 1.2% of the GB population)
- Breeding success will be 1.5 chicks/pair
- Sufficient suitable habitat will be present to support the populations
- The factors affecting the feature are under control

Conservation Objective for Feature 2: Short-eared owl *Asio flammeus*

Vision for feature 2
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The breeding population will be at least 6 pairs
- Breeding success will be at least 1 chicks/pair

Site Name: Skokholm and Skomer SPA

- Sufficient suitable habitat will be present to support the populations
- The factors affecting the feature are under control

Conservation Objective for Feature 3: Storm petrel *Hydrobates pelagicus*

Vision for feature 3
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The population of storm petrel will be at least 3500 pairs within the SPA,
- Sufficient suitable nesting sites will be present to support at least the current populations
- The factors affecting the feature are under control

Conservation Objective for Feature 4: Lesser black-backed gull *Larus fuscus*

Vision for feature 4
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- During the breeding season the population of lesser black-backed gull will be at least 20,300 pairs within the SPA. This re presents around 16.4% of the current breeding Western European/Mediterranean/western African population
- Breeding success will be at least 0.4 chicks/pair
- Sufficient suitable nesting sites will be present to support at least the current populations
- The factors affecting the feature are under control

Conservation Objective for Feature 5: Manx shearwater *Puffinus puffinus*

Vision for feature 5
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- During the breeding season the population of Manx shearwater will be at least 150,000 pairs within the SPA (this represents around half of the current breeding population).
- Breeding success will be at least 0.5 chicks per egg laid
- The factors affecting the feature are under control

Conservation Objective for Feature 6: Puffin *Fratercula arctica*

Vision for feature 6
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- During the breeding season the population of puffins will be at least 9,500 pairs within the SPA, (this represents at least 1.1% of the current breeding population)
- Breeding success will be 0.7 chicks/pair
- The factors affecting the feature are under control

Conservation Objective for Feature 7: Assemblage qualification: A seabird assemblage of international importance.

Vision for feature 7
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- Each of the component species of the seabird assemblage will be in favourable condition for the assemblage as a whole to achieve Favourable Condition
- During the breeding season the SPA will regularly support at least 67,000 individual seabirds of the following species, most of which also qualify independently as SPA features:
  - Razorbill *Alca torda*
  - Guillemot *Uria aalge*
  - Kittiwake *Rissa tridactyla*
  - Puffin *Fratercula arctica*
  - Lesser black-backed gull *Larus fuscus*
  - Manx shearwater *Puffinus puffinus*
  - Storm petrel *Hydrobates pelagicus*

Likely significant effects associated with activities that could follow Block licensing:

- Accidental spills (see Section 6.3)

