Department of Energy & Climate Change

Offshore Oil & Gas Licensing 27th Seaward Round Central North Sea

Blocks 9/27, 15/20f, 15/24a, 15/25c, 16/2c, 16/16

Habitats Regulations Assessment
Appropriate Assessment

November 2013

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1 Introduction

1.1 Background and purpose

On 1st February 2012, the Secretary of State for the Department of Energy and Climate Change (DECC) invited applications for licences in the 27th 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 400 Blocks/part Blocks were received.

To comply with obligations under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended), in summer 2012, 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 2012).

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:

> 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.

A screening assessment (including consultation with the statutory agencies/bodies) forming the first stage of the Habitats Regulations Assessment (HRA) process, identified 61 whole or part Blocks as requiring further assessment prior to decisions on whether to grant licences (DECC 2012). 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 seven regional reports as follows:

- Southern North Sea
- Outer Moray Firth
- Central North Sea

- West of Shetland
- Northern Ireland
- Eastern Irish Sea
- Central English Channel

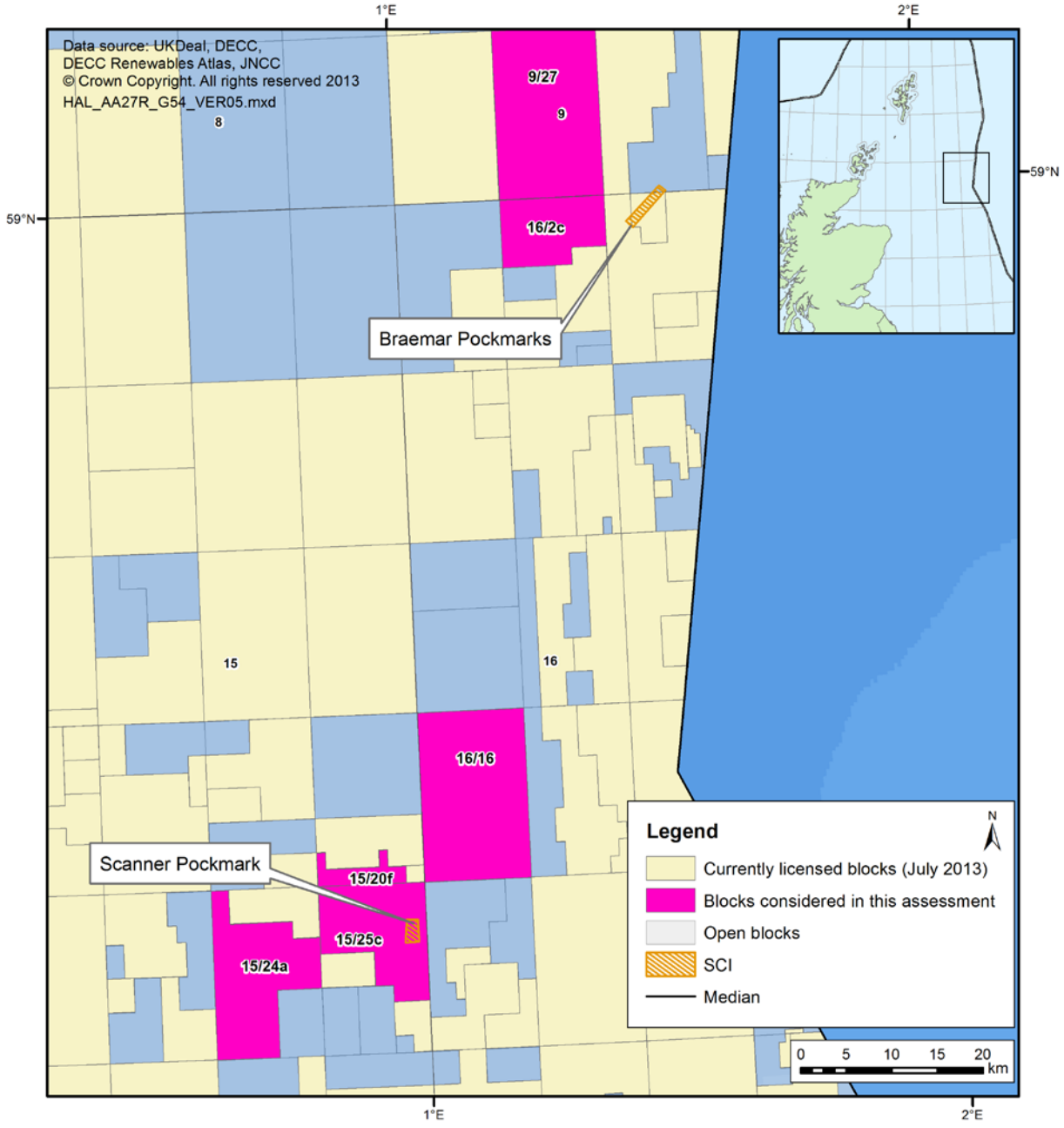
This report documents the further assessment in relation to 6 Blocks in the Central North Sea (see Section 1.2).

