



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

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Contents

1	Introduction	3
1.1	Background and purpose	3
1.2	Irish Sea and St George’s Channel Blocks	4
1.3	Relevant Natura 2000 sites	4
2	Licensing and activity	8
2.1	Licensing	8
2.2	Activity	8
3	Appropriate assessment process	16
3.1	Process	16
3.2	Site integrity	18
3.3	Assessment of effects on site integrity	18
4	Assessment of physical disturbance and drilling effects	20
4.1	Introduction	20
4.2	Potential physical disturbance and drilling effects	20
4.3	Implications for site integrity of relevant sites	23
4.4	Mitigation	28
4.5	Conclusions	28
5	Assessment of underwater noise effects	28
5.1	Introduction	29
5.2	Underwater noise effects	29
5.3	Implications for site integrity of relevant sites	32
5.4	Regulation and mitigation	38
5.5	Conclusions	40
6	Assessment of accidental spill effects	41
6.1	Introduction	41
6.2	Spill risk and potential ecological effects	41
6.3	Implications for site integrity of relevant sites	47
6.4	Mitigation	61
6.5	Conclusions	64

7	Cumulative and in-combination effects.....	66
7.1	Introduction	66
7.2	Sources of potential effect	66
7.3	Underwater noise.....	70
7.4	Other potential in-combination effects.....	73
7.5	Conclusions	75
8	Overall conclusion	76
9	References	77
	Appendix A – The Sites	83
A1	Introduction.....	83
A2	Coastal and Marine Special Protection Areas	83
A3	Coastal and Marine Special Areas of Conservation	91
A4	Offshore Special Areas of Conservation.....	99
A5	Riverine Special Areas of Conservation	99
A6	Ramsar sites.....	100
	Appendix B – Re-screening tables for the identification of likely significant effects on the sites .	102
B1	Introduction.....	102
B2	Coastal and marine Special Protection Areas	103
B3	Coastal and marine Special Areas of Conservation	117
B4	Riverine Special Areas of Conservation	133
B5	Offshore Special Areas of Conservation.....	136
	Appendix C – Detailed information on sites where the potential for effects have been identified	137
C1	Coastal and marine Special Protection Areas	137
C2	Special Areas of Conservation	151

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 is¹:

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

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.

- Northern and Central North Sea
- 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 1.2². 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 2012³), Planning Policy Wales Welsh Government 2014⁴), and the Marine Policy Statement (HM Government 2011), the

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."

relevant sites considered include classified and potential SPAs, possible, candidate and designated SACs and Sites of Community Importance (SCIs).

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

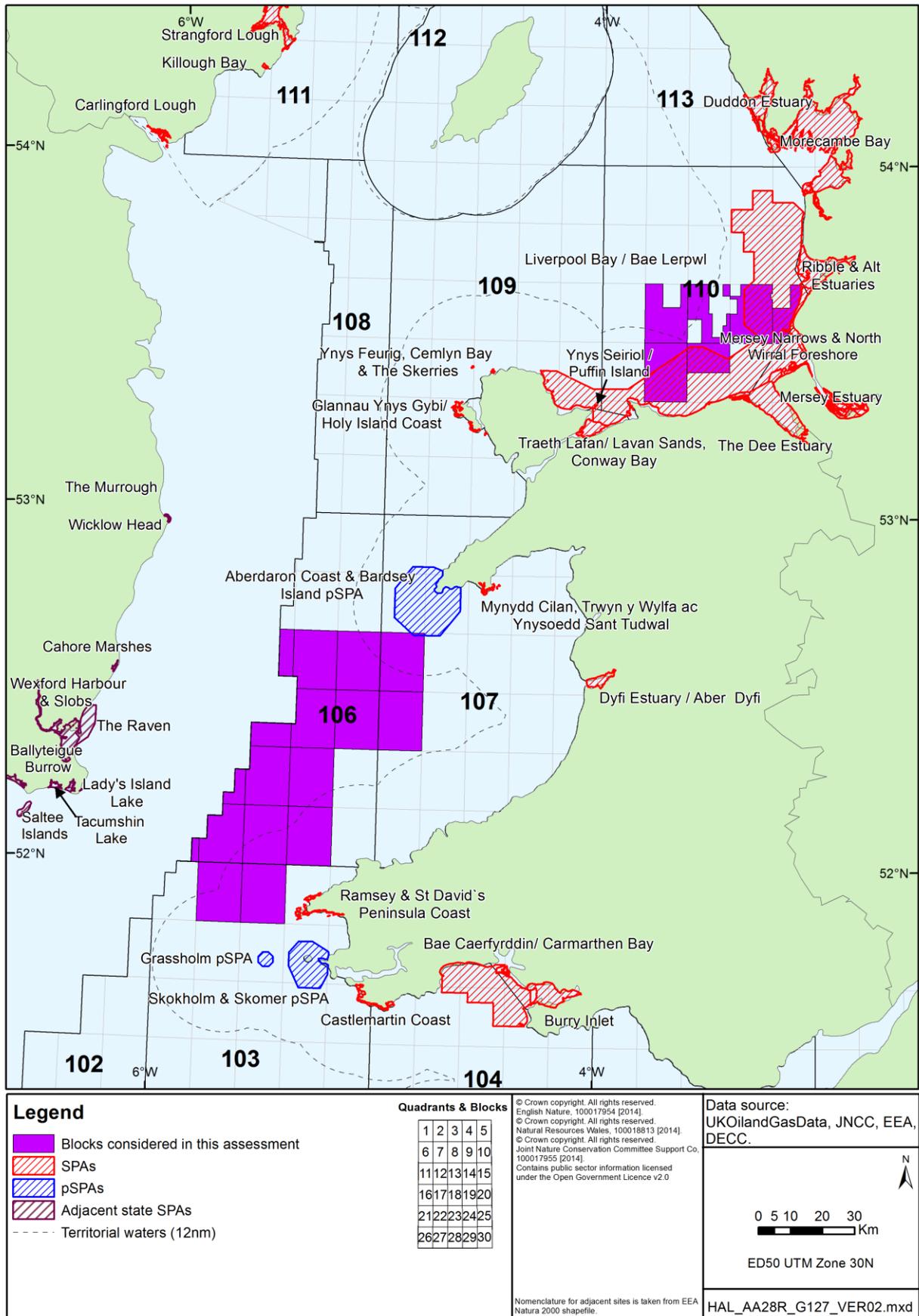
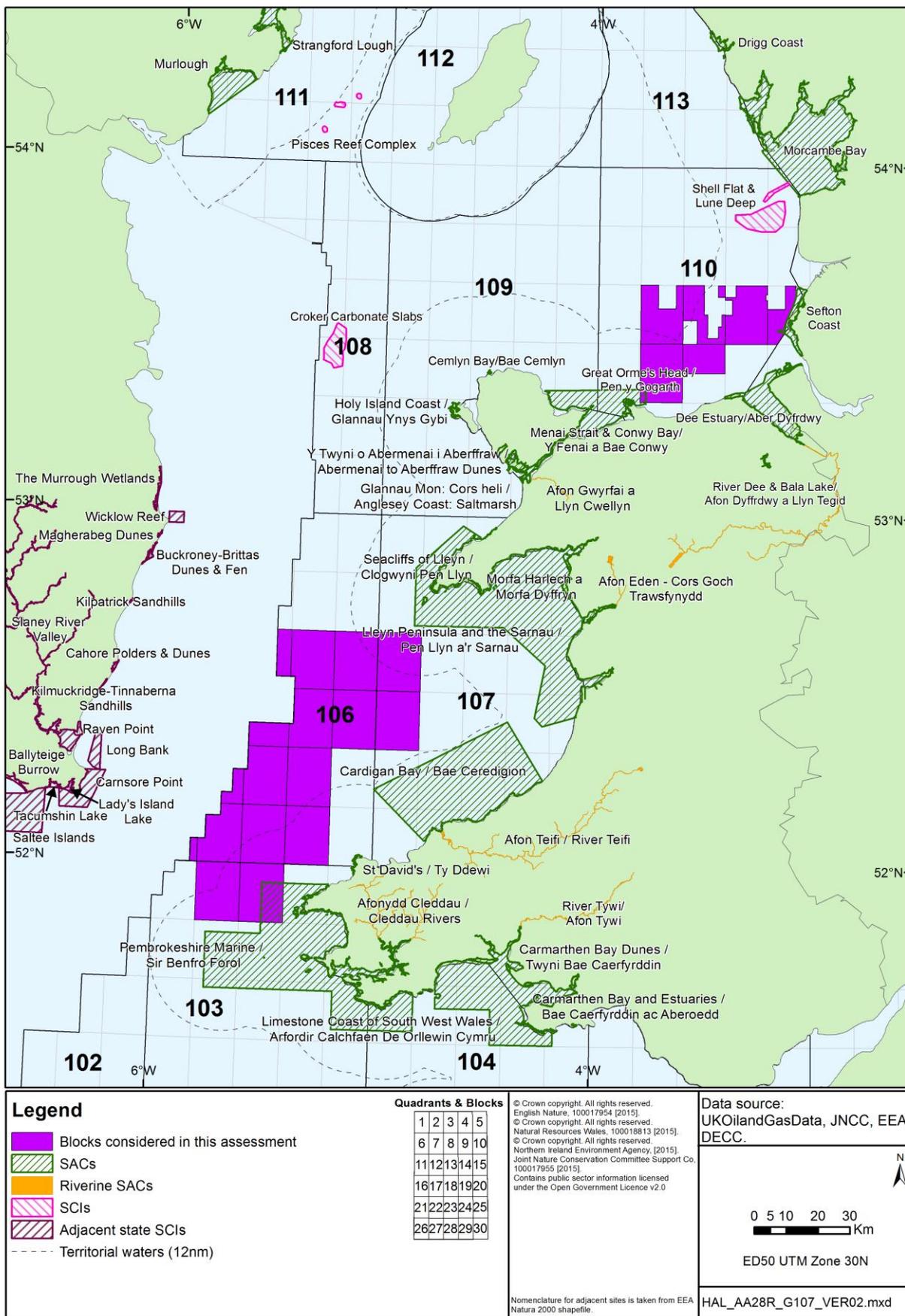


Figure 1.2: Location of Irish Sea and St George’s Channel Blocks and relevant SACs



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.

It is noted 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 data⁵.

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 highlights the total number of exploration and appraisal wells started in the Irish Sea each year since 2000 as well as the number of significant discoveries made (associated with exploration activities).

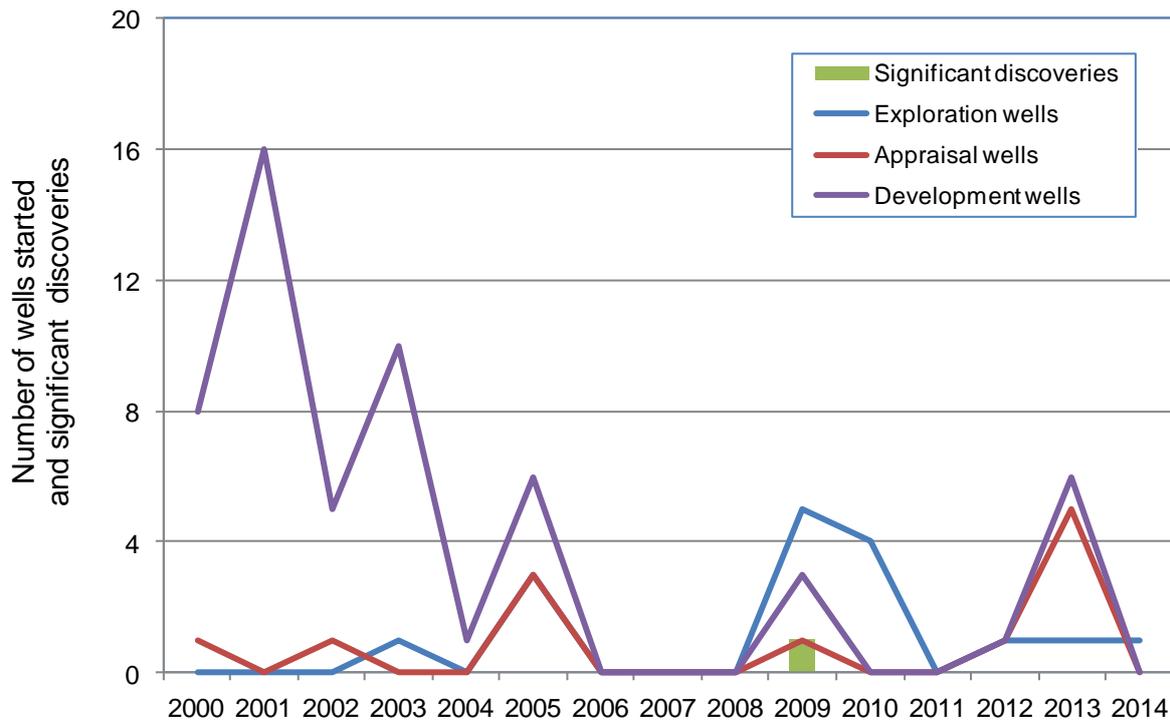
Discoveries that are developed may require further drilling, wellhead infrastructure, pipelines and possibly production facilities such as platforms, although recent developments are mostly subsea tiebacks to existing production facilities rather than stand alone developments. For example, of the 2 current 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 plan. This assessment is to be updated with increasing specificity in subsequent stages of the procedure*" is addressed.

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

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



Note: The description "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](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 survey⁷.

⁷https://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	<p>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.</p> <p>Further mitigation (e.g. alternative well location or rig positioning) may need to be identified and implemented where necessary.</p>
Marine discharges	<p>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).</p> <p>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.</p>

Source of effect	High level controls
Underwater noise	<p>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 <i>Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001</i> (as amended) and <i>Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007</i> (as amended).</p> <p>It is a condition of consents issued under Regulation 4 of the <i>Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001</i> (& 2007 amendments) for oil and gas related seismic surveys that the JNCC, <i>Guidelines for minimising the risk of disturbance and injury to marine mammals from seismic surveys</i>, are followed.</p> <p>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.</p> <p>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 Issues⁸ 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.</p>
Accidental spills	<p>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.</p> <p>Additional conditions may be imposed by DECC through block-specific licence conditions (i.e. "Essential Elements"), and seasonal periods of concern for drilling, 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.</p> <p>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 appropriate¹⁰.</p>

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

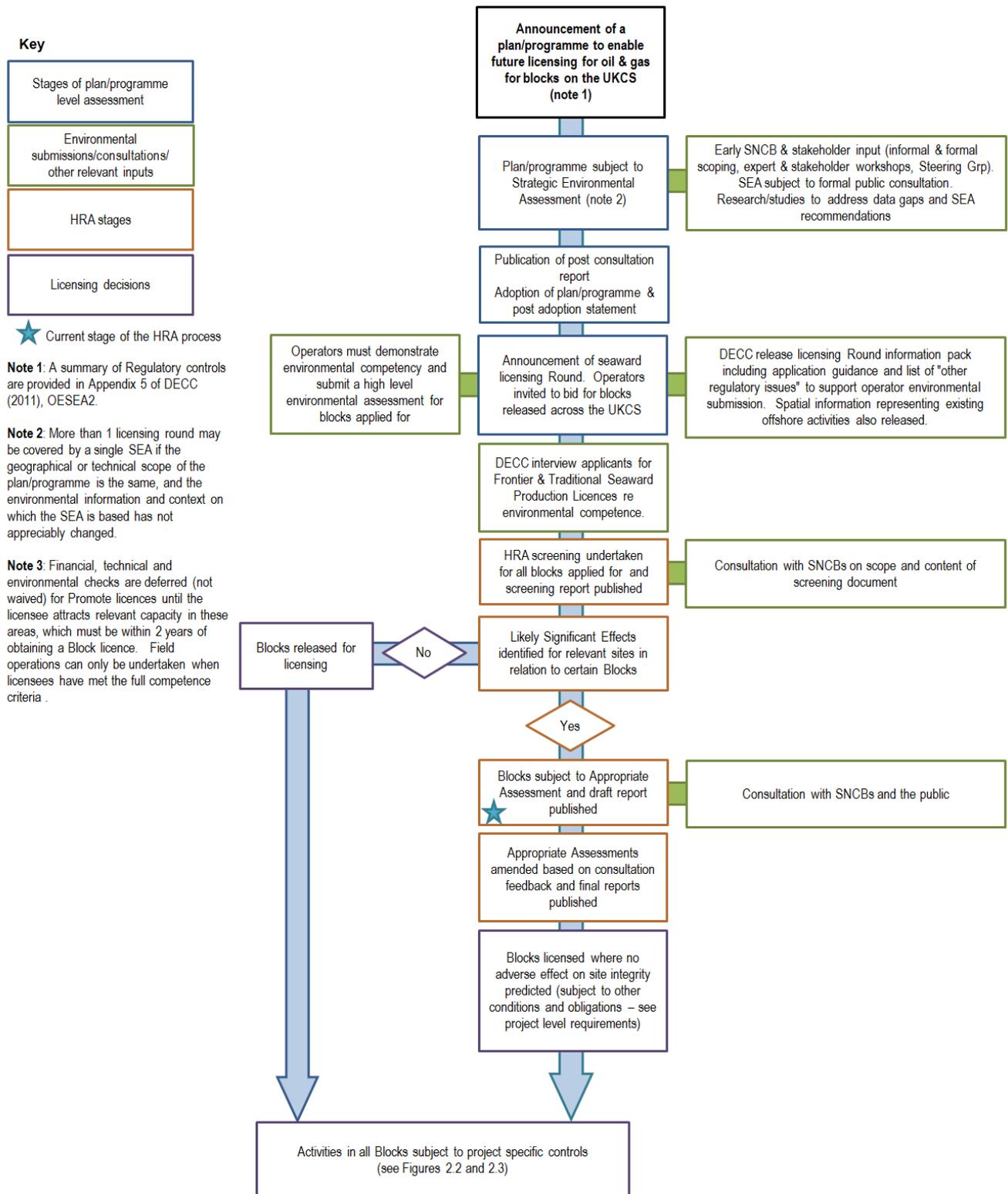
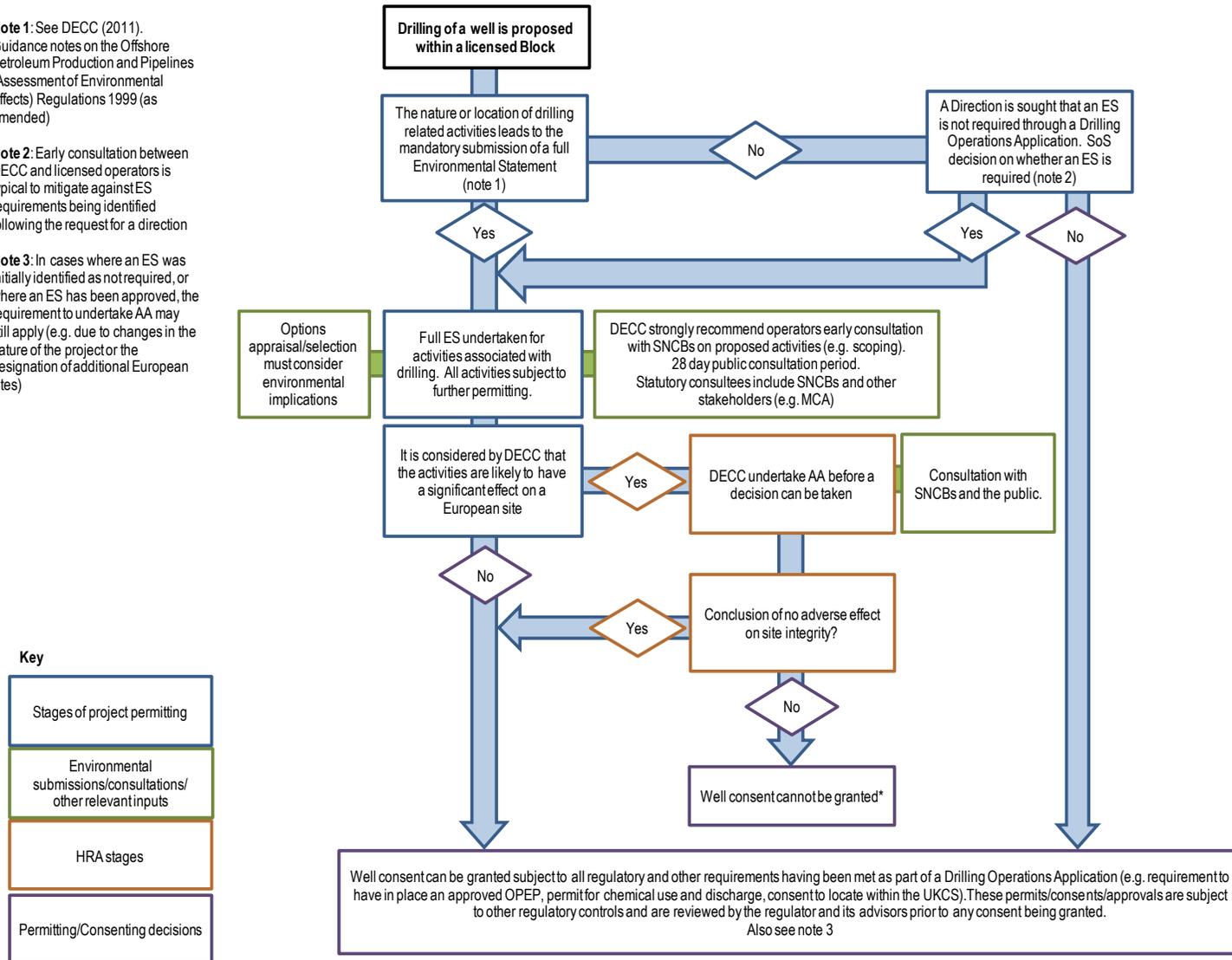