C2 Special Areas of Conservation

Site Name: Drigg Coast SAC	
Location	Grid Ref: SD071960 (central point) Latitude 54º21'02"N Longitude 03º25'47"W
Area (ha)	1,397.44
Summary	Drigg is an example of a small, bar-built estuary on the north-west coast of England. It is fed by three rivers (the Irt, Mite and Esk) which discharge through a mouth that has been narrowed by large sand and shingle spits. The sediments within the estuary are largely muddy within the Rivers Irt and Mite, while those of the Esk are more sandy, particularly towards the mouth. There is a substantial freshwater influence in the upper reaches of all three rivers, with good development of associated animal communities. Within the site are some of the least-disturbed transitions to terrestrial habitats of any estuary found in the UK.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Estuaries, Altlantic decalcified fixed dunes (*Calluno-Ulicetea*) *priority feature, dunes with *Salix repens spp. argentea* Secondary features: Mudflats and sandflats not covered by seawater at low tide, *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*, fixed dunes with herbaceous vegetation* priority feature, humid dune slacks **Annex II Species** Primary features: None Secondary features: None	
Conservation objectives:	
With regard to the natural habitats and/or species for which the site has been designated (the qualifying features listed above): avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving favourable conservation status of each of the qualifying features. Subject to natural change, to maintain or restore: • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats and habitats of qualifying species • The supporting processes on which qualifying natural habitats and habitats of qualifying species rely • The population of qualifying species • The distribution of qualifying species within the site	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Morecambe Bay SAC	
Location	Grid Ref: SD371697 (central point) Latitude 54º07'09"N Longitude 02º57'42"W
Area (ha)	61,506.22
Summary	Morecambe Bay in north-west England is the confluence of four principal estuaries, the Leven, Kent, Lune and Wyre (the latter lies just outside the site boundary), together with other smaller examples such as the Keer. Collectively these form the largest single area of continuous intertidal mudflats and sandflats in the UK and the best example of muddy sandflats on the west coast. The estuaries are macro-tidal with a spring tidal range of 9m. The significant tidal prisms of the estuaries result in the Bay being riven by large low-water channel systems. The Kent, Leven and Lune estuaries have been modified variously by railway embankments, flood embankments and training walls but support extensive intertidal areas. Although cobble 'skears' and shingle beaches occur at their mouths, the estuaries consist predominantly of fine sands and muddy sands. The estuaries support dense invertebrate communities, their composition reflecting the salinity and sediment regimes within each estuary. Extensive saltmarshes and glasswort *Salicornia* spp. beds are present in the Lune estuary, contrasting with the fringing saltmarshes and more open intertidal flats of the Leven and Kent estuaries.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Estuaries, mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, reefs, perennial vegetation of stony banks, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows, shifting dunes along the shoreline with *Ammophila arenaria*, fixed dunes with herbaceous vegetation, humid dunes slacks Secondary features: sandbanks which are slightly covered by seawater all the time, coastal lagoons, reefs, embryonic shifting dunes, Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), dunes with *Salix repens spp. argentea* (*Salicion arenariae*) **Annex II Species** Primary features: Great crested newt *Triturus cristatus* Secondary features: None	
Conservation objectives:	
For Annex I Habitats To avoid deterioration of the qualifying habitats (listed above), thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term: • Extent of the habitats on site • Distribution of the habitats within site • Structure and function of the habitats • Processes supporting the habitats • Distribution of typical species of the habitats • Viability of typical species as components of the habitats • No significant disturbance of typical species of the habitats	
For Annex II Species To avoid deterioration of the habitats of the qualifying species (listed above) 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 the qualifying interest. To ensure for the qualifying species that the following are established then maninatined in the long term: • Population of the species as a viable component of the site • Distribution of the species within the 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	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Shell Flat and Lune Deep SCI	
Location	Grid Ref: Lat 53.857ºN Long 3.217ºW (central point) Latitude 53º51'50"N Longitude 03º12'14"W
Area (ha)	10,565
Summary	The Shell Flat component of the Shell Flat and Lune Deep site is a crescent shaped sandbank comprising a range of mud and sand sediments. Shell Flat has a typical sandy substrate biological community. Shell Flat is the only sandbank feature identified within the outer Shell Flat site and is known to provide important habitat for commercial fish species and bird populations. Lune Deep and the area immediately to the north support mixed faunal turf communities over a cobble/rock substrate. These areas provide habitat for erect hydroids and bryozoans with some areas having erect sponges which form the biotope *Flustra foliacea* and *Haliclona oculata* with a rich faunal turf on tide-swept circalittoral mixed substrata. The reef habitat present in the area represents a good example of boulder and bedrock reef, with the largest proportions of rock found along the unique kettle hole feature known as Lune Deep. The northern edges of Lune Deep are characterised by heavily silted cobble and boulder slopes, subject to strong tidal currents with a dense hydroid and bryozoan turf. This unique enclosed deep hole provides a contrasting habitat to the surrounding muddy communities of the Eastern Irish Mudbelt. The northern flanks of Lune Deep are composed of exposed bedrock with a rugged seabed physiography. In cntrast, the southern flank consists of a smooth seabed which is a sink for muddy sands.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Sandbanks which are slightly covered by seawater all the time, reefs Secondary features: None **Annex II Species** Primary features: None Secondary features: None	
Conservation objectives:	
For Annex I Habitats Subject to natural change, maintain the qualifying habitats (described above) all the time in favourable condition. Favourable condition of the sandbank will be determined through assessment that the following are maintained in the long term in the site: • The extent of the habitat • Diversity of the habitat and its component species • Community structure of the habitat (e.g. population structure of individual notable species and their contribution to the functioning of the ecosystem) • Natural environmental quality (e.g. water quality, suspended sediment levels etc,) • Natural environmental processes (e.g. biological and physical processes that occur naturally in the environment, such as water circulation and sediment deposition should not deviate from baseline at designation)	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Sefton Coast SAC	
Location	Grid Ref: SD281099 (central point) Latitude 53º34'51"N Longitude 04º54'54"W
Area (ha)	4,563.97
Summary	The Sefton Coast in north-west England displays both rapid erosion and active progradation - the area around Formby Point hass been eroding since 1906 while areas north and south of this zone are accreting. A substantial stretch of the Sefton Coast dune system is fronted by shifting dunes usually dominated by Marram *Ammophila arenaria*, with me grass *Leymus arenarius*, sea-holly *Eryngium maritimum* and cat's-ear *Hypochaeris radicata* occur, with red fescue *Festuca rubra* and spreading meadow-grass *Poa humilis* present on the more sheltered ridges. There are also large areas of semi-fixed and fixed dunes with herbaceous vegetation exhibiting considerable variation from calcareous to acidic, and dune slacks dominated by creeping willow *Salix repens* ssp. *argentea*. A large population of petalwort *Petalophyllum ralfsii* occurs at Sefton Coast, the only site chosen for this species in north-west England.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Embryonic shifting dunes, "Shifting dunes along the shoreline with *Ammophila arenaria* (""white dunes"")", "Fixed coastal dunes with herbaceous vegetation (""grey dunes"")" * Priority feature, Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*), Humid dune slacks **Secondary features: Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) * Priority feature** **Annex II Species** Primary features: Petalwort *Petalophyllum ralfsii* Secondary features: Great crested newt *Triturus cristatus*	
Conservation objectives:	
For Annex I Habitats and Annex II Species Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring; • 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, and, • The distribution of qualifying species within the site.	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Dee Estuary / Aber Dyfrdwy SAC	
Location	Grid Ref: SJ191819 (central point) Latitude 53º19'39"N Longitude 03º12'53"W
Area (ha)	15,805.07
Summary	The Dee Estuary forms the most extensive type of saltmarsh in the Dee, and since the 1980s it has probably displaced very large quantities of the non-native common cord-grass *Spartina anglica*. The high accretion rates found in the estuary are likely to favour further development of this type of vegetation. The saltmarsh is regularly inundated by the sea; characteristic salt-tolerant perennial flowering plant species include common saltmarsh-grass *Puccinellia maritima*, sea aster *Aster tripolium*, and sea arrowgrass *Triglochin maritima*. In a few areas there are unusual transitions to wet woodland habitats.