1.2 Central North Sea Blocks

The Central North Sea Blocks applied for in the 27th Round considered in this document are listed below and shown in magenta in Figure 1.1.

9/27	15/20f	15/24a	15/25c
16/2c	16/16		

Figure 1.1: Location of Central North Sea Blocks



Note: Open blocks are currently unlicensed, although they may have been licensed in the past.

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 (see Figure 2.1).

There are three types of Seaward Production Licences:

- Traditional Production Licences are the standard type of Seaward Production Licences and run for three successive periods or Terms. Each Licence expires automatically at the end of each Term, unless the licensee has made enough progress to earn the chance to move into the next Term. The Initial Term lasts for four years and the Licence will only continue into a Second Term of four years if the agreed Work Programme has been completed and if 50% of the acreage has been relinquished. The Licence will only continue into a Third Term of 18 years if a development plan has been approved, and all the acreage outside that development has been relinquished.

- Frontier Production Licences are a variation of the Traditional Production Licence with longer terms. A Frontier Production Licence has a longer Initial Term (six years as opposed to four) with the objective of allowing companies to screen larger areas. After 3 years, the licensee must relinquish 75% of the licensed acreage. At the end of the Initial Term, the exploration Work Programme must have been completed and the licensee must relinquish 50% of what is left (i.e. leaving one eighth of the original licensed area). A variation on the Frontier Production Licence was introduced prior to the 26th Round. Designed for the particularly harsh West of Scotland environment, it is similar to the existing Frontier Licence but with an initial term of nine years with a Drill-or-Drop decision to be made by the end of the sixth year and (if the licensee chooses to drill) drilling to be completed within the remaining three years of the initial term.

- In the 21st Round (2002) the Department introduced Promote Licences. The general concept of the Promote Licence is that the licensee is given two years after award to attract the technical, environmental and financial capacity to complete an agreed Work

Programme. In effect, DECC will defer (not waive) its financial, technical and environmental checks until the preset Check Point. Promote licensees are not allowed to carry out field operations until they have met the full competence criteria. The way this is implemented is that each Promote Licence carries a "Drill-or-Drop" Initial Term Work Programme. The Licence will therefore expire after two years if the licensee has not made a firm commitment to DECC to complete the Work Programme (e.g. to drill a well). By the same point, it must also have satisfied DECC of its technical, environmental and financial capacity to do so.

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

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 Block(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 three levels of drilling commitment:

- 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 **Contingent Drilling Commitment** is also a commitment to the Secretary of State to drill a well, but it includes specific provision for DECC to waive the commitment in light of further technical information.

- 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 and Contingent work programmes (subject to further studies by the licensees) will probably result in a well being drilled in less than 50% of the cases.

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 (see Table 2.1), such as seismic survey or drilling, are subject to further individual controls by DECC (see Figures 2.2-2.3), 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 (six years in the case of Frontier licences) are detailed in the licence applications. For some activities, such as seismic survey noise 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, although there may still be pipelines that cross unlicensed Blocks should any significant development ensue after the initial four-year exploratory period.