Figure 2.3: High level overview of exploration drilling environmental requirements

Note 1: See DECC (2011). Guidance notes on the Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 (as amended)

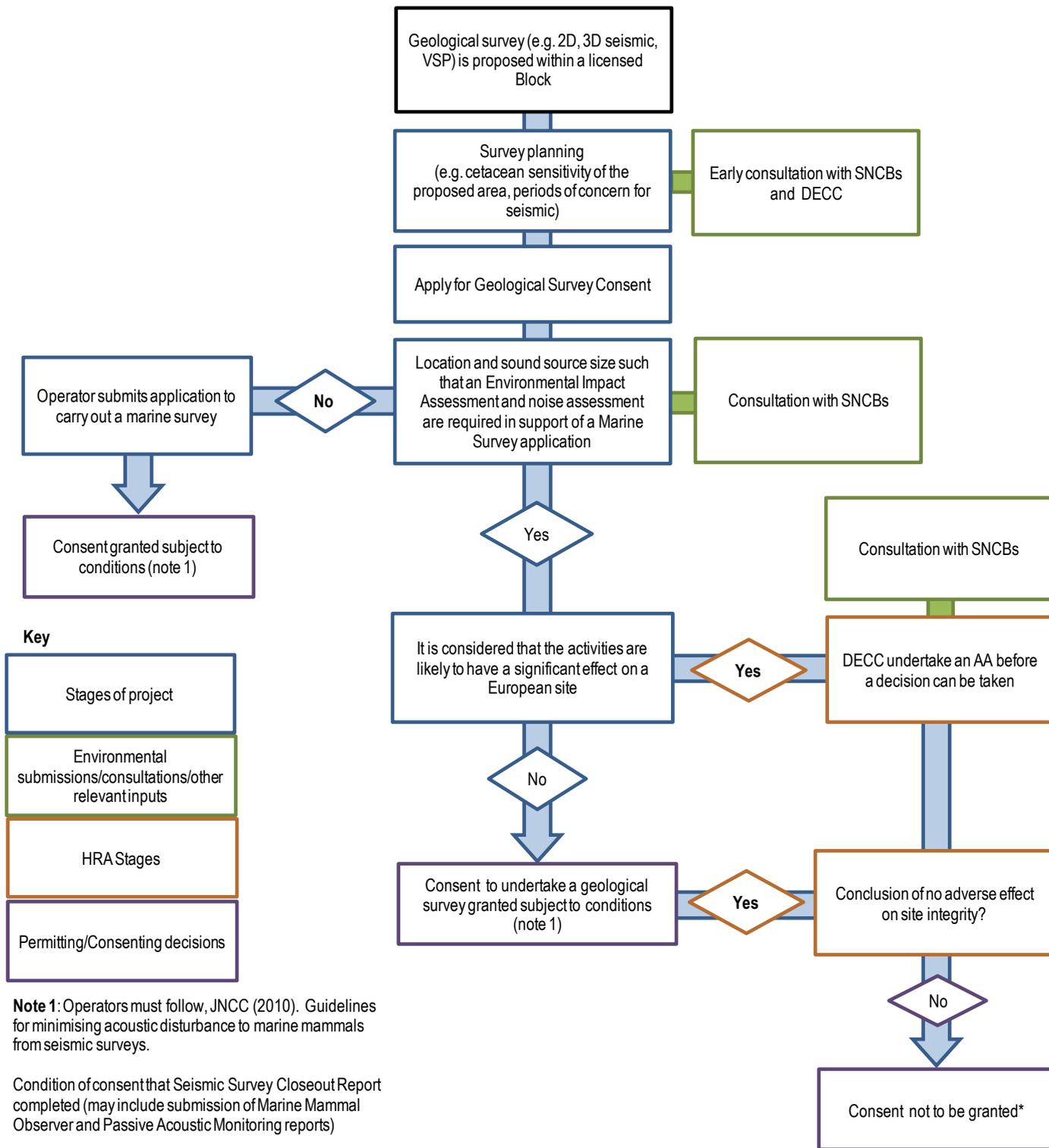
Note 2: Early consultation between DECC and licensed operators is typical to mitigate against ES requirements being identified following the request for a direction

Note 3: In cases where an ES was initially identified as not required, or where an ES has been approved, the requirement to undertake AA may still apply (e.g. due to changes in the nature of the project or the designation of additional European sites)



* 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



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:

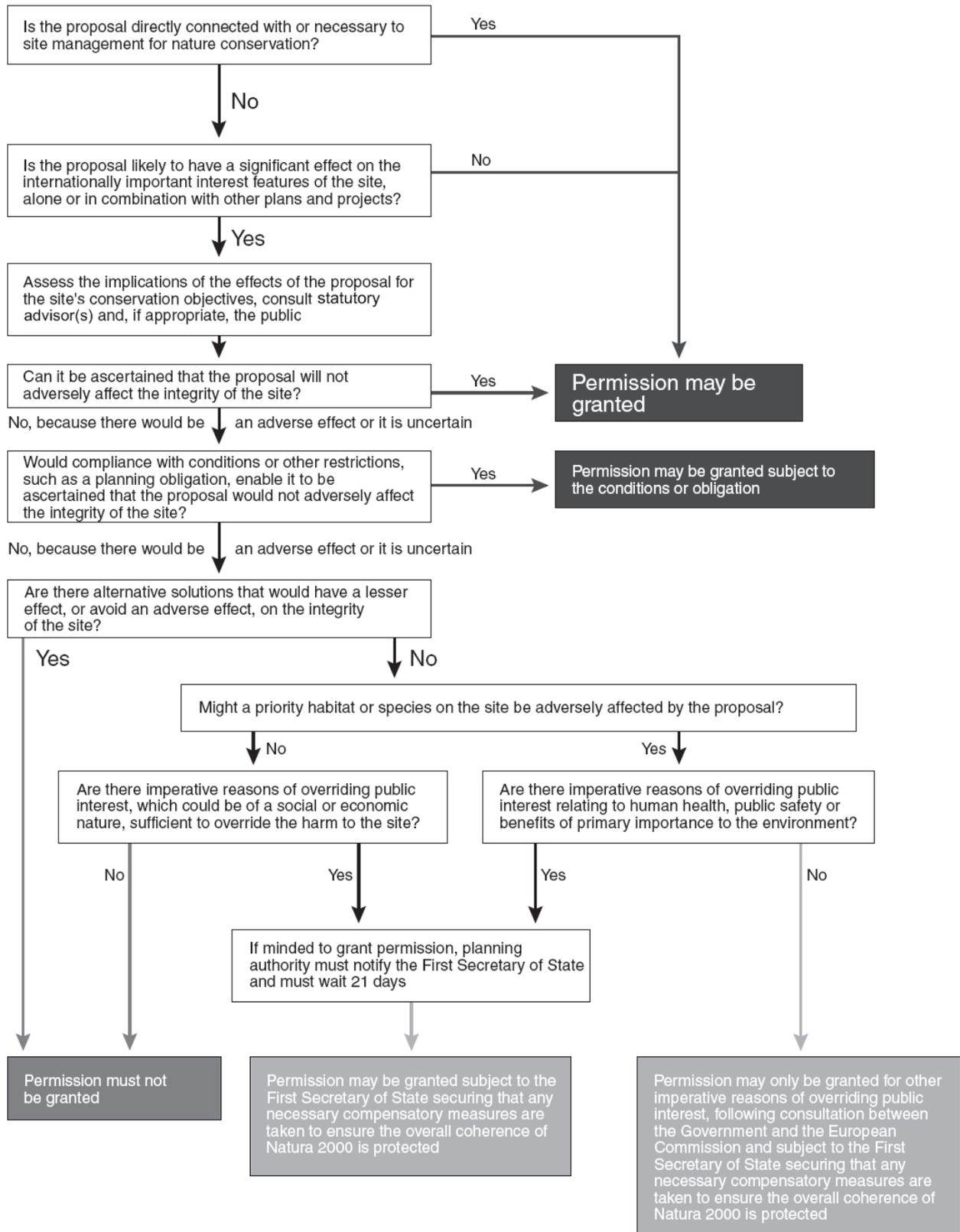
- Considered, on the basis of the precautionary principle, whether it could be concluded that the integrity of relevant European Sites would not be affected. This impact prediction involved a consideration of the cumulative and in-combination effects.
- Examined, in relation to elements of the plan where 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 the various Habitats Regulations, since this typically includes advice on operations that may cause deterioration or disturbance to relevant features or species. Advice given under Regulation 35¹¹ (formerly Regulation 33) includes an activities/factors matrix derived from MarLIN (www.marlin.ac.uk) where applicable. Several of the “probable” effects highlighted in the MarLIN matrices are not inevitable consequences of oil and gas exploration and production, since through the regulatory Environmental Impact Assessment (EIA) and permitting processes they are mitigated by timing, siting (e.g. of rigs) or technology requirements (or a combination of one or more of these). There is a requirement that these options would also be evaluated in the environmental assessments necessary as part of activity consenting.

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.

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. For example, Marathon Oil UK Limited (2005) estimated that a semi-submersible rig using 8 anchors in 93m water depth¹² (Block 103/1a) might impact a seabed area of ca. 0.009km² as a result of anchor drag during tensioning and catenary contact of 990m of anchor chain along an overall anchor spread of 1,200m. The depth of sediment overturned by anchor chains may be in the order of a few metres, and changes to the character of surficial sediments will depend on the nature of shallow seabed sediments, and in many cases the overturned sediment will be qualitatively similar to existing surficial sediments. Rig siting is informed by site survey which includes studies of the nature of sediments within the area of expected anchor spread.
- **Placement of jack-up rigs.** Jack-up rigs, normally used in shallower water (<120m)¹², 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 1,250m² within a radius of ca. 50m of the rig centre. Smaller rigs will have a comparatively smaller footprint, (e.g. 462m² for a three-legged jack-up with 14m diameter spud cans, as estimated by Venture North Sea Gas Ltd 2008). In locations with an uneven seabed, material such as grout bags may be placed on the

¹² 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).

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, though rapid recovery would be expected.

- **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 strong tidal currents and highly mobile nature of the seabed sediments within the eastern Irish Sea, 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 discharges¹³, 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. 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 shallow waters and relatively high tidal and wave generated currents in the area are likely to quickly disperse such cuttings.

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. 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).

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/

¹³ 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.

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) have been found primarily on beaches in eastern Scotland, North Norfolk coast and Strangford Lough; the majority are adult harbour seals or juvenile grey seals (Thompson *et al.* 2010). In the first instance and in the absence of any evidence to suggest predation, concern focused on the potential for ship propellers to cause such injuries, especially as spiral lacerations consistent with those observed on carcasses were reproduced in scale model tests using ducted propulsion systems (Onoufriou & Thompson 2014); advice was produced by the statutory nature conservation bodies (SNCBs) to reflect this (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 carried out on 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 has been 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.

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

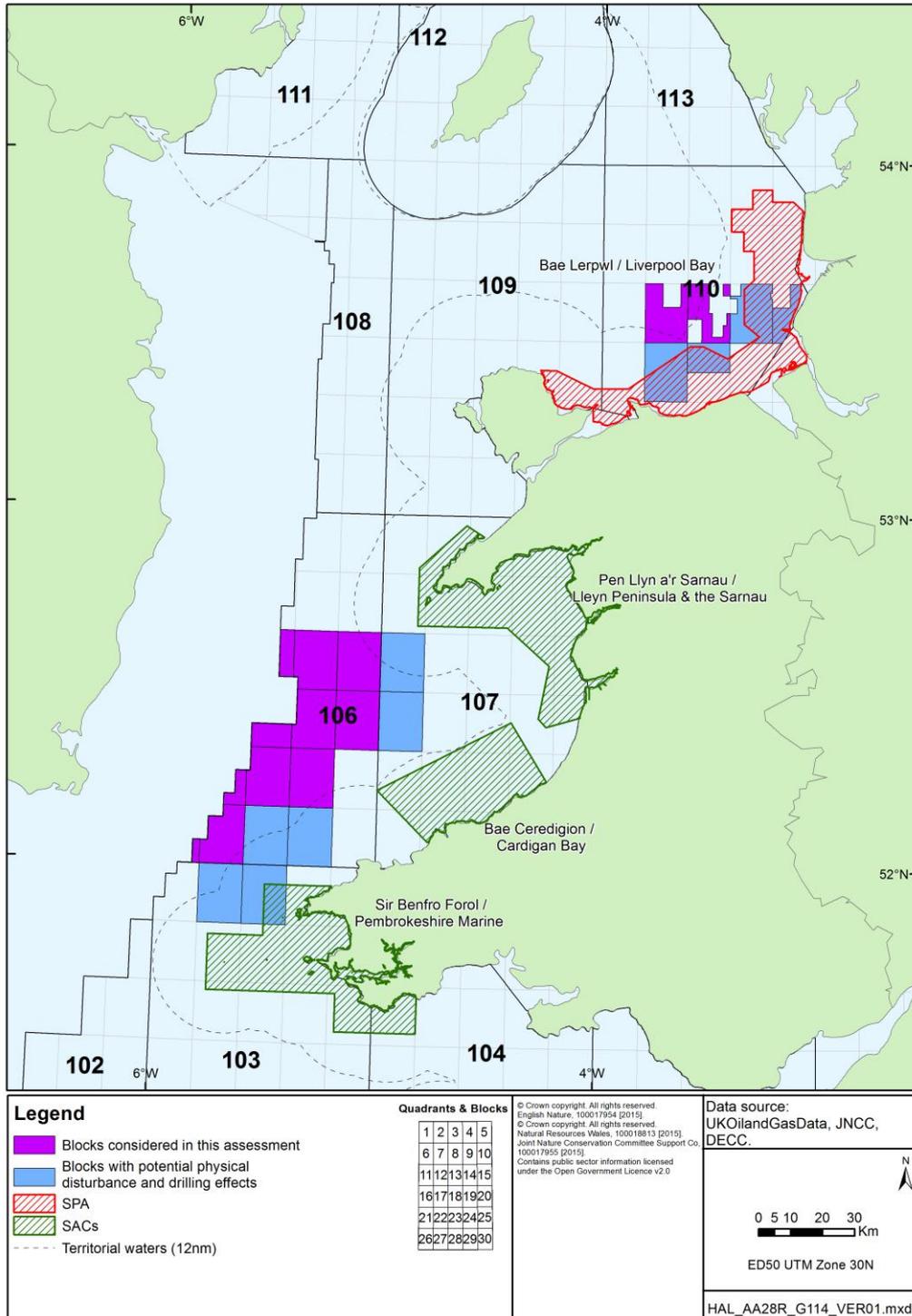


Table 4.1: Consideration of potential physical disturbance and drilling effects and relevant site conservation objectives

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
SPAs		
Liverpool Bay/Bae Lerpwl	Overwintering red-throated diver, common scoter and waterfowl assemblage	<p>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:</p> <ul style="list-style-type: none"> • 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. <p>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. Sensitivity of qualifying features and supporting habitats to physical loss through habitat removal is high and moderate for abrasion (e.g. rig placement)¹⁴. 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. However, significant effect not likely given the temporary nature of drilling activities and the strong tidal currents in the Blocks.</p> <p>Drilling discharges Sensitivity of qualifying features and supporting habitats to physical loss through smothering is moderate to high. 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. However, significant effect not likely given the temporary nature of drilling activities and the strong tidal currents in the Blocks.</p> <p>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.</p>
SACs		
Pen Llyn a'r Sarnau/ Lleyn	Sandbanks, estuaries, coastal	<p>Conservation objectives: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in</p>

¹⁴ <http://publications.naturalengland.org.uk/file/4413148>

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Peninsula and the Sarnau	lagoons, inlets and bays, reefs, mudflats and sandflats, salt marshes and salt meadows, sea caves, bottlenose dolphin, otter, grey seal	<p>the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.</p> <p>Species features</p> <ul style="list-style-type: none"> • 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. <p>Rig/vessel presence and movement Vessel presence and movement have the potential to cause non-physical disturbance (noise and visual disturbance) to site qualifying features¹⁵ (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 Llyn 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.</p> <p>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.</p>
Cardigan Bay/ Bae Ceredigion	Sandbanks, reefs, sea caves, bottlenose dolphin, sea and river lamprey, grey seal	<p>Conservation objectives: As above.</p> <p>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)¹⁶. Information on the range and distribution of bottlenose dolphin is as given above for Pen Llyn a'r Sarnau/ Llyn Peninsula and the Sarnau SAC (grey seal movements are described in Section 5.3.1).</p> <p>Given the low level and temporary nature of the proposed activities (2 drill or drop wells between the 17 Blocks in Quadrants 103,</p>

¹⁵ <http://www.ccg.gov.uk/landscape--wildlife/managing-land-and-sea/marine-policies/policy--legislation--guidance/idoc.ashx?docid=6912ad5e-6ec0-4a0d-bf0b-545f03b33452&version=-1>

¹⁶ <http://www.ccg.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
		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, 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	<p>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.</p> <p>Habitat features:</p> <ul style="list-style-type: none"> • 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. <p>Species features:</p> <ul style="list-style-type: none"> • 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. <p>Rig installation/ placement With respect to potential physical disturbance, the reef and subtidal sandbanks qualifying features¹⁷ 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.</p>

¹⁷ <http://www.ccg.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
		<p>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.</p> <p>Rig/vessel presence and movement Vessel presence and movement have the potential to cause non-physical disturbance to site qualifying features (grey seal).</p> <p>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.</p>

4.4 Mitigation

The routine sources of potential physical damage are assessed and controlled through a range of regulatory processes, such as EIA and the Drilling Operations Application (formerly PON15B) through the Portal Environmental Tracking System (PETS) and, where relevant, HRA to underpin those applications. Based on the results of the assessments including HRA, DECC may require additional mitigation measures to avoid or minimise significant adverse effects. Where this is not possible, DECC may refuse consent. Site surveys are required to be undertaken before drilling rig placement (for safety and environmental reasons). The results of such surveys allow for alteration of the location of activities (e.g. wellhead, jack-up rig and anchor positions) to ensure sensitive seabed surface or subsurface features are avoided. Such 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.

