Department of Energy & Climate Change

Offshore Oil & Gas Licensing
28th Seaward Round
Southern North Sea

Blocks 35/26, 35/27, 37/26, 37/27, 38/13, 38/14, 38/15, 38/18, 38/19, 38/20, 39/11, 39/16, 41/1, 41/2, 42/10b, 42/11, 42/28c, 43/1, 43/2, 43/6, 43/19b, 43/20c, 43/23, 44/17e, 44/18c, 44/27, 47/9d, 47/14e, 48/3, 48/8b, 48/16, 49/3, 49/4d, 49/9d, 49/13, 49/28e

Habitats Regulations Assessment
Stage 2 - Appropriate Assessment

June 2015

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1 Introduction

1.1 Background and purpose

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

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

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

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

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

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

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

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

This report documents the further assessment of 36 Blocks in the southern North Sea.

1.2 Southern North Sea Blocks

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

35/26	35/27	37/26	37/27	38/13	38/14
38/15	38/18	38/19	38/20	39/11	39/16
41/1	41/2	42/10b	42/11	42/28c	43/1
43/2	43/6	43/19b	43/20c	43/23	44/17e
44/18c	44/27	47/9d	47/14e	48/3	48/8b
48/16	49/3	49/4d	49/9d	49/13	49/28e

1.3 Relevant Natura 2000 sites

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

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

[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.

Information gathering is in progress to inform the potential designation of further Natura 2000 sites, for instance the work of Kober *et al.* (2010, 2012) – see Section 6.3.1. Natural England is in the process of identifying initial recommendations for a draft Northumberland Marine SPA[4] and data from the Greater Wash area of search is currently being considered for potential classification[5]. A number of sea areas around the UK are also being considered for designation as SACs for harbour porpoise (see Section 5.3.1). Should further sites be established in the future, these would be considered as necessary in subsequent project specific assessments.

In addition to European sites, the characteristics of broadscale physical and ecological features in the area are described in the Offshore Energy SEA (DECC 2009, 2011a), 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.

[4] http://publications.naturalengland.org.uk/file/5879209897492480
[5] http://publications.naturalengland.org.uk/file/5937494952509440

Figure 1.1: Location of southern North Sea Blocks and relevant SPAs

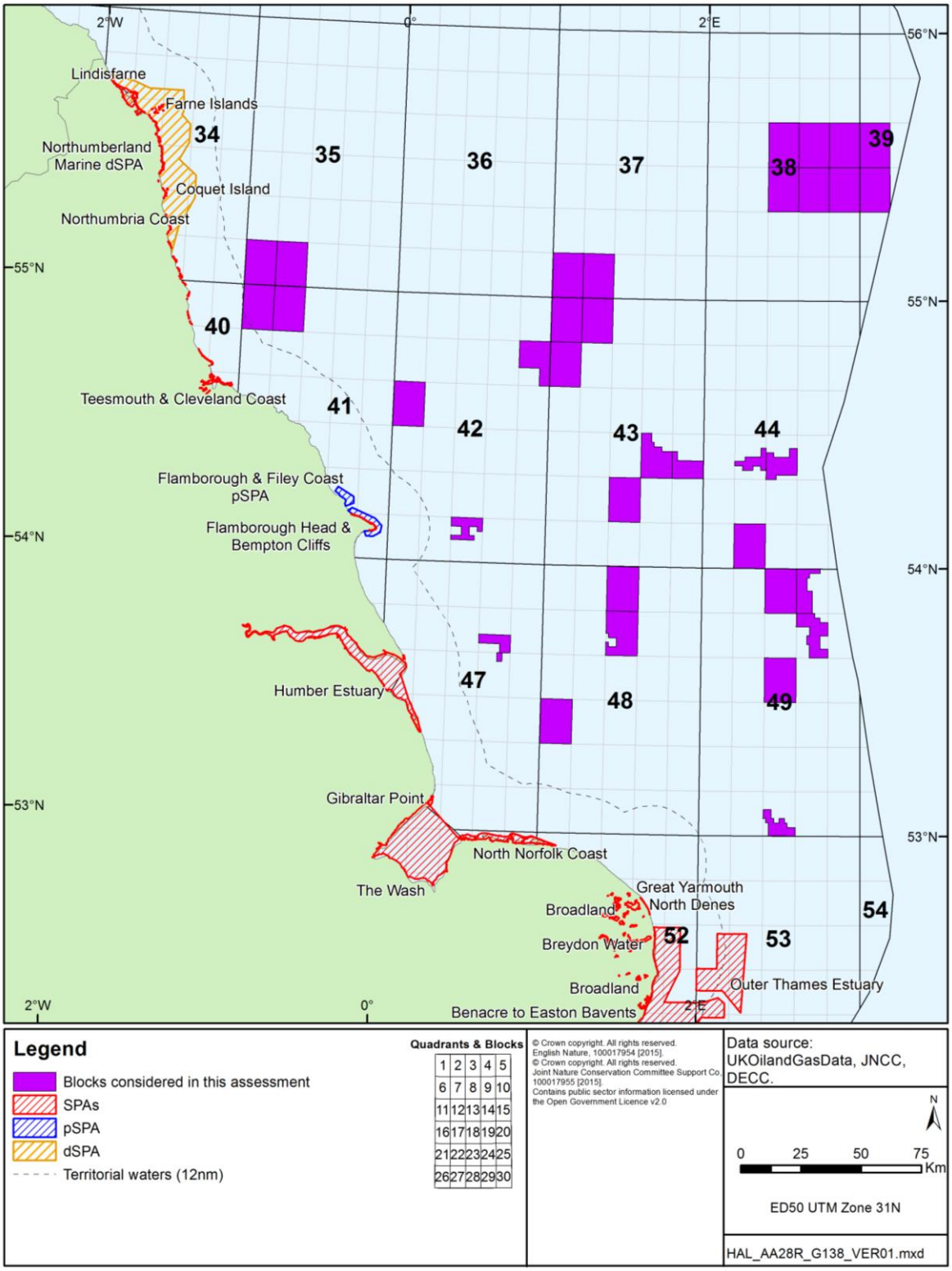
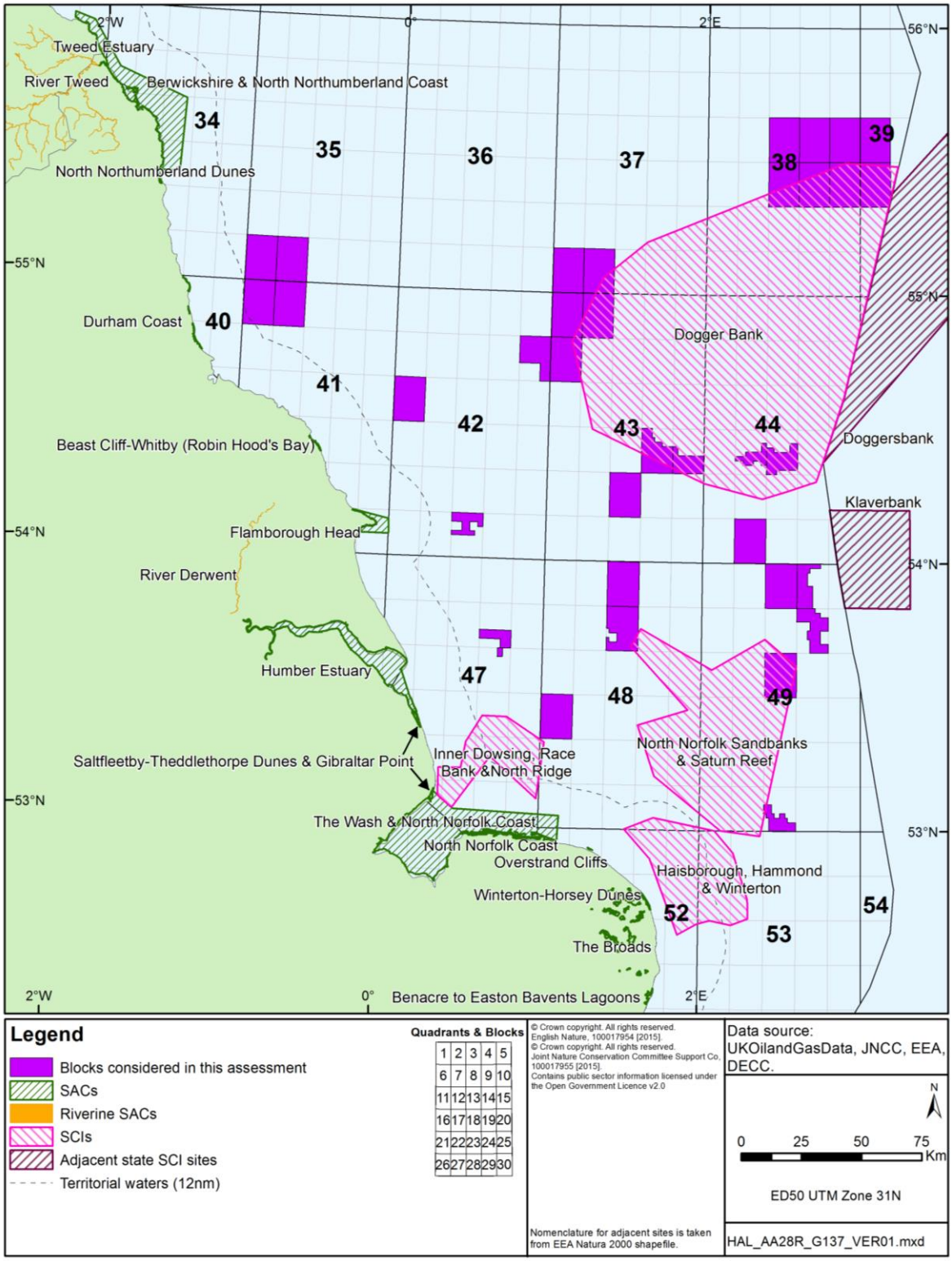


Figure 1.2: Location of southern North Sea Blocks and relevant SACs



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 36 southern North Sea Blocks were for Traditional Production Licences which are the standard type of Seaward Production Licence 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. There are two levels of drilling commitment relevant to the proposed work programmes for the southern North Sea Blocks:

- A **Firm Drilling Commitment** is a commitment to the Secretary of State to drill a well. Applicants are required to make firm drilling commitments on the basis that, if there were no such commitment, the Secretary of State could not be certain that potential licensees would make full use of their licences. However, the fact that a licensee has

been awarded a licence on the basis of a "firm commitment" to undertake a specific activity should not be taken as meaning that the licensee will actually be able to carry out that activity. This will depend upon the outcome of all relevant environmental assessments.

- A **Drill or Drop (D/D) Drilling Commitment** is a conditional commitment with the proviso, discussed above, that the licence is relinquished if a well is not drilled.

Note that Drill-or-Drop work programmes (subject to further studies by the licensees) will probably result in a well being drilled in less than 50% of the cases.

With respect to seismic data commitments, the proposed work programmes for the Blocks include: **shooting** seismic data by carrying out new 2D or 3D seismic survey; **obtaining** seismic data by purchasing or otherwise getting the use of existing data, and **reprocessing** existing data[6].

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 southern North Sea each year since 2000 as well as the number of significant discoveries made (associated with exploration activities).

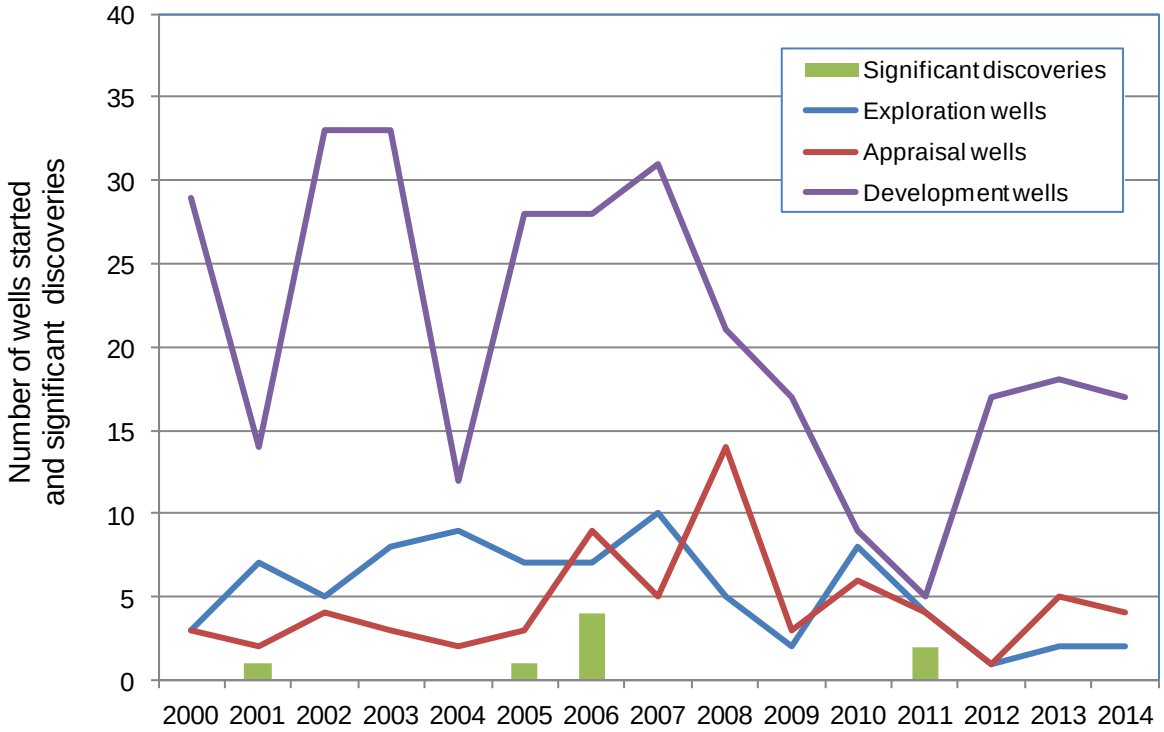
Discoveries that are developed may require further drilling, wellhead infrastructure, pipelines and possibly production facilities such as platforms, although recent developments are mostly subsea tiebacks to existing production facilities rather than stand alone developments. For example, of the 7 current projects identified by DECC's Project Pathfinder (as of February 2015)[7] for Blocks within the southern North Sea, 3 are planned as subsea tie-backs to existing

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

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

infrastructure. Of the other projects: 2 are planned as new platforms, and 2 are still being considered. The nature, extent and timescale of development, if any, which may ultimately result from the licensing of the southern North Sea 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.

Figure 2.1: Number of exploration, appraisal and development wells started and significant discoveries in the southern North 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

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
35/26, 35/27, 41/1 & 41/2	Drill or drop well, obtain 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.
37/26 & 37/27	Drill or drop well, shoot 3D	
38/13, 38/14, 38/15, 38/18, 38/19, 38/20, 39/11 & 39/16	Drill or drop well, obtain 2D	
42/11	Drill or drop well, obtain 3D	
42/10b	Drill or drop well, Reprocess 2D	
42/28c (Part)	Drill or drop well	
43/1, 43/2 & 43/6	Drill or drop well, obtain 3D and reprocess 2D	
43/19b (Part)	Drill or drop well	
43/20c	Drill or drop well, reprocess 3D	
43/23	Drill or drop well, obtain 3D	
44/17e & 44/18c (Split)	Drill or drop well	
44/18c (Split)	Drill or drop well	
44/18c (Split)	Drill or drop well, reprocess 3D	
44/27	Drill or drop well, obtain 3D	
47/9d & 47/14e	Drill or drop well, reprocess 3D	
48/3	1 Firm Well	
48/8b	Drill or drop well	
48/16 (Part)	Drill or drop well	
49/3, 49/4d & 49/9d	Drill or drop well	
49/13	Drill or drop well	
49/28e	1 Firm Well	

Note: Reprocessing or obtaining seismic refers to use of existing seismic data rather than undertaking new seismic survey[8].

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

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

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 2014) – also see Appendix B.

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

Source of effect	High level controls
Physical disturbance	There is a mandatory requirement to have sufficient recent data to characterise the seabed in areas where activities are due to take place (e.g. rig placement). Survey information must be made available to the relevant statutory bodies on submission of a relevant permit application or Environmental Statement for the operation to be undertaken, and the identification of sensitive habitats by such survey (including those under Annex I of the Habitats Directive) may affect DECC's decision with regards to the application. Further mitigation (e.g. alternative well location or rig positioning) may need to be identified and implemented where necessary.
Marine discharges	Discharges from offshore oil and gas facilities have been subject to increasingly stringent regulatory controls over recent decades (see review in DECC 2011, Appendices 4 and 5), and oil and other contaminant concentrations in the major streams (drilling wastes and produced water) have been substantially reduced or eliminated (e.g. the discharge of oil based muds and contaminated cuttings is effectively prohibited), with discharges of chemicals and oil outside of regulatory standards or permit conditions constituting an offence. These are effectively controlled through permitting, monitoring and reporting (e.g. through the mandatory Environmental and Emissions Monitoring System (EEMS) and annual environmental performance reports). At the project level, discharges would be considered in project-specific Environmental Statements and evaluated in further detail within subsequent chemical permit applications, using chemical risk assessments. HRAs (where necessary) may also be undertaken at each stage.
Underwater noise	Seismic operators are required to submit an application for consent to carry out a geological survey. As part of the application process, operators must justify that their proposed activity is not likely to cause a disturbance etc. under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended) and *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007* (as amended). It is a condition of consents issued under Regulation 4 of the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (& 2007 amendments) for oil and gas related seismic surveys that the JNCC, *Guidelines for minimising the risk of disturbance and injury to marine mammals from seismic surveys,* are followed. Passive acoustic monitoring (PAM) may be required as a mitigation tool. DECC will take account of the advice provided by the relevant statutory nature conservation body in determining any consent conditions. Potential disturbance of certain species may be avoided by the seasonal timing of noisy activities, and periods of seasonal concern for individual Blocks on offer have been highlighted (see Section 2 of DECC's Other Regulatory

Source of effect	High level controls
	Issues[9] which accompanied the 28th Round offer) for which licensees should expect to affect DECC's decision whether or not to approve particular activities. Licensees should therefore appropriately plan operations to avoid these sensitivities.
Accidental spills	Oil Pollution Emergency Plans (OPEPs): regulatory requirements on operators to prepare spill prevention and containment measures, risk assessment and contingency planning – these are reviewed by DECC, Maritime and Coastguard Agency (MCA), JNCC and other relevant SNCBs/organisations. Additional conditions may be imposed by DECC through block-specific licence conditions (i.e. "Essential Elements"), and seasonal periods of concern for drilling (see Section 2 of DECC's Other Regulatory Issues which accompanied the 28th Round offer), within which there is a presumption for drilling activity to be refused unless appropriate further mitigation measures can be agreed which are defined at the project level. MCA is responsible for a National Contingency Plan and maintains a contractual arrangement for provision of aerial spraying, with aircraft based at Birmingham International and East Midlands airports, and counter-pollution equipment (booms, adsorbents etc.). Following the cancellation of the MCA's Emergency Towing Vessel (ETV) programme for UK waters in 2011 (with the exception of an ETV for the waters around the Northern and Western Isles up to 2016[10]), the UK Government has been in discussions with the oil industry on the potential of a commercial call-out arrangement to use their vessels, and BP have agreed to volunteer a vessel to help in an emergency should the MCA deem it appropriate[11].

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

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

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

Figure 2.2: Stages of plan level environmental assessment

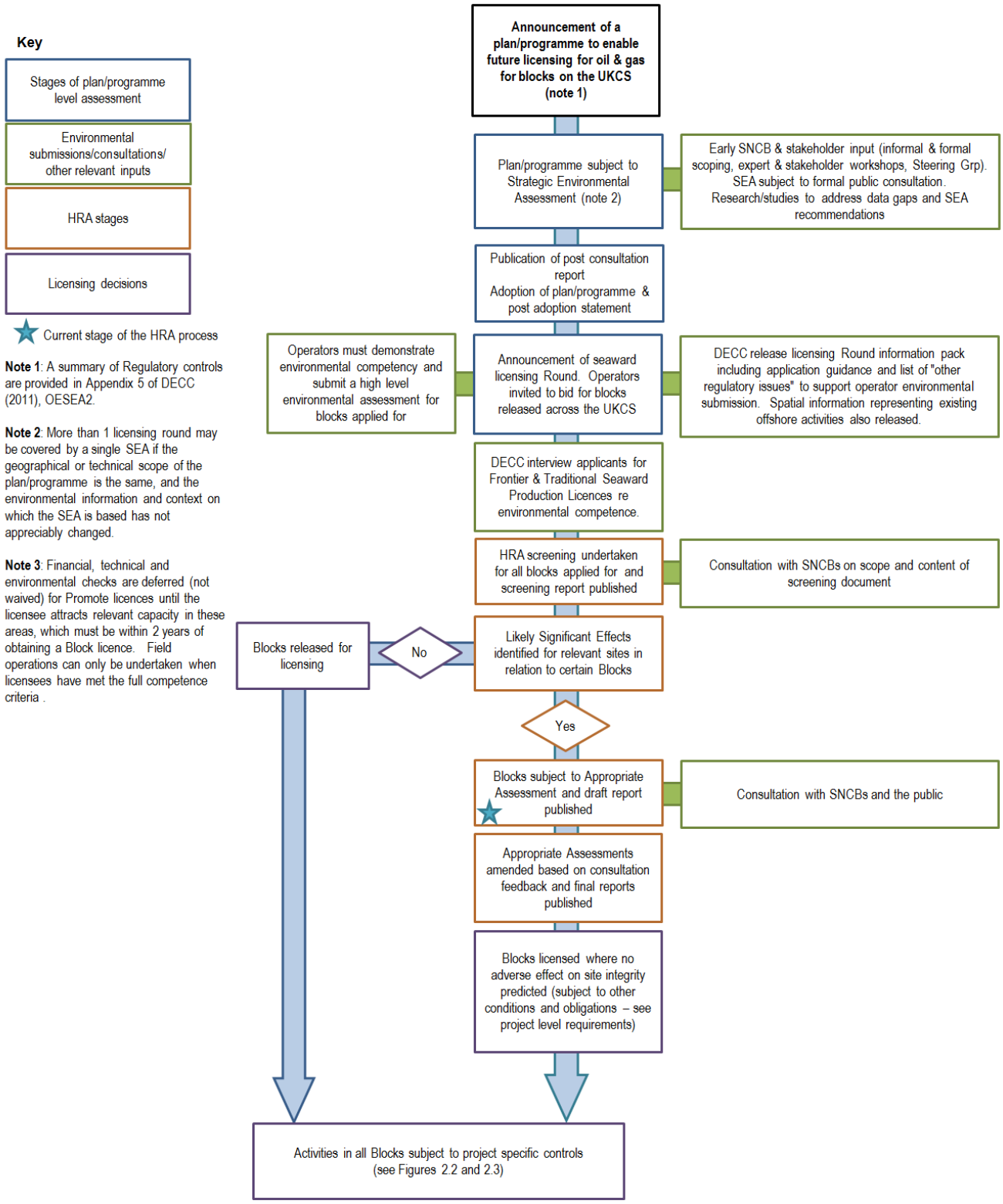
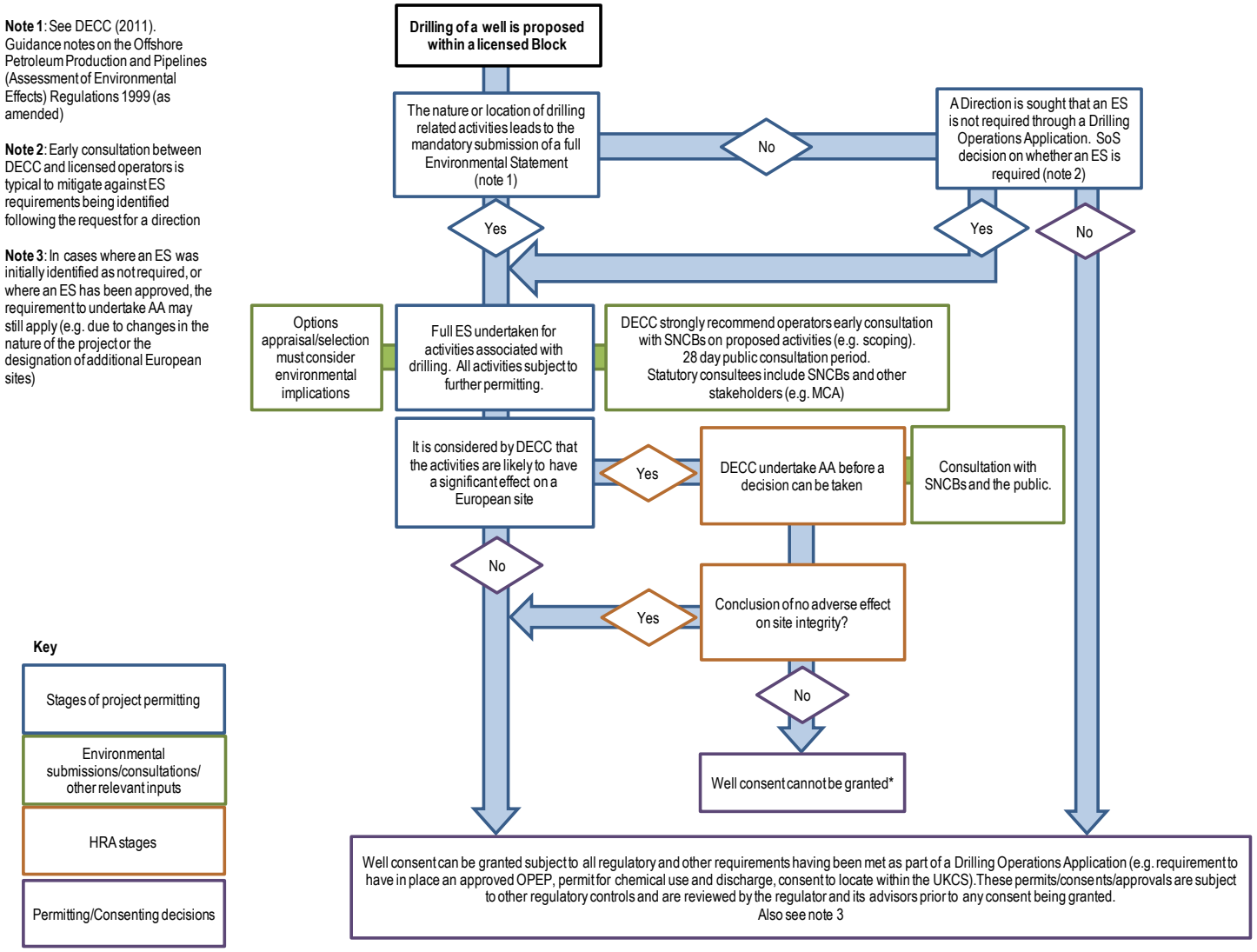
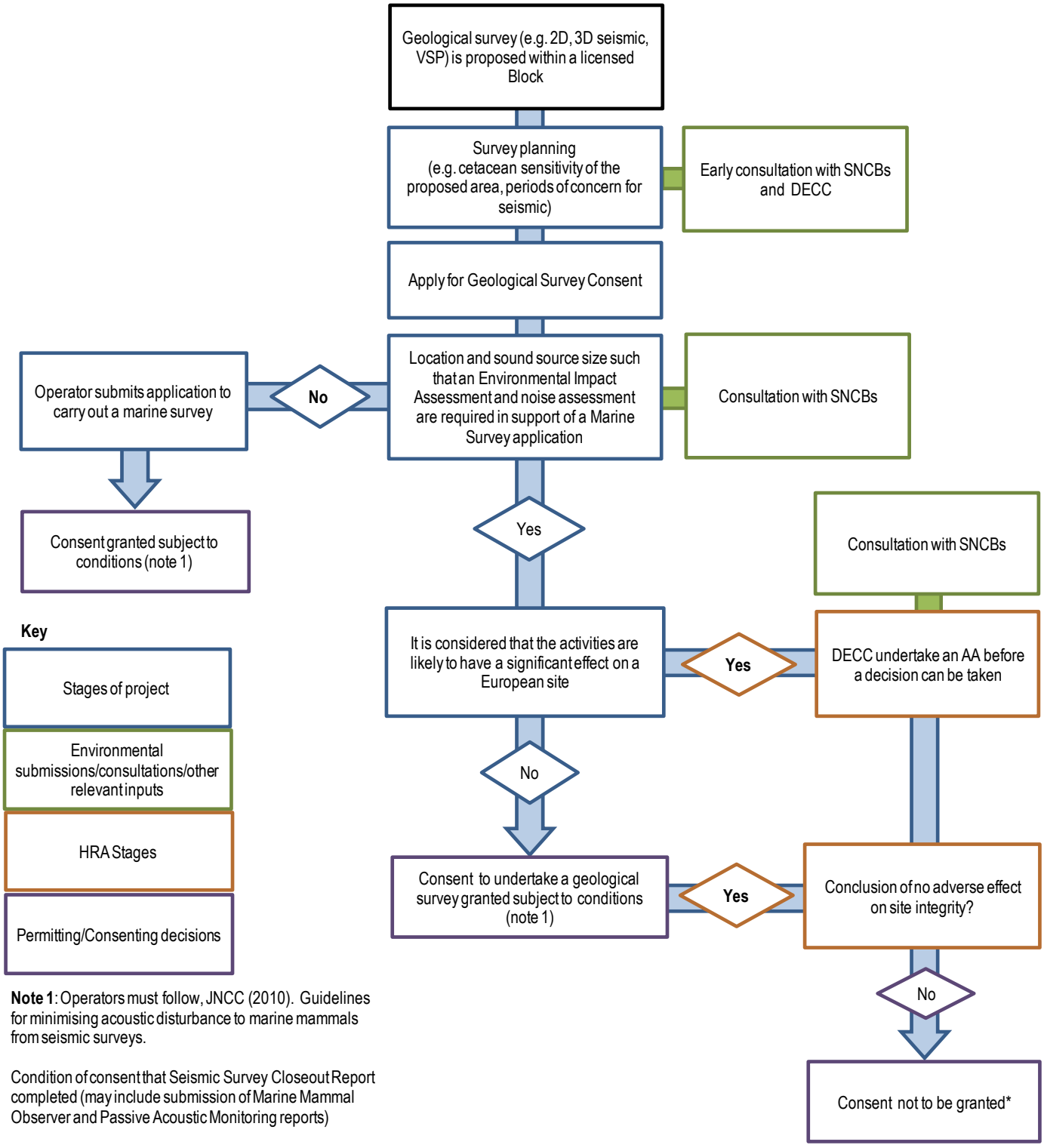