Qualifying features for which the site is designated:

Annex I Habitat
Primary features: Mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-puccinellietalia maritimae*)
Secondary features: Estuaries, annual vegetation of drift lines, vegetated sea cliffs of the Atlantic and Baltic coasts, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria*, fixed dunes with herbaceous vegetation*priority feature, humid dune slacks

Annex II Species
Primary features: None
Secondary features: Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, petalwort *Petalophyllum ralfsii*

Conservation objectives:

For Annex I Habitats, the following features will be considered to be in favourable condition when:

Estuaries
- the aggregate total extent of all estuarine communities within the site is maintained
- the spatial distribution of estuarine communities within the site is maintained
- the extent of individual estuarine habitat features within the site is maintained
- the variety and relative proportions of sediment and rocky substrates within the estuary is maintained
- the variety and extent of any notable subtidal sediment communities is maintained
- the variety and extent of notable intertidal hard substrata communities is maintained
- the spatial and temporal patterns of salinity, suspended sediments and nutrients concentrations are maintained within limits sufficient to satisfy the requirements of the statements above

Mudflats and sandflats
- the total extent of mudflat and sandflat communities within the site is maintained
- the proportions of individual mudflat and sandflat communities within the site are maintained
- the topography of the intertidal flats and the dynamic processes of channel migration and sinuosity across the flats are maintained
- the abundance of typical species of the mudflat and sandflat feature within the site is maintained

***Salicornia* and other annuals colonising mud and sand**
subject to natural processes, each of the following conditions are met
- the total extent of pioneer saltmarsh vegetation communities within the site is maintained
- the presence of pioneer saltmarsh vegetation communities as part of transitions from intertidal sediment communities to higher saltmarsh are maintained
- the abundance of the typical species of the pioneer saltmarsh vegetation communities is maintained;
- the abundance of the notable species of the pioneer saltmarsh vegetation communities is maintained.
- and, regardless of natural processes the overall extent and abundance of common cord grass *Spartina anglica* is not increasing within the pioneer saltmarsh zone

Atlantic salt meadow
- the total extent of Atlantic salt meadow vegetation communities within the site is maintained
- the proportions of individual Atlantic salt meadow vegetation communities within the site are maintained
- the zonation of Atlantic salt meadow vegetation communities and their transitions to fresh water and terrestrial vegetation are maintained
- the morphology of saltmarsh creeks and pans and the process of their evolution are maintained
- the extent of ungrazed areas of salt meadow within the estuary is maintained and there is no increase in grazing intensity over the rest of the salt meadow
- the relative abundance of the typical species of the Atlantic salt meadow vegetation communities is maintained
- the abundance of the notable species of the Atlantic salt meadow vegetation communities is maintained

Annual vegetation of drift lines
- the extent of coarse sediment / shingle formations capable of supporting drift line vegetation communities within the site

Site Name: Dee Estuary / Aber Dyfrdwy SAC
is maintained • the presence of annual drift line vegetation communities within the site is maintained • the presence of the typical species of the annual drift line vegetation communities is maintained
For Annex II Species, the following features will be considered to be in favourable condition when: ***Lampetra fluviatilis* (river lamprey)** subject to natural processes, each of the following conditions are met: • the migratory passage of both adult and juvenile river lamprey through the Dee Estuary between Liverpool Bay and the River Dee is unobstructed by physical barriers and / or poor water quality • the five year mean count of river lampreys recorded by the Chester Weir fish trap is no less than 55 under the monitoring regime in use prior to notification [*i.e. 100% of the mean annual count during the five years for which data are available prior to notification: 1993, 1997-2000*] • the abundance of prey species forming the river lamprey's food resource within the estuary, is maintained ***Petromyzon marinus* (sea lamprey)** subject to natural processes, each of the following conditions are met: • the migratory passage of both adult and juvenile sea lampreys through the Dee Estuary between Liverpool Bay and the River Dee is unobstructed by physical barriers and / or poor water quality • the five year mean count of sea lampreys recorded by the Chester Weir fish trap is no less than 18 under the monitoring regime in use prior to notification. [*i.e. 100% of the mean annual count during the five years for which data are available prior to notification: 1993, 1997-2000*] • the abundance of prey species forming the sea lamprey's food resource within the estuary, is maintained
Likely significant effects associated with activities that could follow Block licensing:
• Accidental spills (see Section 6.3)

Site Name: Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC	
Location	Grid Ref: SH629728 (central point) Latitude 53º19'39"N Longitude 03º12'53"W
Area (ha)	26,482.67
Summary	The unique physiographic conditions experienced within the Menai Strait and Conwy Bay SAC make this an unusual site, which has long been recognised as important for marine wildlife. The variation in physical and environmental conditions throughout the site, including rock and sediment type, aspect, water clarity and exposure to tidal currents and wave action result in a wide range of habitats and associated marine communities. Many of these community types are unusual in Wales. Of particular interest is the continuum of environmental and physical conditions and associated marine communities from the tide-swept, wave-sheltered narrows of the Menai Strait to the more open, less tide-swept waters of Conwy Bay and the moderately wave-exposed Great and Little Ormes. The Menai Strait and Conwy Bay SAC is a multiple interest site that has been selected for the presence of 5 marine habitat types and associated wildlife (Habitats Directive Annex I habitat types).