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

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. Risks to overall site integrity from these activities would be prevented by the existing legal framework for the respective activities (Figure 2.3), which includes HRA where necessary.

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.

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 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 larger¹⁸, with source sizes commonly between 1,000 and 8,000 cubic inches, with typical broadband source pressure levels of 248-259db re 1µPa.

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

¹⁸ OGP 2011 – An overview of marine seismic operations.

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, magnetometer and small airgun and shorter hydrophone streamer (with source sizes of 40-400 cubic inches¹⁸). The surveys typically cover 2-3km². 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 inches¹⁸) 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).

The potential for significant effect is largely related to the anticipated type, extent and duration of seismic survey associated with proposed licensing.

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 pressure¹⁹ and energy²⁰ (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

¹⁹ pressure measurements are based on peak sound pressure levels or SPL expressed as dB re 1 µPa (peak)(flat)

²⁰ energy measurements are based on sound exposure level or SEL expressed as dB re 1 µPa²s

cetaceans and pinnipeds and criteria were identified for each²¹. 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 Observers 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. Instead, they ranked behaviour along a behavioural response severity scale and recommended its use to interpret actual observed behavioural responses²².

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 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).

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).

²¹ 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.

²² 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.

5.3 Implications for site integrity of relevant sites

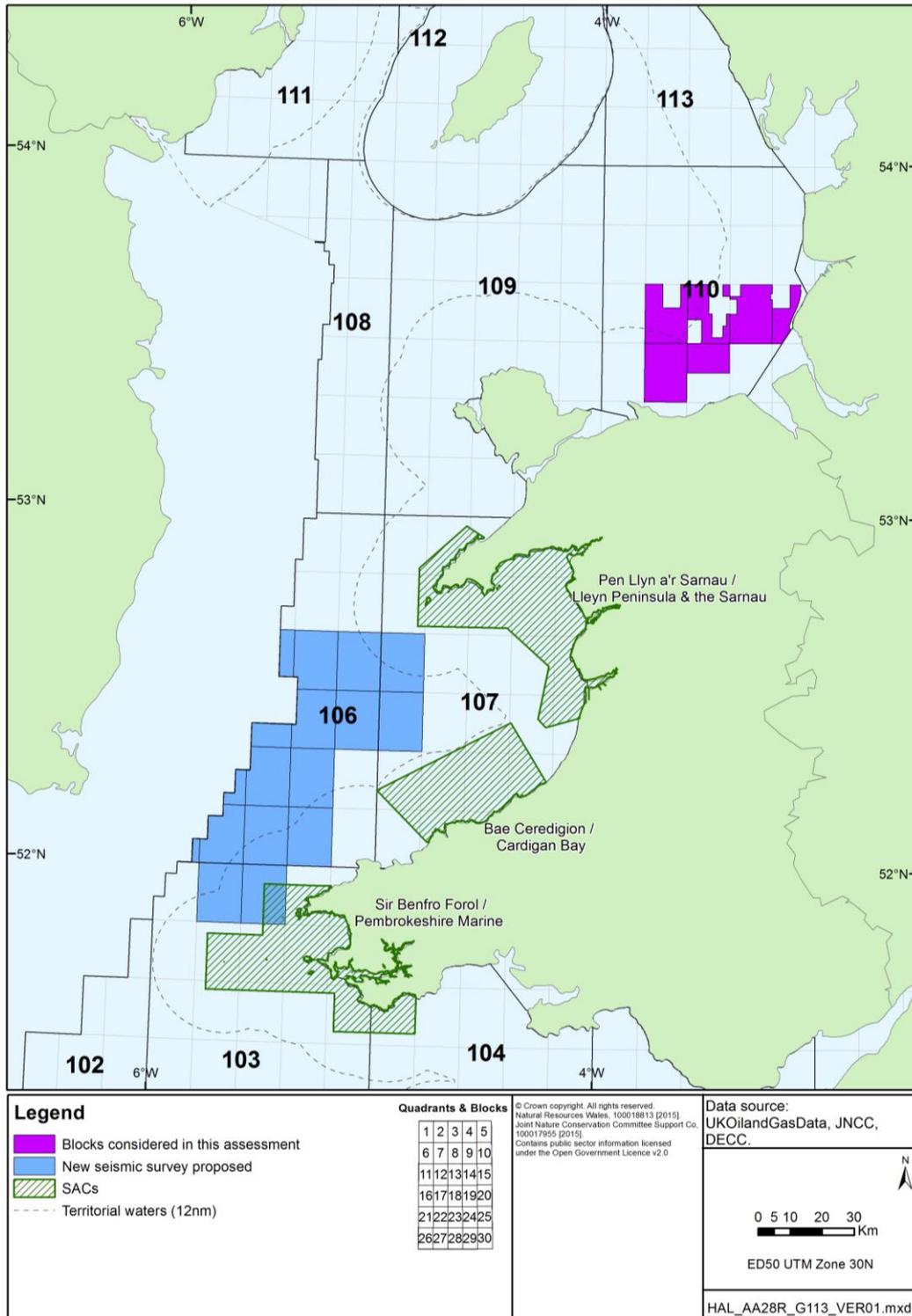
5.3.1 Special Areas of Conservation for marine mammals

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 Llyn 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).
- 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 Llyn Peninsula and the Sarnau SACs conducted by the Sea Watch Foundation in 2012 on behalf of CCW (now NRW) is reported by Feingold & Evans (2013). Population estimates in Cardigan Bay SAC were similar for 2003 and 2005, peaking at 214 individuals in 2006 and then declined to 109 individuals in 2007. Estimates rose again slightly to 133 individuals in 2011, before dropping considerably to 70 individuals in 2012. 2012 was the only year when a large part of Cardigan Bay was surveyed by line-transect, and resulted in an overall abundance

estimate of 330 individuals. These results suggested that the species uses Cardigan Bay SAC differently in different years with no obvious long-term trend. Bottlenose dolphins in Cardigan Bay have a predominantly inshore distribution. Surveys conducted during 2012, recorded ten dolphin sightings outside of the SACs, five of those recorded offshore outside Lleyn Peninsula and the Sarnau SAC, confirming the species as using the offshore waters of Cardigan Bay in summer months as well as in the winter. Offshore sightings have been reported on occasions in previous years although these have still been within ca. 10 nm (18.5km) of the coast.

Photo-identification surveys off the coast of Anglesey commenced in 2007, and along with data provided from the Isle of Man, these have continuously provided evidence that the bottlenose dolphins from Cardigan Bay extend their home ranges to the northern Irish Sea at least as far as the Isle of Man. 102 dolphins were identified in 2012 during surveys around Anglesey. Over 90% of those (n=93) were photographed previously in Cardigan Bay. As in previous years, these data provide evidence confirming that the full geographic range of this population includes all of the coastal waters of West and North Wales, and possibly the entire Irish Sea (see management unit information below, Feingold & Evans 2013).

Feingold & Evans (2013) indicate that 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. It may be the case that prey availability has become greater 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, meaning that dolphins need to travel more widely, including outside of Cardigan Bay, in order to find food. However, relatively stable population estimates for the entire Bay suggest that the shift has been less pronounced over the wider area than in Cardigan Bay SAC itself. This SAC is also considered a high-pressure area for boat traffic, with a continued increase in recreational boat activities occurring each year, which may be affecting bottlenose dolphin presence in the area.

Whilst ICES (2013) recognised that in some areas information are incomplete, that distribution may be ephemeral and the animals present likely comprise sympatric populations, they have proposed a series of bottlenose assessment units around the UK and these largely reflect those identified by the Interagency Marine Mammal Working Group (IAMMWG) (2013). 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).

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 Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC and Block 107/16 is 4km from Cardigan Bay/Bae Ceredigion SAC). Within these sites, bottlenose dolphin numbers peak in summer and animals are most commonly seen within 10 miles of the coast, primarily within 2 miles near headlands and estuaries²³. 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.

Maps showing the at-sea distribution of grey seals around the UK have been produced (Marine Scotland website²⁴). 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).

²³ <http://www.ccg.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=895011fb-b3f2-47a0-bc0c-b142279e7f83&version=-1>

²⁴ <http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/seal-density>

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

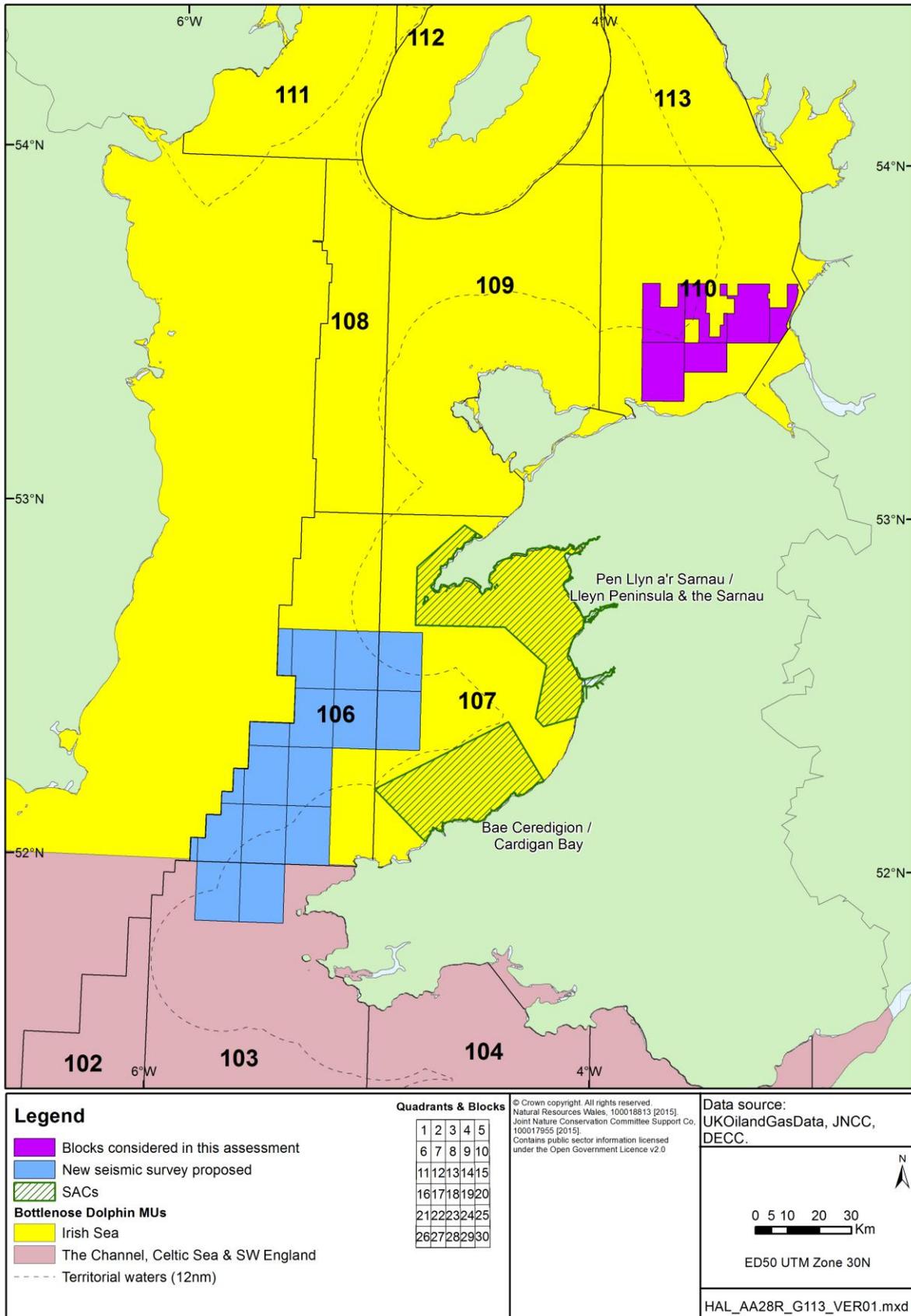
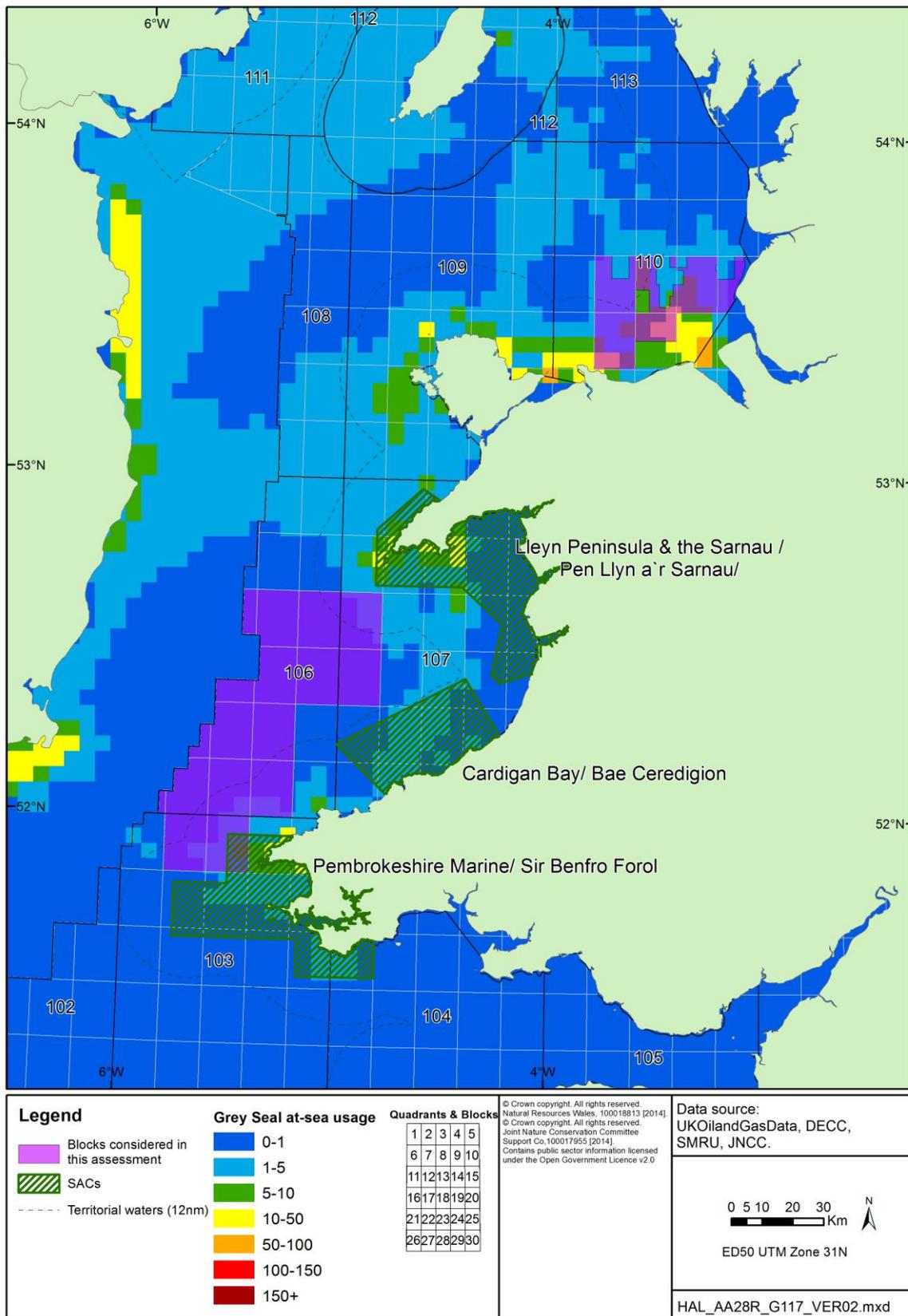


Figure 5.3: Estimated at sea usage by grey seals of the Eastern Irish Sea and St George's Channel area



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. However, noise levels suggested to cause injury to fish (a primary prey species) would not extend beyond a few tens of metres around the noise source. The range over which non-injurious disturbance effects on fish might occur is not possible to define, although available evidence suggests that the extent of any such disturbance of prey species is highly unlikely to undermine the conservation objectives in relation to sites for bottlenose dolphin or grey seals.

DECC will expect the operators to provide sufficient information on the potential impact of the proposed activities on relevant sites and their qualifying features 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.

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.

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 Regulation and mitigation

Both planning and operational controls cover underwater noise resulting from activities on the UKCS, specifically including geophysical surveying. An application for a Geological Survey, which is supported by an Environmental Impact Assessment, is 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 2.3). Consultations with Government Departments and other interested parties are conducted as standard prior to issuing consent, and JNCC, Natural Resources Wales (NRW), Cefas (and possibly others) may request additional risk assessment, specify timing or other constraints, or advise against consent. Any proposed activity with a potentially significant acoustic impact on a designated SAC or SPA would also be subject to the requirement for HRA.

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 surveys that the JNCC Seismic Guidelines are followed. European Protected Species (EPS) disturbance licences can also be issued under the *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007* (as amended).

The guidelines require visual monitoring of the area by a Marine Mammal Observer (MMO) prior to seismic survey being undertaken to determine if cetaceans are in the vicinity, and a slow and progressive build-up of sound to enable animals to move away from the source. Passive Acoustic Monitoring (PAM) may also be required. Seismic operators are required, as part of the application process, to 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). This assessment should consider all operational activities including shooting during hours of darkness or in poor visibility.

In their latest guidelines, JNCC (2010) advise that operators adopt mitigation measures which are appropriate to minimise the risk of an injury or disturbance offence²⁵ 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 in use to detect marine mammals likely to be 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 SACs 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).

Like any offshore activity, seismic surveys are considered on a case-by-case basis, and DECC have the discretion to issue consents with conditions specific to activity taking place and the sensitivities within the area. In addition to the above measures, JNCC provide more specific advice for areas of high importance for marine mammals such as Cardigan Bay, these include.

- The MMO should not have a dual role (e.g. Fisheries liaison), be experienced as a marine mammal observer and therefore be familiar with the JNCC guidelines.

²⁵ Defined under Regulation 39 1(a) and 1(b) (respectively) of the *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007* (as amended).

- A proven (previously used successfully) PAM system should be used, operated by an experienced user.
- Consideration should be given as to whether one MMO and one PAM operative are adequate for the specifics of the survey.
- JNCC will advise that two MMOs should be used when the survey is in an area considered particularly important for marine mammals.

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, 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)²⁶. 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 Book" series, now superseded by on-line data available from the DECC website. Discharges,

²⁶ 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*).

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 website²⁷).

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 reports²⁸ by the MCA and PON1 reports to DECC – the latter are published monthly on the DECC website²⁹. 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 oil³⁰ (2.5×10^{-4}) and gas³¹ wells (3.6×10^{-4}), as well as deep high pressure high temperature³² 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 blowouts³³ 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).