Figure 2.3: High level overview of exploration drilling environmental requirements



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

Figure 2.4: High level overview of seismic survey environmental requirements



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

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

3 Appropriate assessment process

3.1 Process

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

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

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

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

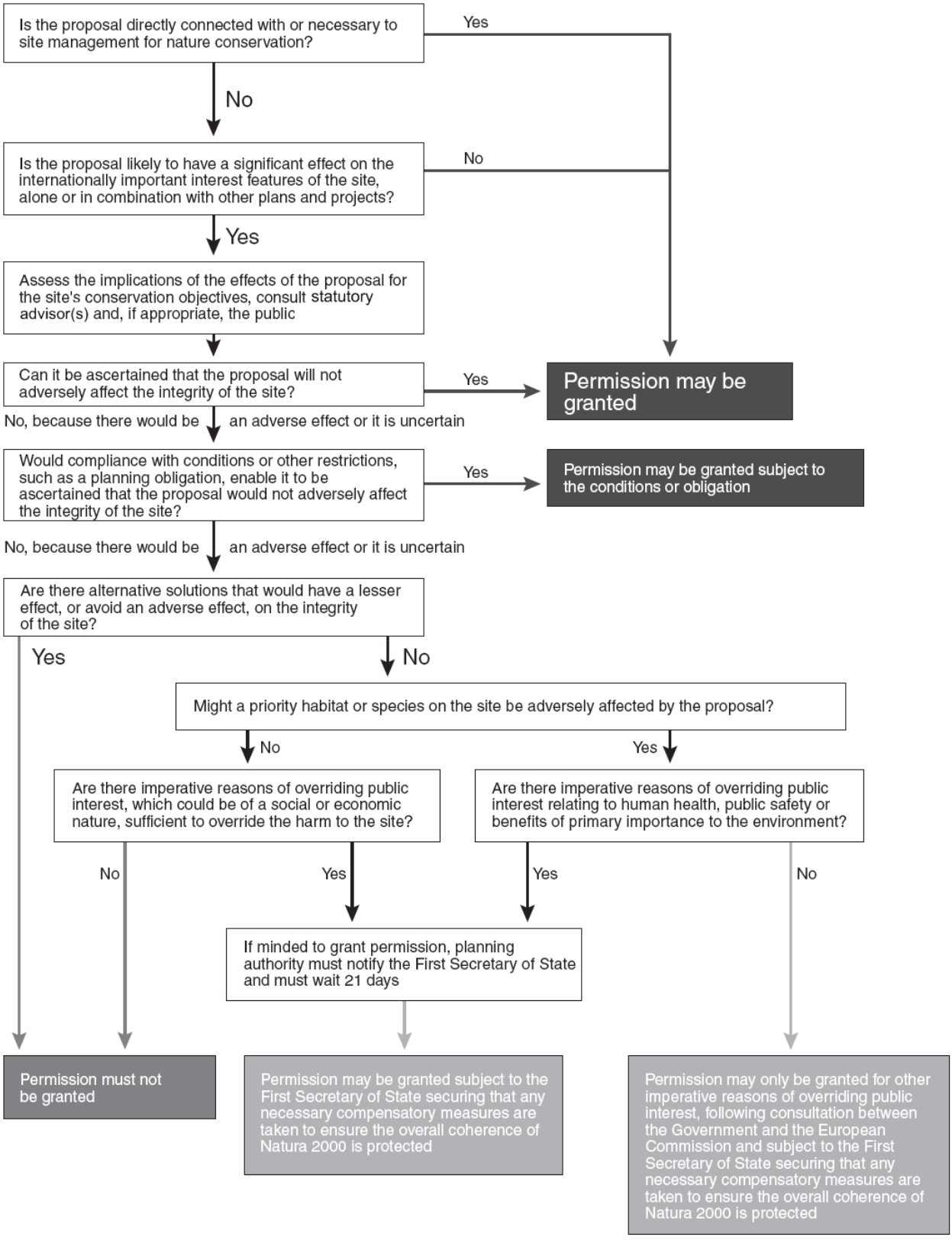
In considering the above, DECC used the clarification of the tests set out in the Habitats Directive in line with the ruling of the ECJ in the *Waddenzee* case (Case C-127/02), so that:

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

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

A flowchart summarising the process is shown in Figure 3.1.

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



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

3.2 Site integrity

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

3.3 Assessment of effects on site integrity

The approach to ascertaining the absence or otherwise of adverse effects on the integrity of a relevant site is set out in Section 3.1 above. This assessment has been undertaken in accordance with the European Commission Guidance (EC 2000), and with reference to various other guidance and reports including the National Planning Policy Framework (DCLG 2012), Circular 06/2005 (ODPM 2005) and Hoskin & Tyldesley (2006).

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

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

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

Use has been made of advice prepared by the conservation agencies under Regulation 35[12] (formerly Regulation 33), since this typically includes advice on operations that may cause deterioration or disturbance to relevant features or species. The future provision of conservation advice may be informed by an ongoing JNCC project linking human activities and marine pressures[13]. A matrix of potential interactions identified by previous studies has been produced[14] as a guide. In the matrix, several of the pressures listed for 'marine hydrocarbon extraction (not including pipelines)' are not inevitable consequences of oil and gas exploration (or production), since through the regulatory Environmental Impact Assessment (EIA) and permitting processes they are routinely mitigated by timing, siting (e.g. of rigs) or technology requirements (or a combination of one or more of these).

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

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

4 Assessment of physical disturbance and drilling effects

4.1 Introduction

With respect to physical disturbance and drilling effects, the re-screening process (Appendix B) identified a number of sites where there was the potential for likely significant effects associated with proposed activities that could follow licensing of the southern North Sea 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:

- **Placement of jack-up rigs**. Jack-up rigs, normally used in shallower water (<120m) which is typical of the southern North Sea, 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 spudcans would have an approximate seabed footprint of 1,250m^2 within a radius of *ca*. 50m of the rig centre. In locations with an uneven seabed, and/or where scour protection is required, material such as grout bags or rock may be placed on the seabed around the spud cans to stabilise the rig feet. An ES for an appraisal well in Block 47/14b in *ca*. 56m water depth indicated that each of the selected jack-up rig's three legs terminated in a spud-can with a diameter of *ca.* 14m. The placement of the spud cans on the seabed was predicted to disturb a localised area totalling 462m^2. Within the seabed footprint, the benthic assemblage would likely be killed by crushing or by the effects of reduced water exchange. The ES concluded that given the small scale of the footprint, the nature of the sandy seabed fauna and the inferred sediment movement in the area, the impact would be negligible and recolonisation rapid (GDF Suez 2012).

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

introduction of rock or structures to the marine environment, and are therefore unlikely to undermine the conservation objectives of SACs in the area.

- **Anchoring of semi-submersible rigs**. The water depths in the Blocks are considered too shallow for a semi-submersible rig to be used.

- **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 highly mobile nature of the seabed sediments within the southern North 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 discharges[15], effects on seabed fauna of the discharge of cuttings drilled with water based muds (WBM) and of the excess and spent mud itself are usually subtle or undetectable, although the presence of drilling material at the seabed close to the drilling location (<500m) is often detectable chemically (see e.g. Daan & Mulder 1996). Modelling of WBM cuttings discharges in the southern North Sea for an exploration well in Block 44/19b in *ca*. 27m water depth (Tullow Oil UK 2010), indicated that most of the material would be deposited within 1km of the well location. Cuttings deposition decreased further from the well location with <400mm thickness predicted within the first 4m of the well, falling to ~10mm covering a 140x65m area. Beyond this, cuttings deposition was predicted to be less than 1mm thick. It was thought likely that all the cuttings would become mixed with the natural sediments and eventually disperse due to the strong tidal and wave generated currents in the area.

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).

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

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

4.2.3 Other effects

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.

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

4.3 Implications for site integrity of relevant sites

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

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

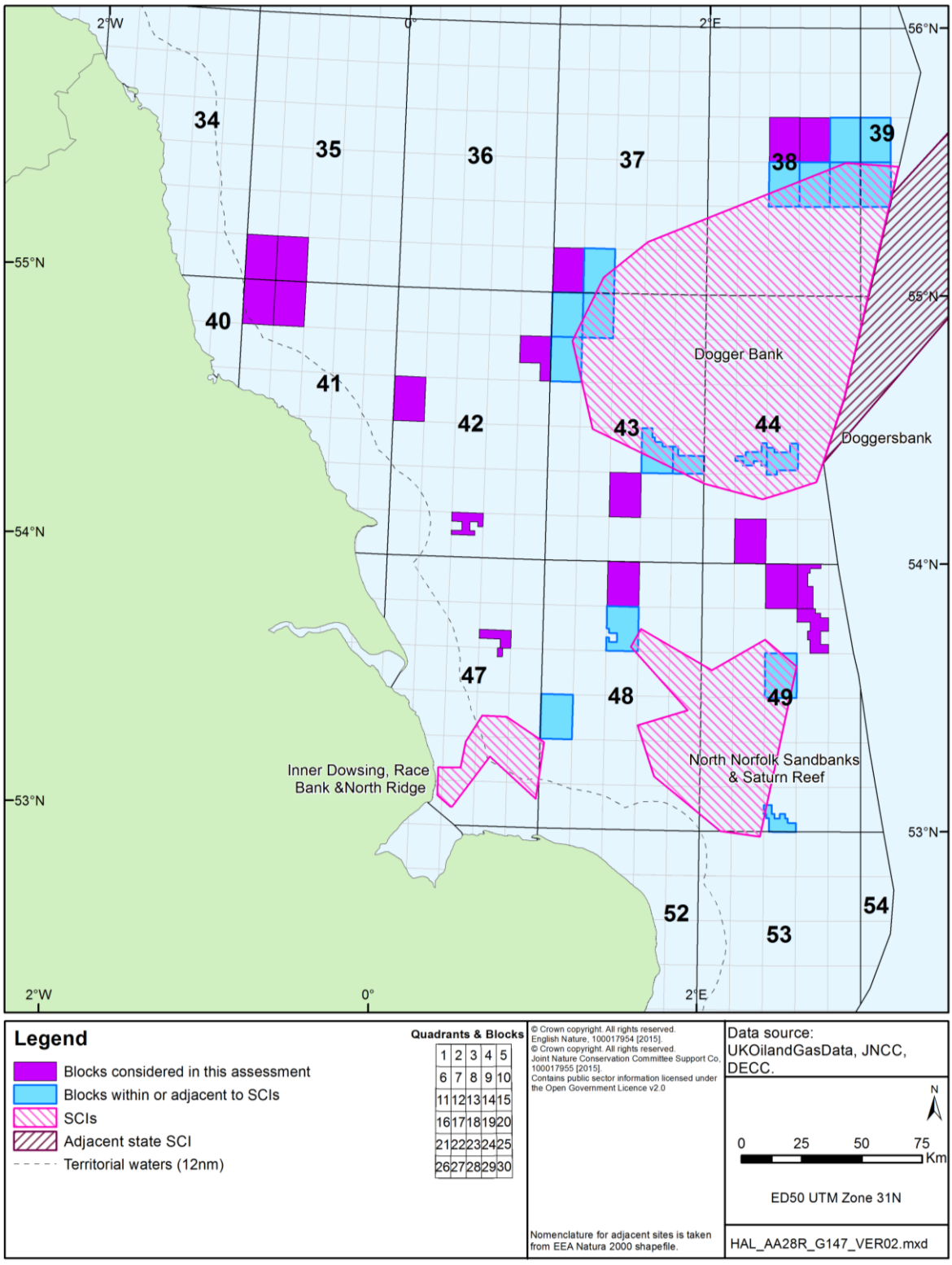


Table 4.1: Consideration of potential physical disturbance and drilling effects and relevant site conservation objectives

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Offshore SACs		
Dogger Bank SCI	Sandbanks	**Conservation objectives:** Subject to natural change, restore the sandbanks to favourable condition, such that: • The natural environmental quality is restored; • The natural environmental processes and the extent are maintained; • The physical structure, diversity, community structure and typical species, representative of sandbanks which are slightly covered by seawater all the time, in the Southern North Sea, are restored. **Rig installation/ placement** Blocks 37/27, 38/15, 38/18, 38/19, 38/20, 39/11, 39/16, 43/1, 43/2, 43/6, 43/19b, 43/20c, 44/17e and 44/18c are adjacent to or overlap with the site boundaries and are part of a number of separate licence applications with eight drill or drop wells proposed between them. The qualifying feature is moderately sensitive to physical damage through disturbance or abrasion (e.g. anchoring)[16]. Although the seabed footprint associated with a jack-up drilling rig is relatively small and temporary (see Section 4.2.1), rig placement could impact the physical structure of the qualifying feature. The likelihood and scale of impact will be determined by the proposed location of drilling activities and mitigation measures (see Section 4.4) are available to ensure site conservation objectives are not undermined. **Drilling discharges** Modelling of WBM cuttings discharges for an exploration well in the southern North Sea indicated that most of the material would deposit within 1km of the well location and it was thought likely that all the cuttings would become mixed with the natural sediments and eventually disperse due to the strong tidal and wave generated currents in the area (see Section 4.2.2). The qualifying feature has a low sensitivity to smothering by drill cuttings and the physical structure, diversity, community structure and typical species of the qualifying features are unlikely to be significantly impacted given the localised and temporary nature of the drill cuttings footprint. However, 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.
North Norfolk Sandbanks and Saturn Reef SCI	Sandbanks, reefs	**Conservation objectives:** Subject to natural change, restore the sandbanks which are slightly covered by seawater all the time and reefs to favourable condition, such that the: • The natural environmental quality, natural environmental processes and extent are maintained • The physical structure, diversity, community structure and typical species, representative of sandbanks which are slightly covered by seawater all the time and reefs in the Southern North Sea are restored.

[16] http://jncc.defra.gov.uk/PDF/DoggerBank_ConservationObjectivesAdviceonOperations_6.0.pdf

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		Rig installation/ placement Blocks 48/8b, 49/13 and 49/28e are adjacent to or overlap with the site boundaries and are part of three separate licence applications with two drill or drop wells and 1 firm well proposed between them. The qualifying features are moderately sensitive to physical damage through disturbance or abrasion (e.g. anchoring)[17]. Although the seabed footprint associated with a jack-up drilling rig is relatively small and temporary (see Section 4.2.1), rig placement could impact the physical structure of the qualifying feature. The likelihood and scale of impact will be determined by the proposed location of drilling activities and mitigation measures (see Section 4.4) are available to ensure site conservation objectives are not undermined. **Drilling discharges** Modelling of WBM cuttings discharges for an exploration well in the southern North Sea indicated that most of the material would deposit within 1km of the well location and it was thought likely that all the cuttings would become mixed with the natural sediments and eventually disperse due to the strong tidal and wave generated currents in the area (see Section 4.2.2). The qualifying features have a low to moderate sensitivity to smothering by drill cuttings and the physical structure, diversity, community structure and typical species of the qualifying features are unlikely to be significantly impacted given the localised and temporary nature of the drill cuttings footprint. However, 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.
Inner Dowsing, Race Bank and North Ridge SCI	Sandbanks, reefs	**Conservation objectives:** Subject to natural change, maintain or restore the sandbanks in favourable condition, in particular the sub-features: • Gravelly muddy sand communities • Dynamic sand communities • Subject to natural change, maintain or restore the reefs in favourable condition. **Rig installation/ placement** Block 48/16 is close to the site (within *ca*. 300m) and is part of a single licence application with 1 drill or drop well proposed. The qualifying features have a low (sandbank) and high (reef) sensitivity to physical damage through disturbance or abrasion (e.g. anchoring)[18]. The seabed footprint associated with a jack-up drilling rig is relatively small and temporary (see Section 4.2.1), and given that the Block does not overlap with the site, rig placement is unlikely to impact the qualifying features. **Drilling discharges** Modelling of WBM cuttings discharges for an exploration well in the southern North Sea indicated that most of the material would deposit within 1km of the well location and it was thought likely that all the cuttings would become mixed with the natural sediments and eventually disperse due to the strong tidal and wave generated currents in the area (see Section 4.2.2). Low sensitivity of sandbank feature to smothering. *Sabellaria* reefs adapted to moderate sediment loads, and not considered sensitive to smothering. Given the localised and temporary nature of the drill cuttings footprint and the location of Block 48/16

[17] http://jncc.defra.gov.uk/pdf/NNSandbanksandSaturnReef_ConservationObjectives_AdviceonOperations_6.0.pdf
[18] http://jncc.defra.gov.uk/pdf/IDRBNR_Reg%2035_Conservation%20Advice_v4.0.pdf

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		outside of the site boundaries, drilling discharges are unlikely to impact the qualifying features.
Sites in Adjacent States		
Doggersbank SCI	Sandbanks, harbour porpoise, harbour seal, grey seal	**Conservation objectives:** For harbour porpoise, grey seal and harbour seal: Maintain extent and quality of habitat in order to maintain population **Rig installation/ placement** Block 39/16 is adjacent to the site and is part of a single licence application that includes another seven Blocks, with one drill or drop well proposed between them. Sandbank qualifying feature is likely to have a low sensitivity to physical damage through disturbance or abrasion (e.g. anchoring). The seabed footprint associated with a jack-up drilling rig is relatively small and temporary (see Section 4.2.1), and given that the Block does not overlap with the site, rig placement is unlikely to impact the extent or quality of the sandbank qualifying feature. **Drilling discharges** Modelling of WBM cuttings discharges for an exploration well in the southern North Sea indicated that most of the material would deposit within 1km of the well location and it was thought likely that all the cuttings would become mixed with the natural sediments and eventually disperse due to the strong tidal and wave generated currents in the area (see Section 4.2.2). The sandbank qualifying feature is likely to have a low sensitivity to smothering. Given the localised and temporary nature of the drill cuttings footprint and that Block 39/16 does not overlap with the site, drilling discharges are unlikely to impact the extent or quality of the sandbank qualifying feature. **Rig/vessel presence and movement** Vessel presence and movement have the potential to cause non-physical disturbance to the harbour porpoise, grey and harbour seal qualifying features. However given the low densities of the marine mammal qualifying features offshore (see Section 5.3.1), and the limited number of vessel movements (e.g. supply vessels typically make 2-3 supply trips per week between rig and shore), relevant activities are unlikely to cause significant disturbance to the qualifying features.

4.4 Mitigation

4.4.1 Mandatory requirements

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

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

4.4.2 Further mitigation measures

Further mitigation measures are available which are identified through the operator's environmental management and the DECC permitting processes. These considerations are informed by specific project plans and the nature of the sensitivities identified from detailed seabed information collected in advance of field activities taking place. Site surveys are required to be undertaken before drilling rig placement (for safety and environmental reasons) and the results of such surveys (survey reports) allow for the identification of further mitigation including the relocation or resiting of the location of activities (e.g. wellhead, rig leg or anchor positions) to ensure sensitive seabed surface or subsurface features are avoided. Such survey reports are used to underpin operator environmental submissions (e.g. Drilling Operations Applications, Environmental Statements) and survey information is made available to nature conservation bodies during the consultation phases of these assessments[19].

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

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

4.5 Conclusions

Likely significant effects identified with regards to physical effects on the seabed and marine discharges, 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

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

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 35/26, 35/27, 37/26, 37/27, 38/13, 38/14, 38/15, 38/18, 38/19, 38/20, 39/11, 39/16, 41/1, 41/2, 42/10b, 42/11, 42/28c, 43/1, 43/2, 43/6, 43/19b, 43/20c, 43/23, 44/17e, 44/18c, 44/27, 47/9d, 47/14e, 48/3, 48/8b, 48/16, 49/3, 49/4d, 49/9d, 49/13 and 49/28e, in so far as they may generate physical disturbance effects, will not cause an adverse effect on the integrity of relevant sites, 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 southern North Sea Blocks (Figure 5.1). The potential effects are summarised below (Section 5.2), and considered against the conservation objectives of the relevant sites to determine whether they could adversely affect site integrity (Section 5.3).

5.2 Underwater noise effects

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

5.2.1 Noise sources

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

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

- 3D seismic survey is similar but uses more than one source and several hydrophone streamers towed by the survey vessel. Thus closely spaced 2D lines (typically between 25 and 50m apart) can be achieved by a single sail line. 3D survey airgun arrays are normally larger[20], commonly between 1,000 and 8,000 cubic inches, with typical broadband source levels of 248-259db re 1µPa.

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

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

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

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

- Rig site surveys undertaken to identify seabed and subsurface hazards to drilling, such as wrecks and the presence of shallow gas. These use a range of techniques, including multibeam and side scan sonar, sub-bottom profiler, magnetometer and small airgun and shorter hydrophone streamer (with source sizes of 40-400 cubic inches[15]). The surveys typically cover 2-3km^2. The rig site survey vessel may also be used to characterise seabed habitats, biota and background contamination. Survey durations are usually of the order of four or five days.

- Vertical Seismic Profiling (VSP) sometimes conducted to assist with well evaluation by linking rock strata encountered in drilling to seismic survey data. A seismic source (airgun array, typically with a source size of up to ~500 cubic inches[15] and a maximum of 1,200 cubic inches (Stone 2015b)) is deployed from the rig, and measurements are made using a series of geophones deployed inside the wellbore. VSP surveys are of short duration (one or two days at most).