Qualifying features for which the site is designated:

Annex I Habitat
Primary features: Sandbanks which are slightly covered by sea water all the time, Mudflats and sandflats not covered by seawater at low tide, reefs
Secondary features: Large shallow inlets and bays, submerged or partially submerged sea caves

Annex II Species
Primary features: None
Secondary features: None

Conservation objectives:

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status:

Range
The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the **intertidal mudflats and sandflats** these include;
- Muddy gravel communities
- Dwarf eelgrass, *Zostera noltei* beds
- Sediment communities at Traeth Lafan

For the **reef** feature these include;
- Reef communities in high energy wave-sheltered, tide-swept conditions
- Under-boulder, overhang and crevice communities
- Limestone reef communities
- Clay outcrop reef communities.

For the **large shallow bay** feature these include;
- Organically enriched muddy sediment areas

Structure and function
The physical biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include;
- geology,
- sedimentology,
- geomorphology,
- hydrography and meteorology,
- water and sediment chemistry,
- biological interactions.

This includes a need for nutrient levels in the water column and sediments to be:
- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:
- at or below existing statutory guideline concentrations
- below levels that would potentially result in increase in contaminant concentrations within sediments or biota •
- below levels potentially detrimental to the long-term maintenance of the features species populations, their

Site Name: Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC

abundance or range.

Restoration and recovery
This includes the need for restoration of some reef features such as underboulder, overhang and crevice communities, and of some mudflat and sandflat features such as the muddy gravel habitats and sheltered muddy habitats. All of these habitats are also part of the large inlets and bays feature.

Typical species
The presence, abundance, condition and diversity of typical species is such that habitat quality is not degraded. Important elements include:

- species richness,
- population structure and dynamics,
- physiological heath,
- reproductive capacity,
- recruitment,
- mobility,
- range

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature, is appropriate for maintaining it in favourable condition and is secure in the long term.

Likely significant effects associated with activities that could follow Block licensing:

- Physical disturbance (see Section 4.3)
- Accidental spills (see Section 6.3)

Site Name: Bae Cemlyn/ Cemlyn Bay SAC	
Location	Grid Ref: SH331934 (central point) Latitude 53º24'42"N Longitude 05º29'20"W
Area (ha)	43.43
Summary	Cemlyn lagoon on the north coast of Anglesey, north Wales, is considered to be the best example of a saline coastal lagoon in Wales. The lagoon is separated from the sea by a shingle bank with a narrow channel at the western end, across which a sluice system was built in the 1930s. Seawater exchange occurs mainly through the sluice and by percolation through the shingle bank, although in extreme storms coinciding with spring tides waves break over the top of the shingle bank. Cemlyn lagoon supports a relatively diverse set of species, several of which are specific to lagoons, including the bryozoan *Conopeum seurati*, the lagoon cockle *Cerastoderma glaucum* and the lagoonal mud-snail *Ventrosia ventrosa*. Cemlyn lagoon is also the only site in Wales where the lagoonal isopod *Idotea chelipes* has been recorded. A number of uncommon plant species are found within the lagoon, including the brackish water-crowfoot *Ranunculus baudotii* and beaked tasselweed *Ruppia maritima*.
Qualifying features for which the site is designated:	
Annex I Habitat **Primary features**: Coastal lagoons * Priority feature **Secondary features: Perennial vegetation of stony banks**	
Conservation objectives:	
For Annex I Habitats Conservation Objective for Coastal Lagoon Vision for: The vision for these features is for them to be in a favourable conservation status, where all the following conditions are satisfied: • There is no loss of area other than that due to natural processes. • The specialised plant and animal communities within the lagoon remain. • All factors affecting the achievement of these conditions are under control Conservation Objective for Perennial Vegetation of Stony Banks Vision for: The vision of this feature is for it to be in a favourable conservation status, where all the following conditions are satisfied: • The extent of the vegetation of shingle banks is maintained unless altered by natural (e.g. storm) events. • Typical component species of vegetation of shingle banks are maintained. • Invasive alien species (e.g. Fallopia japonica) are absent. • The management of activities or operations likely to damage or degrade the population dynamics, natural range and supporting habitat of the feature is appropriate for maintaining favourable conservation status and is secure in the long-term	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Glannau Môn: Cors heli / Anglesey Coast: Saltmarsh SAC	
Location	Grid Ref: SH380655 (central point) Latitude 53º09'42"N Longitude 05º34'41"W
Area (ha)	1,508
Summary	This site, which includes both the Braint and Cefni estuaries, forms a complex of saltmarsh and dune habitats lying either side of the dune systems at Newborough Warren. Atlantic salt meadows form the bulk of the saltmarsh vegetation, but much of it is far from typical. In the Braint estuary the vegetation is characterised by unusually large amounts of greater sea-spurrey *Spergularia media*, whilst in the Cefni estuary the more typical Atlantic salt meadow is subordinate to saltmarsh dominated by sea rush *Juncus maritimus*. In fact, this is one of the largest stands of *Juncus maritimus* saltmarsh in Britain, and has affinities with Mediterranean salt meadows (*Juncetalia maritimi*), an Annex I vegetation type that is not now considered to occur in the UK. The most significant stands of *Salicornia* spp. saltmarsh occur on Malltraeth Sands in the Cefni estuary.
Qualifying features for which the site is designated:	
Annex I Habitat **Primary features**: *Salicornia* and other annuals colonizing mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) **Secondary features: Estuaries, Mudflats and sandflats not covered by seawater at low tide**	
Conservation objectives:	
For Annex I Habitats Conservation Objective for: *Salicornia* and other annuals colonising mud and sand Vision for feature 12 The vision for this feature is for it to be in a favourable conservation status, where, subject to natural processes all of the following conditions are satisfied: • the distribution and extent of *Salicornia* and other annuals is determined predominantly by natural structure and environmental processes; • the natural habitat structures necessary for the long-term maintenance of *Salicornia* and other annuals and their typical species are maintained; • the granulometry and structure of *Salicornia* and other annuals' sediments, and their natural variation, distribution and extent, are determined predominantly by natural sediment supply and transport processes; • the geomorphology of the *Salicornia* and other annuals feature, and its natural variation, distribution and extent, are determined predominantly by the underlying geology and natural environmental processes; • the natural environmental processes necessary for the long-term maintenance of the *Salicornia* and other annuals feature and its typical species, are maintained; • the hydrographic and meteorological processes necessary for the long-term maintenance of the *Salicornia* and other annuals feature and its typical species are determined predominantly by natural environmental processes; • the salinity regime and gradients of the *Salicornia* and other annuals feature are determined predominantly by natural hydrodynamic, hydrological and meteorological processes; • nutrients in the water column and sediments remain within ranges that are not potentially detrimental to the long-term maintenance of the *Salicornia* and other annuals' communities, their distribution and range; • contaminants in the water column and sediments derived from human activity remain below levels potentially detrimental to the long-term maintenance of the *Salicornia* and other annuals' communities, their distribution and range; • dissolved oxygen levels in the water column and sediments are determined predominantly by natural environmental processes • communities of typical species are maintaining their conservation status on a long-term basis as viable components of the *Salicornia* and other annuals' habitats • the management of activities or operations likely to degrade the distribution, extent, structure, function or typical species communities of the feature, is appropriate for maintaining favourable conservation status and is secure in the long-term Conservation Objective for: Mudflats and sandflats not covered by seawater at low tide Vision for feature 13 The vision for this feature is for it to be in a favourable conservation status, whereall of the following conditions are satisfied: • the distribution and extent of the mudflats and sandflats, and their encompassed habitat, are determined predominantly by natural structure and environmental processes • the natural habitat structures necessary for the long-term maintenance of the mudflats and sandflats, and their encompassed habitat and typical species are maintained • the granulometry and structure of the mudflats and sandflats' sediments, and their natural variation, distribution and extent, are determined predominantly by natural sediment supply and transport processes • the quality of habitat structure is no more degraded as a consequence of human action or by materials of anthropogenic origin • the natural environmental processes necessary for the long-term maintenance of the mudflats and sandflats, their encompassed habitats and their typical species are maintained	