On past experience, less activity actually takes place than is bid at the licence application stage and a proportion of Blocks awarded may be relinquished without any field activities occurring. 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 as a result of the structuring of licences. The Blocks comprising individual licences and estimates of work commitments for the Blocks derived by DECC from the application received are as follows:

Block	Initial term work programme	Licence type
9/27 & 16/2c	Drill or drop well, shoot 3D seismic	**Traditional:** work programme must be carried out and 50% of block acreage relinquished within 4 years, otherwise licence will not continue to second term.
15/20f & 15/25c	Firm well	
15/24a	Drill or drop well	
16/16	Firm well	

DECC routinely seeks advice from other Government Departments[1] and statutory nature conservation agencies in considering applications for activity approval. On the announcement of each seaward licensing Round, DECC issues a list of "other regulatory requirements", providing guidance on Block specific issues and concerns. Depending on the activity and the nature of the sensitivity, these concerns may affect DECC's decision whether or not to approve particular activities at specified times.

The guidance indicates seasonal concerns for the Blocks considered in this assessment (Table 2.2). Those seasonal concerns identified for seismic survey are related to fish spawning within the months indicated. Drilling related concerns are for periods of very high seabird vulnerability to surface pollution (see Section 7.2.3). There is little evidence of well-defined seasonal patterns associated with the abundance and distribution of most cetacean species. It is therefore difficult to single out areas/times for which seismic surveying would be less advisable. DECC recommends[2] that cetacean sensitivity is considered in relation to each individual project, and also advises applicants to seek advice directly from JNCC and Marine Scotland.

[1] DECC strongly advise early consultation with all the organisations relevant to the location and nature of an operator's proposed activities.
[2] DECC 27th Round other regulatory issues.

Table 2.1: Potential activities arising from initial work programmes – note that these descriptions are indicative, and activities would require individual environmental assessment and permitting (see Figures 2.2-2.3)

Potential activity	Description
Geophysical survey	
Deep geological seismic (2D and 3D) survey	2-D 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[3] with typical broadband source levels of 248-259db re 1µPa.
Rig site survey	Rig site surveys are undertaken to identify seabed and subsurface hazards to drilling, such as wrecks and the presence of shallow gas. The surveys use a range of techniques, including multibeam and side scan sonar, sub-bottom profiler, magnetometer and small airgun and shorter hydrophone streamer is used (with source size of 40-400 cubic inches[3]). The survey typically covers 2km or 3km square. The rig site survey vessel may also be used to characterise seabed habitats, biota and background contamination.
Well evaluation (e.g. Vertical Seismic Profiling)	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[3]) is deployed from the rig, and measurements are made using a series of geophones deployed inside the wellbore. VSP surveys are of short duration (a few hours).
Drilling	
Rig tow out & de-mobilisation	Mobile rigs are towed to and from the well site typically by 2-3 anchor handling vessels.
Rig placement/ anchoring	Semi-submersible rigs use either anchors (deployed and recovered by anchor handler vessels) or dynamic positioning (DP) to manoeuvre into and stay in position over the well location. Eight to 12 anchors attached to the rig by cable or chain are deployed radially at 1 to 1.5km from the rig; part of the anchoring hold is provided by a proportion of the cables or chains lying on the seabed (catenary). Jack- up rigs are used in shallower waters (normally <120m) and jacking the rig legs to the seabed supports the drilling deck. Each of the rig's legs terminates in a spud-can (base plate) with a diameter of 15-20m to prevent excessive sinking into the seabed.

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

Potential activity	Description
Drilling discharges	Typically around 1,000 tonnes of cuttings result from drilling an exploration well. Water-based mud cuttings are discharged at, or relatively close to sea surface during "closed drilling" (i.e. when steel casing in the well bore and a riser to the rig are in place), whereas surface hole cuttings are normally discharged at seabed during "open-hole" drilling. Use of oil based mud systems, for example in highly deviated sections or in drilling water reactive shales, would require onshore or alternative drilling waste disposal.
Rig/vessel presence and movement (incl. helicopters)	On site, the rig is supported by supply and standby vessels. Supply vessels typically make 2-3 supply trips per week between rig and shore. Helicopter trips to transfer personnel to and from the rig are typically made several times a week.