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

The potential for significant effect is largely related to the anticipated type, extent and duration of seismic survey associated with proposed licensing. In the UKCS, surveys with 'small arrays' (<500 cubic inches) are generally of short duration, with 46% lasting less than one week and only 17% lasting three or more weeks. Surveys with large arrays (>500 cubic inches) commonly cover a wide area over several weeks so that temporal variation in the precise location of firing exists throughout the survey (Stone 2015a). In recent years, site surveys and VSP operations make up the larger proportion of seismic surveys by number (Stone 2015b).

5.2.2 Noise receptors and effects thresholds

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

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

Precautionary noise exposure criteria were developed by Southall *et al*. (2007) after a thorough review of best available science on marine mammal hearing. Injury criteria were defined as received levels of sound that corresponded to the estimated onset of permanent shift in hearing threshold or PTS. A dual-criterion approach based on both pressure[21] and energy[22] (whichever is exceeded first) was proposed. To incorporate consideration of differences between species in hearing bandwidth, the authors divided marine mammals into low, mid, high frequency cetaceans and pinnipeds and criteria were identified for each[23]. Based on these criteria, indicative spatial ranges of injury can then be estimated from sound propagation modelling. Sound from seismic surveys is commonly estimated to drop below threshold criteria for marine mammal injury (PTS) within the first 200m from the source (e.g. 22-130m in Kongsberg 2010); this is also reflected in the mitigation guidelines (JNCC 2010) with the requirement for a Marine Mammal Observer(s) to make a visual assessment within 500 metres of the centre of the airgun.

Broadly applicable behavioural response criteria based on exposure alone have been much more difficult to extrapolate, mainly because behavioural responses are often found to be affected by individual history and by exposure context. For single pulses, Southall *et al*. (2007) assumed that significant behavioural disturbance could occur if noise exposure was sufficient to elicit a measurable transient effect on hearing or 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 responses[24].

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

[22] energy measurements are based on sound exposure level or SEL expressed as dB re 1 μPa^2s

[23] 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.

[24] 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.

Many species of fish are highly sensitive to sound and vibration (review in MMS 2004). Exposure to high sound pressure levels has been shown to cause long-term (>2 months) damage to sensory cells in fish ears (Hastings *et al*. 1996, McCauley *et al*. 2003). Other reported effects include barotrauma injuries (Halvorsen *et al.* 2012) and auditory threshold shifts (hearing loss), stress responses and other behaviour alterations (review in Popper *et al*. 2003). A number of field studies have observed displacement of fish and reduced catch rates, suggested to be attributable to behavioural responses to seismic exploration (e.g. Skalski *et al*. 1992, Engås *et al*. 1996, Hassel *et al*. 2004, Slotte *et al*. 2004). Atlantic salmon *Salmo salar* have been shown through physiological studies to respond to low frequency sounds (below 380Hz), with best hearing at 160Hz (threshold 95 dB re 1 µPa). Hence, their ability to respond to sound pressure is regarded as relatively poor with a narrow frequency span, a limited ability to discriminate between sounds, and a low overall sensitivity (Hawkins & Johnstone 1978, cited by Gill & Bartlett 2010). However, the gaps in understanding of the effects of impulsive sounds on fish are still substantial but relevant research is underway or in planning[25] (Malcolm *et al.* 2013, Hawkins *et al.* 2015).

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

5.3 Implications for site integrity of relevant sites

5.3.1 Special Areas of Conservation for marine mammals

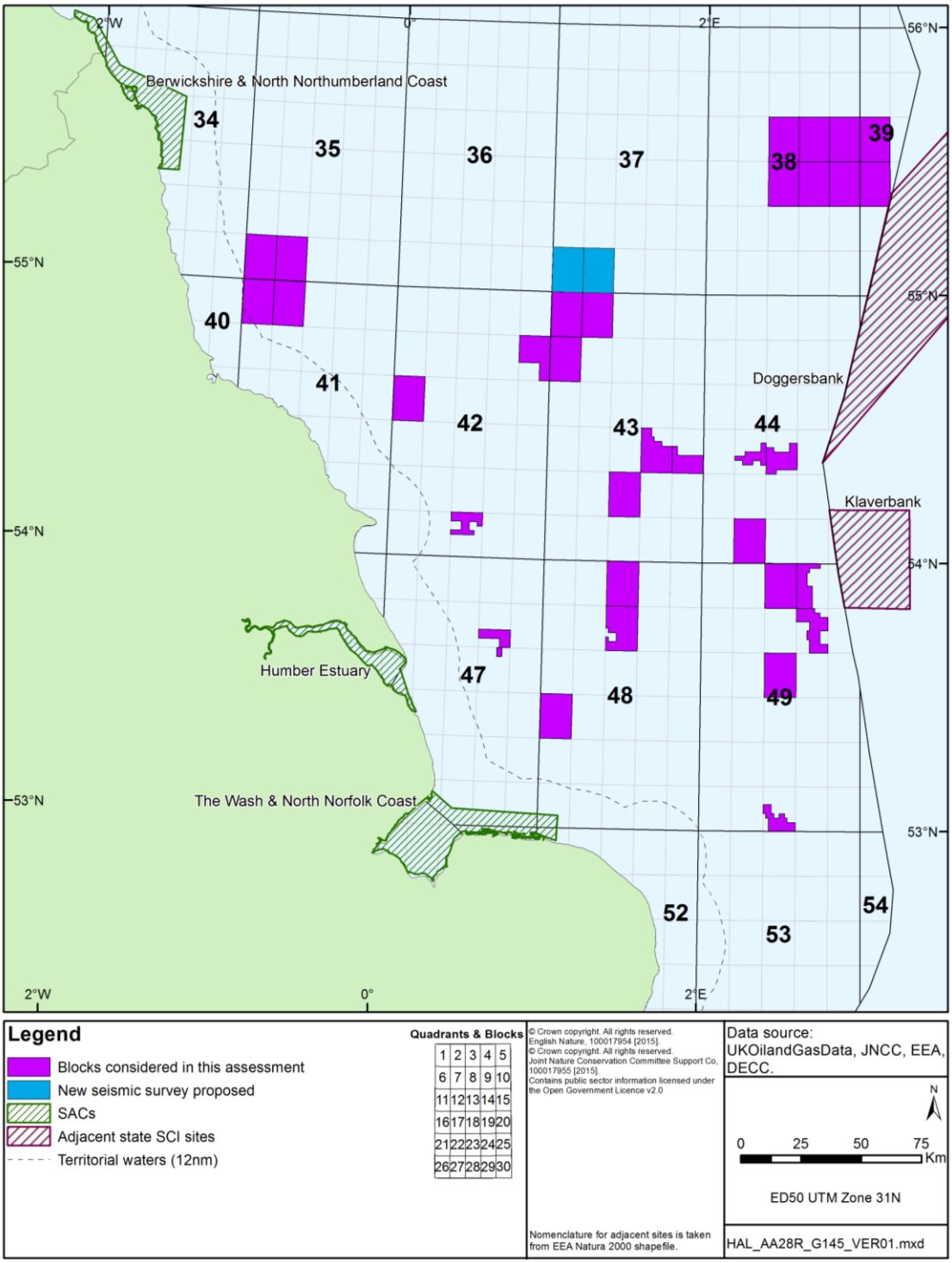
Appendix B indicated that there was potential for likely significant effects with respect to underwater noise associated with proposed seismic activities in Blocks 37/26 and 37/27 (the only Blocks where new seismic is proposed), on a number of sites with marine mammal qualifying features (Figure 5.1), including:

- Berwickshire and North Northumberland Coast SAC and Humber Estuary SAC (both designated for grey seals) which are *ca*. 157km and 169km respectively from Block 37/26.
- The Wash and North Norfolk Coast SAC (harbour seal) which is *ca*. 215km from Block 37/27.
- Doggersbank SCI and Klaverbank SCI (both designated for harbour porpoise, grey seal and harbour seal) in Dutch waters which are 106km and 150km respectively from Block 37/27.

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

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

Figure 5.1: Relevant sites and Blocks for underwater noise effects



Given the distance from the relevant sites, underwater noise associated with seismic survey in Blocks 37/26 and 37/27 is only likely to have a significant effect on qualifying features foraging outside of the site boundaries.

Extensive information on the distribution of British grey seals at sea is available from models of habitat preference derived from satellite telemetry data (McConnell *et al.* 1999, Matthiopoulos *et al*. 2004, Murphy *et al*. 2008, Lonergan *et al.* 2011). At sea, movements range from short-range return trips from haul-out sites to local foraging areas, to extended journeys between distant haul-out sites. Foraging trips from haul-out sites usually last between two and five days, with seals targeting localised areas generally within 50km of haul-out sites; these areas

are typically characterised by gravel/sand seabed sediment, the preferred burrowing habitat of sandeels, and an important component of grey seal diet.

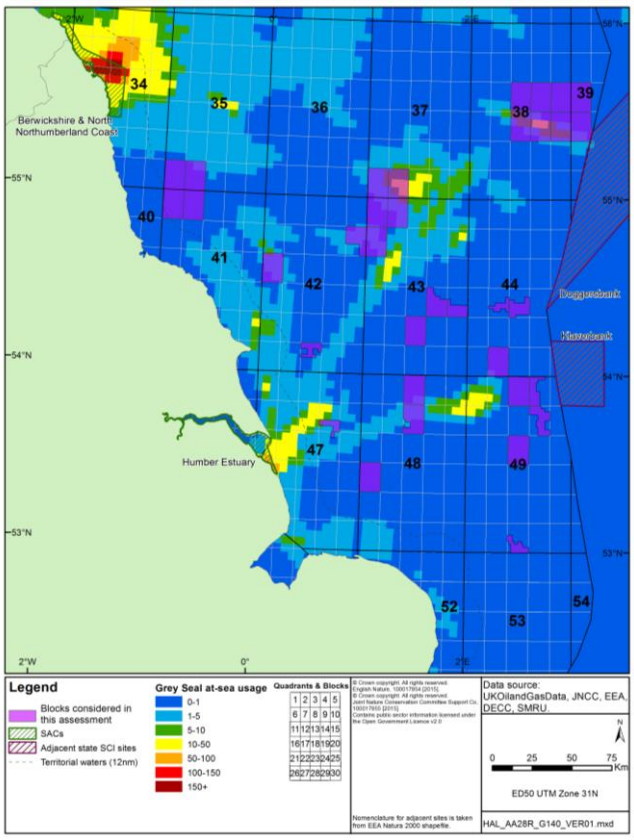
Recent studies of foraging at sea by harbour seals have been funded by SNH and DECC (Sharples *et al*. 2005, 2008, 2012). These indicate high site fidelity to haul-out sites, but ranging over substantial distances at sea. Harbour seals hauling out in The Wash forage widely throughout coastal and offshore waters of the southern North Sea from the North Yorkshire to Sussex coasts. Animals tended to make repeated trips of relatively long distance and duration. All but one of 24 tagged seals travelled repeatedly to between 75 and 120km offshore and as far as 220km to assumed foraging patches (Sharples *et al*. 2008, 2012), though a large degree of individual variation led to an average trip distance of 86km. Foraging trips from The Wash average 8.3 days in duration (Sharples *et al.* 2008) with a general increase in trip duration expected through the non-breeding season from October to June. Animals were found to be fairly site faithful to the areas in which they foraged (Sharples *et al*. 2008, 2012).

Maps showing the at-sea distribution of grey and harbour seals around the UK have been produced (Marine Scotland website[26]). The maps (Figure 5.2) indicate that defined areas of the southern North Sea are important for both grey and harbour seals. Grey seals appear to forage widely over the region with Block 37/27 appearing to coincide with an area of moderate usage, possibly by seals from the Humber Estuary SAC. Harbour seals use a more restricted area radiating out from The Wash with very low or no usage of Blocks 37/26 and 37/27. Usage by both seal species of offshore areas close to the Dutch offshore sites appears to be low or very low. 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 (grey seal) and 1991-2012 (harbour seal). Data from countries outside the UK where seals haul-out (e.g. Dutch waters) were not included in the analysis, which could underestimate usage in those areas (Jones *et al.* 2013). Also, recent increases in the English east coast populations of grey and harbour seals (SCOS 2013) may have an impact on foraging locations not captured by the telemetry data. For example, at colonies between The Humber Estuary and Great Yarmouth, 3,359 grey seal pups were born in 2012 compared with 2,566 in 2010, an average annual increase of 14.4%. Similarly, in The Wash, the harbour seal count in 2012 (3,519) was 22% higher than the 2011 count (2,894). Overall, the combined count for the English east coast harbour seal population (Donna Nook to Scroby Sands) in 2012 was 22% higher than the 2011 (SCOS 2013).

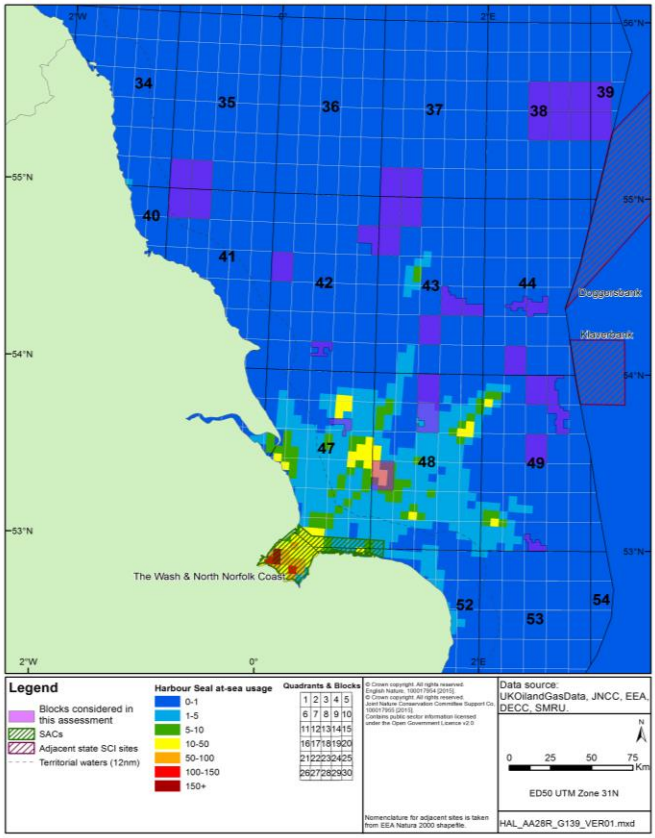
[26] http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/seal-density

Figure 5.2: Estimated at sea usage by seals of the southern North Sea area

a) Grey seal



b) Harbour seal



With respect to harbour porpoise (qualifying feature of Doggersbank and Klaverbank SCI sites in Dutch waters), SCANS II data (for SCANS II area U) which covers much of the southern North Sea indicated an average harbour porpoise density of *ca*. 0.6 animals/km^2 (Hammond *et al*. 2013). ICES (2014) reported on Dutch aerial surveys in March-April 2013 to assess the seasonal abundance and distribution of harbour porpoise. Porpoise densities varied between 0.47 and 1.44 animals/km² with a patchier distribution and lower densities in Dutch offshore waters (including the area of the Dutch SCI sites). A number of UK sea areas are currently being considered for designation as SACs for harbour porpoise. These areas have been identified through assessment of both effort related sea- (Heinänen & Skov 2015) and land-based sightings (Evans *et al.* 2015). The data suggests eight areas in UK waters where densities are persistently high, with the north-western edge of Dogger Bank (summer), inner Silver Pit and the offshore area east of Norfolk and east of the outer Thames estuary being of relevance to this AA. However, further work is needed to refine these areas, to allow formal consultation in advance of any site designation. JNCC expects this formal consultation to be launched in summer 2015.

From DECC-funded research in the Moray Firth (Thompson *et al*. 2013), acoustic and visual data provided evidence of harbour porpoise group responses to airgun noise from a 470 cu inch array over ranges of 5–10km, at received peak-to-peak sound pressure levels of 165–172 dB re 1 mPa and sound exposure levels (SELs) of 145–151 dB re 1 mPa^2 s. However, animals were typically detected again at affected sites within a few hours, and the level of response declined through the 10 day survey. Overall, acoustic detections decreased significantly during the survey period in the impact area compared with a control area, but this effect was small in relation to natural variation. Prolonged seismic survey noise did not lead to broader-scale displacement into suboptimal or higher-risk habitats (Thompson *et al*. 2013). Pirotta *et al.* (2014) indicated that porpoises remaining in the impact area reduced their

buzzing activity by 15% during the seismic survey. Moreover, the probability of detecting buzz inter-click intervals when porpoises were present increased with distance from the source vessel, suggesting that the likelihood of buzzing was dependent upon received noise intensity. The baseline probability of occurrence of buzzes was around 0.4 in the impact block before the survey, although with high natural variability. This declined to 0.1–0.2 at estimated received SEL of 150–165 dB re 1 mPa^2s. The results provide an estimate of the noise levels at which porpoise activity patterns are disrupted, and an indication of the scale of potential reductions in foraging activity. However, porpoise occurrence and activity is typically characterised by large seasonal and diel variability and Pirotta *et al.* (2014) indicate that further studies are required to explore the environmental conditions that drive this variation, and assess whether this scale of disturbance has long-term consequences for individual energy budgets.

With respect to the harbour porpoise and seal qualifying features, if significant ecological effects on prey species were to occur, even at considerable distances from designated sites, these could influence the population of the qualifying feature. The potential for impact will be determined by a range of project-specific factors including the location, source size and timing of the survey as well as the fish species present, their numbers and location in relation to the seismic survey.

DECC will expect the operators to provide sufficient information on the potential impact of the proposed activities on relevant sites and their qualifying features (including relevant prey species) in their applications for 3D seismic survey in Blocks 37/26 and 37/27. 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 work programmes for the Blocks (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 work programmes for the Blocks (Appendix B) did not identify any where significant underwater noise effects were likely.

5.4 Mitigation

5.4.1 Mandatory requirements

Controls are currently in place to cover all significant noise generating activities on the UKCS, specifically including geophysical surveying. All seismic surveys (including Vertical Seismic Profiling and high-resolution site surveys), sub-bottom profile surveys and shallow drilling activities require an application for consent and cannot proceed without it. These applications are supported by an EIA, which includes a noise assessment. Applications are made through DECC's Portal Environmental Tracking System (PETS) using a standalone Master Application Template (MAT) and Geological Survey Subsidiary Application Template (SAT) (see Figure 2.4). DECC circulates each application to the relevant statutory consultees for advice and a

decision on whether to grant consent is only made after careful consideration of their comments. Statutory consultees may request additional information or risk assessment, specific additional conditions to be attached to consent (such as specify timing or other specific mitigation measures), or advise against consent.

It is a condition of consents issued under Regulation 4 of the *Petroleum Activities (Conservation of Habitats) Regulations 2001* (& 2007 Amendments) for oil and gas related seismic and sub-bottom profile surveys that the JNCC Seismic Guidelines are followed. Where appropriate, European Protected Species (EPS) disturbance licences may also be required under the Offshore *Marine Conservation (Natural Habitats, &c.) Regulations 2007* (as amended)[27].

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

- If marine mammals are likely to be in the area, only commence seismic activities during the hours of daylight when visual mitigation using Marine Mammal Observers (MMOs) is possible.
- Only commence seismic activities during the hours of darkness, or low visibility, or during periods when the sea state is not conducive to visual mitigation, if a Passive Acoustic Monitoring (PAM) system is used to detect marine mammals in the area, noting the limitations of available PAM technology (seismic surveys that commence during periods of darkness, or low visibility, or during periods when the observation conditions are not conducive to visual mitigation, could pose a risk of committing an injury offence) – the use of PAM as a mitigation tool will be required where JNCC and other SNCBs deem it appropriate.
- Plan surveys so that the timing will reduce the likelihood of encounters with marine mammals. For example, this might be an important consideration in certain areas/times, e.g. during seal pupping periods near Special Areas of Conservation for harbour seals or grey seals.
- Provide trained MMOs to implement the JNCC guidelines.
- Use the lowest practicable power levels to achieve the geophysical objectives of the survey.
- Seek methods to reduce and/or baffle unnecessary high frequency noise produced by the airguns (this would also be relevant for other acoustic energy sources).

5.4.2 Further mitigation measures

Proposed activities with a potentially significant acoustic impact on a designated SAC or SPA will be subject to the requirement for HRA. DECC require operators to provide sufficient information on the potential impact of proposed activities on relevant sites and their qualifying features as well as proposed further mitigation measures in their applications for Geological Survey consent. In all instances, DECC will expect strict implementation of the JNCC seismic guidelines. The information provided by operators must be detailed enough for DECC (and its

[27] 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.

advisors) to make a decision on whether the activities could lead to a likely significant effect. Depending on the nature and scale of the proposed activities (e.g. area of survey, source size, timing and proposed mitigation measures) and likely effects, DECC may undertake HRA to assess the potential for adverse effects on the integrity of sites.

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

5.5 Conclusions

Significant effects arising from underwater noise were only considered possible for SACs with marine mammals and fish 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). A significant effect on the features 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 37/26 and 37/27 (as indicated by the work programme), 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 harbour porpoises, 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 a 3D seismic survey, 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 likelihood of significant accidental spill effects that could result from licensing of the southern North Sea 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 recent Offshore Energy SEA2 (DECC 2011)[28]. 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 resulting from the proposed licensing of these 36 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.

The southern part of the North Sea is a gas province and so, although blowout risk cannot be excluded, it would not result in significant oil spillage. The only significant blowouts on the UKCS to date have been from West Vanguard (1985) and Ocean Odyssey (1988), both involving gas and not resulting in significant pollution.

[28] 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*).

Potential risks of oil spills are mitigated in the southern North Sea by the nature of the hydrocarbons present (natural gas). Spill risk is therefore associated mainly with transfer and storage of fuel and lubricating oils although condensate blowouts have also been considered (see Table 6.1). This allows a distinction in terms of relative risk to be made between Blocks in the southern North Sea gas province and those in other areas.

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

Since the mid-1990s, the reported number of spills has increased consistent with more rigorous reporting of very minor incidents (e.g. the smallest reported spill in 2013 was 0.000001 tonnes). However, the underlying trend in spill quantity (excluding specifically-identified large spills) suggests a consistent annual average of around 100 tonnes. In comparison, oil discharged with produced water from the UKCS in 2013 totalled 2,177 tonnes (DECC website[29]).

An annual review of reported oil and chemical spills in the UKCS is made on behalf of the Maritime and Coastguard Agency (MCA) by the Advisory Committee on Protection of the Sea (e.g. Dixon 2013). This includes all spills reported by POLREP reports[30] by the MCA and PON1 reports to DECC – the latter are published monthly on the DECC website[31]. In 2012 a total of 246 releases were attributed to oil and gas installations operating in the open sea. The 2012 annual total was the lowest recorded since 2004 and 33 fewer than the mean annual total of 279 releases reported between 2000 and 2011. Analysis of oil types showed that 37% of reported releases were lubrication and hydraulic oils, followed by fuel oils at 24% and crude oils at 17%. The corresponding statistics from the 2011 survey were 32%, 33% and 23% respectively. The majority of spills were small, with some 94% of releases being less than 455 litres (100 gallons).

Well control incidents (i.e. "blowouts" involving uncontrolled flow of fluids from a wellbore or wellhead) have been too infrequent on the UKCS for a meaningful analysis of frequency based on UK data. A review of blowout frequencies cited in UKCS Environmental Statements as part of the OESEA2 gives occurrence values in the range 1/1,000-10,000 well-years. Analysis of the SINTEF Offshore Blowout Database which is based on blowout data from the US Gulf of Mexico, UKCS and Norwegian waters for period 1980 to 2005, provided blowout frequencies (per drilled well) for exploration drilling of normal oil[32] (2.5×10^{-4}) and gas[33] wells (3.6×10^{-4}), as

[29] https://www.gov.uk/oil-and-gas-uk-field-data#oil-discharged-with-produced-water
[30] POLREP (pollution reports) relate to those issued in accordance with the Bonn Agreement, to alert Contracting Parties to relevant pollution events.
[31] https://www.gov.uk/oil-and-gas-environmental-data
[32] A well where the formation has an estimated gas/oil ratio less than 1,000.
[33] A well where the formation has an estimated gas/oil ratio exceeding 1,000.

well as deep high pressure high temperature[34] oil ($1.5x10^{-3}$) and gas ($2.2x10^{-3}$) wells (OGP 2010). Accident statistics for offshore units on the UKCS estimated an annual average frequency of blowouts[35] for mobile drilling units of $6.6x10^{-3}$ 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

The main oil weathering processes following a surface oil spill are spreading, evaporation, dispersion, emulsification, dissolution, oxidation, sedimentation and biodegradation. The anticipated reservoir hydrocarbon type in the southern North Sea Blocks is gas (although condensate may also be present), therefore spills of crude oil are not considered a risk. Diesel spills generally evaporate and disperse without the need for intervention. 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.

In the Elgin gas/condensate release in 2012, the observed sea surface contamination (primarily from condensate) was in line with modelling data, 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 ~50% of the condensate evaporating within approximately 24 hours under conditions relevant to the Elgin release. Brown weathered material was observed which also appeared to disperse naturally, including into the water column, reducing the quantity of material remaining on the sea surface (DECC 2012). The Elgin reservoir and hydrocarbons present are not considered a good parallel with southern North Sea fields where the hydrocarbons are dry gas.