Site Name: Glannau Môn: Cors heli / Anglesey Coast: Saltmarsh SAC
• Water & sediment chemistry are determined predominantly by natural hydrodynamic, hydrological and meteorological processes • the salinity regime and gradients within the mudflats and sandflats are determined predominantly by natural hydrodynamic, hydrological and meteorological processes • typical species are determined predominantly by inherent population dynamics and ecological processes • the species richness, population dynamics, abundance, biomass, population structures, physiological health, reproductive capacity, recruitment, range and mobility are maintained • the management of activities or operations likely to degrade the distribution, extent, structure, function or typical species populations of the feature, is appropriate for maintaining favourable conservation status and is secure in the long-term; and • the management of existing commercial fisheries for typical species ensures that species exploitation is at or below maximum sustainable yield and is secure in the long-term
Likely significant effects associated with activities that could follow Block licensing:
• Accidental spills (see Section 6.3)

Site Name: Pen Llŷn a'r Sarnau /Lleyn Peninsula and the Sarnau SAC	
Location	Grid Ref: SH401130 (central point) Latitude 52º41'29"N Longitude 04º21'59"W
Area (ha)	146023.48
Summary	The Pen Llŷn a'r Sarnau SAC encompasses areas of sea, coast and estuary that support a wide range of different marine habitats and wildlife. The nature of the seabed and coast and the range of environmental conditions present vary throughout the SAC. Differences in rock and sediment type, aspect, sediment movement, exposure to tidal currents and wave action, water clarity and salinity together with biological and food chain interactions have created a wide range of habitats and associated communities of marine plant and animal species, some of which are unique in Wales. Pen Llŷn a'r Sarnau SAC is a multiple interest site that has been selected for the presence of 9 marine habitat types and associated wildlife (Habitats Directive Annex I habitat types) and 3 mammal species (Habitats Directive Annex II species). The features are distributed throughout the SAC with no single feature occupying the entire SAC and with features overlapping in some locations.

Qualifying features for which the site is designated:

Annex I Habitat
Primary features: Sandbanks which are slightly covered by sea water all the time, estuaries, coastal lagoons, large shallow inlets and bays, reefs
Secondary features: Mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), submerged or partially submerged sea caves

Annex II Species
Primary features: None
Secondary features: Bottlenose dolphin *Tursiops truncates*, otter *Lutra lutra*, grey seal *Halichoerus grypus*

Conservation objectives:

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

Habitat features

Range
The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the reef feature these include:
- Rocky intertidal reefs
- Rocky subtidal reefs
- Extensive boulder and cobble reefs – the sarnau
- Biogenic reefs (horse mussel *Modiolus modiolus* reef / green crenella *Musculus discors* reef and Honeycomb worm *Sabellaria alveolata* reef
- Carbonate reef formed by methane gas leaking from the seabed.

For the intertidal mudflat and sandflat feature these include:
- *Mya arenaria* and polychaetes in muddy gravel
- Eel grass *Zostera marina* beds.
- Muddy gullies in the Mawddach estuary.