Figure 2.1 provides an overview of the plan process which has led to the 27th Licensing Round and the various environmental requirements including HRA. Figures 2.2 and 2.3 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 indicate other stages of assessment typically undertaken prior to activities being permitted/consented. They highlight the regulatory requirements and environmental responsibilities at various stages in the development of the plan or exploration level activity, and further opportunities/requirements for project level environmental assessment and HRA. These Figures show that all activities which could give rise to significant effects on the integrity of relevant sites are subject to regulatory control, including HRA as necessary with consultation with statutory nature conservation bodies. Applications for consent to conduct activities are required to include assessment of potential effects and identification of necessary mitigation measures. There are well proven methods to prevent significant impacts and site specific mitigation would be defined at the project level once the location and nature of activity were defined.

Table 2.2: Seasonal and other concerns related to Blocks considered in this Appropriate Assessment

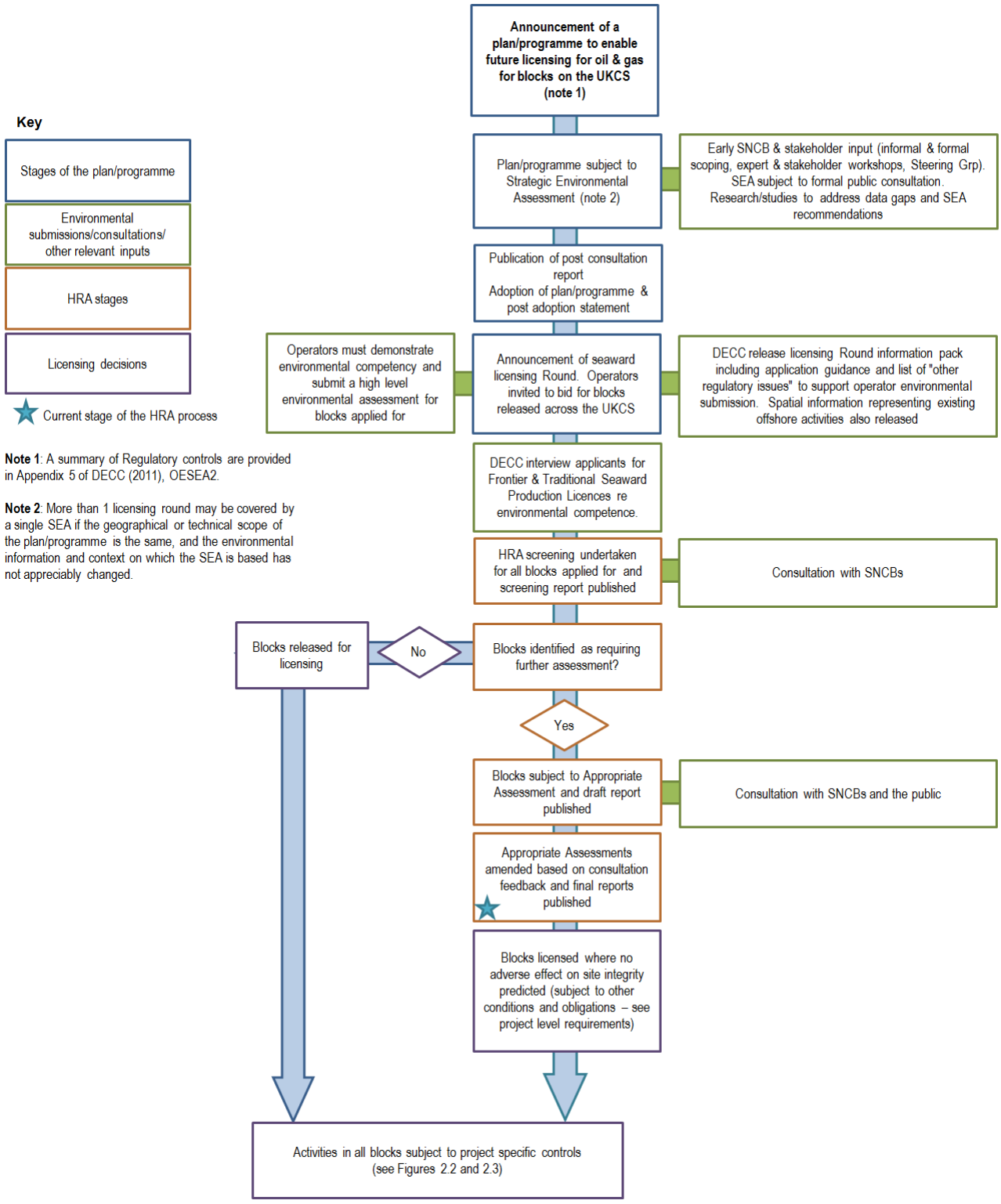
Blocks	Period of concern for seismic surveys	Period of concern for drilling	Special Conditions†
9/27	January-May (MS)	-	-
15/20f	-	-	✓
15/24a	-	Oct-Dec (JNCC)	-
15/25c	-	Oct-Dec (JNCC)	✓
16/2c	January-April (MS)	Sep-Nov (JNCC)	-
16/16	-	-	-