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 southern North Sea Blocks would push spilled oil away from 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 studies completed for gas and condensate exploration and development in the southern North Sea (Table 6.1) provides a deterministic[36] estimate of time to beach (*ca*. 17h) only for a condensate blowout in Block 47/3 (26.5km from the coast). For the same blowout, stochastic modelling[37] indicated that the likelihood of hydrocarbons beaching was *ca*. 7%. All of the other worst case spill scenarios disperse rapidly and do not beach. It should be noted that the estimates in Table 6.1 are from worst case scenarios of unconstrained blowouts and large diesel spills with no intervention, combined with constant winds from one direction over a significant period of time, which is

[34] 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.
[35] 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).
[36] Assumes that a continuous 30 knot onshore wind occurs throughout the spill event - – note that this type of modelling will no longer be a requirement on adoption of the latest OPEP guidance.
[37] Stochastic modelling utilises metocean and meteorological inputs to determine likelihood of beaching and possible areas affected

improbable. With respect to stochastic modelling requirements, the most recent draft OPEP guidance (DECC 2015)[38] indicates that:

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

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

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

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

[38] Any applicable new OPEP submissions, five year reviews or new worst case scenario models submitted post 2015 amendments to the OPRC Regulations (see Section 6.4.1) must comply with this Guidance - http://www.hse.gov.uk/osdr/assets/docs/guidance-notes-opeps-rev1-may-2015.pdf

Table 6.1: Review of representative worst case deterministic and stochastic oil spill modelling for southern North Sea exploration wells and developments

Block	Water depth (m)	Spill type	Spill size	Model used & conditions	Time to beach (deterministic modelling)	Likelihood of beaching	Date of model run[1]
42/13	61	Total rig inventory diesel loss	300t (*ca*. 333.3m³)	OSIS (version not specified), 30 knot onshore wind	Disperses within 8 hours	Probability of beaching was zero	2010
44/14	56	Diesel spill	644t (*ca*. 715.6m³)	OSIS 4.1, 30 knot onshore wind	The spill would disperse offshore within 8 hours, *ca*. 17km from the UK shoreline	No beaching would be expected	2012
44/18	15-30	Total rig inventory (diesel and low toxicity oil based mud) loss	750t (*ca*. 889m^3) diesel, 150 tonnes LTOBM	OSIS 4.5.2, 30 knot onshore wind	Diesel/LTOBM spill crosses the UK/Dutch median line after 7 hours but fully disperses after 8 hours without approaching any coast.	No beaching would be expected	2012
44/18	15-30	Blowout, 51º API Brae B condensate	13.2t (*ca*. 17m³) per day for 28 days	OSIS 4.5.2, 30 knot onshore wind	Spill becomes insignificant 90km from the English coastline.	No beaching would be expected	2012
44/19	27	Diesel spill	600t (*ca*. 666.7m³)	OSIS 4.1, 30 knot onshore wind	Spill disperses within 8 hours and does not reach coastline	No beaching would be expected	2010
47/3	44	Total rig inventory diesel loss	334t (ca. 371m^3)	OSIS 4.2, 30 knot onshore wind	Spill disperses within 7 hours, *ca*. 13km from the UK coast	No beaching would be expected	2010
47/3	44	Blowout, 51º API condensate	222t (*ca*. 286.5m³) per day for a 48 hour period	OSIS 4.2, 30 knot onshore wind	Beaching occurs after 17 hours with a total of 373.5t (482m³) oil beaching	Stochastic modelling of a 222t release per day over 28 days gives a 7% probability that the spill will beach	2010
47/14	58	Total rig inventory diesel loss	644t (*ca*. 715.6m³)	OSIS 4.1, 30 knot onshore wind	The spill would disperse offshore within 9 hour, 16km from shore and 24.5km away from the rig location	No beaching would be expected	2010
48/29	27-37	Diesel spill	25.8t (*ca*. 27.5m³) and 121.5t (135m³)	OSIS (version not specified)	The spills travel 26.7km and 31.7km respectively and became insignificant after 7 and 8 hours respectively.	In both instances the probability of oil beaching is zero.	2009

Block	Water depth (m)	Spill type	Spill size	Model used & conditions	Time to beach (deterministic modelling)	Likelihood of beaching	Date of model run[1]
49/18	25	Total rig inventory (diesel and low toxicity oil based mud) loss	750t (*ca*. 889m^3) diesel, 150 tonnes LTOBM	OSIS 4.5.2, 30 knot onshore wind	The diesel/LTOBM spill fully disperses after 8 hours, 70km from the English coastline and does not cross the UK/Dutch median line	No beaching expected and it does not cross the UK/Dutch transboundary line.	2012
49/18	25	Blowout, 58.6º API Brae B condensate	12.4t (*ca*. 16m³) per day for 28 days	OSIS 4.5.2, 30 knot onshore wind	Condensate will disperse rapidly. The spill becomes insignificant 20km from the English coastline	Spill concentrated around the drilling location. There is a zero percent probability of the condensate beaching but a very low probability (<4%) that hydrocarbons will cross the median line under stronger SW winds.	2012

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).

Note: [1]In a letter to industry (23rd December 2010), DECC advised that spill models undertaken to inform OPEPs should be run for a minimum of 10 days using the worst-case hydrocarbon release rates during that period, and until none of the liquid hydrocarbons released during that period remains on the sea surface (i.e. until it has naturally dissipated or beached). If the minimum 10-day release period does not clearly identify the potential areas at risk, then the release period must be extended. Among other letters, this was in response to the Deepwater Horizon incident, and therefore models after December 2010 would have been run for those minimum periods identified above.

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.

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

Oil spill risks to marine mammals have been reviewed by successive SEAs[39] 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 oiling, 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 accidental ingestion or breathing of oily fumes can 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 drown as a result of these symptoms (Hammond *et al*. 2002).

Grey and harbour seals come ashore regularly throughout the year between foraging trips and additionally spend significantly more time ashore during the moulting period (February-April in grey seals and August-September in harbour seals) and particularly the pupping season (October-December in grey seals and June-July in harbour seals). 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 vulnerable to fouling by oil, should it reach nearshore habitats. They are closely associated with the sea surface and reliant upon fur, not blubber, for insulation.

Fish are at greatest risk from contamination by oil spills when the water depth is very shallow. In open waters deeper than 10m, the likelihood that contaminant concentrations will be high enough to affect fish populations is very small, even if chemical dispersants are used. In shallow or enclosed waters (note that chemical dispersants are not generally appropriate for use in such areas), high concentrations of freshly dispersed oil may kill some fish and have sublethal effects on others. Juvenile fish, larvae and eggs are most sensitive to the oil toxicity (Law *et al.* 2011). Available evidence suggests that salmon smolts utilise shallow water

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

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).

Benthic habitats and species may be sensitive to deposition of oil associated with sedimentation, although based on hydrocarbon types present or used in operations, together with the distance offshore, this is unlikely to be significant in the southern North Sea. However, evidence from the Florida barge spill (Buzzards Bay, Massachusetts, September 1969, in which 700m^3 of diesel fuel were released) suggests that in certain circumstances, contamination from oil spills could be long-term. Monitoring immediately following the spill suggested rapid recovery (reviewed by Teal & Howarth 1984), while subsequent studies 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).

6.3 Implications for site integrity of relevant sites

Table 6.2 below provides a consideration of potential accidental spill impacts associated with the Block work programmes and the conservation objectives of relevant sites in the southern North Sea (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

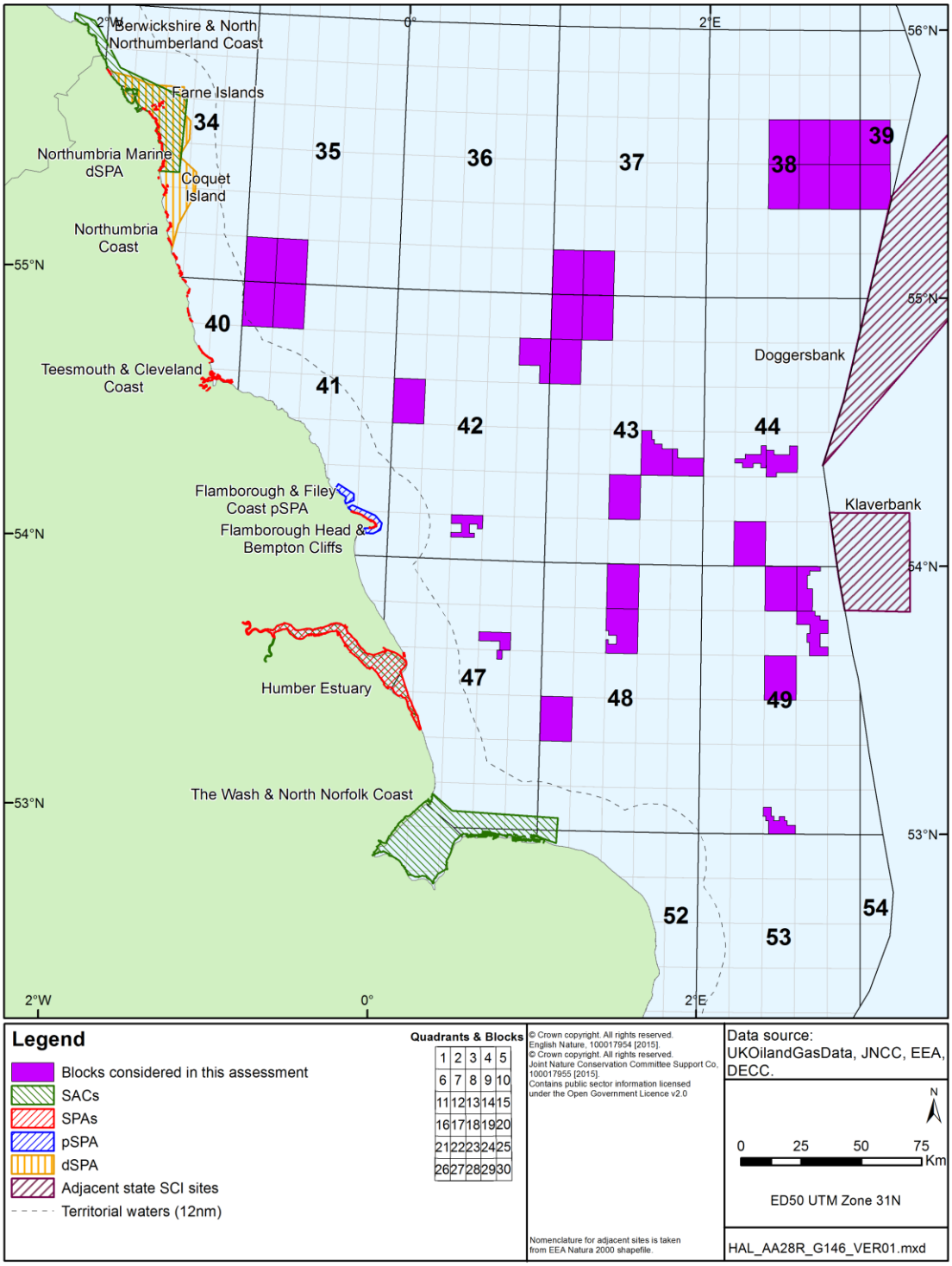


Table 6.2: Consideration of potential accidental spill impacts and relevant site conservation objectives

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Spill risk: Worst-case scenario likely to be release of the total drilling unit diesel fuel inventory or condensate blowout. 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.		
SPAs		
Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 43/7 (*ca*. 26.6km from shore) would disperse naturally within 7 hours, *ca*. 13km from shore. A condensate blowout could reach shore in *ca*. 17h with stochastic modelling indicating a relatively low (7%) likelihood of beaching.		
Northumberland Marine Draft SPA	Breeding terns and auks	**Conservation objectives:** Conservation objectives will be drafted prior to formal consultation. The following consideration is based on the possible qualifying features for the draft site[40]. **Consideration** Closest Block (35/26) is *ca*. 26km from the draft site. Possible qualifying features have a high (e.g. auks, sandwich and common tern) to moderate (e.g. Arctic and little tern) vulnerability to surface pollution (Williams *et al.* 1994). 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 (although not applicable until site confirmed for progression by Government and undergoes formal consultation, probably end of 2015).
Farne Islands SPA	Breeding tern, guillemot and puffin. Seabird assemblage.	**Conservation objectives:** 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. **Consideration** Closest Block (35/26) is *ca*. 64km from the site and an accidental diesel spill is unlikely to impact qualifying features within the site boundaries. However a spill may impact qualifying features foraging outside of the site (see relevant text on mobile qualifying features following this table). Qualifying features have a high (e.g. puffin, guillemot, sandwich and common tern) to moderate (e.g. Arctic tern) vulnerability to surface pollution (Williams *et al.* 1994). 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

[40] http://publications.naturalengland.org.uk/publication/5451695513403392?category=9001

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Northumbria Coast SPA	Breeding tern, overwintering waders	**Conservation objectives:** As above. **Consideration** Closest Block (41/1) is *ca*. 22km from the site. Qualifying features are moderately sensitive to toxic contamination caused by the introduction of non-synthetic compounds (e.g. hydrocarbons) [41]. 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.
Coquet Island SPA	Breeding terns and seabirds	**Conservation objectives:** As above. **Consideration** Closest Block (35/26) is *ca*. 39km from the site and an accidental diesel spill is unlikely to impact qualifying features within the site boundaries. However a spill may impact qualifying features foraging outside of the site (see relevant text on mobile qualifying features following this table). High (e.g. puffin) to moderate (e.g. terns) vulnerability of the qualifying features to surface pollution (Williams *et al.* 1994). 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.
Teesmouth and Cleveland Coast SPA	Breeding and on passage terns, on passage and overwintering waders.	**Conservation objectives:** As above. **Consideration** Closest Block (41/1) is *ca*. 19km from the site. High (e.g. sandwich tern) to moderate (e.g. little tern) vulnerability of the qualifying features to surface pollution (Williams *et al.* 1994). Other features (e.g. waders) appear to have a relatively low vulnerability to the direct effects of oil spills (Law *et al*. 2011). 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.
Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 42/13 would disperse naturally within 8 hours without reaching shore.		
Flamborough and Filey Coast pSPA	Breeding kittiwake, gannet, guillemot and razorbill. Seabird assemblage	**Conservation objectives:** As above. *Note: Natural England consulted recently on proposals to extend the existing Flamborough Head and Bempton Cliffs SPA and rename it as the Flamborough and Filey Coast SPA. The pSPA includes a proposed terrestrial extension to incorporate important breeding seabird colonies that currently fall outside the existing SPA. In addition, marine extensions out to 2km from the existing SPA are also proposed, due to the importance of these waters to breeding seabirds.* **Consideration** Closest Block (42/28c) is *ca*. 30km from the site and an accidental diesel spill is unlikely to impact qualifying features within the site boundaries. However a spill may impact qualifying features foraging outside of the site (see relevant text on mobile qualifying features following this table). High (e.g. auks, gannet) to moderate (e.g. kittiwake) vulnerability to surface pollution

[41] http://publications.naturalengland.org.uk/file/4520446

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
		(Williams *et al*. 1994). 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.
Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 47/14 would disperse naturally within 9 hours, *ca*. 16km from shore.		
Humber Estuary SPA	Breeding and overwintering waders, breeding tern, on passage waterfowl and waders	**Conservation objectives:** As above. **Consideration** Closest Blocks (47/9d & 47/14e) are *ca*. 31km from the site and an accidental diesel spill is unlikely to impact qualifying features within the site boundaries. Qualifying features moderately sensitive to toxic contamination caused by the introduction of non-synthetic compounds (e.g. crude oil) [42]. 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.
SACs		
Berwickshire and North Northumberland Coast SAC	Mudflats and sandflats, inlets and bays, reefs, sea caves, grey seal	**Conservation objectives:** Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring: • The extent and distribution of qualifying natural habitats and habitats of qualifying species • The structure and function (including typical species) of qualifying natural habitats • The structure and function of the habitats of qualifying species • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely • The populations of qualifying species, and, • The distribution of qualifying species within the site. **Consideration** Closest Block (35/26) is *ca*. 39km from the site and an accidental diesel spill is unlikely to impact habitat qualifying features within the site boundaries. However a spill may impact grey seal qualifying features foraging outside of the site (see relevant text on mobile qualifying features following this table). Qualifying features are moderately sensitive to toxic contamination from the introduction of non-synthetic compounds (e.g. oil spillage)[43]. The potential for an accidental spill to impact the populations of the qualifying species 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.

[42] http://publications.naturalengland.org.uk/file/3306602
[43] http://publications.naturalengland.org.uk/file/3495936

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 47/14 would disperse naturally within 9 hours, *ca*. 16km from shore.		
Humber Estuary SAC	Mudflats and sandflats, salt marshes and salt meadows, coastal lagoons, coastal dunes, river lamprey, sea lamprey, grey seal	**Conservation objectives:** As above. **Consideration** Closest Block (47/9d) is *ca*. 35km from the site and an accidental diesel spill is unlikely to impact habitat qualifying features within the site boundaries. However a spill may impact grey seal qualifying features foraging outside of the site (see relevant text on mobile qualifying features following this table). Qualifying features are moderately sensitive to toxic contamination from the introduction of non-synthetic compounds (e.g. oil spillage)[44]. The potential for an accidental spill to impact the populations of the qualifying species will be determined by the location and timing of drilling activities and mitigation measures (see Section 6.4) are available to ensure site conservation objectives are not undermined.
Relevant worst case spill modelling (Table 6.1): A large diesel spill in Block 48/29 would disperse naturally within 8 hours without reaching shore.		
The Wash and North Norfolk Coast SAC	Sandbanks, mudlfats and sandflats, inlets and bays, reefs, salt marshes and meadows, coastal lagoons, harbour seal, otter	**Conservation objectives:** As above. **Consideration** Closest Block (48/16) is *ca*. 30km from the site and an accidental diesel spill is unlikely to impact habitat qualifying features within the site boundaries. However a spill may impact harbour seal qualifying features foraging outside of the site (see relevant text on mobile qualifying features following this table). Harbour seal qualifying features are highly sensitive to toxic contamination from the introduction of non-synthetic compounds (e.g. oil spillage)[45]. The potential for an accidental spill to impact the populations of the qualifying species 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.
SACs in Adjacent States		
Relevant worst case spill modelling (Table 6.1): A large diesel/LTOBM spill in Block 49/18 would disperse after 8 hours and not cross the UK/Dutch transboundary line. A small condensate blowout (16m^3/day for 28 days) would cross the UK/Dutch median line after 150 hours and become insignificant after 28 days with stochastic modelling indicating a low (<4%) likelihood of crossing the median line.		
Doggersbank SCI	Sandbanks, harbour porpoise, harbour & grey seal	**Conservation objectives:** Source of relevant information not found. **Consideration** A number of Blocks (38/15, 38/19, 38/20, 39/11, 39/16, 44/17e, 44/18c) are within 25km of the site. Qualifying features are likely to be low to moderately sensitive to toxic contamination from the introduction of non-synthetic compounds (e.g. oil spillage) (based on information in Law *et al*. 2011). 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.

[44] http://publications.naturalengland.org.uk/file/3306602
[45] http://publications.naturalengland.org.uk/publication/3244315

Relevant sites	Relevant qualifying features	Consideration against conservation objectives
Klaverbank SCI	Reefs, harbour porpoise, harbour & grey seal	**Conservation objectives:** For reefs: Improve the quality; maintain the surface area. For harbour porpoise, grey seal and harbour seal: Maintain extent and quality of habitat in order to maintain population[46]. **Consideration** A number of Blocks (44/18c, 49/3, 49/4d, 49/9d) are within 25km of the site. Qualifying features are likely to be low to moderately sensitive to toxic contamination from the introduction of non-synthetic compounds (e.g. oil spillage) (based on information in Law *et al*. 2011). 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.

[46] http://www.zeeinzicht.nl/docsN2000/Relevant%20Documents,%20annexed%20to%20the%20letter%20of%20request_reduced%20size%20pdf.pdf

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 puffin, guillemot, kittiwake, fulmar and gannet.

Like other auks, puffin (qualifying feature of Farne Islands SPA, Coquet Island SPA and part of the breeding seabird assemblage of Flamborough and Filey Coast pSPA) are vulnerable to oil pollution due to the amount of time they spend on the water. This is especially true during late winter when they are flightless (moulting); the whole of the North Sea holds low densities at this time. During the breeding season, areas around breeding colonies become important (Stone *et al*. 1995).

Similarly guillemot (qualifying feature of Farne Islands SPA, Flamborough and Filey Coast pSPA) are most vulnerable to oil pollution during their autumn moult, when they are also flightless. During this time, high densities of birds are found off the north east coast of England and at the Dogger Bank, and high densities of birds continue to occur in these areas through winter, though they are also found more widely throughout the North Sea at this time (Stone *et al*. 1995). During the breeding season (May to June), highest densities are associated with breeding colonies, and moderate to high densities are found over the Dogger Bank when birds disperse following breeding.

Razorbill (qualifying feature of Flamborough and Filey Coast pSPA) are most vulnerable to oil pollution during their autumn moult (August to September), when they are also flightless. During this time, high to moderate densities of birds are found off Flamborough Head as they disperse from the breeding colony, with low to moderate densities of birds found in the southern North Sea through winter (Stone *et al*. 1995).

Kittiwake (qualifying feature of Flamborough and Filey Coast pSPA) are more vulnerable to oil pollution than other gulls because they spend more time at sea although they are at less risk than diving birds (e.g. auks) because of their aerial lifestyle. During the breeding season (June to July), high densities of kittiwakes are associated with breeding colonies. Birds then disperse over the North Sea in low densities, with higher densities of birds being found over the Dogger Bank in autumn and winter (Stone *et al.* 1995). The Dogger Bank also appears to support consistently high or moderate densities of fulmar throughout the year (Stone *et al*. 1995).

With respect to gannet foraging, Langston *et al.* (2013) reported on a DECC-funded project to track the foraging trips of breeding adult gannets from Bempton Cliffs (part of the Flamborough and Filey Coast pSPA) between 2010-2012, with respect to potential development zones for offshore wind energy generation in the North Sea. They found that distance to colony had the over-riding influence on foraging range. In 2010 and 2011 the core foraging range represented by the 50% kernel density (darkest blue on Figure 6.2), extended to approximately 50km from Bempton Cliffs, whereas in 2012 it extended to about 150km into the sea. Some information was obtained for the early post-breeding period in each year, indicating variability in dispersal and migration away from Bempton Cliffs. For example, relatively few locations were recorded within the Dogger Bank zone during chick-rearing but there were more post-breeding. Tracking data from Wakefield *et al.* (2013) indicated that some gannets from Bass Rock in the Forth Island SPA (41 birds tagged in 2010, 28 in 2011) may forage over some of the more northern 28th Round southern North Sea Blocks. Wakefield *et al.* (2013) also noted distinct colony-specific home ranges for gannets determined by density-dependent competition

(rather than territoriality), with foraging from different colonies largely being in mutually exclusive areas.

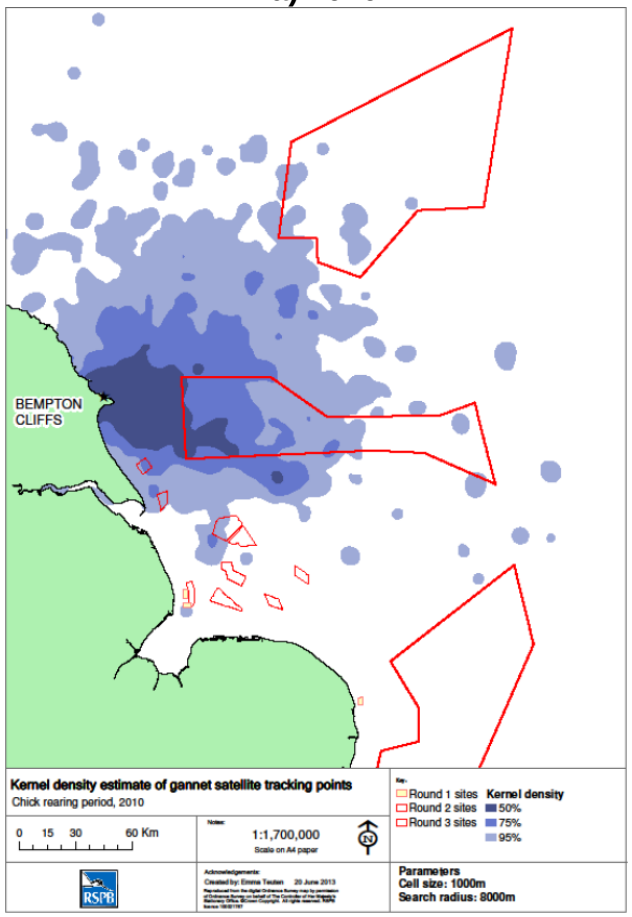
Of particular relevance are important areas of seabird activity outside designated sites which have been identified around the UK coast as part of an ongoing process to identify possible marine SPAs (Kober *et al*. 2010, 2012). Important areas were identified through application of the UK SPA selection guidelines to the European Seabirds at Sea data (1980-2006, Figure 6.3). Relevant offshore areas supporting important numbers of birds were identified for Arctic tern, puffin and fulmar in the northern part of the southern North Sea, none of which coincide with southern North Sea Blocks, though which have contributed to the identification of the Northumberland Marine dSPA.

Both grey and harbour seals forage within the southern North Sea (see Figure 5.1 and Section 5.3.1). Grey seals from the Berwickshire and North Northumberland Coast and Humber Estuary SACs appear to forage widely over the region coinciding with a number of 28th Round Blocks. Harbour seals use a more restricted area radiating out from the Wash. Usage by both seal species of offshore areas close to the Dutch offshore sites appears to be low or very low. Whilst Section 5.3.1 suggested that caution should be used in interpreting the foraging data, potential drilling activities (and accidental spills) in a number of 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.