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) but due to low reservoir pressure, pumps are used to lift

²⁷ <https://www.gov.uk/oil-and-gas-uk-field-data#oil-discharged-with-produced-water>

²⁸ POLREP (pollution reports) relate to those issued in accordance with the Bonn Agreement, to alert Contracting Parties to relevant pollution events.

²⁹ <https://www.gov.uk/oil-and-gas-environmental-data>

³⁰ A well where the formation has an estimated gas/oil ratio less than 1,000.

³¹ A well where the formation has an estimated gas/oil ratio exceeding 1,000.

³² 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.

³³ 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).

the oil to surface, and oil production from the Lennox Field (Block 110/15a) has almost ceased (3,550m³ in 2014 compared to a peak of 2,242,500m³ in 2001). 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. Though small quantities of oil have been produced from the East Irish Sea Basin, all the present significant discoveries in the Irish Sea and St George's Channel 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 associated mainly with small amounts of crude oil (an ES for an exploration well in Block 110/13b considered 10-100 barrels (ca. 2-16m³) of Douglas crude (BHP Billiton Ltd 2009)) or the transfer and storage of diesel fuel and lubricating oils although condensate blowouts have also been considered (see Table 6.1).

The main oil weathering processes following a surface oil spill are spreading, evaporation, dispersion, emulsification, dissolution, oxidation, sedimentation and biodegradation. Diesel spills generally evaporate and disperse without the need for intervention. 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. 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. 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.

With respect to the Elgin gas release in 2012, the observed sea surface contamination (primarily from condensate) was in line with modelling data derived for potential condensate spills, which predicted that there would be an equilibrium point when input was matched by natural loss as a result of evaporation and dispersion in the water column, with approximately 50% of the condensate evaporating within approximately 24 hours under conditions relevant to the Elgin release. Brown, weathered material associated with the spill also appeared to disperse naturally and, during periods when the wind strength and wave height increased, this enhanced dispersion of the condensate and weathered material in the water column, reducing the quantity of material remaining on the sea surface (DECC 2012b).

Coincident with these weathering processes, surface and dispersed oil will be transported as a result of tidal (and other) currents, wind and wave action. 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 gas projects, modelling is carried out for diesel oil releases and for condensate blowouts 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 gas and condensate exploration and development 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 large diesel spills or unconstrained condensate blowouts with no intervention, combined with constant winds from one direction over a significant period of time, which is improbable.

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 ¹)	Likelihood of beaching (stochastic modelling ²)	Date of model run
103/1a	93	Diesel – Rig loss	1,000t (1,177m ³)	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 (1,075.6m ³)	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 (1,075.6m ³)	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 (1,075.6m ³)	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
110/12	32.4	Diesel – Rig loss	968t (1075.6m ³)	OSIS 4.2.2, 30 knot onshore wind	The spill disperses after 8 hours, 16km from the coastline	0% probability of oil beaching	2010
110/14b	18.7	Diesel – Rig loss	200t (222.2m ³)	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
113/27b	27-31	Diesel – Vessel loss	1,500t (1,666.7m ³)	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, 70° API condensate	15t (21.4m ³) 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 (666.7m ³)	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 (1,075.6m ³)	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

Block	Water depth (m)	Spill type	Spill size	Model used & conditions	Time to beach (deterministic modelling ¹)	Likelihood of beaching (stochastic modelling ²)	Date of model run
113/27c	27.9	Diesel – Rig loss	968t (1,075.6m ³)	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 (1,111.1m ³)	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).

¹ *Assumes that a continuous 30 knot onshore wind occurs throughout the spill event*

² *Stochastic modelling utilises metocean and meteorological inputs to determine likelihood of beaching and possible areas affected*

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 SEAs³⁴ 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

³⁴ See: [Offshore Energy Strategic Environmental Assessment \(SEA\): An overview of the SEA process.](#)

in such areas)⁵⁶, 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 (Law *et al.* 2011). Available evidence suggests that salmon smolts utilise shallow water depths (1-6m) and that adults show varying behaviour, swimming generally close to the surface (0-40m depth), with occasional deeper dives – e.g. Holm *et al.* (2005, cited by Malcolm *et al.* 2010) noted dive depths of between 85 and 280m. The most sensitive period for Atlantic salmon is likely to be during the peak smolt run, rather than when adult salmon are returning to rivers. This is because Atlantic salmon return to natal rivers throughout the year, whereas the smolt run is more seasonally defined (April and May). 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 700m³ 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

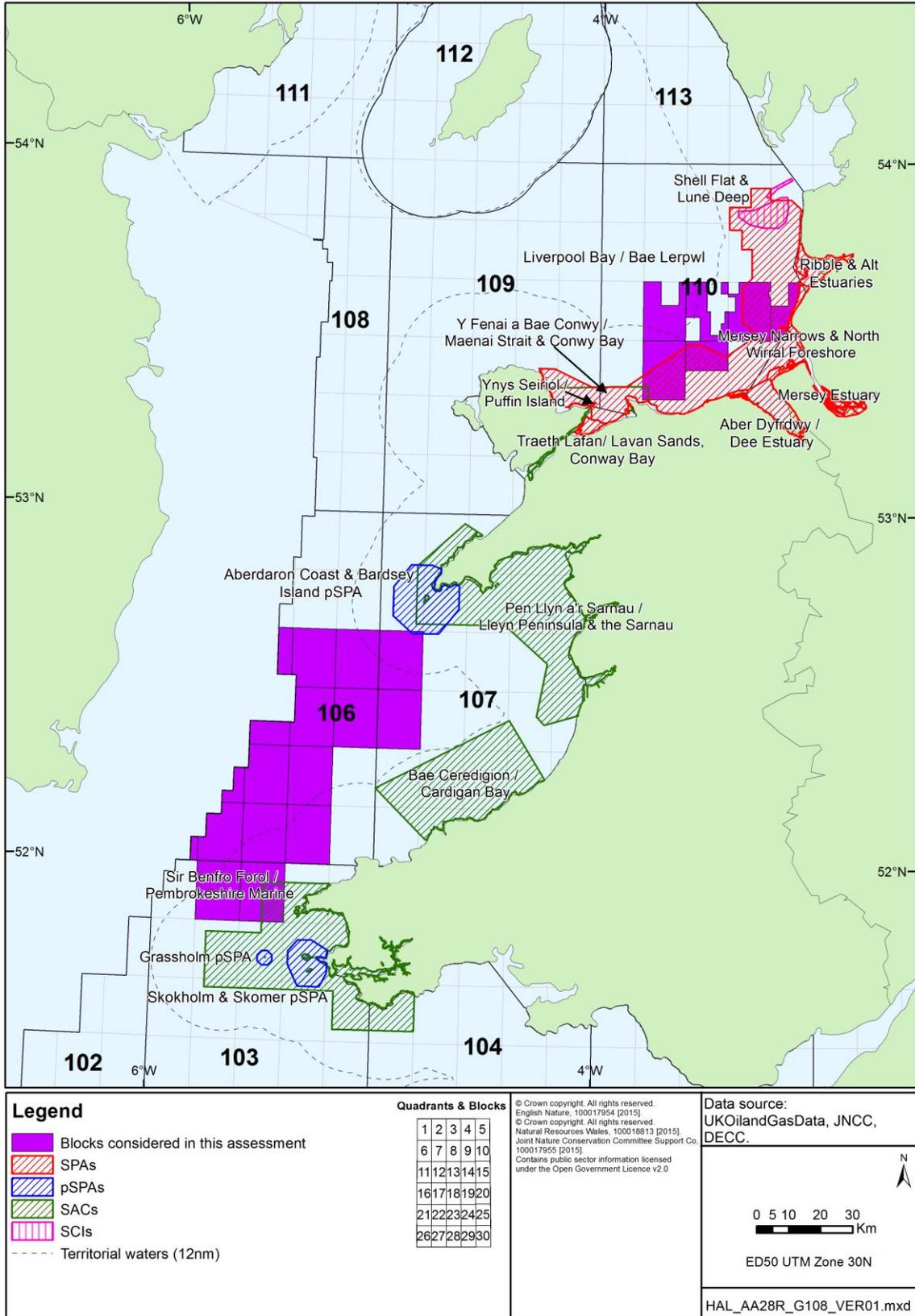


Table 6.2: Consideration of potential accidental spill impacts and relevant site conservation objectives

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
<p>Spill risk: Worst-case scenario likely to be release of the total drilling unit diesel fuel inventory, a condensate blowout or a small crude oil spill (see Section 6.2.2). Diesel spills generally evaporate and disperse without the need for intervention. A major diesel spill of ca. 1,000 tonnes would disperse naturally in about 8 hours and travel some 24km in conditions of a constant unidirectional 30 knot wind. Most frequent types of spill from mobile drilling rigs tend to be small releases of organic phase drilling fluids (and base oil), diesel and crude oil (Section 6.3.1). Blowouts of condensate are rare.</p>		
<p>SPAs</p>		
<p>Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 110/14b would disperse naturally within 7 hours, ca. 15km from shore with stochastic modelling indicating a very low (<1%) likelihood of beaching.</p>		
Ribble and Alt Estuaries SPA	Breeding tern, gulls, ruff and seabirds, on passage and overwintering waterbirds and waders	<p>Conservation objectives: Ensure that the integrity of the site is maintained or restored as appropriate, and to ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:</p> <ul style="list-style-type: none"> • 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; and • The distribution of the qualifying features within the site. <p>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)³⁵. The likelihood of a significant diesel spill (Section 6.2.1) combined with the probability of beaching (see Table 6.1) is extremely low. The potential for an accidental spill to impact 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.</p>
Mersey Narrows and North Wirral Foreshore SPA	Breeding tern, on passage gulls, overwintering waders and waterfowl	<p>Conservation objectives: As above.</p> <p>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 <i>et al.</i> 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 SPA³⁶. The deterministic output that a diesel spill of 1,000 tonnes would travel 24km in 8 hours under a worst case 30 knot onshore wind indicates a theoretical risk to site features. However, the likelihood of such an occurrence (Section 6.2.1) combined with the probability of beaching using</p>

³⁵ <http://publications.naturalengland.org.uk/file/4038157>

³⁶ http://www.naturalengland.org.uk/Images/mersey-narrows-departmental-brief_tcm6-27628.pdf

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Mersey Estuary SPA	Overwintering and passage waders, and waterfowl	<p>stochastic considerations (see Table 6.1) 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.</p> <p>Conservation objectives: As above.</p> <p>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)³⁷. The deterministic output that a diesel spill of 1,000 tonnes would travel 24km in 8 hours under a worst case 30 knot onshore wind indicates a theoretical risk to site features. However the likelihood of such an occurrence (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) 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.</p>
Relevant worst case spill modelling (Table 6.1): Large diesel spills in all of the Quadrant 110 Blocks described in the table would disperse naturally within 7-8 hours.		
Liverpool Bay / Bae Lerpwl SPA	Overwintering red-throated diver, common scoter and waterfowl assemblage	<p>Conservation objectives:</p> <p>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:</p> <ul style="list-style-type: none"> • 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. <p>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 sea³⁸. The likelihood of a significant diesel spill (Section 6.2.1) combined with the probability of beaching (see Table 6.1) 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.</p>

³⁷ <http://publications.naturalengland.org.uk/file/3968461>

³⁸ <http://publications.naturalengland.org.uk/file/4413148>

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 110/12 would disperse naturally within 8 hours, ca. 16km from shore with stochastic modelling indicating a 0% likelihood of beaching.		
The Dee Estuary SPA	Breeding terns, overwintering and passage waders and waterfowl	<p>Conservation objectives: See: Natural England & CCW (2010)³⁹</p> <p>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. The deterministic output that a diesel spill of 1,000 tonnes would travel 24km in 8 hours under a worst case 30 knot onshore wind indicates a theoretical risk to site features. However, the likelihood of such an occurrence (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) 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.</p>
Traeth Lafan / Lavan Sands, Conway Bay SPA	Overwintering waders and on passage great crested grebe	<p>Conservation objectives: See: CCW (2008)⁴⁰</p> <p>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 2008³⁵) and are highly vulnerable to surface pollution (Williams <i>et al.</i> 1994). Overwintering waders have a relatively low vulnerability to the direct effects of oil spills (Law <i>et al.</i> 2011). The deterministic output that a diesel spill of 1,000 tonnes would travel 24km in 8 hours under a worst case 30 knot onshore wind indicates a theoretical risk to site features. However the likelihood of such an occurrence (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) 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.</p>
Ynys Seiriol / Puffin Island SPA	Breeding cormorant	<p>Conservation objectives: See: CCW (2008)⁴¹</p> <p>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 <i>et al.</i> 1994). The deterministic output that a diesel spill of 1,000 tonnes would travel 24km in 8 hours under a worst case 30 knot onshore wind indicates a theoretical risk to site features. However the likelihood of such an occurrence (Section 6.2.1) combined with the</p>

³⁹ <http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/the-dee-estuary-european-marine.aspx>

⁴⁰ <http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=dae16b88-02b1-45e6-bdea-e6358f2a92c0&version=-1>

⁴¹ <http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=3b507731-26e8-4b1f-9c9a-953c6fa813df&version=-1>

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		probability of beaching using stochastic considerations (see Table 6.1) 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.
Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island pSPA	Breeding and overwintering chough, breeding Manx shearwater	<p>Conservation objectives: See: CCW (2008)⁴²</p> <p><i>Note: Natural Resources Wales recently consulted on a proposed 9km boundary extension to the site from Bardsey island as surveys have revealed the local extent to which the Manx shearwaters congregate.</i></p> <p>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 2008⁴⁰). The likelihood of a significant diesel spill (Section 6.2.1) combined with the probability of beaching (see Table 6.1) 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.</p>
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.		
Grassholm pSPA	Breeding gannet	<p>Conservation objectives: See: CCW (2008)⁴³</p> <p><i>Note: Natural Resources Wales recently consulted on a proposed 2km boundary extension to Grassholm SPA around the island from the existing site boundary.</i></p> <p>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 <i>et al.</i> 1994) and oil spills and other pollution episodes may damage the qualifying feature (CCW 200⁴¹). The deterministic output that a diesel spill of 1,000 tonnes would travel 24km in 8 hours under a worst case 30 knot onshore wind indicates a theoretical risk to site features. However the likelihood of such an occurrence (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) 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</p>

⁴² <http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=c17e5e16-a93f-4e56-a8f9-5cff3e30a4c&version=-1>

⁴³ <http://www.ccgc.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=2fdd00e7-af4f-4ad1-add2-1a3fda8a46c2&version=-1>

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Skokholm and Skomer pSPA	Chough, short-eared owl, breeding seabirds. Seabird assemblage.	<p>available to ensure site conservation objectives are not undermined. See also relevant text on mobile qualifying features following this table.</p> <p>Conservation objectives: See: CCW (2008)⁴⁴</p> <p><i>Note: Natural Resources Wales recently consulted on proposed changes to SPA Proposed additional qualifying species are chough (breeding), short eared owl (breeding), lesser black backed gull (breeding), as well as an assemblage of nearly 395,000 breeding seabirds. Proposed boundary extension is a 4km extension seawards around the islands from the existing site boundary and would protect other species in the site such as puffin, guillemot and razorbill.</i></p> <p>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 <i>et al.</i> 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. The deterministic output that a diesel spill of 1,000 tonnes would travel 24km in 8 hours under a worst case 30 knot onshore wind indicates a theoretical risk to site features. However the likelihood of such an occurrence (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) 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.</p>
SACs		
Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 110/14b would disperse naturally within 7 hours, ca. 15km from shore with stochastic modelling indicating a very low (<1%) likelihood of beaching.		
Shell Flat and Lune Deep SCI	Sandbanks, reefs	<p>Conservation objectives: Subject to natural change, maintain the qualifying habitats all the time in favourable condition. Favourable condition of the habitats will be determined through assessment that the following are maintained in the long term in the site:</p> <ul style="list-style-type: none"> • 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)

⁴⁴ <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
		<p>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 contamination⁴⁵. The deterministic output that a diesel spill of 1,000 tonnes would travel 24km in 8 hours under a worst case 30 knot onshore wind indicates a theoretical risk to site features. However the likelihood of such an occurrence (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) is extremely low. The potential for an accidental spill to impact the community structure 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.</p>
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	<p>Conservation objectives: See: Natural England & CCW (2010)⁴⁶</p> <p>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. The 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 2010⁴⁴). The deterministic output that a diesel spill of 1,000 tonnes would travel 24km in 8 hours under a worst case 30 knot onshore wind indicates a theoretical risk to site features. However the likelihood of such an occurrence (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) 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.</p>
<p>Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 110/12 would disperse naturally within 8 hours, ca. 16km from shore with stochastic modelling indicating a 0% likelihood of beaching.</p>		
Y Fenai a Bae Conwy / Menai Strait and Conwy Bay	Sandbanks, mudflats and sandbanks, reefs, inlets and bays and sea caves	<p>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.</p> <p>Habitat features</p> <ul style="list-style-type: none"> • 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

⁴⁵ <http://publications.naturalengland.org.uk/file/3268971>

⁴⁶ <http://www.ccg.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
		<p>the habitat are not degraded.</p> <ul style="list-style-type: none"> The presence, abundance, condition and diversity of typical species are such that habitat quality is not degraded. <p>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 2009⁴⁷). Qualifying features such as mudflats and sandflats and inlets and bays are highly sensitive to oil pollution with the sandbank and reef features moderately sensitive although strong tidal currents may disperse oil in the water column which may impact benthic organisms (Law <i>et al.</i> 2011). The likelihood of a significant diesel spill (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) 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.</p>
Pen Llyn a`r Sarnau/ Lley 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	<p>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.</p> <p>Habitat features</p> <ul style="list-style-type: none"> 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. <p>Species features</p> <ul style="list-style-type: none"> 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. <p>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</p>

⁴⁷ <http://www.ccg.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
		<p>or drop well proposed between them. Oil & gas exploration and accidental discharges could have an adverse effect on most of the qualifying features (CCW 2009⁴⁸). 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 <i>et al.</i> 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 <i>et al.</i> 2011). 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. The likelihood of a significant diesel spill (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) is extremely low. See also relevant text on mobile qualifying features following this table.</p>
Cardigan Bay/ Bae Ceredigion	Sandbanks, reefs, sea caves, bottlenose dolphin, sea and river lamprey, grey seal	<p>Conservation objectives: As above.</p> <p>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 2009⁴⁹). As for Pen Llyn a'r Sarnau/ Llyn Peninsula and the Sarnau SAC above. The likelihood of a significant diesel spill (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) 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.</p>
<p>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.</p>		
Pembrokeshire Marine/ Sir Benfro Forol	Estuaries, inlets and bays, reefs, sandbanks, mudflats and sandflats, coastal lagoons, salt marshes and salt meadows,	<p>Conservation objectives: As above.</p> <p>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 2009⁵⁰). 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 <i>et al.</i> 2011). The likelihood of a significant diesel spill (Section 6.2.1) combined with the probability of beaching using stochastic considerations (see Table 6.1) is extremely low. The potential for an accidental spill to</p>

⁴⁸ <http://www.ccg.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=6912ad5e-6ec0-4a0d-bf0b-545f03b33452&version=-1>

⁴⁹ <http://www.ccg.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=895011fb-b3f2-47a0-bc0c-b142279e7f83&version=-1>

⁵⁰ <http://www.ccg.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=1b72e681-cf1f-4006-b65a-d38bd3e17642&version=-1>