Note: † Activity may be permitted subject to conditions to protect sensitive seabed pockmarks and associated Annex I habitat (submarine structures made by leaking gases) found within these blocks. MS – Marine Scotland.
Source: Other regulatory issues (DECC 27th Seaward licensing Round website).

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). Discoveries that are developed may require further drilling, wellhead infrastructure, pipelines and possibly production facilities such as platforms, although most recent developments are tiebacks to existing production facilities rather than stand-alone developments.

The extent and timescale of development, if any, which may ultimately result from the licensing of these Blocks is therefore uncertain and it is not regarded that a meaningful assessment of development level activity (e.g. pipelay, placement of jackets, subsea templates or floating installations) can be made at this stage for any given block in relation to relevant sites. Any information provided in relation to these activities is for context. All activities as part of exploration, appraisal and development are subject to individual permitting and environmental assessment (incorporating HRA where appropriate) prior to any consent being issued.

Figure 2.1: Environmental obligations for the competent authority when licensing for offshore oil and gas



Note 1: A summary of Regulatory controls are provided in Appendix 5 of DECC (2011), OESEA2.

Note 2: More than 1 licensing round may be covered by a single SEA if the geographical or technical scope of the plan/programme is the same, and the environmental information and context on which the SEA is based has not appreciably changed.

Figure 2.2: High level overview of exploration drilling environmental requirements[4]