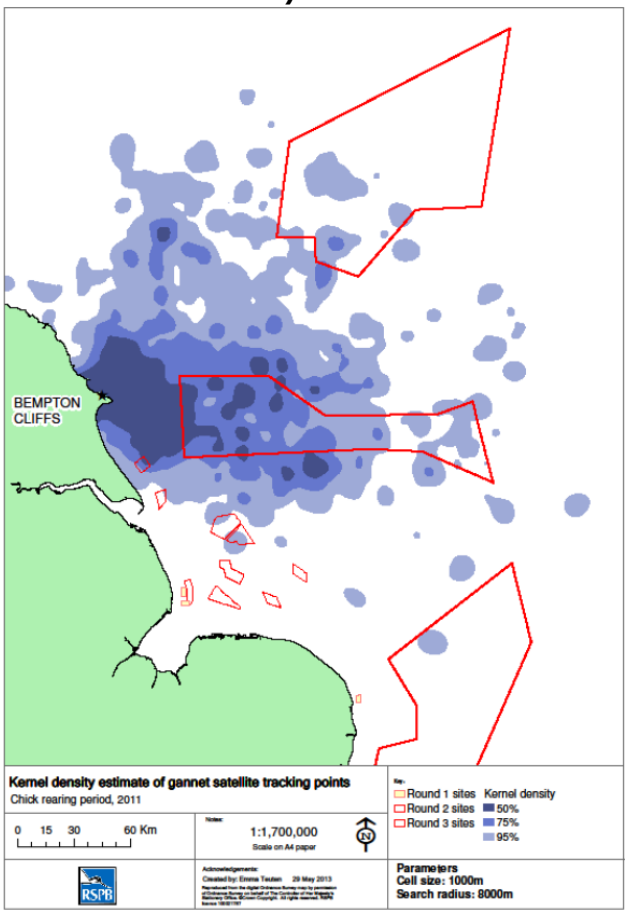
Section 5.3.1 also indicated that the southern North Sea was an important area for harbour porpoise (e.g. Hammond *et al*. 2013) with both the Doggersbank and Klaverbank SCI sites in Dutch waters having harbour porpoise as a qualifying feature. While no SAC sites have yet been defined for harbour porpoise in the UK sector of the southern North Sea, the North-western edge of Dogger Bank (summer), inner Silver Pit and the offshore area east of Norfolk and east of outer Thames estuary have been identified as having a persistent high density of animals during the summer (Heinänen & Skov 2015). The JNCC intends to formally consult on potential sites for SAC designation for harbour porpoise in summer 2015. Whilst current evidence does not suggest more than a low vulnerability to oil spills (Law *et al*. 2011), an accidental oil spill within a number of the Blocks could potentially impact harbour porpoise foraging and mitigation measures (see Section 6.4) may be required to ensure any future site conservation objectives are not undermined.

Figure 6.2: Kernel density estimation for adult gannets during chick-rearing showing the 50%, 75% and 95% density contours

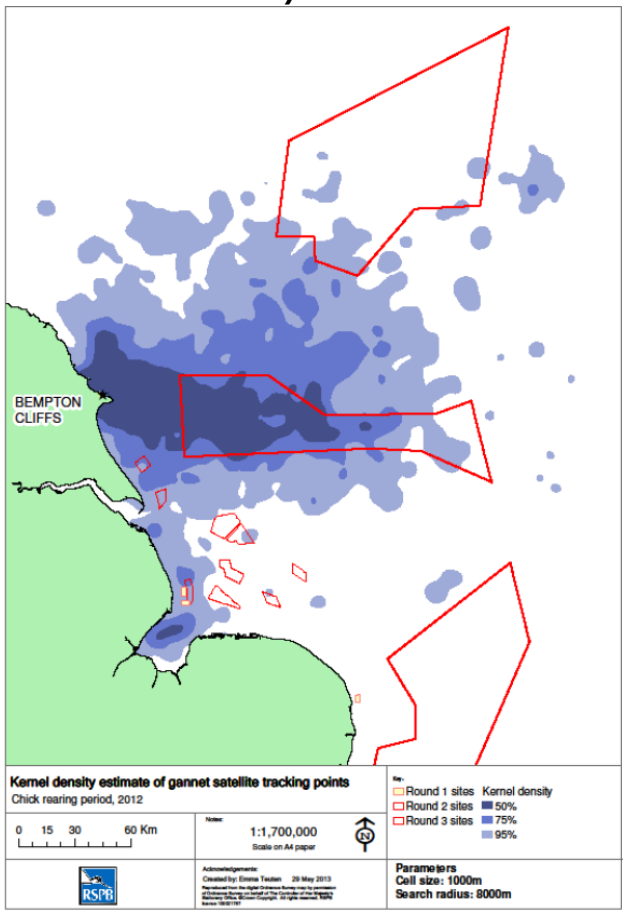
a) 2010



b) 2011

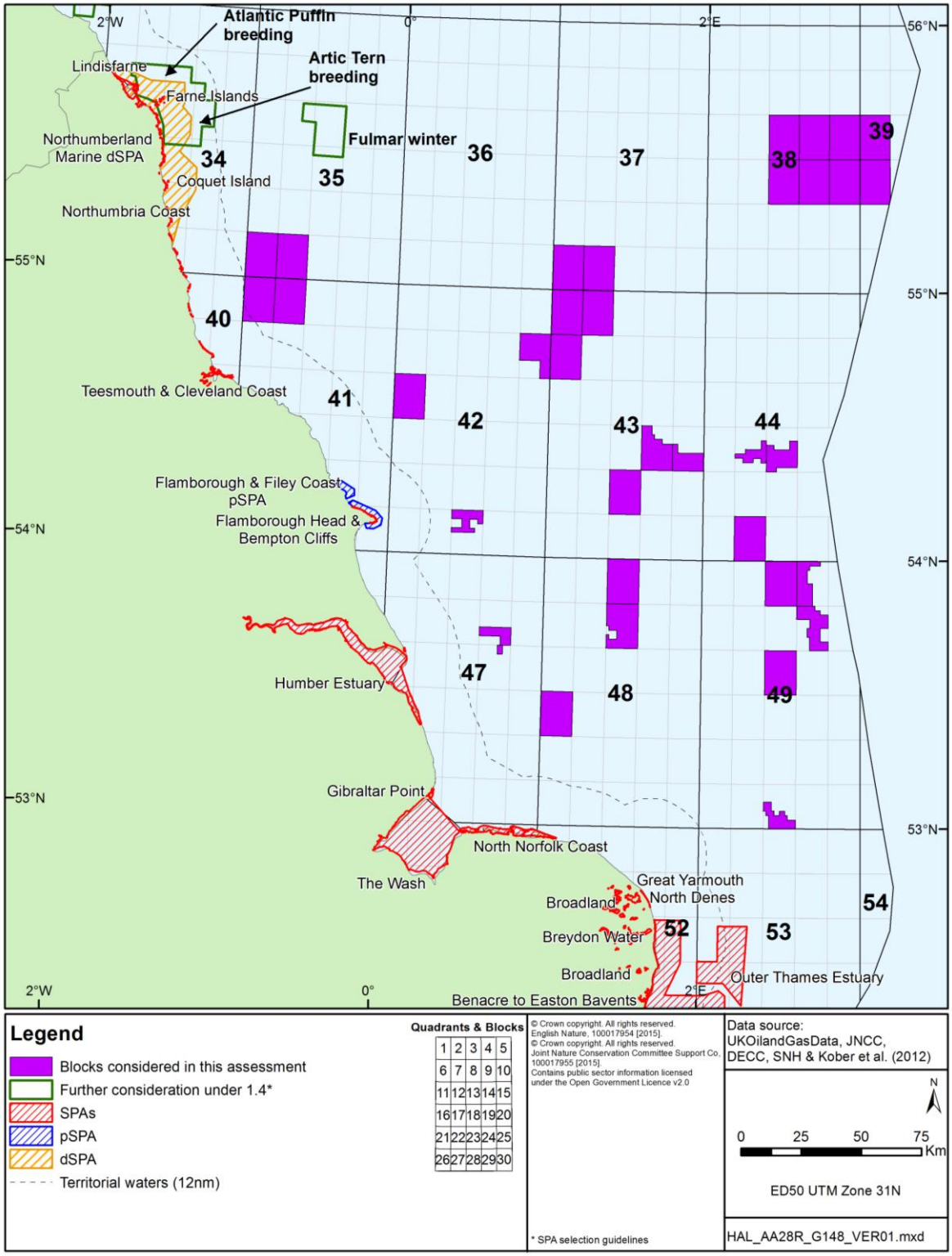


c) 2012



Notes: a) 2010 (n = 14), b) 2011 (n = 13) & c) 2012 (n = 15)
Source: Langston et al. (2013)

Figure 6.3: Important seabird areas relevant to the southern North Sea Blocks



6.4 Mitigation

6.4.1 Mandatory requirements

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

- Monitoring and surveillance (from installation, vessel, aircraft, satellite)
- Dispersion (natural or chemically/mechanically assisted)
- Containment and recovery (booming and mechanical recovery)
- Source control (well capping and relief well operations)

In June 2013 the EU published the Directive on the safety of offshore oil and gas operations. The objective of this Directive is to reduce as far as possible the occurrence of major accidents related to offshore oil and gas operations and to limit their consequences. DECC and HSE are jointly leading the transposition of the Directive as it contains requirements relating to licensing, environmental protection, emergency response and liability, in addition to safety. The Directive has to be implemented by 19th July 2015. While the required content of OPEPs remains largely consistent with existing guidance, there are a number of proposed amendments introduced by the *Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation Convention) (Amendment) Regulations 2015*[47] and updates to OPEP[48] guidance to fulfil specific requirements of the Directive.

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

[48] 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

Offshore, primary responsibility for oil spill response lies with the relevant operator and their accredited third party pollution responders, although the Secretary of State's Representative may intervene if necessary. The MCA is responsible for a National Contingency Plan and maintains a contractual arrangement for provision of aerial spraying, with aircraft based at East Midlands and if necessary, Inverness. MCA holds counter-pollution equipment (booms, adsorbents etc.) which can be mobilised within 2-12 hours depending on incident location, in addition to a stockpile of chemical dispersant[49].

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

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

- an appropriate dispersant[48] can be applied within 30 minutes of a pollution incident; and
- sufficient dispersant stocks are available to treat a minimum oil release of 25 tonnes,
- appropriate at sea and shoreline response resources can be available on scene within half the time taken for the oil to beach.

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

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

6.4.2 Further mitigation measures

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

Whilst the indemnity and insurance group of OSPRAG concluded that the current Offshore Pollution Liability Association Limited (OPOL) level of US $250 million is appropriate in the majority of scenarios, in certain limited cases spill clean up and compensation costs could result in claims above this limit. Guidance issued by Oil & Gas UK (OGUK) in November 2012 outlined a new process by which operators assess the potential cost of well control, pollution remediation and compensation, with a subsequent requirement to demonstrate to DECC financial capability to address these potential consequences. DECC released a guidance note to industry[50] 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.

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

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

6.5 Conclusions

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

[50] 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).

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

- Many sites are considered not to be at risk from accidental 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). 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 southern North Sea; however, given the nature of the hydrocarbons that may be encountered following licensing, and as these 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 35/26, 35/27, 37/26, 37/27, 38/13, 38/14, 38/15, 38/18, 38/19, 38/20, 39/11, 39/16, 41/1, 41/2, 42/10b, 42/11, 42/28c, 43/1, 43/2, 43/6, 43/19b, 43/20c, 43/23, 44/17e, 44/18c, 44/27, 47/9d, 47/14e, 48/3, 48/8b, 48/16, 49/3, 49/4d, 49/9d, 49/13 and 49/28e, 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, which may include the drilling of a number of wells, 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 southern North Sea, 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 mechanism. Additionally, the first Marine Plans (East Inshore and East Offshore) were published in June 2014[51] and set out objectives and policies to guide development in the southern North Sea over a 20-year period.

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 potential interactions with operations that could arise from 28th Round Block licensing have been identified. Interactions were identified on the basis of the nature and location of the proposed activities, using a combination of documents submitted as part of project applications and related spatial datasets in a Geographic Information System (GIS).

Table 7.1: Projects relevant to the cumulative and in-combination assessment of the southern North Sea Blocks

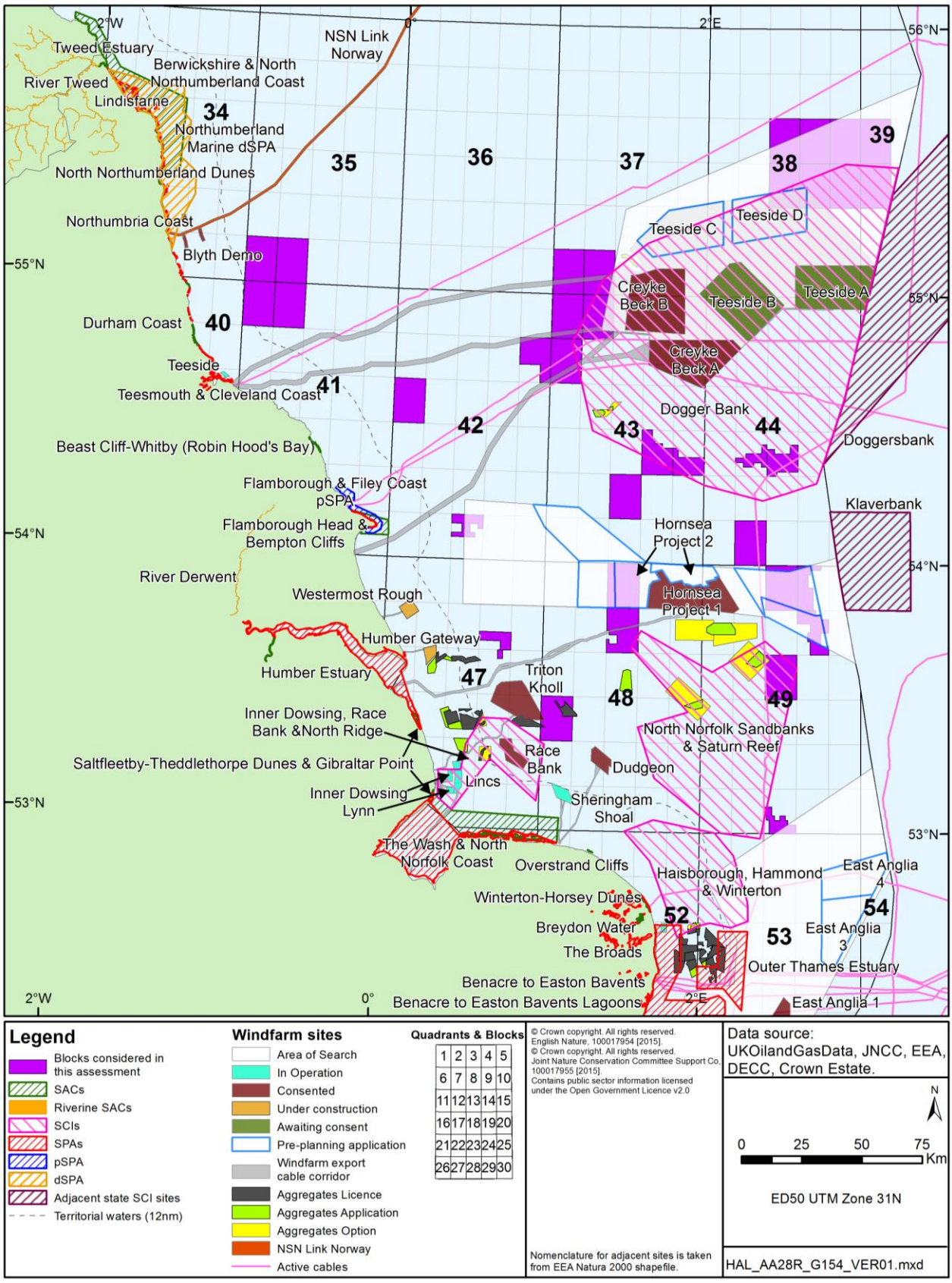
Relevant projects	Project summary	Project status
Norway - UK electricity Interconnector (National Grid NSN Link)	Development of an electrical high-voltage direct current (HVDC) interconnector between Norway and the UK. Proposed interconnector would have a capacity of 1,400MW and would run from Hylen, in southwest Norway, to the Northumberland coast. Generally cable will be buried at 1-2m below the seabed, however, certain sections, at cable and pipeline crossings and where burial may not be feasible, will be laid on the seabed with additional protection. Final route of the marine cable will be within the 500m wide survey corridor[52]	Licence issued December 2014 Construction due to begin 2017/2018[53]
Westermost Rough offshore wind farm (DONG Energy)	Offshore wind farm with an installed capacity of up to 245MW comprising up to 80 wind turbine generators. Located approximately 8km from the Holderness coast[54].	Licence granted November 2013 Expected to be commissioned in 2015

[51] https://www.gov.uk/government/publications/east-inshore-and-east-offshore-marine-plans
[52] https://marinelicensing.marinemanagement.org.uk/mmo/fox?thread_id=esWzx_dtp3ZGM99&app_mnem=live&xfsessionid=sid_esWjR_dtp3ZGM99
[53] http://nsninterconnector.com/about/project-timeline/
[54] https://www.og.decc.gov.uk/EIP/pages/projects/Westermost.htm

Relevant projects	Project summary	Project status
Humber Gateway wind farm (E.ON Climate and Renewables UK Limited)	Offshore wind turbine generating station with an installed capacity of 219MW comprising 73 wind turbine generators. Located 8km off the Holderness coast[55].	Granted consent February 2011 Plans to be commissioned in 2015
Triton Knoll wind farm (RWE Innogy UK)	Offshore wind turbine generating station with an installed capacity of up to 1.2GW (now revised to 0.9GW) comprising up to 288 wind turbine generators. Located *ca*. 33km off the coast of Lincolnshire and 46km off the coast of North Norfolk[56].	Granted development consent July 2013.
Race Bank wind farm (DONG Energy RB (UK) Limited)	Proposed offshore wind farm with a generating capacity of up to 580MW, comprising up to 116 wind turbines. Located 27km north of Blakeney Point off the coast of Norfolk[57].	Consent granted July 2012. Offshore construction estimated to begin spring 2016
Dudgeon Offshore wind farm (Dudgeon Offshore Wind Limited)	Proposed offshore wind farm with a generating capacity of up to 400MW (reduced from 580MW), comprising up to 77 wind turbines (reduced from 168)[58]. Located 32km north of Cromer off the coast of Norfolk.	Variation to original planning approval granted December 2013. Wind farm planned to be completed in 2017.
Dogger Bank Creyke Beck (Forewind)	Dogger Bank Creyke Beck (previously known as Dogger Bank Offshore Wind Farm) is the first stage of Forewind's offshore wind energy development of the Dogger Bank Zone. It will comprise two wind farms, each with an installed capacity of up to 1.2GW. Therefore, Dogger Bank Creyke Beck could have a total installed capacity of up to 2.4GW[59].	Development consent for the Creyke Beck wind farms granted in February 2015.
Dogger Bank Teesside A & B (Forewind)	Dogger Bank Teesside A & B (previously part of Dogger Bank Teesside) is the second stage of Forewind's offshore wind energy development of the Dogger Bank Zone. Dogger Bank Teesside A & B will comprise up to two wind farms, each with an installed capacity of up to 1.2GW[60].	Planning consent for Teesside A & B will be determined mid to late 2015.
Hornsea Zone Project One (DONG Energy)	Project One is the first development proposed within the Hornsea Zone. It will constitute up to three offshore wind generating stations with a total capacity of up to 1.2GW. The DCO for Project One authorised the construction and operation of up to 320 wind turbines[61]. Project scheduled to commence operation in 2020.	Granted development consent December 2014.
East Anglia ONE Offshore Windfarm (East Anglia Offshore Wind Limited)	Development of an offshore wind farm consisting of up to 240 wind turbine generators with an installed capacity of 1.2GW, located 43km from the Suffolk Coast. Part of a development of *ca*. 7.2GW of wind capacity in East Anglia Zone[62]. Construction expected to begin in 2017 with first power in 2019.	Granted development consent June 2014

[55] https://www.eonenergy.com/About-eon/our-company/generation/planning-for-the-future/wind/offshore/humber-gateway/project-information
[56] http://infrastructure.planningportal.gov.uk/projects/east-midlands/triton-knoll-offshore-wind-farm/
[57] https://www.og.decc.gov.uk/EIP/pages/projects/RaceDecision.pdf
[58] https://www.og.decc.gov.uk/EIP/pages/projects/VariationFINALDecisionModifications.pdf
[59] http://infrastructure.planningportal.gov.uk/projects/yorkshire-and-the-humber/dogger-bank-creyke-beck/
[60] http://infrastructure.planningportal.gov.uk/projects/yorkshire-and-the-humber/dogger-bank-teesside-ab/
[61] http://infrastructure.planningportal.gov.uk/projects/yorkshire-and-the-humber/hornsea-offshore-wind-farm-zone-4-project-one/
[62] http://infrastructure.planningportal.gov.uk/projects/eastern/east-anglia-one-offshore-windfarm/

Figure 7.1: Location of current projects relevant to the southern North Sea Blocks



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.

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)"*[63]. 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)[63] where scheduling overlaps may occur should allow both for developer cooperation, and the mitigation of potential cumulative or in-combination effects.

This is also reflected in the East Inshore and East Offshore Marine Plans (paragraph 295) which state *"Future oil and gas activity has the potential to require access to the same area of seabed as other activities. In most cases, the consequence of this will be insignificant due to the small footprint of oil and gas production infrastructure. In some cases this may not be the case, such as where another user of the sea bed has a lease in place. Where a lease has been agreed for a co-located activity, there may be a requirement for negotiation between parties involved."* and is supported in plan policies such as GOV2 and GOV3, which respectively promote the maximisation of activity co-existence, and the demonstration that activity displacement will be avoided, minimised or mitigated.

There are also a number of licences for the extraction of aggregates held in the southern North Sea, these are also indicated on Figure 7.1. Licences are normally granted for a 15 year period with restrictions of average off-take of aggregate per annum imposed. In relation to the Blocks considered in this assessment, Block 48/16 overlaps with two licences held for aggregate extraction (Crown Estate Application Areas 440 and 441) while Block 49/13 overlaps slightly with an area listed by Crown Estate as an option[64] for aggregate extraction.

[63] DECC 28th Round other regulatory issues

[64] Option agreement between The Crown Estate and a marine aggregate company for exclusive rights to search, seek permission for and extract sand and gravel within a defined geographical area for an agreed term. Source: http://www.thecrownestate.co.uk/media/5635/marine_aggregate_glossary.pdf

7.3 Underwater noise

Seismic survey (only proposed for Blocks 37/26 and 37/27 and as part of a single licence application) and other noise producing activities (e.g. rig site survey, VSP) that might follow the proposed licensing of the southern North Sea Blocks are anticipated to be widely separated in space and time. Therefore, any acoustic disturbance to marine mammals with the potential to cause displacement from foraging areas will be short-term and infrequent. SMRU (2007) note that "*The effects of repeated surveys are not known, but insignificant transient effects may become important if potentially disturbing activities are repeated and/or intensified.*" There is the potential for cumulative noise impacts where concurrent and sequential activities result in long-term exposure to elevated noise levels within the wider area. During the period 1995-2010 reviewed by Stone (2015b), seismic activity in the southern North Sea was consistent over time, albeit with some peaks and troughs, making up just under 20% of all surveys[65] across the UKCS.

Other noise producing activities which are likely to occur within the southern North Sea include those associated with the development of offshore wind energy. Offshore wind energy is in the process of large-scale development off the east coast of England and wider southern North Sea. In addition to the constructed 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 works are expected to begin in near future at Race Bank and Dudgeon. For several, final investment and construction decisions are pending, while construction at Westermost Rough and Humber Gateway has begun and both are expected to be commissioned in 2015.

The first phase of development of the Round 3 offshore wind zones in the area have been or are close to being consented (Table 7.1). With respect to the Dogger Bank zone, the Forewind development programme for both the Creyke Beck and Teesside areas indicates that the development consent applications were submitted in Q3 2013 and Q1 2014 respectively. Development consent was granted for the Creyke Beck project in February 2015 and a recommendation from the Planning Inspectorate on the Teesside project is expected to be made in May 2015, with the Secretary of State's decision due later. Construction of the projects is proposed between 2016 and 2021, and operation from 2017 onwards. In the Hornsea zone, development consent was granted in 2014, and construction of Project One is proposed between 2015 and 2017. An application to the Planning Inspectorate was submitted in January 2015 for Hornsea Project Two (planned capacity of up to 1.8GW[66] and consisting of between 80 and 360 turbines). Further south in the East Anglia zone, development consent was granted in June 2014 for East Anglia ONE, and construction of the wind farm is proposed to start in 2016[67]. East Anglia THREE and FOUR are in the pre-application stage of planning, and scoping reports for both proposed wind farms were published in late 2012. These projects are to be planned and developed in parallel.

The consenting of offshore wind developments in the region is subject to detailed project-specific EIA and Habitats Regulations Assessments. The development of offshore wind energy is also taking place in other North Sea nations, with plans for several large

[65] Stone (2015b) indicated that a total of *ca*. 100 seismic surveys were carried out on the UKCS in 2010 including 2D and 3D seismic surveys (10%), site surveys (60%) and VSP (20%).
[66] SMart Wind website - http://www.smartwind.co.uk/project2.aspx
[67] East Anglia Offshore Wind Limited website - http://www.eastangliawind.com/east-anglia-one.aspx

developments close to the UK median line, although these will similarly be subject to EIA and Habitats Regulations Assessments.

There is currently no infrastructure in the region associated with the extraction of wave and tidal energy, and none is envisaged in the immediate future. Prospective areas for wave and tidal development in the southern North Sea were identified in OESEA2 (DECC 2011) and the East Marine Plans (see policy TIDE1 and related policy map).

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 37/26 and 37/27 which are relatively close to the Creyke Beck B site (Figure 7.1). Block 37/27 partly overlaps with the Dogger Bank SCI, within which the Creyke Beck and Teesside offshore wind developments are situated. However, the Dogger Bank SCI qualifying feature (sandbanks) and associated communities are not regarded as sensitive to non-physical disturbance through noise[68]. As described in Section 5.3.1, grey and harbour seals which are qualifying features of the Humber Estuary SAC and The Wash and North Norfolk Coast SAC respectively, and are sensitive to underwater noise, appear to make low (harbour seal) or moderate (grey seal) use of Block 37/26 and 37/27, and the Dogger Bank area in general. Therefore significant effects on sensitive qualifying features outside of designated sites are unlikely.