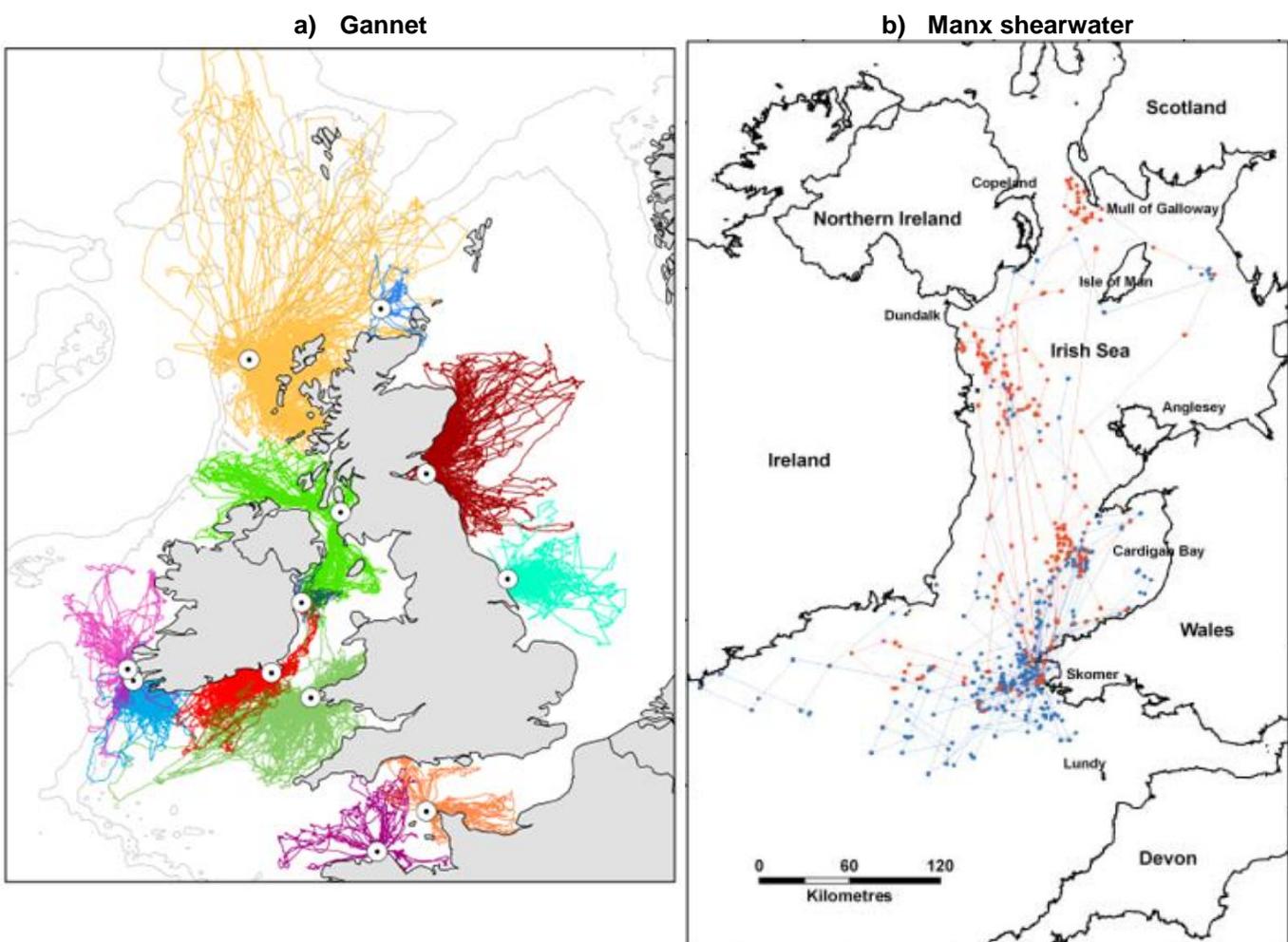
Relevant sites	Relevant qualifying features	Consideration against conservation objectives
	sea caves, grey seal, shore dock, sea and river lamprey, allis and twaite shad, otter	undermine the conservation objectives of the qualifying features will be determined by the location and timing of drilling activities 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.

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.

With respect to gannet foraging, tracking data from Wakefield *et al.* (2013) indicated that gannets from Grassholm pSPA (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).

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



Source: Wakefield *et al.* (2013)

Source: Guilford *et al.* (2008)

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 pSPA and Skokholm and Skomer pSPA).

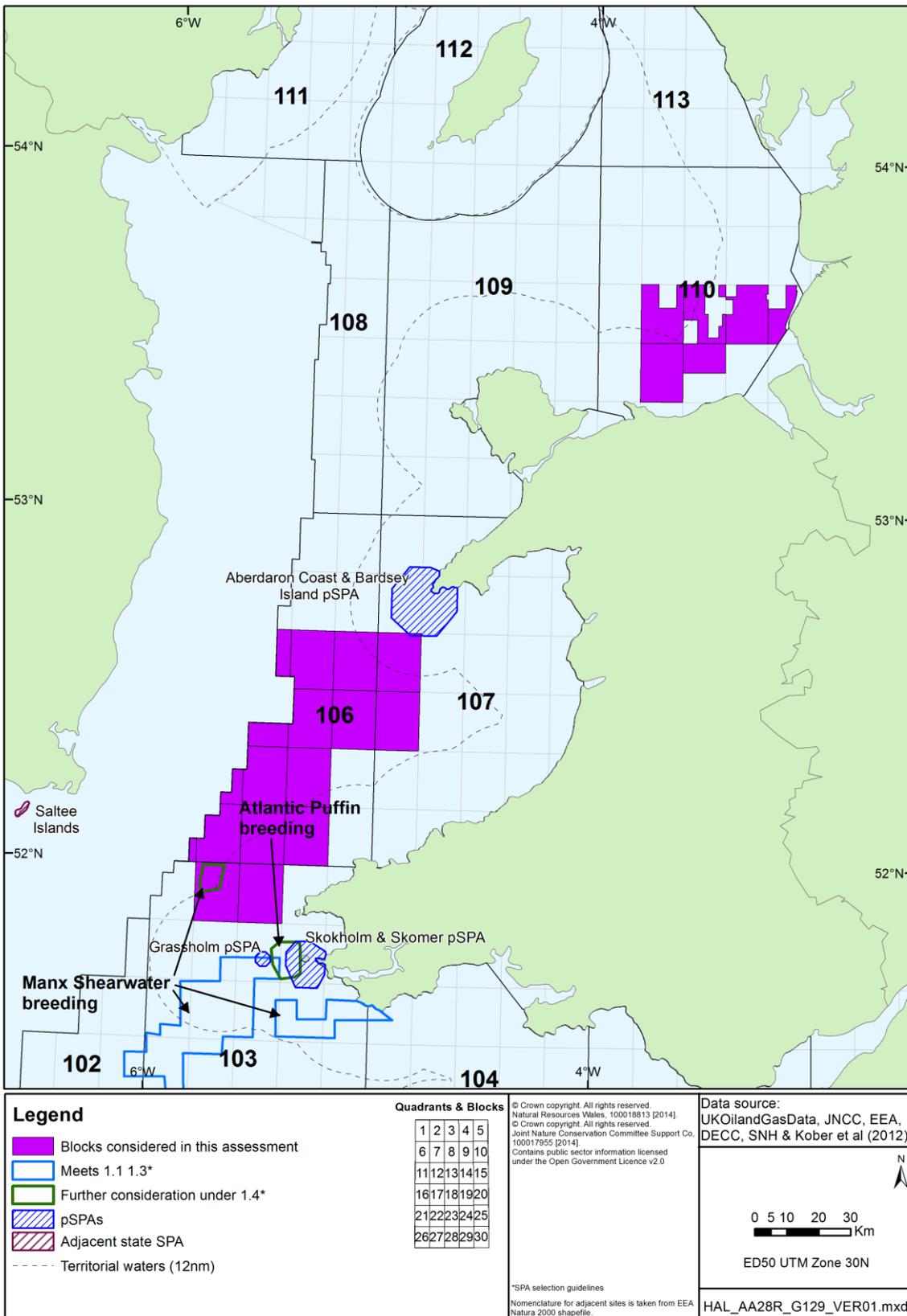
Stone *et al.* (1995) reported high densities of puffins during the chick-rearing period (June to July) close to the Skomer colony. By August and September, birds had left the colony and low densities were found in the Irish Sea and St George's Channel.

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.

Section 5.3.1 indicates that bottlenose dolphins (qualifying feature of the Pen Llyn 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. Densities in the Irish Sea are likely to be low (average of ca. 0.335 animals/km², Hammond *et al.* 2013) and current evidence does not suggest more than a low vulnerability to oil spills (Law *et al.* 2011). However, an accidental oil spill within any of the Blocks could impact dolphins foraging and mitigation measures (see Section 6.4) may be required to ensure site conservation objectives 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. 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.

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



6.4 Mitigation

The likelihood of a large condensate spill is extremely low (blowout occurrence frequency in the range of 1/1,000-10,000 well years, see Section 6.3.1). All of the proposed work programmes indicate a drill or drop well. The potential for spills to cause deterioration or significant disturbance of qualifying features will be determined by the location and timing of drilling activities which are currently unknown (Note: oil spills are an accidental event and not a planned activity). Therefore, a detailed assessment of the potential for effects of a particular operation cannot be made at this time, but would be fully assessed as part of project-level EIA.

Following licensing, specific exploration drilling activities require permitting (see 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. 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.

Spill prevention 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 prevention and 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 inshore statutory nature conservation body, e.g. Natural Resources Wales, 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 of incidents with the potential to cause marine pollution by oil, with a view to preventing such pollution or reducing or 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 must have in place the capability to employ response strategies for a spill of any severity. The minimum requirements for a response to spills of various sizes are shown in Table 6.3. Diesel and condensate would be considered Group 1 oil types.

Table 6.3: Guidance on minimum standards required for oil pollution incident response

Estimated Oil Quantity (tonnes)	Dispersant combat rate (tonnes/hr)	Oil Type ¹	Aerial Surveillance Capability	Response Times	
				For Block Specific Vulnerability ² of 1 (very high)	All other Vulnerability Categories (low to high)
0 to 25	10	1 ³	Within 4 hours	Monitor and natural dispersion (dispersant requirement assessed on case by case basis)	Monitor and natural dispersion - No dispersant requirement
		2, 3 and 4		Monitor and dispersant within 1 hour	Monitor and dispersant available but no "within 1 hour requirement"
25 to 100	2, 3 and 4	Monitor and dispersant within 2 hours		Monitor and dispersant available but no "within 2 hour requirement"	
100 to 500	50	2; 3 and 4		Monitor and dispersant within 6 hours	Monitor and dispersant within 6 hours
>500	>50	2; 3 and 4		Monitor and dispersant within 18 hours	Monitor and dispersant within 18 hours

Notes: ¹Oil type based on [ITOPF groups](#), ²based on JNCC (1999), ³Oil type 1 response times are the same for the larger oil quantity categories as for 0 to 25 tonnes.

Source: DECC OPEP Guidance, July 2012

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. A [consultation](#) on the UK's proposed approach to implement the offshore safety Directive closed in September 2014. While the required content of OPEPs remains largely consistent with existing guidance, there are a number of proposed amendments to the *Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation) Regulations 1998*⁵¹ and updates to OPEP guidance⁵² to fulfil specific requirements of the Directive.

Activity level management measures (e.g. which should be implemented through an accredited Environmental Management System) can help to reduce the potential for spills of oil and chemicals of all sizes through, for instance, inventories 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

⁵¹ Draft Regulations were provided as part of the consultation process in July 2014: <http://www.hse.gov.uk/consult/condocs/cd272.htm>

⁵² 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>

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 may check training records for offshore personnel to ensure compliance with training requirements. Offshore, primary responsibility for oil spill response lies with the relevant Operator and their third party accredited 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. Within two days, aircraft can deliver sufficient dispersant to treat a 16,000 tonne spill within 50 miles of the coast anywhere around the UK. MCA holds 1,400 tonnes of dispersant stockpiled in 14 locations around the UK, in addition to counter-pollution equipment (booms, adsorbents etc.) which can be mobilised within 2-12 hours depending on incident location. 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)⁵³. The government has also been in discussions with the oil industry on the potential of a commercial call-out arrangement to use their vessels⁵⁴ and BP have agreed to volunteer a vessel to help in an emergency should the MCA deem it appropriate⁵⁵.

For activities in proximity to sensitive shorelines, the Department's guidance (DECC 2012a) specifies that the risk of shoreline contamination be determined through an appropriate risk assessment, and operators with oil spill scenarios that could impact the shoreline must have access to appropriate oil spill response resources suitable for shoreline clean-up operations. Additional resources are required for installations operating in any Block wholly or partly within 25 miles of the coastline dependent on the hydrocarbon inventory and the oil pollution incident scenarios identified, including:

- The presence near the facility at all times of a vessel:
 - with the capability of spraying dispersant⁵⁶ within 30 minutes of an oil pollution incident notification
 - has a stock of dispersant sufficient to deal with an oil pollution incident of 25 tonnes, and if required, have the capability (equipment and capacity) of recovering any oil likely to be lost from the installation under a Tier 1⁵⁷ scenario

⁵³ <http://www.shetnews.co.uk/news/9565-sic-retaining-northern-isles-emergency-vessel-is-crucial>

⁵⁴ Scotland Office website - <http://www.scotlandoffice.gov.uk/scotlandoffice/17322.html>

⁵⁵ <https://www.gov.uk/government/news/moore-welcomes-bp-and-north-star-support-for-second-support-vessel>

⁵⁶ 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.

⁵⁷ Oil pollution incidents are classified according to the response levels they are most likely to require and not the volume of oil pollution, unless this is supported by a location specific risk assessment. For example, if a pollution incident requires the use of resources from a regional centre, this would be used to classify the necessary response level, irrespective of its size.

For consistency with the National Contingency Plan, the following Tier definitions apply:

- Tier 1 Local (within the capability of the operator on site);
- Tier 2 Regional (beyond the in-house capability of the operator);

- In the event of a Tier 2 incident, Tier 2 resources must be available on scene within half the time taken for the oil to reach shore in 30 knot wind conditions
- Details of resources to deal with a Tier 3 incident (i.e. an oil pollution incident that cannot be controlled by Tier 1 or 2 resources), including sources of transport and delivery system
- A Shoreline Protection Strategy Plan

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 also a collision risk assessment where there is considered to be a significant navigational risk, 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.

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 industry⁵⁸ 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 responsibility by, for instance: insurance, parent company guarantee, reliance on credit/financial strength rating of the operator.

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 diesel or small spill of crude oil (i.e. where site conservation objectives are at risk of being undermined).

• Tier 3 National (requiring national resources).

⁵⁸ 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).

- 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 2014⁵⁹ 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 areas⁶⁰ and a Welsh Marine Plan is currently in development⁶¹.

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 2014⁶².

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

⁵⁹ <https://www.gov.uk/government/publications/east-inshore-and-east-offshore-marine-plans>

⁶⁰ <https://www.gov.uk/government/publications/marine-plan-areas-in-england>

⁶¹ <http://wales.gov.uk/topics/environmentcountryside/fisheries/marine/marine-planning/latest-news/?lang=en>

⁶² <http://www.bbc.com/news/uk-wales-north-west-wales-28580683>

used to demonstrate the capability of DeltaStream as a tidal stream generator and provide evidence on how the device interacts with the environment⁶³. 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 2014⁶⁴. 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) sites⁶⁵. 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)"⁶⁶. 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 or holders of other Crown Estate offshore interests)⁶⁶ 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.

⁶³ http://www.tidalenergyltd.com/?page_id=650

⁶⁴ <http://www.bbc.com/news/uk-wales-north-west-wales-29023425>

⁶⁵ <http://www.wavehub.co.uk/news/crown-estate-unlocks-further-uk-wave-and-tidal-current-opportunities/>

⁶⁶ [DECC 28th Round other regulatory issues](#)

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 ⁶⁷ .	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 40km ² 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 ⁶⁸ .	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 ⁶⁹ . Under construction and due to be fully operational end of 2014 ⁷⁰ .	Overlaps with Blocks 110/17 and 110/18b

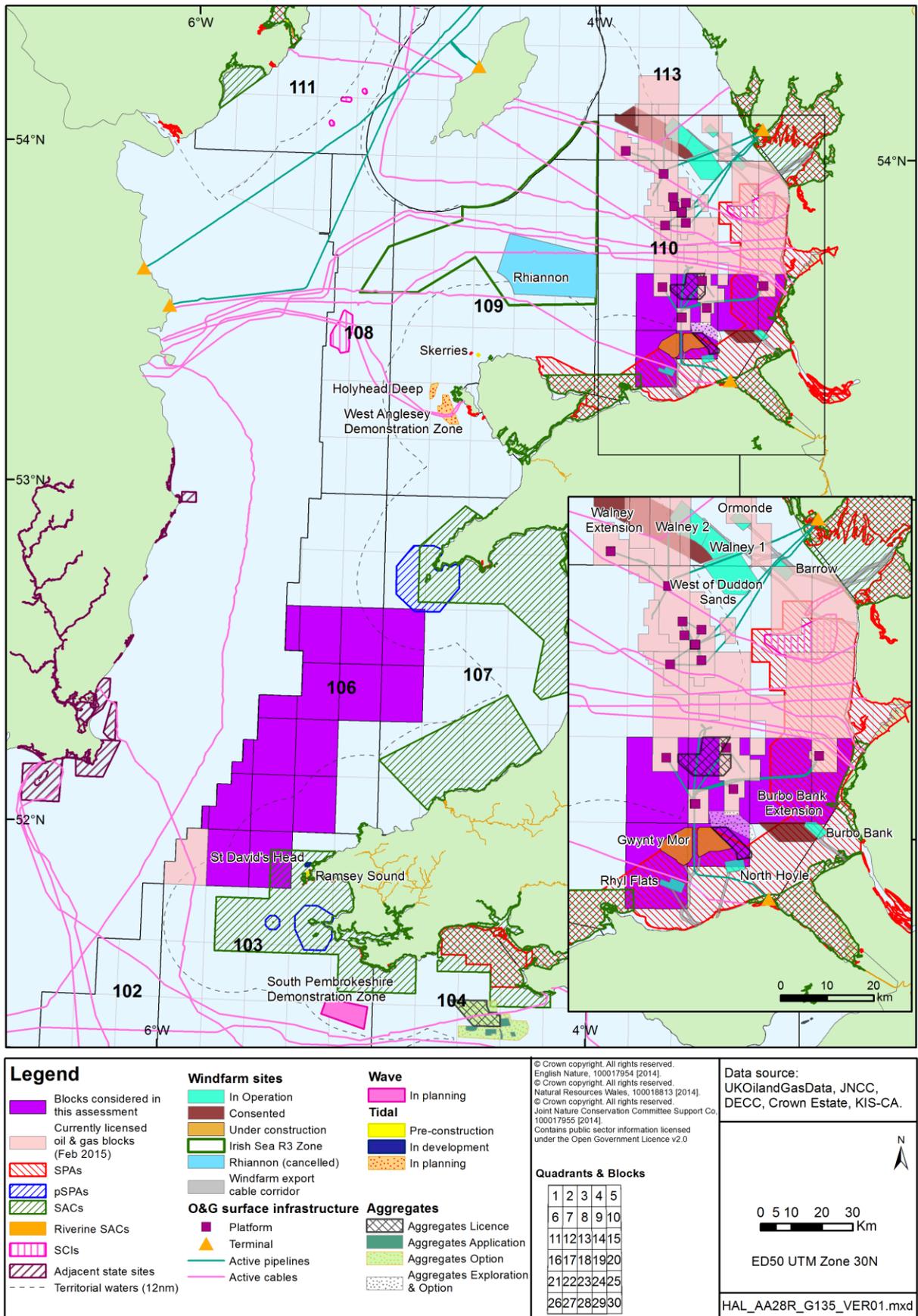
⁶⁷ <http://infrastructure.planningportal.gov.uk/document/2809139>

⁶⁸ <http://infrastructure.planningportal.gov.uk/projects/north-west/burbo-bank-extension-offshore-wind-farm/>

⁶⁹ <https://www.og.decc.gov.uk/EIP/pages/projects/GwyntyMorDecisionConsent.pdf>

⁷⁰ <http://www.rwe.com/web/cms/en/1202906/rwe-innogy/sites/wind-offshore/under-construction/gwynt-y-mr/>

Table 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.