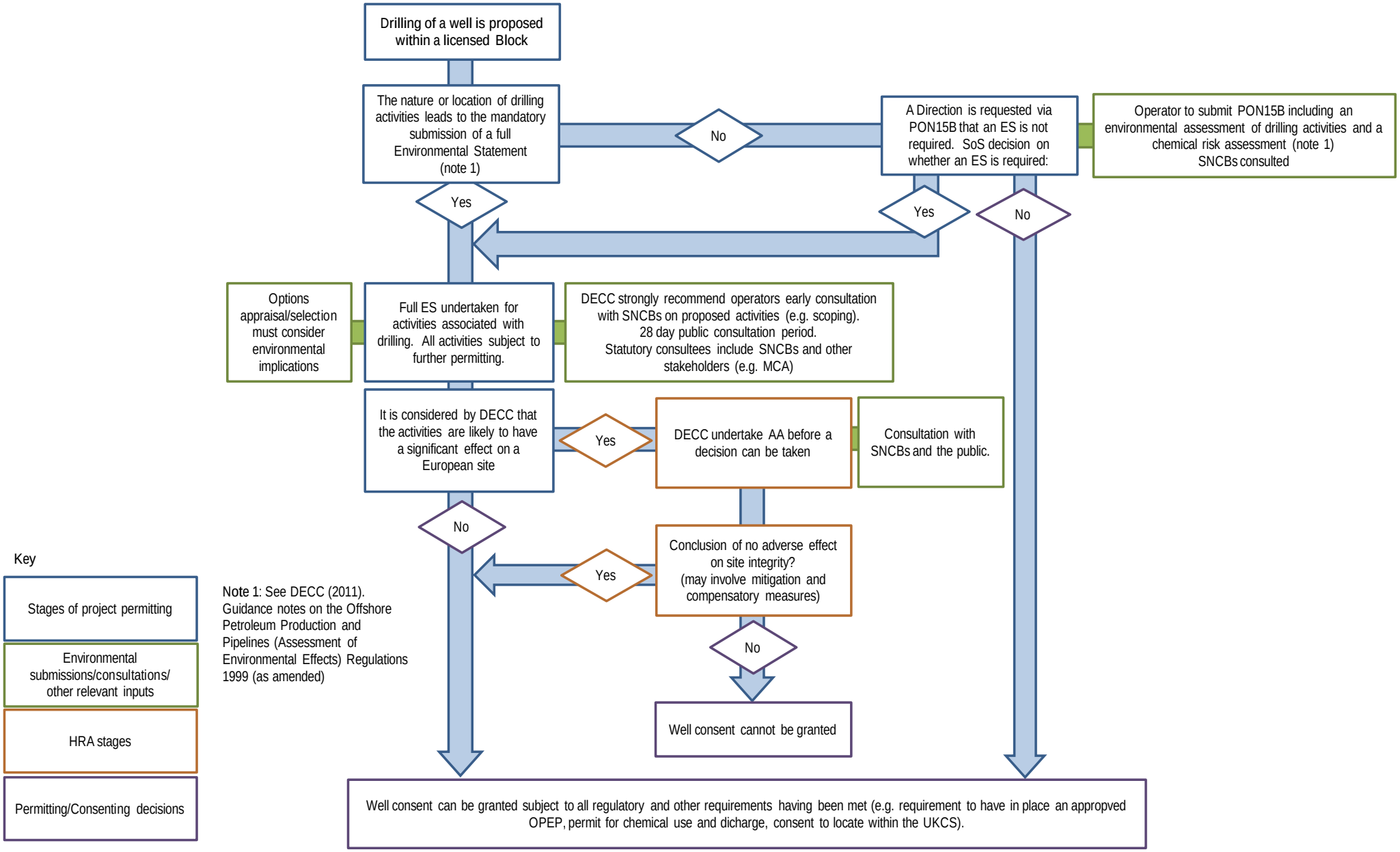
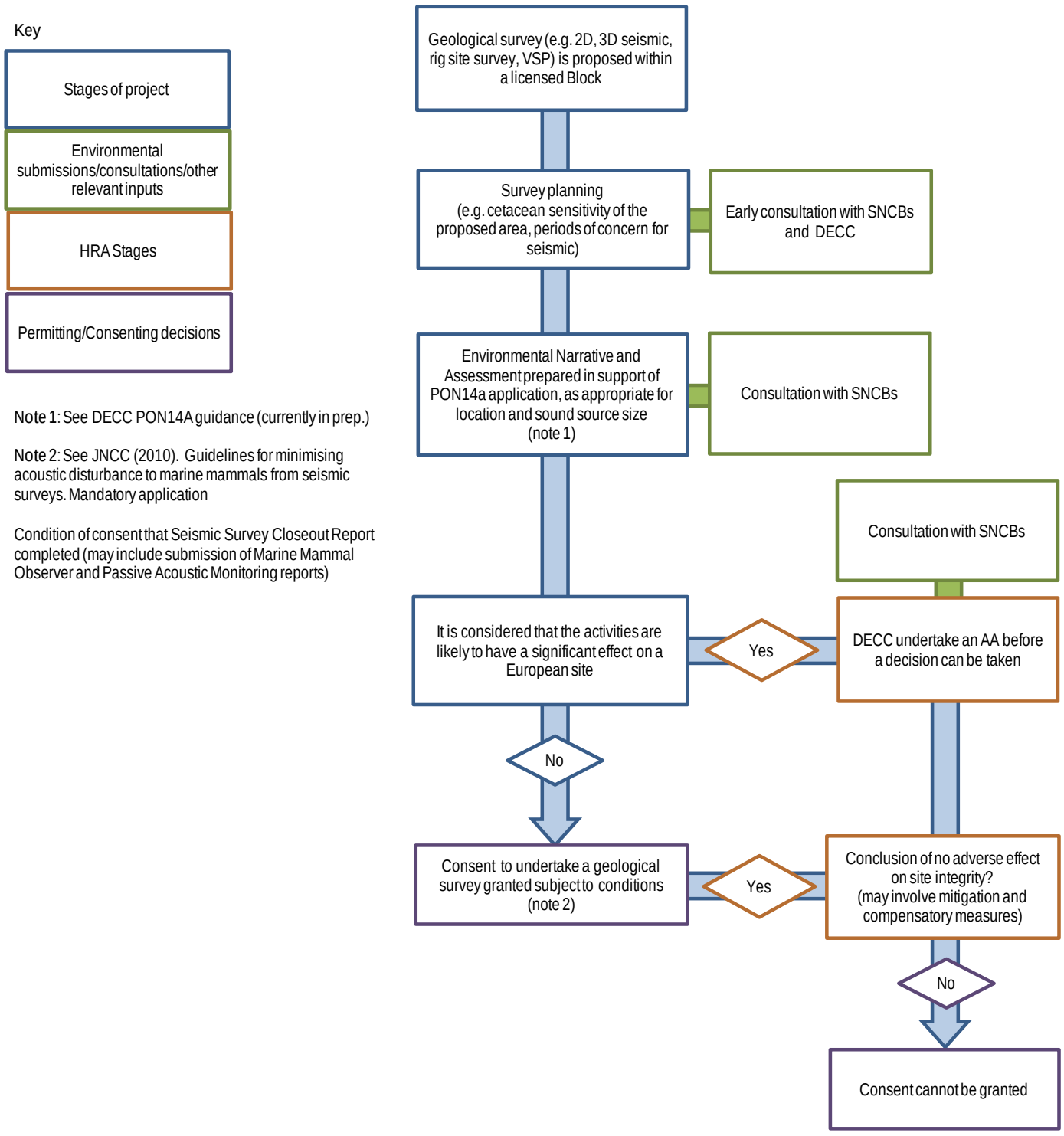