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

[68] http://jncc.defra.gov.uk/PDF/DoggerBank_ConservationObjectivesAdviceonOperations_6.0.pdf

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 stage of planning and development of Round 3 wind farms in the southern North Sea, and the relatively discrete level of activity which could arise from the completion of the work programmes, 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 southern North Sea 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 7.2), fishing, shipping, military exercise areas, wildlife watching cruises) and planned (e.g. oil and gas exploration and production) noise-producing activities in overlapping or adjacent areas. Despite this, DECC is not aware of any projects or activities which are likely to cause cumulative and in-combination effects that, when taken in-combination with the likely number and scale of activities proposed by the work programmes (see Section 2.2), would adversely affect the integrity of the relevant sites. This is due to the presence of effective regulatory mechanisms which ensure that operators, DECC and other relevant consenting authorities take such considerations into account during activity permitting. These mechanisms generally allow for public participation in the process, and this will be strengthened by regulations amending the offshore EIA regime which may come into force 2015/2016. These will reflect Directive 2014/52/EU (amending the EIA Directive) which provides for closer co-ordination between the EIA and Habitats Directives, with a revised Article 3 indicating that biodiversity within EIA should be described and assessed "*with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC".*

With respect to the ongoing process to implement the Marine Strategy Framework Directive, the first stage (reported in previous 27th Round AA documents) was for Member States to carry out an initial assessment of the current status of their seas, determine specific characteristics of Good Environmental Status (GES) for their marine waters and set out specific environmental targets and indicators to underpin this (based on the 11 descriptors of GES given in the Directive). The UK completed this first stage in December 2012 with the publication of the Marine Strategy Part One. The second stage required Member States to establish and implement monitoring programmes to measure progress towards GES. The final stage is the implementation of management measures to achieve GES by 2020. These have to be developed by 2015 and implemented by 2016. A consultation on the UK's proposed programme of measures closed in April 2015[69]. 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

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

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

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

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

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

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

Cefas, funded by Defra, are currently scoping out an ambient noise monitoring programme which will be coordinated through the UK Clean and Safe Seas Evidence Group with input from the Underwater Sound Forum and the EU Technical Sub-Group (TSG) on Noise. This project will identify the most appropriate equipment for monitoring ambient noise and provide sample data to determine its suitability for meeting the requirements of the Directive. After this it will be necessary to design and implement an appropriate UK monitoring programme (post/during 2014) which will be developed taking a risk-based approach i.e. identifying those areas where shipping levels are highest. Hydrophone deployments are being undertaken in Northern Irish waters as part of the moored inshore monitoring programme to test the potential for background noise assessments and to help develop the science for making these assessments adequately. This work aims to define background noise levels (using the MSFD descriptor) and to help inform the development of a formal monitoring programme suitable for regional assessments. Marine Scotland is developing a programme for the deployment of monitoring devices off the east coast of Scotland to monitor noise levels from anthropogenic activity. The primary aim is to monitor noise from offshore renewable developments, but the devices are also capable of recording ambient noise at the frequencies required in the MSFD indicators.

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.

7.4 Other potential in-combination effects

7.4.1 Physical damage/change to features and habitats

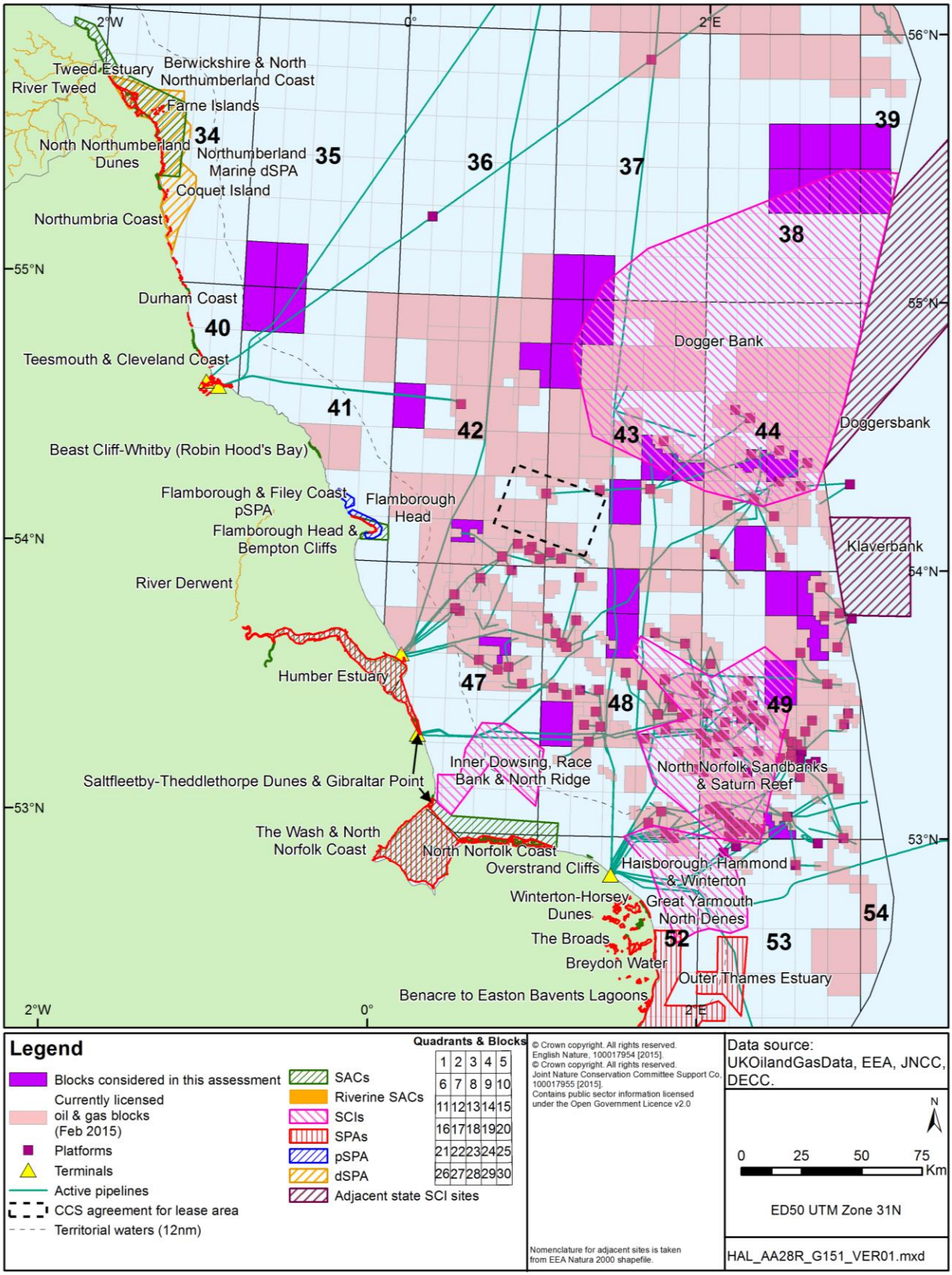
Potential sources of physical disturbance to the seabed, and damage to biotopes, associated with oil and gas activities that could result from licensing were described in Section 4.2 and include the placement of jack-up drilling rigs and wellhead placement and recovery.

No 28th Round Blocks overlap with areas identified for current offshore wind farm projects (see Table 7.1 and Figure 7.1) and which coincide with Natura 2000 sites. Similarly, cumulative effects associated with aggregate extraction are unlikely given that Block 49/13 is the only Block which overlaps (to a very small extent) with an aggregate option area and the North Norfolk Sandbanks and Saturn Reef SCI site. The relevant qualifying features of the SCI site (sandbanks) are moderately sensitive to physical damage[70] and given the small and temporary seabed footprint associated with drilling activities, significant in-combination effects with potential aggregate extraction activities are not likely.

With regards to the southern North 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 and decommissioning projects (as of February 2015) published by DECC's Project Pathfinder[71] indicates 7 current projects for Blocks within the Southern North Sea. The only relevant project is a subsea tieback in Block 44/19a, although few details are available. This Block is adjacent to the 28th Round Block 44/18c (up to 3 drill or drop wells proposed) and within the Dogger Bank SCI. Within the site, the qualifying feature (sandbanks) is moderately sensitive to physical damage through disturbance or abrasion[72]. With respect to the 9 decommissioning projects identified by Project Pathfinder, only two are adjacent to 28th Round Blocks and coincide with a Natura 2000 site; a well abandonment in Block 49/18 (adjacent to Block 49/13) and a field decommissioning in Block 49/28 (adjacent to Block 49/28e). The Blocks partly overlap the North Norfolk Sandbanks and Saturn Reef SCI site, the qualifying features of which (sandbanks and reefs) are moderately sensitive to physical damage through disturbance or abrasion[73]. Given the small and temporary seabed footprint associated with drilling activities, significant in-combination effects associated with other oil and gas projects in adjacent Blocks is not expected.

[70] http://jncc.defra.gov.uk/pdf/NNSandbanksandSaturnReef_ConservationObjectives_AdviceonOperations_6.0.pdf
[71] https://itportal.decc.gov.uk/eng/fox/path/PATH_REPORTS/pdf
[72] http://jncc.defra.gov.uk/PDF/DoggerBank_ConservationObjectivesAdviceonOperations_6.0.pdf
[73] http://jncc.defra.gov.uk/pdf/NNSandbanksandSaturnReef_ConservationObjectives_AdviceonOperations_6.0.pdf

Figure 7.2: Location of existing oil & gas infrastructure relevant to the southern North Sea Blocks



In general, cumulative effects are likely to be dominated by trawling, with potential scour and physical damage from cable laying and other activities associated with potential offshore wind developments (e.g. Round 3 wind farm zones), which are likely to be more important in the future. Figure 7.1 indicates that there is very little potential for the wind farm export cable corridors identified to coincide with 28th Round Blocks and Natura 2000 sites which may be sensitive to physical damage.

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

7.4.2 Physical presence

Physical presence of offshore infrastructure and support activities may also potentially cause behavioural responses in fish, birds and marine mammals. Previous SEAs have considered the majority of such behavioural responses resulting from interactions with offshore oil and gas infrastructure (whether positive or negative) to be insignificant; in part because the number of 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. Potential displacement and barrier effects will likely be an important consideration at the project level for the large offshore wind developments that are planned for the southern North Sea and will likely form an important part of associated HRAs (as indicated by the record of the HRA undertaken for the recently consented East Anglia ONE offshore wind farm[74]).

Though representing an incremental source of activity in and around offshore wind farm zones, it is anticipated that cumulative impacts 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 qualifying features of European sites.

Shipping densities over the licence Blocks are predominantly low to moderate (although very high densities over Block 48/16), 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

[74] http://infrastructure.planningportal.gov.uk/document/2550950

to within a statutory 500m safety zone around the rig, and the presence of the rig and standby vessel would be temporary (days to a few months).

7.4.3 Marine discharges

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

7.5 Conclusions

Available evidence (see e.g. UKBenthos database and OSPAR 2000) for the southern North Sea indicates that past oil and gas activity and discharges has not lead 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 southern North Sea (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 to ensure that subsequent to licensing, specific projects (if consented) will not result in adverse effects on integrity of European sites. Therefore, bearing this in mind, it is concluded that the in-combination effects from activities arising from the licensing of Blocks 35/26, 35/27, 37/26, 37/27, 38/13, 38/14, 38/15, 38/18, 38/19, 38/20, 39/11, 39/16, 41/1, 41/2, 42/10b, 42/11, 42/28c, 43/1, 43/2, 43/6, 43/19b, 43/20c, 43/23, 44/17e, 44/18c, 44/27, 47/9d, 47/14e, 48/3, 48/8b, 48/16, 49/3, 49/4d, 49/9d, 49/13 and 49/28e with those from existing and planned activities in the southern North Sea will not adversely affect the integrity of relevant European Sites.

8 Overall conclusion

Taking account of the evidence and assessment presented above, the report determines that the plan/programme will not have an significant adverse effect on the integrity of the relevant sites (identified in Section 1.3), and recommends the granting of consent by the Secretary of State for the award of licences covering Blocks 35/26, 35/27, 37/26, 37/27, 38/13, 38/14, 38/15, 38/18, 38/19, 38/20, 39/11, 39/16, 41/1, 41/2, 42/10b, 42/11, 42/28c, 43/1, 43/2, 43/6, 43/19b, 43/20c, 43/23, 44/17e, 44/18c, 44/27, 47/9d, 47/14e, 48/3, 48/8b, 48/16, 49/3, 49/4d, 49/9d, 49/13 and 49/28e (considered further in Sections 4-7). 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 Sections 4.3, 5.3 and 6.3), taking account of the mitigation measures that can be imposed through existing permitting mechanisms on the planning and conduct of activities (as described in Section 4.4, 5.4 and 6.4).

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

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

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Appendix A – The Sites

A1 Introduction

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

The primary sources of site data were the latest JNCC SAC[75] (version as of 1st September 2014) and SPA[76] (version as of 1st September 2014) summary data and interest features and site characteristics were filtered for their coastal and marine relevance. The Natural England[77] 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). A number of inshore marine SPAs are presently at the draft or potential stage. Northumberland Marine draft SPA is currently being considered for recommendation. Once initial site recommendations for a draft SPA have been developed, Natural England will submit proposals as formal advice to Defra. Formal public consultation on the proposals may happen towards the end of 2015, with a decision regarding the site's classification by December 2016[78]. A public consultation on proposals to extend the existing Flamborough Head and Bempton Cliffs Special Protection Area (SPA) and was completed in April 2014. The proposed site is called the Flamborough and Filey Coast potential SPA (pSPA)[79]. Both 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://publications.naturalengland.org.uk/category/6490068894089216
[78] http://publications.naturalengland.org.uk/publication/5451695513403392?category=9001
[79] https://www.gov.uk/government/consultations/flamborough-and-filey-coast-potential-special-protection-area-pspa-and-flamborough-head-possible-special-area-of-conservation-psac

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

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

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

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

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

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

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

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

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

Map A.1: Location of SPAs

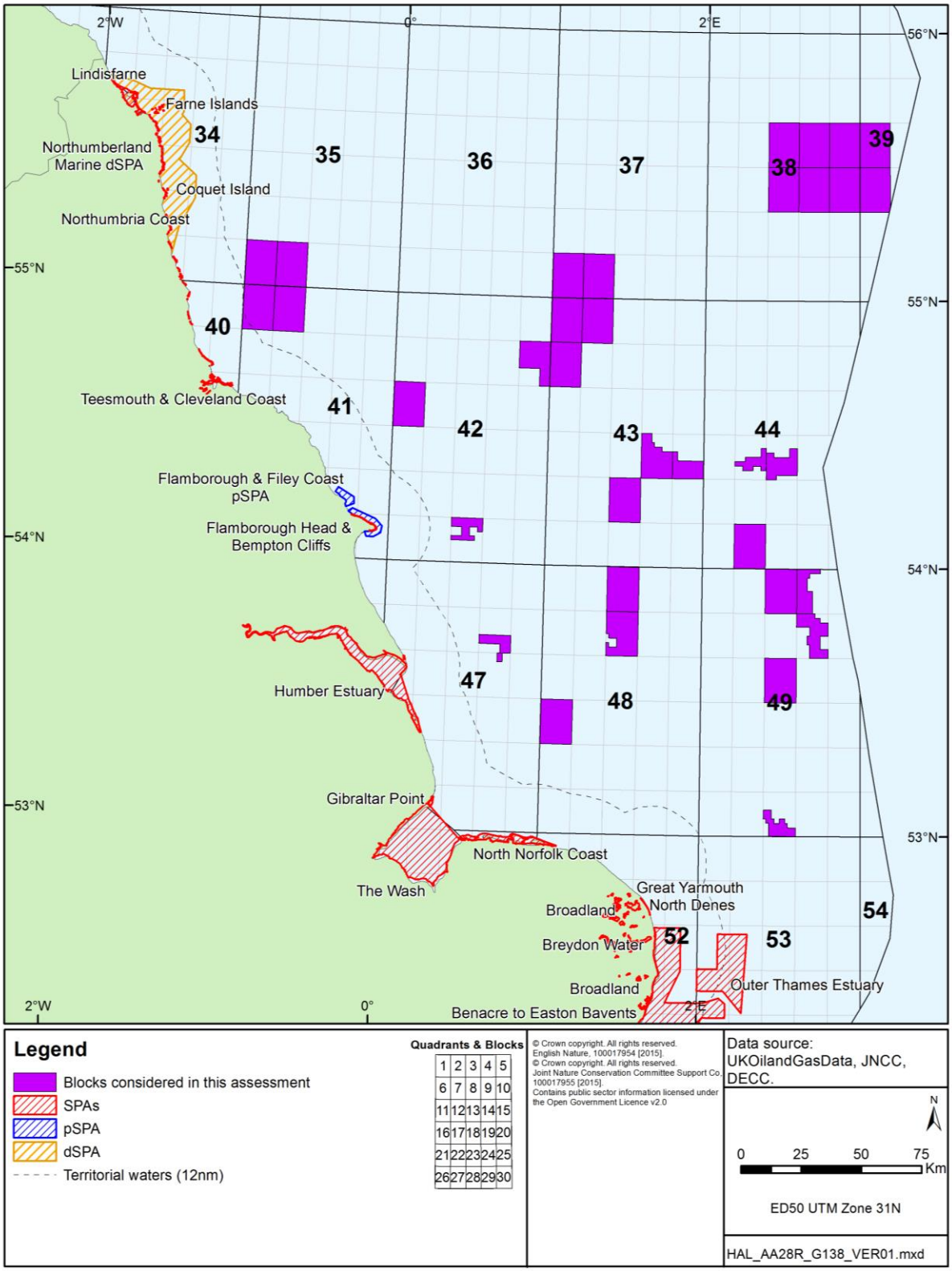


Table A.1: Coastal and marine SPAs and their Qualifying Features

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[80]
NORTHEAST ENGLAND				
Northumberland Marine Draft SPA	TBC	Breeding: Roseate tern Common tern Arctic tern Sandwich tern Little tern	Breeding: Puffin Guillemot	N/A
Lindisfarne SPA	3,679.22	Breeding: Little tern Roseate tern Over winter: Bar-tailed godwit Golden plover Whooper swan	On passage: Ringed plover Over winter: Grey plover Greylag goose Light-bellied brent goose Wigeon Redshank Dunlin Sanderling Red-breasted merganser Common scoter Long-tailed duck Eider Shelduck	N/A
Farne Islands SPA	101.86	Breeding: Arctic tern Common tern Sandwich tern	N/A	N/A
Northumbria Coast SPA	1,107.98	Breeding: Little tern	Over winter: Purple sandpiper Turnstone	N/A
Coquet Island SPA	22.28	Breeding: Arctic tern Common tern Roseate tern Sandwich tern	Breeding: Puffin	N/A
Teesmouth and Cleveland Coast SPA	1,247.31	Breeding: Little tern On passage: Sandwich tern	On passage: Ringed plover Over winter: Knot Redshank	Over winter: Waterfowl
YORKSHIRE AND HUMBER				
Flamborough and Filey Coast pSPA	8039.6	N/A	Breeding: Kittiwake Gannet Guillemot Razorbill	Breeding: Seabirds

[80] - 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[80]
Humber Estuary SPA	37,630.24	Breeding: Bittern Marsh harrier Avocet Little tern Over winter: Bittern Avocet Hen harrier Bar-tailed godwit Golden plover On passage: Ruff	Over winter: Dunlin Knot Shelduck Black-tailed godwit Redshank On passage: Knot Dunlin Black-tailed godwit Redshank	Non-breeding: Waterfowl
LINCOLNSHIRE, NORFOLK AND SUFFOLK				
Gibraltar Point SPA	414.09	Breeding: Little tern Over winter: Bar-tailed godwit	Over winter: Grey plover Knot	N/A
The Wash SPA	62,211.66	Breeding: Common tern Little tern Over winter: Bar-tailed godwit Bewick's swan	Over winter: Curlew Dark-bellied brent goose Dunlin Grey plover Knot Oystercatcher Pink-footed goose Pintail Redshank Shelduck Turnstone Sanderling Wigeon Goldeneye Gadwall Common scoter	Over winter: Waterfowl
North Norfolk Coast SPA	7,886.79	Breeding: Avocet Bittern Common tern Little tern Marsh harrier Sandwich tern Over winter: Avocet	Over winter: Dark-bellied brent goose Knot Pink-footed goose Wigeon	N/A
Broadland SPA	5,462.4	Breeding: Marsh harrier Over winter: Bewick's swan Ruff Whooper swan Hen harrier	Over winter: Gadwall Wigeon Shoveler	N/A
Great Yarmouth North Denes SPA	149.19	Breeding: Little tern	N/A	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[80]
Breydon Water SPA	1,202.94	Breeding: Common tern Over winter: Avocet Bewick's swan Golden plover On passage: Ruff	Over winter: Lapwing	Over winter: Waterfowl
Benacre to Easton Bavents SPA	516.83	Breeding: Bittern Little tern Marsh harrier	N/A	N/A
Outer Thames Estuary SPA	379,268.14	Over winter: Red-throated diver	N/A	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. Riverine/freshwater SACs which are designated for migratory fish are included on Map A.2 and considered in Section A4.

Abbreviations for the Annex 1 habitats used in SAC site summaries (Tables A.2 and A.3 and Map A.2) are listed in Box A.2.

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

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

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

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

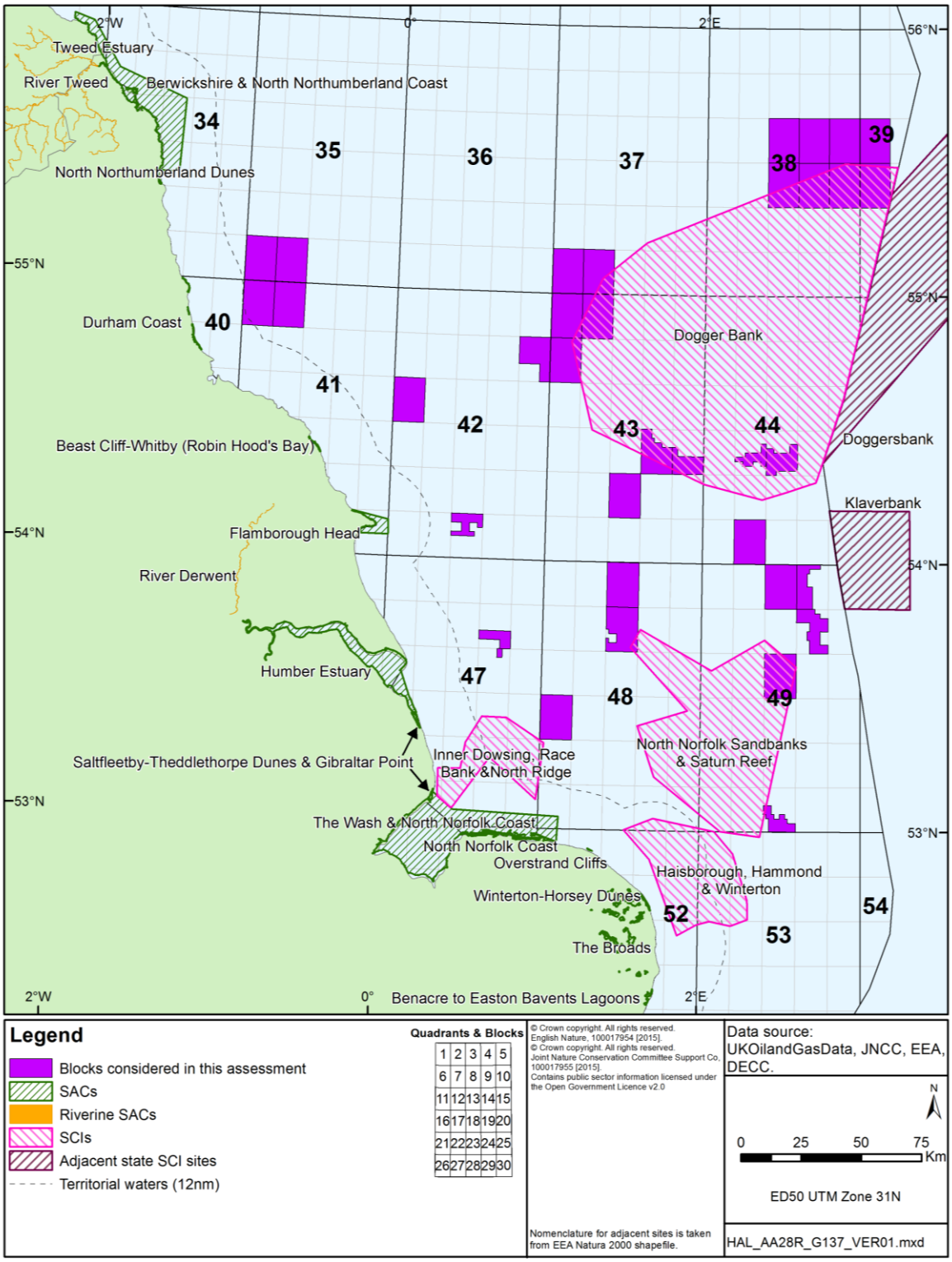


Table A.2: Coastal and marine SACs and their Qualifying Features

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
NORTHEAST ENGLAND					
Berwickshire and North Northumberland Coast SAC	65,045.5	Mudflats and sandflats Inlets and bays Reefs Sea caves	N/A	Grey seal *Halichoerus grypus*	N/A
Tweed Estuary SAC	155.93	Estuaries Mudflats and sandflats	N/A	N/A	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis*
North Northumberland Dunes SAC	1,147.56	Coastal dunes	N/A	Petalwort *Petalophyllum ralfsii*	N/A
Durham Coast SAC	393.63	Sea cliffs	N/A	N/A	N/A
YORKSHIRE AND THE HUMBER					
Beast Cliff-Whitby (Robin Hood's Bay) SAC	260.2	Sea cliffs	N/A	N/A	N/A
Flamborough Head SAC (Consultation on landward modification to site - Flamborough Head pSAC in April 2014	6,311.96	Reefs Sea cliffs Sea caves	N/A	N/A	N/A
Humber Estuary SAC	36,657.15	Estuaries Mudflats and sandflats	Sandbanks Salt marshes and salt meadows Coastal lagoons Coastal dunes	N/A	River lamprey *Lampetra fluviatilis* Sea lamprey *Petromyzon marinus* Grey seal *Halichoerus grypus*
LINCOLNSHIRE, NORFOLK AND SUFFOLK					
Saltfleetby - Theddlethorpe Dunes and Gibraltar Point SAC	960.2	Coastal dunes	Coastal dunes	N/A	N/A
The Wash and North Norfolk Coast SAC	107,761.28	Sandbanks Mudflats and sandflats Inlets and bays	Coastal lagoons	Harbour seal *Phoca vitulina*	Otter *Lutra lutra*