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 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 Llyn 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, to be completed by July 2014, was for 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 is currently underway and will close in April 2015⁷¹". 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 $\mu\text{Pa}^2 \text{m}^2\text{s}$; or the zero to peak source level of 224 dB re 1 $\mu\text{Pa}^2 \text{m}^2$ 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 1 μPa 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.

⁷¹ <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)⁷². 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 Pathfinder⁷³ 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

⁷² <http://publications.naturalengland.org.uk/file/4413148>

⁷³ https://itportal.decc.gov.uk/eng/fox/path/PATH_REPORTS/pdf

number of 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 projects⁷⁴. Though representing an incremental source of activity in and around offshore wind farm areas, 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 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).

⁷⁴<http://infrastructure.planningportal.gov.uk/wp-content/uploads/projects/EN010026/3.%20Post%20Decision%20Information/Decision/Secretary%20of%20State%20for%20Energy%20and%20Climate%20Change%E2%80%99s%20HRA%20report.pdf>

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 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 a 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 SAC⁷⁵ (version as of 1st September 2014) and SPA⁷⁶ (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 Wales⁷⁷ 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). Public consultation on proposals to extend a number of existing SPAs including Glannau Aberdaron and Ynys Enlli/Aberdaron Coast and Bardsey Island SPA, Skokholm and Skomer SPA and Grassholm SPA, and was completed in April 2014. The proposed sites were renamed potential SPAs (pSPA)⁷⁸. The sites are listed and shown in relevant maps below.

⁷⁵ Version as of 1st September 2014 - <http://jncc.defra.gov.uk/page-1461>

⁷⁶ Version as of 1st September 2014 - <http://jncc.defra.gov.uk/page-1409>

⁷⁷ <http://www.ccw.gov.uk/landscape--wildlife/protecting-our-landscape/special-landscapes--sites/sites-search-results.aspx>

⁷⁸ <http://naturalresourceswales.gov.uk/content/docs/pdfs/consultation-pdfs/2014-our-consultations/three-spas/spa-consultation-letter.pdf?lang=en>

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 albigifrons*

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 oedipnemus*
 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

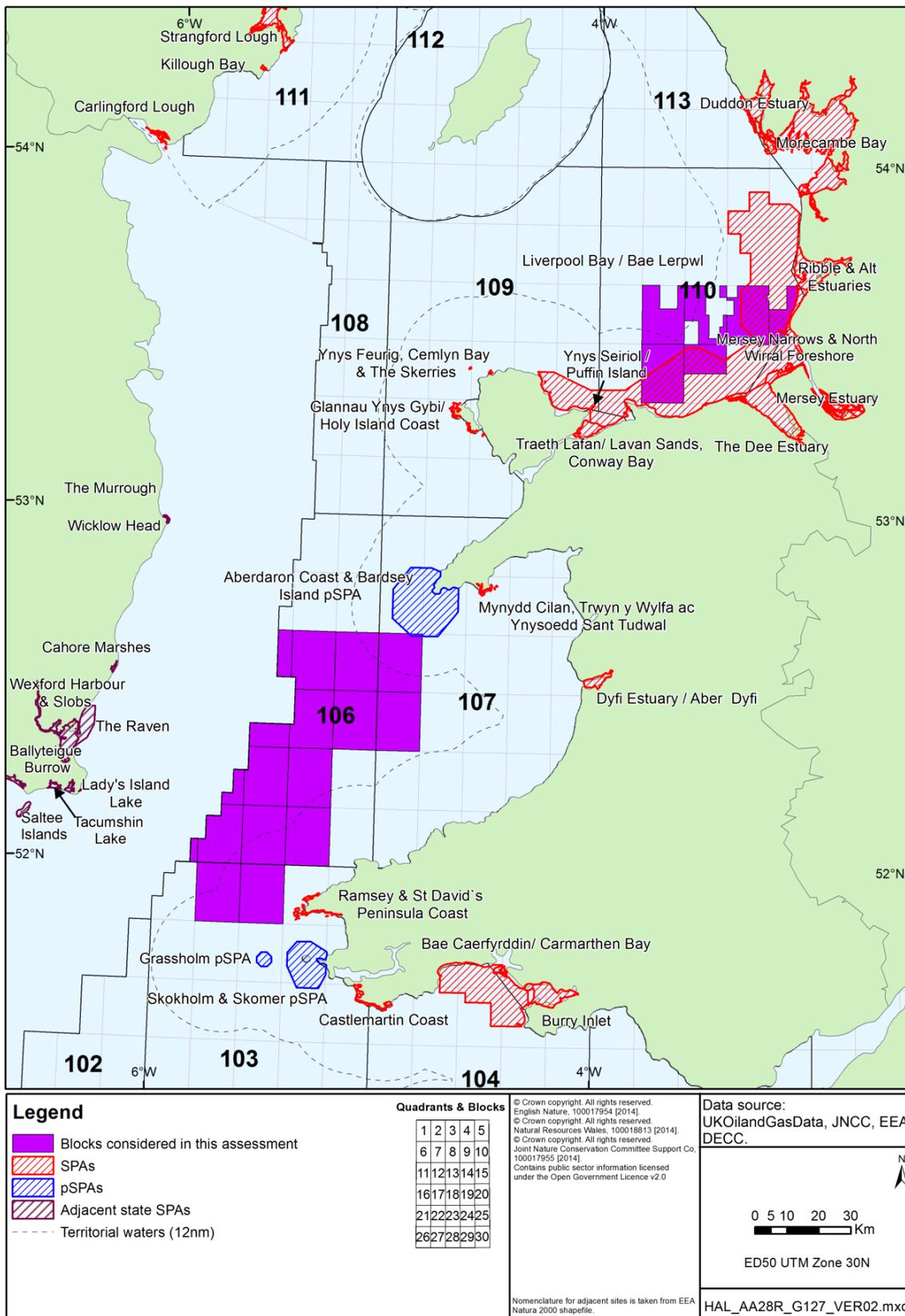


Table A.1: Coastal and marine SPAs and their Qualifying Features

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages ⁷⁹
Northern Ireland				
Strangford Lough SPA	15580.79	Breeding: Arctic tern Common tern Sandwich tern Over winter: Bar-tailed godwit Golden plover	Over winter: Knot Canadian light-bellied brent goose Redshank Shelduck	Over winter: Waterfowl
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
England				
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	Breeding: Lesser black-backed gull Black-headed gull	Breeding: Seabirds Over winter:

⁷⁹ - 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 ⁷⁹
		Over winter: Bewick swan Whooper swan Bar-tailed godwit Golden plover	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 On passage: Sanderling Ringed plover Whimbrel Redshank	Waterfowl
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:	Over winter: Pintail Knot Oystercatcher Shelduck Redshank Black-tailed godwit Curlew	Over winter: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages ⁷⁹
		Sandwich tern	Dunlin Grey plover Teal On passage: Redshank	
Wales				
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 Bay and the Skerries SPA	85.98	Breeding: Roseate tern Common tern Arctic tern Sandwich tern	N/A	N/A
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 /	33410.03	N/A	Over winter:	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages ⁷⁹
Carmarthen Bay SPA			Common scoter	
Burry Inlet SPA	6627.99	N/A	Over winter: Oystercatcher Pintail	Over winter: Waterfowl
Republic of Ireland				
The Murrrough 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 waterbirds and
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 waterbirds and
The Raven SPA	2610.43	Over winter: Red-throated diver Greenland white- fronted goose	Over winter: Cormorant Common scoter Grey plover Sanderling	Wetlands waterbirds and
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 waterbirds and
Lady's Island Lake SPA	478.81	Breeding: Sandwich tern Roseate tern Common tern Arctic tern	Over winter: Gadwall Breeding: Black-headed gull	Wetlands waterbirds and
Tacumshin Lake SPA	528.8	On passage: Hen harrier	Over winter: Little grebe	Wetlands waterbirds and

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages ⁷⁹
		Over winter: Bewick's swan Whooper swan Golden plover Grey plover	Wigeon Gadwall Teal Pintail Shoveler Tufted duck Coot Lapwing Black-tailed godwit	
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 <i>Rhynchosporion</i> Transition mires and quaking bogs
Caves	Caves not open to the public
Coastal Dunes	Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>) Coastal dunes with <i>Juniperus</i> spp. Decalcified fixed dunes with <i>Empetrum nigrum</i> Dunes with <i>Hippophae rhamnoides</i> Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>) Embryonic shifting dunes Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature Humid dune slacks Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (`white dunes`)
Coastal Lagoons	Coastal lagoons *Priority feature
Estuaries	Estuaries
Fens	Alkaline fens Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> * Priority feature Petrifying springs with tufa formation (<i>Cratoneurion</i>) * Priority feature
Forest	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) * Priority feature Old sessile oak woods with <i>Quercus robur</i> on sandy plains <i>Tilio-Acerion</i> forests of slopes, screes and ravines * Priority feature Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) * Priority feature
Grasslands	Alpine and subalpine calcareous grasslands Calaminarian grasslands of the <i>Violetalia calaminariae</i> Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels <i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) Semi-natural dry grasslands and scrubland facies: on calcareous substrates (<i>Festuco-Brometalia</i>) (important orchid sites) * Priority feature Species-rich <i>Nardus</i> 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 <i>Erica vagans</i> European dry heaths Northern Atlantic wet heaths with <i>Erica tetralix</i>
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 <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
Salt marshes and salt meadows	Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>) <i>Salicornia</i> and other annuals colonising mud and sand <i>Spartina</i> swards (<i>Spartinion maritimae</i>)
Sandbanks	Sandbanks which are slightly covered by sea water all the time
Scree	Calcareous and calcshist scree of the montane to alpine levels (<i>Thlaspietea rotundifolii</i>) Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>)
Scrub (matorral)	<i>Juniperus communis</i> 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 <i>Chara</i> spp. Mediterranean temporary ponds Natural dystrophic lakes and ponds Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>
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

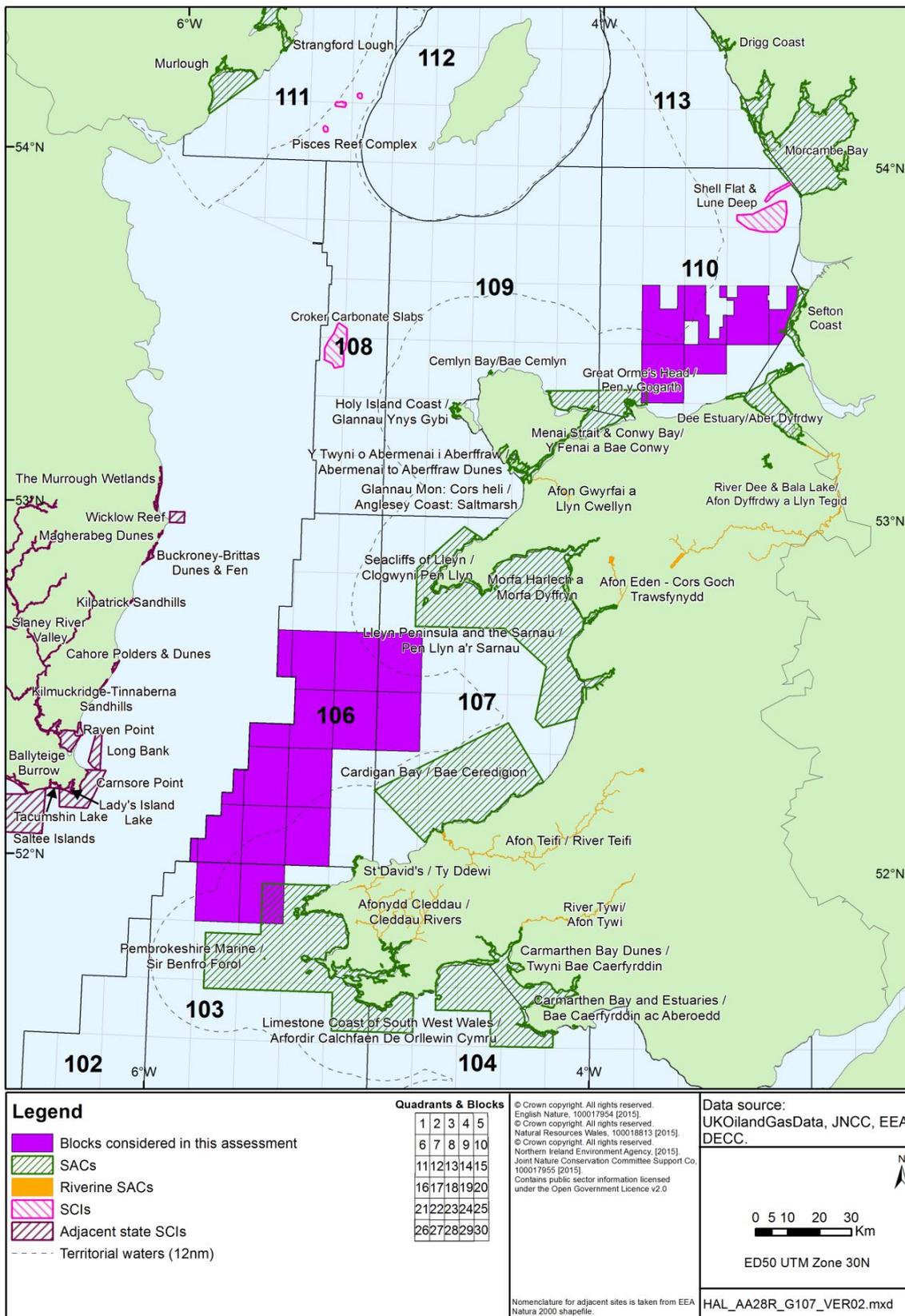


Table A.2: Coastal and marine SACs and their Qualifying Features

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
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 <i>Phoca vitulina</i>
Murlough SAC	11902.03	Coastal dunes	Sandbanks Mudflats and sandflats Salt marshes and salt meadows Coastal dunes	Marsh fritillary butterfly <i>Euphydryas (Eurodryas, Hypodryas) aurinia</i>	Harbour seal <i>Phoca vitulina</i>
England					
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 <i>Triturus cristatus</i>	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 <i>Petalophyllum ralfsii</i>	Great crested newt <i>Triturus cristatus</i>

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
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 <i>Petromyzon marinus</i> River lamprey <i>Lampetra fluviatilis</i> Petalwort <i>Petalophyllum ralfsii</i>
Wales					
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
Y Twyni o Abermenai i Aberffraw/ Abermenai to Aberffraw Dunes SAC	1871.03	Coastal dunes	Standing freshwater	Petalwort <i>Petalophyllum ralfsii</i> Shore dock <i>Rumex rupestris</i>	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 Llyn / Seacliffs of Llyn SAC	1048.4	Sea cliffs	N/A	N/A	N/A
Pen Llyn a'r Sarnau/ Llyn 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 <i>Tursiops truncatus</i> Otter <i>Lutra lutra</i> Grey seal <i>Halichoerus grypus</i>
Morfa Harlech a Morfa Dyffryn SAC	1062.57	Coastal dunes	N/A	Petalwort <i>Petalophyllum ralfsii</i>	N/A

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Cardigan Bay/ Bae Ceredigion SAC	95860.36	N/A	Sandbanks Reefs Sea caves	Bottlenose dolphin <i>Tursiops truncatus</i>	Sea lamprey <i>Petromyzon marinus</i> River lamprey <i>Lampetra fluviatilis</i> Grey seal <i>Halichoerus grypus</i>
St David's / Ty Ddewi SAC	935.47	Sea cliffs Heaths	N/A	Floating water-plantain <i>Luronium natans</i>	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 <i>Halichoerus grypus</i> Shore dock <i>Rumex rupestris</i>	Sea lamprey <i>Petromyzon marinus</i> River lamprey <i>Lampetra fluviatilis</i> Allis shad <i>Alosa alosa</i> Twaite shad <i>Alosa fallax</i> Otter <i>Lutra lutra</i>
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 <i>Rhinolophus ferrumequinum</i> Early gentian <i>Gentianella anglica</i>	Petalwort <i>Petalophyllum ralfsii</i>
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 <i>Alosa fallax</i>	Sea lamprey <i>Petromyzon marinus</i> River lamprey <i>Lampetra fluviatilis</i> Allis shad <i>Alosa alosa</i> Otter <i>Lutra lutra</i>

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Carmarthen Bay Dunes / Twyni Bae Caerfyrddin SAC	1206.32	Coastal dunes	N/A	Narrow-mouthed whorl snail <i>Vertigo angustior</i> Petalwort <i>Petalophyllum ralfsii</i> Fen orchid <i>Liparis loeselii</i>	N/A

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
Buckronev – 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 <i>Margaritifera margaritifera</i> Sea lamprey <i>Petromyzon marinus</i> Brook lamprey <i>Lampetra planeri</i> River lamprey <i>Lampetra fluviatilis</i> Twaite shad <i>Alosa fallax</i> Atlantic salmon <i>Salmo salar</i> Otter <i>Lutra lutra</i> Harbour seal <i>Phoca vitulina</i>
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

Site Name	Area (ha)	Annex I Habitat	Annex II Species
Saltee Island SAC	15809.17	Mudflats and sandflats Inlets and bays Reefs Sea cliffs Sea caves	Grey seal <i>Halichoerus grypus</i>

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 <i>Margaritifera margaritifera</i>	Migratory fish ¹
England		
River Eden	-	SL, RL, AS
River Derwent & Bassenthwaite Lake	-	SL, RL, AS
River Ehen	✓	AS
River Kent	✓	-
Wales		
River Dee and Bala Lake/Afon Dyffrdwy a Llyn Tegid	-	AS, SL, RL
Afon Gwyrfaï 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*