For the *Salicornia* feature this includes:
- Communities characterised by the species *Sarcocornia perennis*.

For the intertidal mudflats and sandflats and sandbanks features this requires an overall stability or increase in the amount of the feature, taking into account the areas of long term stability and localised losses and additions arising from environmental processes.

For estuaries this includes the stability of sandy sediments in proportion to the muddy sediments.

Restoration and recovery
As part of this objective it should be noted that; for the estuaries feature additional land which should form an integral part of the estuarine ecosystem should be restored

Structure and function
The physical, biological and chemical structure and functions necessary for the long-term maintenance and quality of the

Site Name: Pen Llŷn a'r Sarnau /Lleyn Peninsula and the Sarnau SAC

habitat are not degraded. Important elements include:

- geology
- sedimentology
- geomorphology,
- hydrography and meteorology
- water and sediment chemistry
- biological interactions.

This includes a need for nutrient levels in the water column and sediments to be:

- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:

- at or below existing statutory guideline concentrations
- below levels that would potentially result in increase in contaminant concentrations within sediments or biota
- below levels potentially detrimental to the long-term maintenance of the features species populations, their abundance or range.

For Atlantic saltmeadows this includes the morphology of the saltmarsh creeks and pans

Restoration and recovery

As part of this objective it should be noted that; for the estuaries feature the structure and functions of the estuaries that have been damaged/degraded by the constraints of artificial structures such as flood banks, are restored.

Typical species

The presence, abundance, condition and diversity of typical species are such that habitat quality is not degraded. Important elements include:

- species richness
- population structure and dynamics,
- physiological heath,
- reproductive capacity
- recruitment,
- mobility
- range

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature, is appropriate for maintaining it in favourable condition and is secure in the long term.

Restoration and recovery

As part of this objective it should be noted that; for the reefs feature the potential for expansion of the horse mussel Modiolus modiolus community off the north Llŷn coast is not inhibited.

Species features

Populations

The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production, and condition of the species within the site.

As part of this objective it should be noted that :

- for bottlenose dolphin, otter and grey seal; contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression
- grey seal populations should not be reduced as a consequence of human activity

Range

The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

As part of this objective it should be noted that for bottlenose dolphin, otter and grey seal

- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond
- The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing

Site Name: Pen Llŷn a'r Sarnau /Lleyn Peninsula and the Sarnau SAC

Supporting habitats and species

The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include;

- distribution,
- extent,
- structure,
- function and quality of habitat,
- prey availability and quality.

As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.
- The management and control of activities or operations likely to adversely affect the species feature, is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health.
- Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour
- For otter there are sufficient sources within the SAC and beyond of high quality freshwater for drinking and bathing.

Restoration and recovery

As part of this objective it should be noted that for the bottlenose dolphin and otter, populations should be increasing.

Likely significant effects associated with activities that could follow Block licensing:

- Physical disturbance (see Section 4.3)
- Underwater noise (see Section 5.3)
- Accidental spills (see Section 6.3)
- Cumulative and in-combination effects (see Section 7)

Site Name: Cardigan Bay/ Bae Ceredigion SAC	
Location	Grid Ref: SN214641 (central point) Latitude 52º14'47"N Longitude 04º37'02"W
Area (ha)	95860.36
Summary	Cardigan Bay is one of the largest bays in the British Isles, measuring over 100km (60 miles) across its westernmost extent from the Lleyn Peninsula to St. David's Head. A population of bottlenose dolphins forms a primary interest of the Bay and it was for this that the Bay was first selected as a Special Area of Conservation. Bottlenose dolphins range widely throughout UK waters and considerably further afield, but Cardigan Bay is one of the very few areas around the UK where significant numbers are known to occur regularly. The Cardigan Bay SAC is a multiple interest site which has been selected for the presence of 7 interest features that qualify under Annex I and Annex II of the Habitats Directive. The features are distributed throughout the SAC with no single feature occupying the entire SAC and with features overlapping in some locations.

Qualifying features for which the site is designated:

Annex I Habitat
Primary features: None
Secondary features: Sandbanks which are slightly covered by sea water all the time, reefs, submerged or partially submerged sea caves

Annex II Species
Primary features: Bottlenose dolphin *Tursiops truncates*
Secondary features: Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, grey seal *Halichoerus grypus*

Conservation objectives:

To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

Habitat features

Range
The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.

For the reef feature these include:
- Intertidal bedrock reefs
- Intertidal cobble, pebble with *Sabellaria alveolata* (biogenic) reefs
- Subtidal bedrock reefs
- Subtidal pebble, cobble and boulder reefs
- Sea caves

Structure and function
The physical, biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include:
- geology
- sedimentology
- geomorphology,
- hydrography and meteorology
- water and sediment chemistry
- biological interactions.

This includes a need for nutrient levels in the water column and sediments to be:
- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:
- at or below existing statutory guideline concentrations
- below levels that would potentially result in increase in contaminant concentrations within sediments or biota
- below levels potentially detrimental to the long-term maintenance of the features species populations, their abundance or range.

Typical species
The presence, abundance, condition and diversity of typical species are such that habitat quality is not degraded. Important elements include:

Site Name: Cardigan Bay/ Bae Ceredigion SAC

- species richness
- population structure and dynamics,
- physiological heath,
- reproductive capacity
- recruitment,
- mobility
- range

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature, is appropriate for maintaining it in favourable condition and is secure in the long term.