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
		Reefs Salt marshes and salt meadows			
North Norfolk Coast SAC	3,207.37	Coastal lagoons Vegetation of stony banks Salt marshes and salt meadows Coastal dunes	N/A	N/A	Otter *Lutra lutra* Petalwort *Petalophyllum ralfsii*
Overstrand Cliffs SAC	30.02	Sea cliffs	N/A	N/A	N/A
The Broads SAC	5,889.66	Standing freshwater Bog Fens Forests	Grasslands	Desmoulin's whorl snail *Vertigo moulinsiana* Fen orchid *Liparis loeselii* Ramshorn snail *Anisus vorticulus*	Otter *Lutra lutra*
Winterton-Horsey Dunes SAC	425.94	Coastal dunes	Coastal dunes	N/A	N/A
Benacre to Easton Bavents Lagoons SAC	366.93	Coastal lagoons	N/A	N/A	N/A

A4 Offshore Special Areas of Conservation

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

Site Name	Area (ha)	Annex I Habitat	Annex II Species
Dogger Bank SCI	1,233,115	Sandbanks	N/A
North Norfolk Sandbanks and Saturn Reef SCI	360,341	Sandbanks Reefs (biogenic *Sabellaria spinulosa*)	N/A
Inner Dowsing, Race Bank and North Ridge SCI	84,514	Sandbanks Reefs (biogenic *Sabellaria spinulosa*)	N/A
Haisborough, Hammond and Winterton SCI	146,759	Sandbanks Reefs (biogenic *Sabellaria spinulosa*)	N/A
Sites in Adjacent States			
Doggersbank SCI(Netherlands)	471,750	Sandbanks	Harbour porpoise *Phocoena phocoena* Harbour seal *Phoca vitulina* Grey seal *Halichoerus grypus*

Site Name	Area (ha)	Annex I Habitat	Annex II Species
Klaverbank SCI (Netherlands)	123,733	Reefs	Harbour porpoise *Phocoena phocoena* Harbour seal *Phoca vitulina* Grey seal *Halichoerus grypus*

A5 Riverine Special Areas of Conservation

Table A.3: Riverine SACs designated for migratory fish

Site Name	Migratory fish[1]
River Tweed	AS, SL, RL
River Derwent	SL, RL

Note: [1] SL - Sea lamprey Petromyzon marinus, RL - River lamprey Lampetra fluviatilis, AS - Atlantic salmon Salmo salar

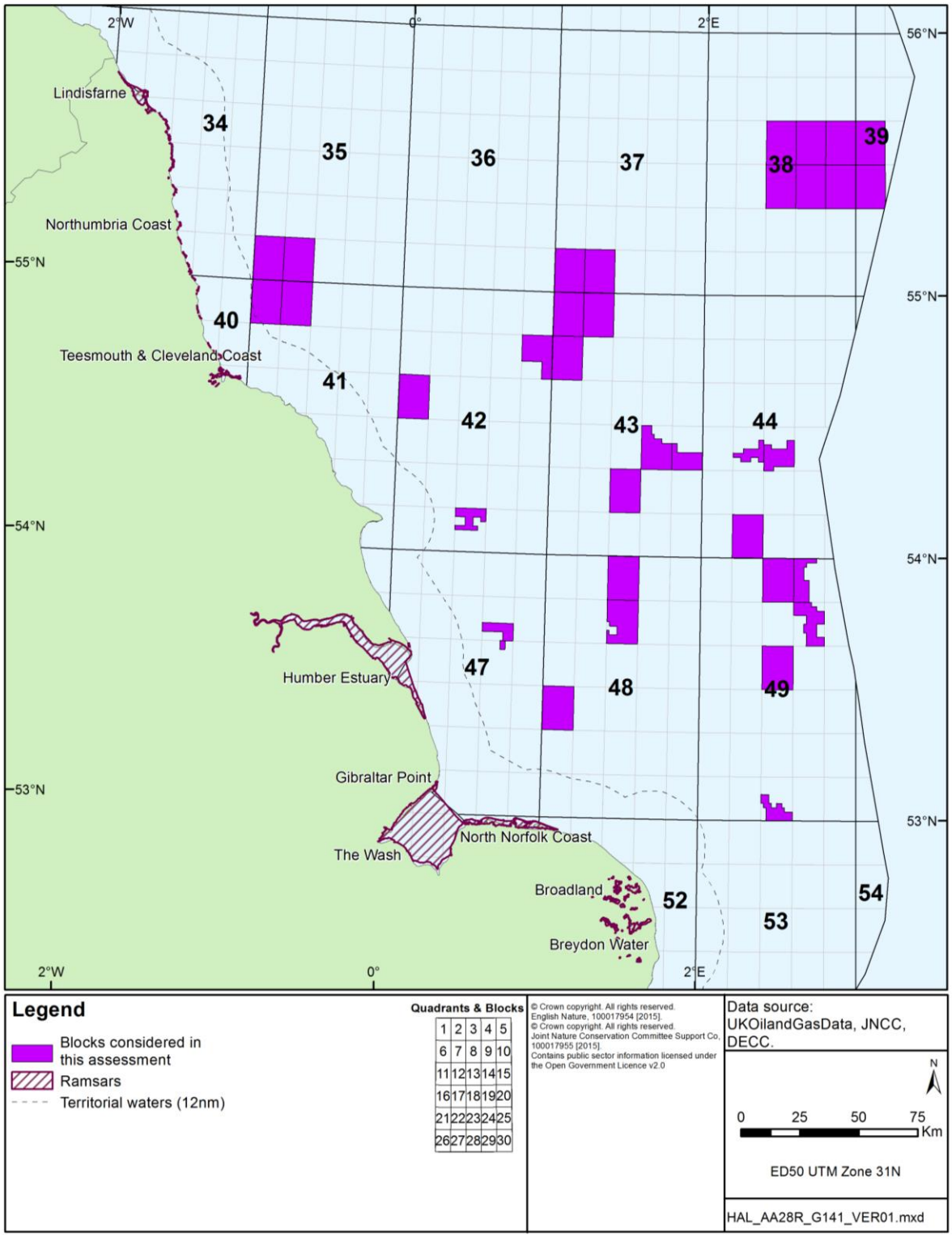
A6 Ramsar sites

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
Teesmouth & Cleveland Coast	Northumbria Coast Teesmouth & Cleveland Coast	Durham Coast
Northumbria Coast	Northumbria Coast Teesmouth & Cleveland Coast	Berwickshire and North Northumberland Coast Durham Coast North Northumberland Dunes
Gibraltar Point	Gibraltar Point The Wash	Saltfleetby-Theddlethorpe Dunes & Gibraltar Point The Wash and North Norfolk Coast
Humber Estuary	Humber Estuary	Humber Estuary Saltfleetby-Theddlethorpe Dunes & Gibraltar Point
North Norfolk Coast	North Norfolk Coast The Wash	North Norfolk Coast The Wash and North Norfolk Coast
The Wash	Gibraltar Point North Norfolk Coast The Wash	The Wash and North Norfolk Coast
Breydon Water	Breydon Water	-
Broadland	Broadland	The Broads

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 2014), 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:

- 35/26, 35/27, 41/1 & 41/2 - Drill or drop well, obtain 2D
- 37/26 & 37/27 - Drill or drop well, shoot 3D seismic
- 38/13, 38/14, 38/15, 38/18, 38/19, 38/20, 39/11 & 39/16 - Drill or drop well, obtain 2D seismic
- 42/11 - Drill or drop well, obtain 3D seismic
- 42/10b - Drill or drop well, reprocess 2D
- 42/28c (Part) - Drill or drop well
- 43/1, 43/2 & 43/6 - Drill or drop well, obtain 3D seismic and reprocess 2D
- 43/19b (Part) - Drill or drop well
- 43/20c - Drill or drop well, reprocess 3D
- 43/23 - Drill or drop well, obtain 3D seismic
- 44/17e & 44/18c (Split) - Drill or drop well
- 44/18c (Split) - Drill or drop well
- 44/18c (Split) - Drill or drop well, reprocess 3D
- 44/27 - Drill or drop well, obtain 3D seismic
- 47/9d & 47/14e - Drill or drop well, reprocess 3D
- 48/3 - 1 Firm well
- 48/8b - Drill or drop well
- 48/16 (Part) - Drill or drop well
- 49/3, 49/4d & 49/9d - Drill or drop well
- 49/13 - Drill or drop well

- 49/28e - 1 Firm 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	
NORTHEAST ENGLAND								
Northumberland Marine Draft SPA	✓	-	-	✓	-	-	-	**Qualifying features** Breeding terns and auks **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Blocks (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil could have a significant effect on the site's conservation objectives given the foraging range and vulnerability (to surface pollution) of some of the qualifying features, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Lindisfarne	✓	✓	✓	-	-	-	-	**Qualifying features** Breeding tern, overwintering and passage waders and waterfowl, waterfowl assemblage **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (over 70km) from site and limited foraging range of qualifying features. Cumulative: N/A **Appropriate Assessment** N/A
Farne Islands	✓	-	-	✓	-	-	-	**Qualifying features** Breeding tern, guillemot and puffin. Seabird assemblage. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								Accidental spills: In the unlikely event of a major diesel oil spill from the closest Blocks (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil could have a significant effect on the site's conservation objectives given the foraging range and vulnerability (to surface pollution) of some of the qualifying features, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Northumbria Coast	✓	✓	-	✓	-	-	-	**Qualifying features** Breeding tern, overwintering waders **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Blocks (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Coquet Island	✓	-	-	✓	-	-	-	**Qualifying features** Breeding terns, puffin and seabird assemblage. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Blocks (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil could have a significant effect on the site's conservation objectives given the foraging range and vulnerability (to surface pollution) of some of the qualifying features, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Teesmouth and Cleveland Coast	✓	✓	✓	✓	-	-	-	**Qualifying features** Breeding and on passage terns, on passage and overwintering waders. Waterfowl assemblage.

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	
								Consideration of likely significant effects Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Blocks (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil could have a significant effect on the site's conservation objectives, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
YORKSHIRE AND THE HUMBER								
Flamborough and Filey Coast pSPA	✓	-	-	✓	-	-	-	**Qualifying features** Breeding kittiwake, gannet, guillemot and razorbill. Seabird assemblage. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (42/28c), weathered spilled diesel oil could have a significant effect on the site's conservation objectives given the foraging range and vulnerability to surface pollution of the qualifying features, although mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
Humber Estuary	✓	✓	✓	✓	-	-	-	**Qualifying features** Breeding and overwintering waders, breeding tern, breeding and overwintering birds of prey, on passage waterfowl and waders **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Blocks (47/9d, 47/14e), weathered spilled diesel oil could have a significant effect on the site's conservation objectives, although

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	
								mitigation would be possible. Cumulative: N/A **Appropriate Assessment** See Section 6.3.
LINCOLNSHIRE, NORFOLK AND SUFFOLK								
Gibraltar Point	✓	✓	-	-	-	-	-	**Qualifying features** Breeding little tern, overwintering waders and waterfowl. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (48/16), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (over 50km) from site and limited foraging range of qualifying features. Cumulative: N/A **Appropriate Assessment** N/A
The Wash	✓	✓	✓	-	-	-	-	**Qualifying features** Breeding tern, birds of prey, on passage and overwintering waders and waterfowl. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (48/16), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (over 50km) from site and limited foraging range of qualifying features. Cumulative: N/A **Appropriate Assessment** N/A
North Norfolk Coast	✓	✓	✓	-	-	-	-	**Qualifying features** Breeding and overwintering waders and waterfowl, breeding terns and birds of prey. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (48/16), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (38km) from site and limited foraging range of qualifying features. Cumulative: N/A **Appropriate Assessment** N/A
Broadland	✓	✓	-	-	-	-	-	**Qualifying features** Breeding and overwintering bittern and birds of prey, overwintering waterfowl and waders. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (49/28e), weathered spilled crude oil is not likely to have a significant effect on the site's conservation objectives given distance (*ca*. 60km) and limited interaction between qualifying features and marine environment. Cumulative: N/A **Appropriate Assessment** N/A
Great Yarmouth and North Denes	✓	-	-	-	-	-	-	**Qualifying features** Breeding tern **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (49/28e), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (59km) from site and limited foraging range of qualifying features. Cumulative: N/A **Appropriate Assessment** N/A
Breydon Water	✓	✓	-	-	-	-	-	**Qualifying features** Breeding tern, on passage and overwintering waders and waterfowl. **Consideration of likely significant effects**

Site name	Features present			Potential for likely significant effects				Consideration in light of Block work programmes
	Breeding	Wintering	Passage	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
								Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (49/28e), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (59km) from site and limited interaction between qualifying features and marine environment. Cumulative: N/A **Appropriate Assessment** N/A
Benacre to Easton Bavents	✓	✓	-	-	-	-	-	**Qualifying features** Breeding tern, birds of prey and bittern, overwintering bittern. **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (49/28e), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (82km) from site and limited foraging range of qualifying features. Cumulative: N/A **Appropriate Assessment** N/A
Outer Thames Estuary	-	✓	-	-	-	-	-	**Qualifying features** Overwintering red-throated diver **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (49/28e), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (42km) from site and limited foraging range of qualifying features. Cumulative: N/A **Appropriate Assessment** N/A

B3 Coastal and marine Special Areas of Conservation

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
NORTHEAST ENGLAND							
Berwickshire and North Northumberland Coast	✓	✓	✓	-	✓	-	**Qualifying features** Mudflats and sandflats, inlets and bays, reefs, sea caves, grey seal **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: New seismic proposed for Blocks 37/26 and 37/27 which are *ca*. 157km from the site. Potential for underwater noise effect on grey seals foraging outside of site described in Section 5.3. Accidental spills: In the unlikely event of a major diesel oil spill from the closest Blocks (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil could have a significant effect on the site's conservation objectives given the foraging range of the seal feature and their low to moderate sensitivity to oil pollution. Cumulative: N/A **Appropriate Assessment** See Sections 5.3 and 6.3.
Tweed Estuary	✓	✓	-	-	-	-	**Qualifying features** Estuaries, mudflats and sandflats, sea and river lamprey **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Blocks (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given that relevant Blocks are over 93km from site. Cumulative: N/A **Appropriate Assessment** N/A
North Northumberland Dunes	✓	✓	-	-	-	-	**Qualifying features** Coastal dunes, petalwort **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: Qualifying features largely above MHWS and not generally

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	
							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 *et al*. 2011). Given the nearest Block (35/26) is *ca*. 42km from the site, no significant effect likely. Cumulative: N/A **Appropriate Assessment** N/A
Durham Coast	✓	-	-	-	-	-	**Qualifying features** Sea cliffs **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from any of the closest Blocks (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives as qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
YORKSHIRE AND THE HUMBER							
Beast Cliff-Whitby (Robin Hood's Bay)	✓	-	-	-	-	-	**Qualifying features** Sea cliffs **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (42/11), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives as qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
Flamborough Head	✓	-	-	-	-	-	**Qualifying features** Reefs, sea cliffs, sea caves **Consideration of likely significant effects**

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (42/28c), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given the distance (26km), and moderate sensitivity of qualifying features[81]. Cumulative: N/A **Appropriate Assessment** N/A
Humber Estuary	✓	✓	✓	-	✓	-	**Qualifying features** Mudflats and sandflats, salt marshes and salt meadows, coastal lagoons, coastal dunes, river lamprey, sea lamprey, grey seal **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: New seismic proposed for Blocks 37/26 and 37/27 which are *ca*. 169km from the site. Potential for underwater noise effect on grey seals foraging outside of site described in Section 5.3. Accidental spills: In the unlikely event of a major diesel oil spill from the closest Blocks (47//9d & 47/14e), weathered spilled diesel oil could have a significant effect on the site's conservation objectives given the foraging range of the seal feature and their low to moderate sensitivity to oil pollution. Cumulative: N/A **Appropriate Assessment** See Sections 5.3 and 6.3.
LINCOLNSHIRE, NORFOLK AND SUFFOLK							
Saltfleetby - Theddlethorpe Dunes and Gibraltar Point	✓	-	-	-	-	-	**Qualifying features** Coastal dunes **Consideration of likely significant effects**

[81] http://publications.naturalengland.org.uk/file/3295646

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
							Physical disturbance: N/A Underwater noise: N/A Accidental spills: 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 *et al*. 2011). Given the nearest Blocks (47/9d, 47/14e) are *ca*. 40km from the site, no significant effect likely. Cumulative: N/A **Appropriate Assessment** N/A
The Wash and North Norfolk Coast	✓	✓	✓	✓	✓	-	**Qualifying features** Sandbanks, mudlfats and sandflats, inlets and bays, reefs, salt marshes and meadows, coastal lagoons, harbour seal, otter **Consideration of likely significant effects** Physical disturbance: N/A. Underwater noise: New seismic proposed for Blocks 37/26 and 37/27 which are *ca*. 215km from the site. Potential for underwater noise effect on harbour seals foraging outside of site described in Section 5.3. Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (48/16), weathered spilled diesel oil could have a significant effect on the site's conservation objectives given the foraging range of the seal feature and their moderate sensitivity to oil pollution. Cumulative: N/A **Appropriate Assessment** See Sections 4.3 and 5.3
North Norfolk Coast	✓	✓	-	-	-	-	**Qualifying features** Coastal lagoons, vegetation of stony banks, salt marshes and salt meadows, coastal dunes, otter, petalwort Physical disturbance: N/A Underwater noise: N/A Accidental spills: Qualifying features largely above MHWS and not generally vulnerable to surface oil pollution. Sand dunes and vegetation of stony banks 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

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	
							laydown area for equipment (Law *et al*. 2011). Given the nearest Block (48/16) is *ca*. 39km from the site, no significant effect likely. Cumulative: N/A **Appropriate Assessment** N/A
Overstrand Cliffs	✓	-	-	-	-	-	**Qualifying features** Sea cliffs **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (48/16), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives as qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011). Cumulative: N/A **Appropriate Assessment** N/A
The Broads	✓	✓	-	-	-	-	**Qualifying features** Standing freshwater, bog, fens, forests, grasslands, Desmoulin's whorl snail, fen orchid, ramshorn snail, otter **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (49/28e), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (*ca*. 60km) and limited interaction between qualifying features and marine environment. Cumulative: N/A **Appropriate Assessment** N/A
Winterton-Horsey Dunes	✓	-	-	-	-	-	**Qualifying features:** Coastal dunes **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: Qualifying features largely above MHWS and not generally vulnerable to surface oil pollution. Sand dunes above the level of spring high

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	
							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 *et al*. 2011). Given the nearest Block (49/28e) is *ca*. 59km from the site, no significant effect likely. Cumulative: N/A **Appropriate Assessment** N/A
Benacre to Easton Bavents Lagoons	✓	-	-	-	-	-	**Qualifying features** Coastal lagoons **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from the closest Block (49/28e), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given distance (82km) from site and lagoons not generally vulnerable to surface oil pollution due to limited access (Law *et al.* 2011). Cumulative: N/A **Appropriate Assessment** N/A

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

B4 Riverine Special Areas of Conservation

Site name	Features present		Potential for likely significant effects				Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
River Tweed	✓	✓	-	-	-	-	**Qualifying features** Running freshwater, Atlantic salmon, sea, brook and river lamprey **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: Qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011). In the unlikely event of a major diesel oil spill from the closest Blocks (35/26, 35/27, 41/1, 41/2), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given that relevant Blocks are over 93km from site. Cumulative: N/A **Appropriate Assessment** N/A
River Derwent	✓	✓	-	-	-	-	**Qualifying features** Running freshwater, river lamprey, sea lamprey, bullhead, otter **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: Qualifying features not considered particularly sensitive to marine spills (Law *et al*. 2011). In the unlikely event of a major diesel oil spill from the closest Block (47/9d), weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given that relevant Block is over 100km from site (straight line distance). Cumulative: N/A **Appropriate Assessment** N/A

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

B5 Offshore Special Areas of Conservation

Site name	Features present			Potential for likely significant effects			Consideration in light of Block work programmes
	Habitats	Species	Accidental spills	Physical Disturbance	Underwater noise	Cumulative	
Dogger Bank SCI	✓	-	-	✓	-	✓	**Qualifying features** Sandbanks **Consideration of likely significant effects** Physical disturbance: Conservation objectives could be undermined by physical disturbance and drilling effects given that a number of Blocks overlaps with site. Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from those Blocks which are close to or overlap the site, weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given the moderate sensitivity of the qualifying feature, the depth of the feature (*ca*. 20m) and large size of site. Cumulative: Potential for cumulative effects described in Section 7. **Appropriate Assessment** See section 4.3 and 7
North Norfolk Sandbanks and Saturn Reef SCI	✓	-	-	✓	-	✓	**Qualifying features** Sandbanks, reefs **Consideration of likely significant effects** Physical disturbance: Conservation objectives could be undermined by physical disturbance and drilling effects given that a number of Blocks overlaps with site. Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from those Blocks which are close to or overlap the site, weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given the moderate sensitivity of the qualifying feature, the depth of the feature (*ca*. 20m) and large size of site. Cumulative: Potential for cumulative effects described in Section 7. **Appropriate Assessment** See section 4.3 and 7
Inner Dowsing, Race Bank and North Ridge SCI	✓	-	-	✓	-	-	**Qualifying features** Sandbanks, reefs **Consideration of likely significant effects** Physical disturbance: Conservation objectives could be undermined by physical disturbance and drilling effects given that Block 48/16 is close to

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 site. Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from Block 48/16, weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given the low to moderate sensitivity of the sandbank qualifying feature, the depth of the feature (*ca*. 20m) and large size of site. Cumulative: N/A **Appropriate Assessment** See section 4.3
Haisborough, Hammond and Winterton SCI	✓	-	-	-	-	✓	**Qualifying features** Sandbanks, reefs **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: N/A Accidental spills: In the unlikely event of a major diesel oil spill from Block 49/28e, weathered spilled diesel oil is not likely to have a significant effect on the site's conservation objectives given the low sensitivity of the qualifying features[82], the depth of the feature (*ca*. 20m) and large size of site. Cumulative: N/A **Appropriate Assessment** N/A
Sites in Adjacent States							
Doggersbank SCI	✓	✓	✓	✓	✓	-	**Qualifying features** Sandbanks, harbour porpoise, harbour seal, grey seal **Consideration of likely significant effects** Physical disturbance: Conservation objectives could be undermined by physical disturbance and drilling effects given that Block 39/16 is adjacent to

[82] http://jncc.defra.gov.uk/pdf/HHW_Reg%2035_Conservation%20Advice_v6.0.pdf

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 site. Underwater noise: New seismic proposed for Blocks 37/26 and 37/27 which are *ca*. 106km from the site. Potential for underwater noise effect on marine mammal features foraging outside of site described in Section 5.3. Accidental spills: In the unlikely event of a major diesel oil spill from Blocks in proximity to the site, weathered spilled diesel oil could have a significant effect on the site's conservation objectives given the low to moderate sensitivity of the mobile qualifying features which could forage outside of the site. Cumulative: N/A **Appropriate Assessment** See section 4.3, 5.3 and 6.3
Klaverbank SCI	✓	✓	✓	-	✓	-	**Qualifying features** Reefs, harbour porpoise, harbour seal, grey seal **Consideration of likely significant effects** Physical disturbance: N/A Underwater noise: New seismic proposed for Blocks 37/26 and 37/27 which are *ca*. 150km from the site. Potential for underwater noise effect on marine mammal features foraging outside of site described in Section 5.3. Accidental spills: In the unlikely event of a major diesel oil spill from Blocks in proximity to the site, weathered spilled diesel oil could have a significant effect on the site's conservation objectives given the low to moderate sensitivity of the mobile qualifying features which could forage outside of the site. Cumulative: N/A **Appropriate Assessment** See section 5.3 and 6.3

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

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

C1 Coastal and marine Special Protection Areas

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

Site Name: Northumberland Marine Draft SPA	
Location	To be confirmed
Area (ha)	To be confirmed
Summary	It is proposed that this new marine SPA will cover an area from Scremerston, near Berwick-Upon-Tweed in the north, to Blyth in the south. It will have its landward boundary at Mean High Water except around the existing island SPAs of the Farne Islands and Coquet Island, where the landward boundary will be defined by the Mean Low Water mark so as to abut the existing boundaries of those 2 SPAs where terns are already features. The seaward extent of the new boundary is a composite of various foraging ranges of tern species away from existing colonies and this area will extend to a maximum of 18km out to sea
Qualifying features for which the site is designated:	
To be confirmed	
Conservation objectives:	
To be confirmed	
Likely significant effects associated with activities that could follow Block licensing:	
• Accidental spills (see Section 6.3)	