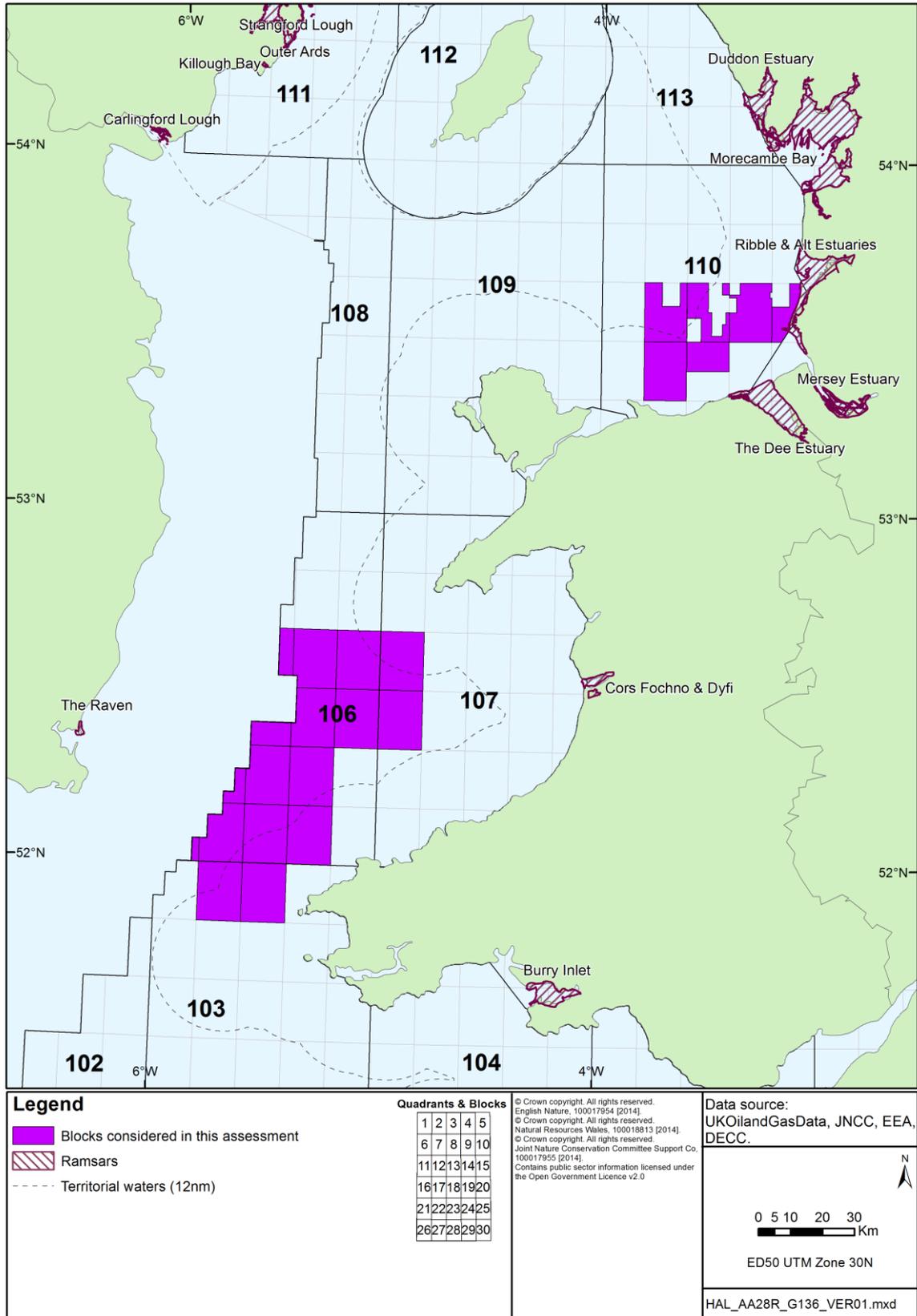
A6 Ramsar sites

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	Clogwyni Pen Llyn / Seacliffs of Llyn
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	
NORTHERN IRELAND								
Strangford Lough	✓	✓	-	-	-	-	-	<p>Qualifying features Breeding terns, overwintering waterfowl and waders</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Killough Bay	-	✓	-	-	-	-	-	<p>Qualifying features Overwintering geese</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Carlingford Lough	✓	✓	-	-	-	-	-	<p>Qualifying features Breeding terns and overwintering geese</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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.</p>

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
ENGLAND								
Duddon Estuary	✓	✓	✓	-	-	-	-	<p>Qualifying features Breeding tern, on passage overwintering waterbirds and waders</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 that the closest Block (110/14b) is ca. 49km from the site and the moderate sensitivity of the qualifying features to toxic contamination from the introduction of non-synthetic compounds (e.g. hydrocarbons)⁸⁰.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Morecambe Bay	✓	✓	✓	-	-	-	-	<p>Qualifying features Breeding terns, gulls and seabirds, on passage and overwintering waterbirds and waders</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 that the closest Block (110/15b) is ca. 31km from the site and the moderate</p>

⁸⁰ <http://publications.naturalengland.org.uk/file/3952436>

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	
								sensitivity of the qualifying features to toxic contamination from the introduction of non-synthetic compounds (e.g. hydrocarbons) ⁸¹ . <u>Cumulative:</u> 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 <u>Physical disturbance:</u> 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. <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> 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 <u>Physical disturbance:</u> 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

⁸¹ <http://publications.naturalengland.org.uk/file/3305927>

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	
								activity (1 drill or drop well in Q110), not likely to have significant physical disturbance and drilling effects. <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> 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 <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> 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 <u>Physical disturbance:</u> Potential for significant physical disturbance and drilling effects given that Quadrant 110 Blocks overlap or are adjacent to the site. <u>Underwater noise:</u> No seismic proposed for Quadrant 110 Blocks and therefore no significant underwater noise effects. <u>Accidental spills:</u> In the unlikely event of a major diesel or small crude oil spill from Blocks in Quadrant 110, weathered oil could have a significant

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	
								effect on the site's conservation objectives, although mitigation would be possible. <u>Cumulative:</u> 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.
The Dee Estuary	✓	✓	✓	✓	-	-	✓	Qualifying features Breeding terns, overwintering and passage waders and waterfowl Consideration of likely significant effects <u>Physical disturbance:</u> 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. <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. Appropriate Assessment See Sections 6.3 and 7.
WALES								
Traeth Lafan / Lavan Sands, Conway Bay	-	✓	-	✓	-	-	✓	Qualifying features Overwintering waders and on passage great crested grebe Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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.

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	
								<p><u>Cumulative:</u> Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. Appropriate Assessment See Sections 6.3 and 7.</p>
Ynys Seiriol / Puffin Island	✓	-	-	✓	-	-	✓	<p>Qualifying features Breeding cormorant Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea. Appropriate Assessment See Sections 6.3 and 7.</p>
Ynys Feurig, Cemlyn Bay and The Skerries	✓	-	-	-	-	-	-	<p>Qualifying features Breeding terns Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 that the closest Block (110/12b) is ca. 49km from the site and the moderate sensitivity of the qualifying features to surface pollution (Williams <i>et al.</i> 1994). <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
Glannau Ynys Gybi / Holy Island Coast	✓	✓	-	-	-	-	-	<p>Qualifying features Breeding and overwintering chough Consideration of likely significant effects <u>Physical disturbance:</u> N/A</p>

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	
								<p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> In the unlikely event of a major diesel or small crude oil spill from any of the Blocks, 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island pSPA	✓	✓	✓	✓	-	-	-	<p>Qualifying features Breeding and overwintering chough, breeding Manx shearwater</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> Whilst Block 107/11 partly overlaps the site, the relative insensitivity of the qualifying features present offshore (Manx shearwater) to disturbance by ship movements (Furness <i>et al.</i> 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.</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment See Section 6.3.</p>
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal SPA	✓	✓	-	-	-	-	-	<p>Qualifying features Breeding and overwintering chough</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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.</p>

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	
								<p><u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
Dyfi Estuary / Aber Dyfi	-	✓	✓	-	-	-	-	<p>Qualifying features Overwintering geese Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 <i>et al.</i> 2011). <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
Ramsey and St David's Peninsula Coast SPA	✓	-	-	-	-	-	-	<p>Qualifying features Breeding chough Consideration of likely significant effects <u>Physical disturbance:</u> 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. <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>

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	
Grassholm pSPA	✓	-	✓	✓	-	-	-	<p>Qualifying features Breeding gannet</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> 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.</p> <p><u>Underwater noise:</u> 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.</p> <p><u>Accidental spills:</u> 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment See Section 6.3.</p>
Skokholm and Skomer pSPA	✓	-	✓	✓	-	-	-	<p>Qualifying features Chough, short-eared owl, breeding seabirds. Seabird assemblage.</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> 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.</p> <p><u>Underwater noise:</u> 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.</p> <p><u>Accidental spills:</u> 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</p>

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	
								a significant effect on the site's conservation objectives, although mitigation would be possible. <u>Cumulative:</u> N/A Appropriate Assessment See Section 6.3.
Castlemartin Coast SPA	✓	-	-	-	-	-	-	Qualifying features Breeding chough Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> N/A Appropriate Assessment N/A
Bae Caerfyddrin / Carmarthen Bay	-	✓	✓	-	-	-	-	Qualifying features Overwintering common scoter Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> N/A Appropriate Assessment N/A
Burry Inlet	-	✓	✓	-	-	-	-	Qualifying features Overwintering waders and waterfowl Consideration of likely significant effects <u>Physical disturbance:</u> 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	
								<u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> N/A Appropriate Assessment N/A
REPUBLIC OF IRELAND								
The Murrugh	✓	✓	✓	-	-	-	-	Qualifying features Breeding tern, overwintering gulls, divers, waders and waterfowl Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A Appropriate Assessment N/A
Wicklow Head	✓	-	-	-	-	-	-	Qualifying features Breeding kittiwake Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> 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
Cahore Marshes	-	✓	-	-	-	-	-	Qualifying features Overwintering waders and waterfowl Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A Appropriate Assessment N/A
The Raven		✓	✓	-	-	-	-	Qualifying features Overwintering divers, cormorant, waders and waterfowl Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 (106/22) is ca. 45km from the site (see Table 6.1 for details of relevant oil spill modelling). <u>Cumulative:</u> N/A Appropriate Assessment N/A
Wexford Harbour & Slobs	✓	✓	✓	-	-	-	-	Qualifying features Breeding tern, overwintering gulls, cormorant, waders and waterfowl Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> 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	
								<p><u>Accidental spills:</u> 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).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Lady's Island Lake	✓	✓	✓	-	-	-	-	<p>Qualifying features Breeding terns and gulls. Overwintering and passage waterfowl and waders.</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Tacumshin Lake	-	✓	✓	-	-	-	-	<p>Qualifying features Overwintering waterfowl and waders</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>

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	
Ballyteigue Burrows	-	✓	-	-	-	-	-	<p>Qualifying features Overwintering waterfowl and waders</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Saltee Islands	✓	-	-	-	-	-	-	<p>Qualifying features Breeding seabirds</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>

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	
NORTHERN IRELAND							
Strangford Lough	✓	✓	-	-	-	-	<p>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</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Murlough	✓	✓	-	-	-	-	<p>Qualifying features: Coastal dunes, sandbanks, mudflats and sandflats, salt marshes and salt meadows, coastal dunes, marsh fritillary butterfly and harbour seal</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
ENGLAND							

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	
Drigg Coast	✓	-	-	-	-	-	<p>Qualifying features: Estuaries, coastal dunes, mudflats and sandflats, salt marshes and salt meadows, coastal dunes.</p> <p>Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 that the closest Block (110/13c) is ca. 75km from the site. <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
Morecambe Bay	✓	✓	-	-	-	-	<p>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.</p> <p>Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 that the closest Block (110/15b) is ca. 29km from the site and the moderate sensitivity of the qualifying features to toxic contamination from the introduction of non-synthetic compounds (e.g. hydrocarbons)⁸². <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>

⁸² <http://publications.naturalengland.org.uk/file/3305927>

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	
Shell Flat and Lune Deep SCI	✓	-	✓	-	-	-	<p>Qualifying features: Sandbanks, reefs</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment See Section 6.3.</p>
Sefton Coast	✓	✓	-	-	-	-	<p>Qualifying features Coastal dunes, petalwort and great crested newt</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> Block 110/15b partly overlaps site. Significant physical disturbance and drilling effects not likely given terrestrial nature of qualifying features.</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> Qualifying features largely above MHWS and not generally vulnerable to surface oil pollution. Sand dunes above the level of spring high tides may be physically impacted by intensive clean-up activity if they are used as an access route to the shore or as a laydown area for equipment (Law <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Dee Estuary / Aber Dyfrdwy	✓	✓	✓	-	-	-	<p>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</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> 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).</p> <p><u>Underwater noise:</u> Significant underwater noise effects not likely given distance from Blocks and no seismic proposed in Quadrant 110 Blocks.</p>

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	
							<p><u>Accidental spills:</u> 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment See Section 6.3.</p>
WALES							
Great Orme's Head / Pen y Gogarth	✓	-	-	-	-	-	<p>Qualifying features Sea cliffs, heaths and grasslands</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Y Fenai a Bae Conwy / Menai Strait and Conwy Bay	✓	-	✓	-	-	-	<p>Qualifying features Sandbanks, mudflats and sandbanks, reefs, inlets and bays and sea caves</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> Block 110/17 partly overlaps the site. 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 Block⁸³. However significant effects unlikely given the low level of proposed activity (1 drill or drop well in</p>

⁸³ <http://www.ccw.gov.uk/landscape--wildlife/protecting-our-landscape/special-sites-project/idoc.ashx?docid=a64f8bb6-41a1-4890-a5d4-7332ab162fb2&version=-1>

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	
							Q110) and small physical footprint associated with jack up rig. <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> N/A Appropriate Assessment See Section 4.3.
Bae Cemlyn / Cemlyn Bay	✓	-	-	-	-	-	Qualifying features Coastal lagoons, vegetation of stony banks Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 as qualifying features not considered particularly sensitive to marine spills (Law <i>et al.</i> 2011) and the closest Block (110/12b) is <i>ca.</i> 49km from the site. <u>Cumulative:</u> N/A Appropriate Assessment N/A
Glannau Ynys Gybi / Holy Island Coast	✓	-	-	-	-	-	Qualifying features Sea cliffs and heaths Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 <i>et al.</i> 2011) and the closest Block (107/11) is <i>ca.</i> 69km from the site. <u>Cumulative:</u> 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	
Y Twyni o Abermenai i Aberffraw/ Abermenai to Aberffraw Dunes	✓	✓	-	-	-	-	<p>Qualifying features Coastal dunes, standing freshwater, petalwort, shoredock</p> <p>Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 <i>et al.</i> 2011) and the closest Block (107/11) is ca. 65km from the site. <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
Glannau Môn Cors heli/Anglesey Coast: Saltmarsh	✓	-	-	-	-	-	<p>Qualifying features Salt marshes and salt meadows, estuaries, mudflats and sandflats</p> <p>Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 the closest Block (107/11) is ca. 67km from the site. <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
Clogwyni Pen Llyn/ Seacliffs of Llyn	✓	-	-	-	-	-	<p>Qualifying features Sea cliffs</p> <p>Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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</p>

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 <i>et al.</i> 2011). <u>Cumulative:</u> N/A Appropriate Assessment N/A
Pen Llyn a`r Sarnau/ Lleyr 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 <u>Physical disturbance:</u> 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). <u>Underwater noise:</u> 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. <u>Accidental spills:</u> 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. <u>Cumulative:</u> 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 <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 <i>et al.</i> 2011) and

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	
							the closest Block (107/11) is ca. 47km from the site. <u>Cumulative:</u> 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 <u>Physical disturbance:</u> 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). <u>Underwater noise:</u> 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. <u>Accidental spills:</u> 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. <u>Cumulative:</u> 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 <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 <i>et al.</i> 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	
							<p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Pembrokeshire Marine/ Sir Benfro Forol	✓	✓	✓	✓	✓	✓	<p>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</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> 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).</p> <p><u>Underwater noise:</u> 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.</p> <p><u>Accidental spills:</u> 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.</p> <p><u>Cumulative:</u> Potential in-combination effects with renewable energy developments in the eastern and central Irish Sea.</p> <p>Appropriate Assessment See Sections 4.3, 5.3, 6.3 and 7</p>
Limestone Coast of South West Wales/ Arfordir Calchfaen de Orllewin Cymru	✓	-	-	-	-	-	<p>Qualifying features Sea cliffs, coastal dunes, sea caves</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p>

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	✓	✓	-	-	-	-	<p>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</p> <p>Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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. <u>Cumulative:</u> N/A Appropriate Assessment See Section.6.3</p>
Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin	✓	✓	-	-	-	-	<p>Qualifying features Coastal dunes, narrow-mouthed whorl snail, petalwort, fen orchid</p> <p>Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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 <i>et al.</i> 2011). <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
REPUBLIC OF IRELAND							
The Murrrough Wetlands	✓	-	-	-	-	-	<p>Qualifying features Vegetation of stony banks, salt marshes and salt meadows, fens</p>

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	
							<p>Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
Wicklow Reef	✓	-	-	-	-	-	<p>Qualifying features Reefs Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
Magherabeg Dunes	✓	-	-	-	-	-	<p>Qualifying features Coastal dunes, vegetation of drift lines Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A</p>

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
Buckronev – Brittas Dunes & Fen	✓	-	-	-	-	-	<p>Qualifying features Coastal dunes, vegetation of drift lines and stony banks, fens</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Kilpatrick Sandhills	✓	-	-	-	-	-	<p>Qualifying features Vegetation of drift lines, coastal dunes</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Cahore Polders and Dunes	✓	-	-	-	-	-	<p>Qualifying features Vegetation of drift lines, coastal dunes</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> In the unlikely event of a major diesel or small crude oil spill</p>

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	
							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). <u>Cumulative:</u> N/A Appropriate Assessment N/A
Kilmuckridge-Tinnaberna Sandhills SAC	✓	-	-	-	-	-	Qualifying features Coastal dunes Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> 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 <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A Appropriate Assessment N/A
Slaney River Valley	✓	✓	-	-	-	-	Qualifying features Freshwater pearl mussel, sea, brook and river lamprey,

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	
							allis and twaite shad, Atlantic salmon, estuaries, mudflats and sandflats, otter, running freshwater, forest Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A Appropriate Assessment N/A
Long Bank	✓	-	-	-	-	-	Qualifying features Sandbanks Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A Appropriate Assessment N/A
Carnsore Point	✓	-	-	-	-	-	Qualifying features Reefs, mudflats and sandflats Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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

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	
							(106/26) is ca. 33km from the site (see Table 6.1 for details of relevant oil spill modelling). <u>Cumulative:</u> N/A Appropriate Assessment N/A
Lady's Island Lake	✓	-	-	-	-	-	Qualifying features Lagoons, reefs, vegetation of stony banks Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A Appropriate Assessment N/A
Tacumshin Lake	✓	-	-	-	-	-	Qualifying features Lagoons, vegetation of drift lines and stony banks, coastal dunes Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> 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

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	
							<p><u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> 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). <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>
Saltee Island	✓	-	-	-	-	-	<p>Qualifying features Mudflats and sandflats, inlets and bays, reefs, sea cliffs, sea caves, grey seal Consideration of likely significant effects <u>Physical disturbance:</u> N/A <u>Underwater noise:</u> N/A <u>Accidental spills:</u> In the unlikely event of a major diesel spill 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. 45km from the site (see Table 6.1 for details of relevant oil spill modelling). <u>Cumulative:</u> N/A Appropriate Assessment N/A</p>

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	
ENGLAND							
River Kent	-	✓	-	-	-	-	<p>Qualifying features Freshwater pearl mussel</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
WALES							
River Dee and Bala Lake/Afon Dyffrdwy a Llyn Tegid	-	✓	-	-	-	-	<p>Qualifying features Sea and river lamprey, Atlantic salmon, brook lamprey, bullhead, otter</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> No seismic proposed for Q110 Blocks.</p> <p><u>Accidental spills:</u> 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 that the closest Block (110/18b) is ca. 30km from the site and the qualifying features are not considered particularly sensitive to marine spills (Law <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Afon Gwyrfai a Llyn Cwellyn	-	✓	-	-	-	-	<p>Qualifying features: Atlantic salmon</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p>

Site name	Features present		Potential for likely significant effects				Cumulative	Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise			
							<p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 considered particularly sensitive to marine spills (Law <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>	
Afon Eden - Cors Goch Trawsfynydd	-	✓	-	-	-	-	<p>Qualifying features Freshwater pearl mussel, Atlantic salmon, otter</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>	
Afon Teifi/ River Teifi	-	✓	-	-	-	-	<p>Qualifying features Brook and river lamprey, Atlantic salmon, bullhead, otter</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p>	

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 See Section 6.3
Afonydd Cleddau/ Rivers	Cleddau/ Cleddau	-	✓	-	-	-	<p>Qualifying features Brook, river and sea lamprey, bullhead, otter</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 limited marine access to the site and the qualifying features are not considered particularly sensitive to marine spills (Law <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>
Afon Tywi/ River Tywi		-	✓	-	-	-	<p>Qualifying features Twaite and allis shad, brook, river and sea lamprey, bullhead, otter</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> 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 <i>et al.</i> 2011).</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>

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				Cumulative	Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise			
Pisces Reef Complex	✓	-	-	-	-	-	<p>Qualifying features Reefs</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> JNCC (2012)⁸⁴ 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>	
Croker Carbonate Slabs	✓	✓	-	-	-	-	<p>Qualifying features Submarine structures made by leaking gases</p> <p>Consideration of likely significant effects</p> <p><u>Physical disturbance:</u> N/A</p> <p><u>Underwater noise:</u> N/A</p> <p><u>Accidental spills:</u> JNCC (2012)⁸⁵ 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.</p> <p><u>Cumulative:</u> N/A</p> <p>Appropriate Assessment N/A</p>	

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

⁸⁴ http://jncc.defra.gov.uk/PDF/PiscesReef_ConservationObjectives_AdviceOperations_V3.0.pdf

⁸⁵ 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.