Species features

Populations

The population is maintaining itself on a long-term basis as a viable component of its natural habitat.
Important elements include:

- population size
- structure, production
- condition of the species within the site.

As part of this objective it should be noted that for bottlenose dolphin and grey seal;
Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression

For grey seal populations should not be reduced as a consequence of human activity

Range

The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

As part of this objective it should be noted that for bottlenose dolphin and grey seal

- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond
- The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing

Supporting habitats and species

The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include;

- distribution,
- extent,
- structure,
- function and quality of habitat,
- prey availability and quality.

As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.
- The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health.
- Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour

Restoration and recovery

As part of this objective it should be noted that for the bottlenose dolphin populations should be increasing.

Likely significant effects associated with activities that could follow Block licensing:

- Physical disturbance (see Section 4.3)
- Underwater noise (see Section 5.3)
- Accidental spills (see Section 6.3)
- Cumulative and in-combination effects (see Section 7)

Site Name: Pembrokeshire Marine/ Sir Benfro Forol SAC	
Location	Grid Ref: SM503093 (central point) Latitude 51º43'35"N Longitude 05º36'57"W
Area (ha)	138069.45
Summary	The seas around Pembrokeshire have long been recognised for their marine conservation importance. Many characteristics have been identified as being important in the Pembrokeshire marine environment, including the: • extremely wide range of physical habitats; • distribution and extent of the physical entity of habitats; • very wide array of habitat structures and functional (environmental) processes; • integrity of structures and functional (environmental) processes; • species diversity; • extent, sizes and integrity of species populations resulting from the relatively limited • modification of distribution and extent of habitat and structure and functional (environmental) processes by human activity; • presence of specific habitats and species judged to be of particular importance because of their rarity, ecological importance or isolated position at the edge of population ranges. High habitat and biological diversity is of great importance throughout the site, particularly the well documented reefs habitat and the Milford Haven ria-estuary. The site's location at a biogeographical boundary between northern and southern species distributions contributes to the biological diversity. The habitat features are characterised by complex interrelationships with and between biotic and abiotic functional (environmental) processes and species populations. It is the combination of all these components together which gives the overall importance to the habitat features of the site.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Estuaries, large shallow inlets and bays, reefs Secondary features: Sandbanks which are slightly covered by sea water all the time, mudflats and sandflats not covered by seawater at low tide, coastal lagoons, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), submerged or partially submerged sea caves **Annex II Species** Primary features: Grey seal *Halichoerus grypus,* shore dock *Rumex rupestris* Secondary features: Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis,* allis shad *Alosa alosa*, twaite shad *Alosa fallax*, otter *Lutra lutra*	
Conservation objectives:	
To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.	
Habitat features **<u>Range</u>** The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing. For the inlets and bays feature these include; • The embayment of St.Brides Bay • The ria of Milford Haven • Peripheral embayments and inlets For the coastal lagoons feature this is subject to the requirements for maintenance of the artificial impoundment structure and maintenance of the lagoons for the original purpose or subsequent purpose that pre-dates classification of the site. **<u>Structure and function</u>** The physical, biological and chemical structure and functions necessary for the long-term maintenance and quality of the habitat are not degraded. Important elements include: • geology • sedimentology • geomorphology, • hydrography and meteorology • water and sediment chemistry • biological interactions. This includes a need for nutrient levels in the water column and sediments to be:	

Site Name: Pembrokeshire Marine/ Sir Benfro Forol SAC

- at or below existing statutory guideline concentrations
- within ranges that are not potentially detrimental to the long term maintenance of the features species populations, their abundance and range.

Contaminant levels in the water column and sediments derived from human activity to be:

- at or below existing statutory guideline concentrations
- below levels that would potentially result in increase in contaminant concentrations within sediments or biota
- below levels potentially detrimental to the long-term maintenance of the features species populations, their abundance or range.

Restoration and recovery

As part of this objective it should be noted that; the Milford Haven waterway complex would benefit from restorative action, for example through the removal of non-natural beach material, and the removal, replacement or improved maintenance of rock filled gabions. There is also need for some restoration of the populations of several typical species of the Milford Haven waterway complex that are severely depleted with respect to historical levels as a consequence primarily of human exploitation.

In the Milford Haven waterways complex inputs of nutrients and contaminants to the water column and sediments derived from human activity must remain at or below levels at the time the site became a candidate SAC.

For the lagoons feature this is subject to the requirements for maintenance of the artificial impoundment structures of coastal lagoons and maintenance of the lagoons for their original purpose or subsequent purpose that pre-dates classification of the site.

Typical species

The presence, abundance, condition and diversity of typical species are such that habitat quality is not degraded. Important elements include:

- species richness
- population structure and dynamics,
- physiological heath,
- reproductive capacity
- recruitment,
- mobility
- range

As part of this objective it should be noted that:

- populations of typical species subject to existing commercial fisheries need to be at an abundance equal to or greater than that required to achieve maximum sustainable yield and secure in the long term
- the management and control of activities or operations likely to adversely affect the habitat feature, is appropriate for maintaining it in favourable condition and is secure in the long term.

Restoration and recovery

For the inlets and bays features this includes the need for some restoration of the populations of several typical species which are severely depleted with respect to historical levels as a consequence, primarily of human exploitation.

In the Milford Haven waterways complex inputs of nutrients and contaminants to the water column and sediments derived from human activity must remain at or below levels at the time the site became a candidate SAC.

Species features

Populations

The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production, and condition of the species within the site.