Site Name: Farne Islands SPA	
Location	Latitude 55º 37'13"N Longitude 01º 38'55"E
Area (ha)	101.86
Summary	The Farne Islands are a group of low-lying islands between 2-6km off the coast of Northumberland in north-east England. They form the easternmost outcroppings of the Great Whin Sill of quartz dolerite, and although some islands retain cappings of boulder clay or peaty deposits, vegetation is limited to pioneer communities. Vegetation is further affected by the maritime conditions and large numbers of seabirds. The islands are important as nesting areas for these birds, especially terns, gulls and auks. The seabirds feed outside the SPA in the nearby waters, as well as more distantly in the North 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:** Arctic Tern *Sterna paradisaea*, 2,840 pairs representing at least 6.5% of the breeding population in Great Britain (5 year mean, 1993-1997) Common Tern *Sterna hirundo*, 230 pairs representing at least 1.9% of the breeding population in Great Britain (5 year mean, 1993-1997) Roseate Tern *Sterna dougallii*, 3 pairs representing at least 5.0% of the breeding population in Great Britain (5 year mean, 1993-1997) Sandwich Tern *Sterna sandvicensis*, 2,070 pairs representing at least 14.8% of the breeding population in Great Britain (5 year mean, 1993-1997)	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **Over winter:** Guillemot *Uria aalge*, 23,499 pairs representing at least 1.0% of the breeding East Atlantic population (1997) Puffin *Fratercula arctica*, 34,710 pairs representing at least 3.9% of the breeding population (1996)	
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. During the breeding season, the area regularly supports 142,490 individual seabirds including: Kittiwake *Rissa tridactyla*, Shag *Phalacrocorax aristotelis*, Cormorant *Phalacrocorax carbo*, Puffin *Fratercula arctica*, Guillemot *Uria aalge*, Arctic Tern *Sterna paradisaea*, Common Tern *Sterna hirundo*, Roseate Tern *Sterna dougallii*, Sandwich Tern *Sterna sandvicensis*.	
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)	

Site Name: Northumbria Coast SPA	
Location	Latitude 55º 27'59"N Longitude 01º 35'18"E
Area (ha)	1107.98
Summary	The Northumbria Coast SPA includes much of the coastline between the Tweed and Tees Estuaries in north-east England. The site consists of mainly discrete sections of rocky shore with associated boulder and cobble beaches. The SPA also includes parts of three artificial pier structures and a small section of sandy beach. In summer, the site supports important numbers of breeding Little Tern *Sterna albifrons*, whilst in winter the mixture of rocky and sandy shore supports large number of Turnstone *Arenaria interpres* and Purple Sandpiper *Calidris maritima*.
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:** Little Tern *Sterna albifrons*, 40 pairs representing at least 1.7% of the breeding 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: **Over winter:** Purple Sandpiper *Calidris maritima*, 763 individuals representing at least 1.5% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6) *Turnstone Arenaria interpres, 1,456 individuals representing at least 2.1% of the wintering Western Palearctic - wintering population (5 year peak mean 1991/2 - 1995/6)*	
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)	

Site Name: Coquet Island SPA	
Location	Latitude 55º 20'06"N Longitude 01º 32'14"E
Area (ha)	22.28
Summary	Coquet Island is located 1km off the coast of Northumberland in north-east England. It is a small, flat-topped island with a plateau extent of *c.* 7ha. The island is surrounded by low sandstone cliffs and a broad rock platform at low tide, partly the result of former stone quarrying. The peaty soil of the plateau supports short turf grassland, although where nutrient input from seabird colonies is greatest, there are dense stands of taller species, including nettles *Urtica* spp. These provide cover for some of the nesting terns. The island is of importance for a range of breeding seabirds, including four species of terns, auks and gulls. The seabirds feed outside the SPA in the nearby waters, as well as more distantly in the North 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:** Arctic Tern *Sterna paradisaea*, 700 pairs representing at least 1.6% of the breeding population in Great Britain (Four count mean, 1993 & 1995-1997) Common Tern *Sterna hirundo*, 740 pairs representing at least 6.0% of the breeding population in Great Britain (5 year mean, 1993-1997) Roseate Tern *Sterna dougallii*, 31 pairs representing at least 51.7% of the breeding population in Great Britain (5 year mean, 1993-1997) Sandwich Tern *Sterna sandvicensis*, 1,590 pairs representing at least 11.4% of the breeding population in Great Britain (5 year mean, 1993-1997)	
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:** Puffin *Fratercula arctica*, 11,400 pairs representing at least 1.3% of the breeding population (1995)	
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. During the breeding season, the area regularly supports 33,448 individual seabirds including: Black-headed Gull *Larus ridibundus*, Puffin *Fratercula arctica*, Arctic Tern *Sterna paradisaea*, Common Tern *Sterna hirundo*, Roseate Tern *Sterna dougallii*, Sandwich Tern *Sterna sandvicensis*.	
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)	

Site Name: Teesmouth and Cleveland Coast SPA	
Location	Latitude 54° 37'50"N Longitude 01° 07'07"E
Area (ha)	1247.31
Summary	Teesmouth and Cleveland Coast SPA is located on the coast of north-east England. It includes a range of coastal habitats – sand- and mud-flats, rocky shore, saltmarsh, freshwater marsh and sand dunes – on and around an estuary which has been considerably modified by human activities. Together these habitats provide feeding and roosting opportunities for important numbers of waterbirds in winter and during passage periods. In summer Little Tern *Sterna albifrons* breed on beaches within the site, while Sandwich Tern *Sterna sandvicensis* are abundant on passage.
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:** Little Tern *Sterna albifrons*, 37 pairs representing at least 1.5% of the breeding population in Great Britain (4 year mean 1993-1996) **On passage:** Sandwich Tern *Sterna sandvicensis*, 2,190 individuals representing at least 5.2% of the population in Great Britain (5 year mean 1991-1995)	
Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: **On passage:** Ringed Plover *Charadrius hiaticula*, 634 individuals representing at least 1.3% of the Europe/Northern Africa - wintering population (5 yr mean spring 91-95) **Over winter:** *Knot Calidris canutus, 4,190 individuals representing at least 1.2% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)* *Redshank Tringa totanus, 1,648 individuals representing at least 1.1% of the wintering Eastern Atlantic - wintering population (5 year peak mean 87-91)*	
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 21,406 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Sanderling *Calidris alba*, Lapwing *Vanellus vanellus*, Shelduck *Tadorna tadorna*, Cormorant *Phalacrocorax carbo*, Redshank *Tringa totanus*, Knot *Calidris canutus*.	
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)	

Site Name: Flamborough and Filey Coast pSPA	
Location	Grid Ref: TA233723 (central point) Latitude 54º 07'55"N Longitude 00º 06'48"W
Area (ha)	212.17
Summary	Flamborough and Filey Coast pSPA is located on the central Yorkshire coast of eastern England. The pSPA extends to an area between South Landing and Cunstone Nab (excluding an area from Speeton, to north of Filey Town). The cliffs project into the North Sea, rising to 135m at Bempton Cliffs, exposing a wide section of chalk strata. The site supports large numbers of breeding seabirds including Kittiwake, Guillemot and Razorbill, as well as the only mainland-breeding colony of Gannet in the UK. The seabirds feed and raft in the waters around the cliffs and the intertidal chalk platforms are used as roosting sites at low water, notably by juvenile Kittiwakes.
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:** Kittiwake *Rissa tridactyla*, 83,370 pairs representing at least 2.6% of the Eastern Atlantic breeding population (as of 1987).	
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 305,784 individual seabirds including: Puffin *Fratercula arctica*, razorbill *Alca torda*, guillemot *Uria aalge*, herring gull *Larus argentatus*, gannet *Morus bassanus*, kittiwake *Rissa tridactyla*.	
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)	

Site Name: Humber Estuary SPA	
Location	Latitude 53º 32'59"N Longitude 00º 03'25"E
Area (ha)	37,630.24
Summary	The Humber Estuary is the largest coastal plain estuary on the east coast of Britain. The site supports internationally important populations of waterfowl species overwinter and provides a migratory feeding ground during spring and autumn migrations. In the summer the site supports several important breeding populations of declining species such as bittern, marsh harrier and avocet.

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:
Bittern *Botaurus stellaris,* 10.5% of the breeding population in Great Britain (3 year mean 2000 – 2002)
Marsh harrier *Circus aeruginosus,* 6.3% of the breeding population in Great Britain (3 year mean 2000 – 2002)
Avocet *Recurvirostra avosetta,* 8.6% of the breeding population in Great Britain (3 year mean 2000 – 2002)
Sandwich tern *Sterna sandvicensis*, 2.1% of the breeding population in Great Britain (3 year mean 2000 – 2002)

Over winter:
Bittern *Botaurus stellaris,* 4% of the wintering population in Great Britain (5 year peak mean 1998/9 - 2002/3)
Hen harrier *Circus cyaneus,* 1.1% of the wintering population in Great Britain (5 year peak mean 1997/8 - 2001/2)
Bar-tailed Godwit *Limosa lapponica,* 4.4% of the wintering population in Great Britain (5 year peak mean 1996/7 - 2000/1)
Golden plover *Pluvialis apricaria,* 12.3% of the wintering population in Great Britain (5 year peak mean 1996/7 - 2000/1)
Avocet *Recurvirostra avosetta,* 1.7% of the wintering population in Great Britain (5 year peak mean 1996/7 - 2000/1)

On passage:
Ruff *Philomachus pugnax,* 1.4% of the wintering population in Great Britain (5 year peak mean 1996 - 2000)

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

Over winter:
Dunlin *Calidris alpina alpina,* 1.7% of the Northern Siberia/Europe/Western Africa population (5 year peak mean 1996/7 - 2000/1)
Knot *Calidris canutus,* 6.3% of the breeding North-eastern Canada/Greenland/Iceland/North-western Europe population (5 year peak mean 1996/7 - 2000/1)
Black-tailed Godwit *Limosa limosa islandica,* 3.2% of the breeding Iceland population (5 year peak mean 1996/7 - 2000/1)
Shelduck *Tadorna tadorna,* 1.5% of the North-western Europe population (5 year peak mean 1996/7 - 2000/1)
Redshank *Tringa totanus,* 3.6% of the wintering Eastern Atlantic population (5 year peak mean 1996/7 - 2000/1)

On passage:
Dunlin *Calidris alpina alpina,* 1.5% of the Northern Siberia/Europe/Western Africa population (5 year peak mean 1996 - 2000)
Knot *Calidris canutus,* 4.1% of the breeding North-eastern Canada/Greenland/Iceland/North-western Europe population (5 year peak mean 1996 - 2000)
Black-tailed Godwit *Limosa limosa islandica,* 2.6% of the breeding Iceland population (5 year peak mean 1996 - 2000)
Redshank *Tringa totanus,* 5.7% of the wintering Eastern Atlantic population (5 year peak mean 1996 - 2000)

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 153934 individual waterfowl (5 year peak mean 1996/7 - 2000/1) including: Teal *Anas crecca*, Wigeon *Anas penelope, Mallard Anas platyrhynchos,* Ruddy turnstone *Arenaria interpres,* Pochard *Aythya farina,* Scaup *Aythya marila,* Bittern *Botaurus stellaris, Dark-bellied brent goose Branta bernicla bernicla,* Goldeneye *Bucephala clangula,* Sanderling *Calidris alba,* Dunlin *Calidris alpina alpina,* knot *Calidris canutus, Ringed plover Charadrius hiaticula,* Oyster catcher *Haematopus ostralegus, Bar-tailed Godwit Limosa lapponica,* Black-tailed Godwit *Limosa limosa islandica,* Curlew *Numenius arquata,* Whimbrel *Numenius phaeopus,* Ruff *Philomachus pugnax,* Golden plover *Pluvialis apricaria,* Grey plover *Pluvialis squatarola,* Avocet *Recurvirostra avosetta,* Shelduck *Tadorna tadorna,* Greenshank *Tringa nebularia,* Redshank *Tringa totanus,* Lapwing *Vanellus vanellus*

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:

Site Name: Humber Estuary SPA
• 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)

C2 Special Areas of Conservation

Site Name: Berwickshire and North Northumberland Coast SAC	
Location	Grid Ref: SE838110 (central point) Latitude 55º 37'40"N Longitude 01º 44'06"W
Area (ha)	65,045.5
Summary	This is an extensive and diverse stretch of coastline in north-east England and south-east Scotland. Whilst predominantly rocky, this extensive and diverse stretch of coastline has several characteristic, sediment-dominated embayments in north-east England, including Budle Bay, Beadnell Bay and Embleton Bay. Each of these areas is relatively exposed and uniform in nature and is characterised by crustacean/polychaete- and bivalve/polychaete-biotopes. Stretches of the coast support a very extensive range of intertidal mudflats and sandflats, ranging from wave-exposed beaches to sheltered muddy flats with rich infaunal communities. These have been selected as biologically diverse and extensive examples of clean sandflats on the east coast. There are examples of partially submerged caves in the cliffs north of Berwick and in the limestone at Howick (south of Craster), and there are submerged sea caves, tunnels and arches in the volcanic rock of the Farne Islands and around St Abb's Head.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, reefs, submerged or partially submerged sea caves ***Annex II Species*** Primary features: Grey seal *Halichoerus grypus*	
Conservation objectives:	
With regard to the natural habitats and/or species for which the site has been designated (the Qualifying Features listed above), avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving Favourable Conservation Status of each of the qualifying features. Subject to natural change, to maintain or restore: • The extent and distribution of qualifying natural habitats and habitats of qualifying species; • The structure and function (including typical species) of qualifying natural habitats and habitats of qualifying species; • The supporting processes on which qualifying natural habitats and habitats of qualifying species rely; • The populations of qualifying species; • The distribution of qualifying species within the site.	
Likely significant effects associated with activities that could follow Block licensing:	
• Underwater noise (see Section 5.3) • Accidental spills (see Section 6.3)	

Site Name: Humber Estuary SAC	
Location	Latitude 53º 35'21"N Longitude 00º 44'05"W
Area (ha)	36,657.15
Summary	The Humber is the second-largest coastal plain estuary in the UK, and the largest coastal plain estuary on the east coast of Britain. It is a muddy, macro-tidal estuary, fed by the Rivers Ouse, Trent and Hull, Ancholme and Graveney. Suspended sediment concentrations are high, and are derived from a variety of sources, including marine sediments and eroding boulder clay along the Holderness coast. This is the northernmost of the English east coast estuaries whose structure and function is intimately linked with soft eroding shorelines. As salinity declines upstream, reedbeds and brackish saltmarsh communities fringe the estuary. This section of the estuary is also noteworthy for extensive mud and sand bars, which in places form semi-permanent islands. Significant fish species present include the migratory river lamprey and sea lamprey, which breed in the River Derwent, a tributary of the River Ouse. Donna Nook, on the south shore at the mouth of the estuary, is used by grey seals as a breeding colony and haul-out site.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Estuaries, mudflats and sandflats not covered by seawater at low tide Secondary features: Sandbanks which are slightly covered by seawater all the time, coastal lagoons, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes'), fixed dunes with herbaceous vegetation ('grey dunes'), dunes with *Hippophae rhamnoides* ***Annex II Species*** Primary features: None Secondary features: Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluvitilis*, grey seal *Halichoerus grypus*	
Conservation objectives:	
With regard to the natural habitats and/or species for which the site has been designated (the Qualifying Features listed above), avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving Favourable Conservation Status of each of the qualifying features. Subject to natural change, to maintain or restore: • The extent and distribution of qualifying natural habitats and habitats of qualifying species; • The structure and function (including typical species) of qualifying natural habitats and habitats of qualifying species; • The supporting processes on which qualifying natural habitats and habitats of qualifying species rely; • The populations of qualifying species; • The distribution of qualifying species within the site.	
Likely significant effects associated with activities that could follow Block licensing:	
• Underwater noise (see Section 5.3) • Accidental spills (see Section 6.3)	

Site Name: The Wash and North Norfolk Coast SAC	
Location	Grid Ref: TF558403 (central point) Latitude 52º 56'13"N Longitude 00º 19'05"E
Area (ha)	107,761.28
Summary	The Wash is the largest embayment in the UK with extensive areas of subtidal mixed sediment. In the tide-swept approaches to the Wash, the relatively common tube-dwelling polychaete worm *Sabellaria spinulosa* forms areas of biogenic reef. The site includes one of the largest expanses of sublittoral sandbanks and the second-largest area of intertidal flats in the UK. These habitats support important invertebrate communities; benthic communities on sandflats in the deeper, central part of the Wash are particularly diverse. The embayment supports a variety of mobile species, including a range of fish and harbour seal, with the subtidal sandbanks also providing important nursery grounds for young commercial fish species. Extensive saltmarsh habitats are also present, fringed by important areas of Mediterranean and thermo-Atlantic vegetation.

Qualifying features for which the site is designated:

Annex I Habitat

Primary features: Sandbanks which are slightly covered by sea water all the time, mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, reefs, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)

Secondary features: Coastal lagoons

Annex II Species

Primary features: Harbour seal *Phoca vitulina*

Secondary features: Otter *Lutra lutra*

Conservation objectives:

With regard to the natural habitats and/or species for which the site has been designated (the Qualifying Features listed above), avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving Favourable Conservation Status of each of the qualifying features.

Subject to natural change, to maintain or restore:

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

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

- Physical disturbance and drilling (see Section 4.3)
- Underwater noise (see Section 5.3)
- Accidental spills (see Section 6.3)

C3 Offshore SACs

Site Name: Dogger Bank SCI	
Location	Latitude 54º 51'27"N Longitude 02º 13'08"E
Area (ha)	1,233,884
Summary	The Dogger Bank in the Southern North Sea is the largest sandbank in UK waters and the SCI adjoins Dutch and German Dogger Bank sites. The bank supports communities typical of sandy sediments, characterised by polychaete worms, amphipods and small clams within the sediments and hermit crabs, flatfish and starfish on the seabed. Sandeels are abundant on the flanks of the bank and provide a food resource for seabirds, cetaceans and other commercial fish species, such as cod. Harbour porpoise, harbour seals and grey seals are also present at the site and have been included as non-qualifying features.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Sandbanks which are slightly covered by sea water all the time ***Annex II Species*** None	
Conservation objectives:	
Subject to natural change, restore* the sandbanks to favourable condition, such that: • The natural environmental quality* is restored; • The natural environmental processes* and the extent* are maintained; • The physical structure*, diversity*, community structure* and typical species*, representative of sandbanks which are slightly covered by seawater all the time, in the Southern North Sea, are restored. * For definitions of these terms, see the material presented in support of site selection by Natural England/JNCC: http://jncc.Defra.gov.uk/pdf/DoggerBank_ConservationObjectivesAdviceonOperations_6.0.pdf Notes: In the case of the Dogger Bank site, there is some evidence to date that, due to damage caused by bottom trawling and possibly infrastructure development, the Annex I feature may not be in favourable condition and might require restoration where possible. These are high-level conservation objectives, which may be refined by Natural England/JNCC in light of increased understanding of the features. The objectives must be viewed in light of the material presented in support of site selection and relevant definitions of favourable conservation status.	
Likely significant effects associated with activities that could follow Block licensing:	
• Physical disturbance and drilling (see Section 4.3) • Cumulative and in-combination (see Section 7)	

Site Name: North Norfolk Sandbanks and Saturn Reef SCI	
Location	Latitude 53º 22'29"N Longitude 02º 07'15"E
Area (ha)	360,341
Summary	The North Norfolk Sandbanks consist of 10 main sandbanks and a number of smaller banks, which collectively form the most extensive example of offshore linear ridge sandbanks in UK waters. The banks are home to invertebrate communities typical of sandy sediments, such as polychaete worms, crabs and brittlestars. The Saturn reef is a *Sabellaria spinulosa* biogenic reef structure located within the area occupied by the sandbank site.
Qualifying features for which the site is designated:	
Annex I Habitat Sandbanks which are slightly covered by sea water all the time; reefs (biogenic *Sabellaria spinulosa*) ***Annex II Species*** None	
Conservation objectives:	
Subject to natural change, restore* the *sandbanks which are slightly covered by seawater all the time* and *reefs* to favourable condition, such that the: • The natural environmental quality*, natural environmental processes* and extent* are maintained • The physical structure*, diversity*, community structure* and typical species*, representative of *sandbanks which are slightly covered by seawater all the time* and *reefs* in the Southern North Sea are restored. * For definitions of these terms, see Offshore Special Area of Conservation: North Norfolk Sandbanks and Saturn Reef Conservation Objectives and Advice on Operations (September 2012): http://jncc.Defra.gov.uk/pdf/NNSandbanksandSaturnReef_ConservationObjectives_AdviceonOperations_6.0.pdf	
Likely significant effects associated with activities that could follow Block licensing:	
• Physical disturbance and drilling (see Section 4.3) • Cumulative and in-combination (see Section 7)	

Site Name: Inner Dowsing, Race Bank and North Ridge SCI	
Location	Latitude 53º 15'26"N Longitude 00º 43'14"E
Area (ha)	84,514
Summary	The site is located off the south Lincolnshire coast and has been recommended for the sandbank habitat and *Sabellaria spinulosa* reef communities present. A wide range of sandbank types are enclosed by the boundary including banks bordering channels, relict linear banks and sinusoidal banks. The area contains species such as polychaete and nemertean worms and the ascidian *Molgula* sp. The main areas of *S. spinulosa* reef are found in the southwest of the site, particularly at Lynn Knock and in the Docking Shoal area. These areas support a diverse community of bryozoans, hydroids, sponges and tunicates. Harbour porpoise and grey seal are also present at the site and have been included as non-qualifying features.
Qualifying features for which the site is designated:	
Annex I Habitat Sandbanks which are slightly covered by sea water all the time; reefs (biogenic *Sabellaria spinulosa*) ***Annex II Species*** None	
Conservation objectives:	
Subject to natural change, maintain* or restore* the sandbanks in favourable condition, in particular the sub-features: • Gravelly muddy sand communities • Dynamic sand communities Subject to natural change, maintain or restore the reefs in favourable condition. * For definitions of these terms, see the material presented in support of site selection by Natural England/JNCC: http://jncc.Defra.gov.uk/pdf/IDRBNR_Reg%2035_Conservation%20Advice_v4.0.pdf	
Likely significant effects associated with activities that could follow Block licensing:	
• Physical disturbance and drilling (see Section 4.3)	

Site Name: Haisborough, Hammond and Winterton SCI	
Location	Latitude 52º 50'27"N Longitude 01º 57'58"E
Area (ha)	146,759
Summary	The Haisborough, Hammond and Winterton site lies off the north east coast of Norfolk, and contains a series of sandbanks which meet the Annex I habitat description 'Sandbanks slightly covered by sea water all the time'. The central sandbank ridge in the site is composed of alternating ridge headland associated sandbanks. This ridge consists of the sinusoidal banks which have evolved over the last 5,000 years, originally associated with the coastal alignment at the time that the Holocene marine transgression occurred. Inshore are the Newarp Banks and North and Middle Cross Sands which lie on the south west corner of the site. *Sabellaria spinulosa* reefs are located at Haisborough Tail, Haisborough Gat and between Winterton Ridge and Hewett Ridge. They arise from the surrounding coarse sandy seabed to heights of between 5cm to 10cm. The reefs are consolidated structures of sand tubes showing seafloor coverage of between 30% to areas where reef occupies 100% of the sediment. Some parts of the reefs appear to be acting as sediment traps, with exposed tube height accordingly reduced within the core parts of reefs.
Qualifying features for which the site is designated:	
Annex I Habitat Sandbanks which are slightly covered by sea water all the time; reefs (biogenic *Sabellaria spinulosa*) ***Annex II Species*** None	
Conservation objectives:	
Subject to natural change, maintain* or restore* the sandbanks in favourable condition, in particular the sub-features: • Low diversity dynamic sand communities • Gravelly muddy sand communities Subject to natural change, maintain or restore the reefs in favourable condition. * For definitions of these terms, see the material presented in support of site selection by Natural England/JNCC: http://jncc.defra.gov.uk/pdf/HHW_Reg%2035_Conservation%20Advice_v6.0.pdf	
Likely significant effects associated with activities that could follow Block licensing:	
• Cumulative and in-combination (see Section 7)	

C3 Sites in Adjacent States

Site Name: Doggersbank SCI	
Location	Latitude 55º 08'13"N Longitude 03º 28'53"E
Area (ha)	471,750
Summary	The Dogger Bank is 100% marine area. The Dogger Bank as a whole, i.e. including the English and German part is a sandbank. The top (the English part) is shallower than 20m. The entire bank is sand. Higher diversity of macrobenthos to the west, with a peak between 30 and 40m depth. Along the southern border of the bank fronts occur frequently in the summer, which may lead to increased concentrations of fish and birds. Because of its shallow depth, orientation and enormous size, the bank has a large effect on processes in the North Sea. From translation of Natura 2000 standard data form[83].
Qualifying features for which the site is designated:	
Annex I Habitat Sandbanks which are slightly covered by sea water all the time ***Annex II Species*** Grey seal *(Halichoerus grypus)* Harbour seal *(Phoca vitulina)* Harbour porpoise *(Phocoena phocoena)*	
Conservation objectives:	
For harbour porpoise, grey seal and harbour seal: Maintain extent and quality of habitat in order to maintain population	
Likely significant effects associated with activities that could follow Block licensing:	
• Physical disturbance and drilling (see Section 4.3) • Underwater noise (see Section 5.3) • Accidental spills (see Section 6.3)	

Site Name: Klaverbank SCI	
Location	Latitude 54º 01'24"N Longitude 03º 05'04"E
Area (ha)	124,026
Summary	Klaverbank is an area of shallow gravelly sediments interspersed with larger stones colonised by calcareous red algae. It is an area with the high benthic fauna diversity. The Bank stretches from the northwest to southeast and is divided by a 60-meter deep trench, Botney Cut. Also, on the English Continental Shelf are large gravel and stone concentrations. The area was formed by the moraine of a glacier from the last ice age. From translation of Natura 2000 standard data form[84].
Qualifying features for which the site is designated:	
Annex I Habitat Reefs ***Annex II Species*** Grey seal *(Halichoerus grypus)* Harbour seal *(Phoca vitulina)* Harbour porpoise *(Phocoena phocoena)*	
Conservation objectives:	
For harbour porpoise, grey seal and harbour seal: Maintain extent and quality of habitat in order to maintain population	
Likely significant effects associated with activities that could follow Block licensing:	
• Underwater Noise (see Section 5.3) • Accidental spills (see Section 6.3)	

[83] http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=NL2008001#4
[84] http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=NL2008002#4

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