England

Site Name: Ribble and Alt Estuaries SPA	
Location	Latitude 53° 42'20"N Longitude 02° 59'14"W
Area (ha)	12,412.31
Summary	<p>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 <i>Anser brachyrhynchus</i>) utilise feeding areas on agricultural land outside the SPA boundary.</p>
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 <i>Sterna hirundo</i> , 182 pairs representing at least 1.5% of the breeding population in Great Britain (Count, as at 1996)	
Ruff <i>Philomachus pugnax</i> , 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 <i>Limosa lapponica</i> , 18,958 individuals representing at least 35.8% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)	

Site Name: Ribble and Alt Estuaries SPA

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 *Numenius 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)

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

Site Name: Ribble and Alt Estuaries SPA

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
- 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 53° 25'09"N Longitude 03° 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 <i>Arenaria interpres</i> . 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 <i>Tringa totanus</i> , 1,981 individuals representing at least 1.3% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) Turnstone <i>Arenaria interpres</i> , 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 <i>Calidris alpina alpina</i> , Knot <i>Calidris canutus</i> , Grey Plover <i>Pluvialis squatarola</i> , Oystercatcher <i>Haematopus ostralegus</i> , Cormorant <i>Phalacrocorax carbo</i> , Turnstone <i>Arenaria interpres</i> , Redshank <i>Tringa totanus</i>	
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: <ul style="list-style-type: none"> • 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:	
<ul style="list-style-type: none"> • Accidental spills (see Section 6.3) • Cumulative and in-combination effects (see Section 7) 	

Site Name: Mersey Estuary SPA	
Location	Latitude 53° 19'39"N Longitude 02° 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 <i>Pluvialis apricaria</i> , 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 <i>Tringa totanus</i> , 3,516 individuals representing at least 2.0% of the Eastern Atlantic - wintering population (5 year peak mean, 1987-1991) Ringed Plover <i>Charadrius hiaticula</i> , 1,453 individuals representing at least 2.9% of the Europe/Northern Africa - wintering population (Count, as at 1989)	
Over winter: Dunlin <i>Calidris alpina alpina</i> , 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 <i>Anas acuta</i> , 2,744 individuals representing at least 4.6% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6) Redshank <i>Tringa totanus</i> , 4,689 individuals representing at least 3.1% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) Shelduck <i>Tadorna tadorna</i> , 5,039 individuals representing at least 1.7% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6) Teal <i>Anas crecca</i> , 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 <i>Numenius arquata</i> , Black-tailed Godwit <i>Limosa limosa islandica</i> , Lapwing <i>Vanellus vanellus</i> , Grey Plover <i>Pluvialis squatarola</i> , Wigeon <i>Anas penelope</i> , Great Crested Grebe <i>Podiceps cristatus</i> , Redshank <i>Tringa totanus</i> , Dunlin <i>Calidris alpina alpina</i> , Pintail <i>Anas acuta</i> , Teal <i>Anas crecca</i> , Shelduck <i>Tadorna tadorna</i> , Golden Plover <i>Pluvialis apricaria</i>	
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:	
<ul style="list-style-type: none"> • 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:	
<ul style="list-style-type: none"> • Accidental spills (see Section 6.3) 	

Site Name: Liverpool Bay / Bae Lerpwl SPA	
Location	Latitude 53° 36'10"N Longitude 03° 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 <i>Gavia stellata</i> and sea-ducks, notably common scoter <i>Melanitta nigra</i> , 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 <i>Gavia stellata</i> , 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 <i>Melanitta nigra</i> , 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 (<i>Gavia stellata</i>) 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: <ul style="list-style-type: none"> 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 (<i>Melanitta nigra</i>) 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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:	
<ul style="list-style-type: none"> 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 53° 18'39"N Longitude 03° 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 <i>Sterna hirundo</i> , 392 pairs representing at least 3.2% of the breeding population in Great Britain (5 year mean 1995-99)	
Little Tern <i>Sterna albifrons</i> , 69 pairs representing at least 2.9% of the breeding population in Great Britain (5 year mean 1995-99)	
On passage:	
Sandwich Tern <i>Sterna sandvicensis</i> , 957 individuals representing at least 2.3% of the population in Great Britain (5 year mean 1995-99)	
Over winter:	
Bar-tailed Godwit <i>Limosa lapponica</i> , 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 <i>Tringa totanus</i> , 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 <i>Limosa limosa islandica</i> , 1,747 individuals representing at least 2.5% of the wintering Iceland - breeding population (5 year peak mean 1994/5 - 1998/9)	
Curlew <i>Numenius arquata</i> , 3,899 individuals representing at least 1.1% of the wintering Europe - breeding population (5 year peak mean 1994/5 - 1998/9)	
Dunlin <i>Calidris alpina alpina</i> , 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 <i>Pluvialis squatarola</i> , 1,643 individuals representing at least 1.1% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1994/5 - 1998/9)	
Knot <i>Calidris canutus</i> , 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 <i>Haematopus ostralegus</i> , 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 <i>Anas acuta</i> , 5,407 individuals representing at least 9.0% of the wintering Northwestern Europe population (5 year peak mean 1994/5 - 1998/9)	
Redshank <i>Tringa totanus</i> , 5,293 individuals representing at least 3.5% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1994/5 - 1998/9)	
Shelduck <i>Tadorna tadorna</i> , 7,725 individuals representing at least 2.6% of the wintering Northwestern Europe population (5 year peak mean 1994/5 - 1998/9)	

Site Name: The Dee Estuary SPA

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)

Wales

Site Name: Traeth Lafan / Lavan Sands, Conway Bay SPA	
Location	Latitude 53° 15'18"N Longitude 04° 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 <i>Haematopus ostralegus</i> . 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 <i>Haematopus ostralegus</i> , 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 (<i>Haematopus ostralegus</i>) The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied: <ul style="list-style-type: none"> • 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:	
<ul style="list-style-type: none"> • Accidental spills (see Section 6.3) • Cumulative and in-combination effects (see Section 7) 	

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 <i>Festuca rubra</i> and Cock's-foot <i>Dactylis glomerata</i>), Common Nettle <i>Urtica dioica</i> , Bramble <i>Rubus fruticosus</i> and Alexanders <i>Smyrniolum olusatrum</i> . It was heavily grazed by rabbits until the advent of myxomatosis. Dense woodland of Elder <i>Sambucus nigra</i> 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 <i>Rattus norvegicus</i> 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 <i>Phalacrocorax carbo</i> , 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 <i>Phalacrocorax carbo</i> , 776 pairs representing at least 1.9% of the breeding Northwestern Europe population (count as at 1996)	
Conservation objectives:	
Cormorant (<i>Phalacrocorax carbo</i>) The conservation objective for the Cormorant is to achieve and maintain favourable conservation status, in which all the following conditions are satisfied: <ul style="list-style-type: none"> • 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:	
<ul style="list-style-type: none"> • 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 pSPA	
Location	Latitude 52° 42'21"N Longitude 04° 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 Llyn Peninsula in north-west Wales. The site consists of the island of Bardsey (Ynys Enlli) and part of the tip of the Llyn 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 <i>Calluna vulgaris</i> , bell heather <i>Erica cinerea</i> and western gorse <i>Ulex gallii</i> 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 <i>Pyrrhocorax pyrrhocorax</i> 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 <i>Puffinus puffinus</i> . 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 <i>Pyrrhocorax pyrrhocorax</i> , 12 pairs representing at least 3.5% of the breeding population in Great Britain (Count, as at late 1990s)	
Over winter: Chough <i>Pyrrhocorax pyrrhocorax</i> , 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 <i>Puffinus puffinus</i> , 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 <i>Pyrrhocorax pyrrhocorax</i> .	
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: <ul style="list-style-type: none"> • 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 <i>Puffinus puffinus</i> .	
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: <ul style="list-style-type: none"> • 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:	
<ul style="list-style-type: none"> • Accidental spills (see Section 6.3) 	

Site Name: Grassholm pSPA	
Location	Latitude 51° 43'51"N Longitude 05° 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 <i>Morus bassanus</i> . 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 <i>Morus bassanus</i> , 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:	
<ul style="list-style-type: none"> • 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:	
<ul style="list-style-type: none"> • Accidental spills (see Section 6.3) 	

Site Name: Skokholm and Skomer pSPA	
Location	Latitude 51° 43'08"N Longitude 05° 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 <i>Pteridium aquilinum</i> . The coastal habitats of the SPA support an important resident population of chough <i>Pyrrhocorax pyrrhocorax</i> . 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 <i>Puffinus puffinus</i> 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 <i>Pyrrhocorax pyrrhocorax</i> , 4 pairs representing at least 1.2% of the breeding population in Great Britain Short-eared owl <i>Asio flammeus</i> , 6 pairs representing at least 0.6% of the breeding population in Great Britain (Count as at 1998) Storm petrel <i>Hydrobates pelagicus</i> , 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 <i>Larus fuscus</i> , 20,300 pairs representing at least 16.4% of the breeding Western Europe/Mediterranean/Western Africa population (Mean 1993 to 1997) Manx shearwater <i>Puffinus puffinus</i> , 150,968 pairs representing at least 56.9% of the breeding population (Count, as at late 1990s) Puffin <i>Fratercula arctica</i> , 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 <i>Alca torda</i> , guillemot <i>Uria aalge</i> , kittiwake <i>Rissa tridactyla</i> , puffin <i>Fratercula arctica</i> , lesser black-backed gull <i>Larus fuscus</i> , Manx shearwater <i>Puffinus puffinus</i> , storm petrel <i>Hydrobates pelagicus</i> .	
Conservation objectives:	
Conservation Objective for Feature 1: Chough <i>Pyrrhocorax pyrrhocorax</i>	
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: <ul style="list-style-type: none"> • 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 <i>Asio flammeus</i>	
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: <ul style="list-style-type: none"> • The breeding population will be at least 6 pairs • Breeding success will be at least 1 chicks/pair • Sufficient suitable habitat will be present to support the populations • The factors affecting the feature are under control 	

Site Name: Skokholm and Skomer pSPA

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 represents 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

England

Site Name: Shell Flat and Lune Deep SCI	
Location	Grid Ref: Lat 53.857°N Long 3.217°W (central point) Latitude 53°51'50"N Longitude 03°12'14"W
Area (ha)	10,565
Summary	<p>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.</p> <p>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 <i>Flustra foliacea</i> and <i>Haliclona oculata</i> 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 contrast, the southern flank consists of a smooth seabed which is a sink for muddy sands.</p>
Qualifying features for which the site is designated:	
<p>Annex I Habitat Primary features: Sandbanks which are slightly covered by seawater all the time, reefs Secondary features: None</p> <p>Annex II Species Primary features: None Secondary features: None</p>	
Conservation objectives:	
<p>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:</p> <ul style="list-style-type: none"> • 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:	
<ul style="list-style-type: none"> • Accidental spills (see Section 6.3) 	

Site Name: Dee Estuary / Aber Dyfrdwy SAC	
Location	Grid Ref: SJ191819 (central point) Latitude 53°19'39"N Longitude 03°12'53"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 <i>Spartina anglica</i> . 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 <i>Puccinellia maritima</i> , sea aster <i>Aster tripolium</i> , and sea arrowgrass <i>Triglochin maritima</i> . 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, <i>Salicornia</i> and other annuals colonising mud and sand, Atlantic salt meadows (<i>Glauco-puccinellietalia maritimae</i>) 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 <i>Ammophila arenaria</i> , fixed dunes with herbaceous vegetation*priority feature, humid dune slacks	
Annex II Species Primary features: None Secondary features: Sea lamprey <i>Petromyzon marinus</i> , river lamprey <i>Lampetra fluviatilis</i> , petalwort <i>Petalophyllum ralfsii</i>	
Conservation objectives:	
For Annex I Habitats, the following features will be considered to be in favourable condition when:	
Estuaries	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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 <i>Spartina anglica</i> is not increasing within the pioneer saltmarsh zone 	
Atlantic salt meadow	
<ul style="list-style-type: none"> 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	
<ul style="list-style-type: none"> 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 SAC	
Location	Grid Ref: SH629728 (central point) Latitude 53°19'39"N Longitude 03°12'53"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:	
<p>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</p> <p>Annex II Species Primary features: None Secondary features: None</p>	
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:	
<p>Range The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.</p> <p>For the intertidal mudflats and sandflats these include;</p> <ul style="list-style-type: none"> • Muddy gravel communities • Dwarf eelgrass, <i>Zostera noltei</i> beds • Sediment communities at Traeth Lafan <p>For the reef feature these include;</p> <ul style="list-style-type: none"> • Reef communities in high energy wave-sheltered, tide-swept conditions • Under-boulder, overhang and crevice communities • Limestone reef communities • Clay outcrop reef communities. <p>For the large shallow bay feature these include;</p> <ul style="list-style-type: none"> • Organically enriched muddy sediment areas 	
<p>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;</p> <ul style="list-style-type: none"> • geology, • sedimentology, • geomorphology, • hydrography and meteorology, • water and sediment chemistry, • biological interactions. <p>This includes a need for nutrient levels in the water column and sediments to be:</p> <ul style="list-style-type: none"> - 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. <p>Contaminant levels in the water column and sediments derived from human activity to be:</p> <ul style="list-style-type: none"> - 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. 	

Site Name: Y Fenai a Bae Conwy/ Menai Strait SAC**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 health,
- 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)

Site Name: Pen Llŷn a'r Sarnau /Lleyn Peninsula and the Sarnau SAC	
Location	Grid Ref: SH401130 (central point) Latitude 52°41'29"N Longitude 04°21'59"W
Area (ha)	146023.48
Summary	<p>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.</p> <p>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.</p>
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, <i>Salicornia</i> and other annuals colonising mud and sand, Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>), submerged or partially submerged sea caves	
Annex II Species	
Primary features: None	
Secondary features: Bottlenose dolphin <i>Tursiops truncatus</i> , otter <i>Lutra lutra</i> , grey seal <i>Halichoerus grypus</i>	
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:	
<ul style="list-style-type: none"> Rocky intertidal reefs Rocky subtidal reefs Extensive boulder and cobble reefs – the sarnau Biogenic reefs (horse mussel <i>Modiolus modiolus</i> reef / green crenella <i>Musculus discors</i> reef and Honeycomb worm <i>Sabellaria alveolata</i> reef Carbonate reef formed by methane gas leaking from the seabed. 	
For the intertidal mudflat and sandflat feature these include:	
<ul style="list-style-type: none"> <i>Mya arenaria</i> and polychaetes in muddy gravel Eel grass <i>Zostera marina</i> beds. Muddy gullies in the Mawddach estuary. 	
For the <i>Salicornia</i> feature this includes:	
<ul style="list-style-type: none"> Communities characterised by the species <i>Sarcocornia perennis</i>. 	
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 habitat are not degraded. Important elements include:	
<ul style="list-style-type: none"> geology sedimentology 	

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

- 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 health,
- 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

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,

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

- 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 52°14'47"N Longitude 04°37'02"W
Area (ha)	95860.36
Summary	<p>Cardigan Bay is one of the largest bays in the British Isles, measuring over 100km (60 miles) across its westernmost extent from the Llyn 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.</p> <p>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.</p>
Qualifying features for which the site is designated:	
<p>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</p> <p>Annex II Species Primary features: Bottlenose dolphin <i>Tursiops truncatus</i> Secondary features: Sea lamprey <i>Petromyzon marinus</i>, river lamprey <i>Lampetra fluviatilis</i>, grey seal <i>Halichoerus grypus</i></p>	
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	
<p>Range The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.</p> <p>For the reef feature these include:</p> <ul style="list-style-type: none"> • Intertidal bedrock reefs • Intertidal cobble, pebble with <i>Sabellaria alveolata</i> (biogenic) reefs • Subtidal bedrock reefs • Subtidal pebble, cobble and boulder reefs • Sea caves 	
<p>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:</p> <ul style="list-style-type: none"> • geology • sedimentology • geomorphology, • hydrography and meteorology • water and sediment chemistry • biological interactions. <p>This includes a need for nutrient levels in the water column and sediments to be:</p> <ul style="list-style-type: none"> • 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. <p>Contaminant levels in the water column and sediments derived from human activity to be:</p> <ul style="list-style-type: none"> • 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. 	
<p>Typical species The presence, abundance, condition and diversity of typical species are such that habitat quality is not degraded. Important elements include:</p> <ul style="list-style-type: none"> • species richness • population structure and dynamics, 	

Site Name: Cardigan Bay/ Bae Ceredigion SAC

- physiological health,
- 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 51°43'35"N Longitude 05°36'57"W
Area (ha)	138069.45
Summary	<p>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:</p> <ul style="list-style-type: none"> • 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. <p>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.</p>
Qualifying features for which the site is designated:	
<p>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 (<i>Glauco-Puccinellietalia maritima</i>), submerged or partially submerged sea caves</p> <p>Annex II Species Primary features: Grey seal <i>Halichoerus grypus</i>, shore dock <i>Rumex rupestris</i> Secondary features: Sea lamprey <i>Petromyzon marinus</i>, river lamprey <i>Lampetra fluviatilis</i>, allis shad <i>Alosa alosa</i>, twaite shad <i>Alosa fallax</i>, otter <i>Lutra lutra</i></p>	
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	
<p>Range The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing.</p> <p>For the inlets and bays feature these include;</p> <ul style="list-style-type: none"> • The embayment of St.Brides Bay • The ria of Milford Haven • Peripheral embayments and inlets <p>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.</p>	
Structure and function	
<p>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:</p> <ul style="list-style-type: none"> • geology • sedimentology • geomorphology, • hydrography and meteorology • water and sediment chemistry • biological interactions. <p>This includes a need for nutrient levels in the water column and sediments to be:</p> <ul style="list-style-type: none"> • 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 	

Site Name: Pembrokeshire Marine/ Sir Benfro Forol SAC

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 health,
- 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 or increasing

Site Name: Pembrokeshire Marine/ Sir Benfro Forol 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

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)

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