As part of this objective it should be noted that for otter and grey seal;

- Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression

For grey seal, populations should not be reduced as a consequence of human activity

Range

The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

As part of this objective it should be noted that for otter and grey seal

- Their range within the SAC and adjacent inter-connected areas is not constrained or hindered
- There are appropriate and sufficient food resources within the SAC and beyond
- The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable

Site Name: Pembrokeshire Marine/ Sir Benfro Forol SAC

or increasing

Supporting habitats and species

The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include;

- distribution,
- extent,
- structure,
- function and quality of habitat,
- prey availability and quality.

As part of this objective it should be noted that;

- The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term.
- The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term.
- Contamination of potential prey species should be below concentrations potentially harmful to their physiological health.
- Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour
- For otter there are sufficient sources within the SAC and beyond of high quality freshwater for drinking and bathing.

Restoration and recovery

In the Milford Haven waterways complex inputs of nutrients and contaminants to the water column and sediments derived from human activity must remain at or below levels at the time the site became a candidate SAC.

As part of this objective it should be noted that for the otter, populations should be increasing.

Likely significant effects associated with activities that could follow Block licensing:

- Physical disturbance (see Section 4.3)
- Underwater noise (see Section 5.3)
- Accidental spills (see Section 6.3)
- Cumulative and in-combination effects (see Section 7)

Site Name: River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	
Location	Grid Ref: SJ423503 (central point) Latitude 53º02'50"N Longitude 03º08'20"W
Area (ha)	1,309
Summary	This site, which includes both the Braint and Cefni estuaries, forms a complex of saltmarsh and dune habitats lying either side of the dune systems at Newborough Warren. Atlantic salt meadows form the bulk of the saltmarsh vegetation, but much of it is far from typical. In the Braint estuary the vegetation is characterised by unusually large amounts of greater sea-spurrey *Spergularia media*, whilst in the Cefni estuary the more typical Atlantic salt meadow is subordinate to saltmarsh dominated by sea rush *Juncus maritimus*. In fact, this is one of the largest stands of *Juncus maritimus* saltmarsh in Britain, and has affinities with Mediterranean salt meadows (*Juncetalia maritimi*), an Annex I vegetation type that is not now considered to occur in the UK. The most significant stands of *Salicornia* spp. saltmarsh occur on Malltraeth Sands in the Cefni estuary.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation Secondary features: Estuaries, Mudflats and sandflats not covered by seawater at low tide **Annex II Species** Primary features: Atlantic salmon *Salmo salar,* floating water-plantain *Luronium natans* Secondary features: Sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, bullhead *Cottus gobio*, otter *Lutra lutra*	
Conservation objectives:	
For Annex I Habitats Conservation Objective for Feature 1: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Vision for feature 1:** The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied: • The conservation objective for the water course as defined in 4.1[103] must be met • The extent of this feature within its potential range in this SAC should be stable or increasing • The extent of the sub-communities that are represented within this feature should be stable or increasing. • The conservation status of the feature's typical species should be favourable. • All known, controllable factors, affecting the achievement of these conditions are under control • (many factors may be unknown or beyond human control) **For Annex II Species** Conservation Objective for Feature 2: Atlantic salmon *Salmo salar* Vision for feature 2 The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied: • The parameters defined in the vision for the water course as defined in 4.1 must be met • The SAC feature populations will be stable or increasing over the long term. • The natural range of the features in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future. • There will be no reduction in the area or quality of habitat for the feature populations in the SAC on a long-term basis • All known, controllable factors, affecting the achievement of these conditions are under control (many factors may be unknown or beyond human control) Conservation Objective for Feature 3:*Luronium natans* / Floating water plantain Vision for feature 3: The conservation objective for the lake water body as defined in conservation objective number 10 must be met. The vision for this feature is for it be in favourable conservation status, where all of the following conditions are satisfied:	

[103] Management Plan for River Dee and Bala Lake SAC: http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/river-to-usk-sac-list/river-dee-and-bala-lake-sac.aspx

Site Name: River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC

- There will be no contraction of the current L. natans extent and distribution, and the populations will be viable throughout their current distribution & will be able to maintain

Conservation Objective for Features 4, 5, and 6
Sea lamprey *Petromyzon marinus*
Brook lamprey *Lampetra planeri*
River lamprey *Lampetra fluviatilis*

Vision for features 4, 5, and 6:
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The parameters defined in the vision for the water course as defined in 4.1 must be met
- The SAC feature populations will be stable or increasing over the long term.
- The natural range of the features in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
- There will be no reduction in the area or quality of habitat for the feature populations in the SAC on a long-term basis
- All factors affecting the achievement of these conditions are under control

Conservation Objective for Feature 7: Bullhead *Cottus gobio*
Vision for feature 7
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The parameters defined in the vision for the water course as defined in 4.1 must be met
- The SAC feature populations will be stable or increasing over the long term.
- The natural range of the features in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.
- There will be no reduction in the area or quality of habitat for the feature populations in the SAC on a long-term basis
- All factors affecting the achievement of these conditions are under control

Conservation Objective for Feature 8: European otter *Lutra lutra*
Vision for feature 8
The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The parameters defined in the vision for the water course as defined in 4.1 must be met.
- The SAC otter population is stable or increasing over the long term, both within the SAC and within its catchment.
- There will be no loss of otter breeding or resting sites other than by natural means (such as naturally occurring river processes) within the SAC or its catchment

Likely significant effects associated with activities that could follow Block licensing:

- Accidental spills (see Section 6.3)

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