Figure 2.3: High level overview of seismic survey environmental requirements[4]



[4] The PON application processes referred to in Figures 2.2 and 2.3 are presently being replaced with the Portal Environmental Tracking System (PETS). PETS will cover applications including those for Drilling Operations (formerly PON15B) and Marine Survey Notifications and Acoustic Survey Consents (formerly PON14A).

3 Relevant Natura 2000 Sites

The Natura 2000 sites to be considered in this assessment were identified based on their location in relation to the 6 Blocks (see Section 1.2 above) which are the subject of licence applications and in terms of the foreseeable possibility of interactions. 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.

The sites considered are listed and mapped in Appendix A. In accordance with Government policy (as set out in the Scottish Planning Policy (Scottish Government 2010) and Marine Policy Statement (HM Government 2011)), and revised guidance updating Scottish Office Circular No. 6/1995 (Scottish Government 2000), the relevant sites considered include potential SPAs[5], designated and candidate SACs and Sites of Community Importance[6] (SCIs).

The relevant sites are listed in Table 3.1 below, shown in Figure 1.1 and detailed in Appendix A.

Table 3.1: SCI sites and qualifying features under Annex 1 and Annex 2 in the Central North Sea area, and those relevant to this Appropriate Assessment

Site Name	Annex I Habitat	Annex II Species
Braemar Pockmarks SCI	Submerged structures made by leaking gases	N/A
Scanner Pockmark SCI	Submerged structures made by leaking gases	N/A

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

[5] Paragraph 135 of Scottish Planning Policy – note that the SPP and Scottish National Planning Framework 3 were recently subject to consultation and responses are presently being considered. The draft revised SPP maintains the policy that the same level of protection be afforded to potential SACs and SPAs as to designated sites.

[6] Sites of Community Importance (SCIs) are more advanced in designation than cSACs in that they have been adopted by the European Commission but not yet formally designated by the government of the relevant country.

4 Assessment of the effects of the plan on site integrity

4.1 Process

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

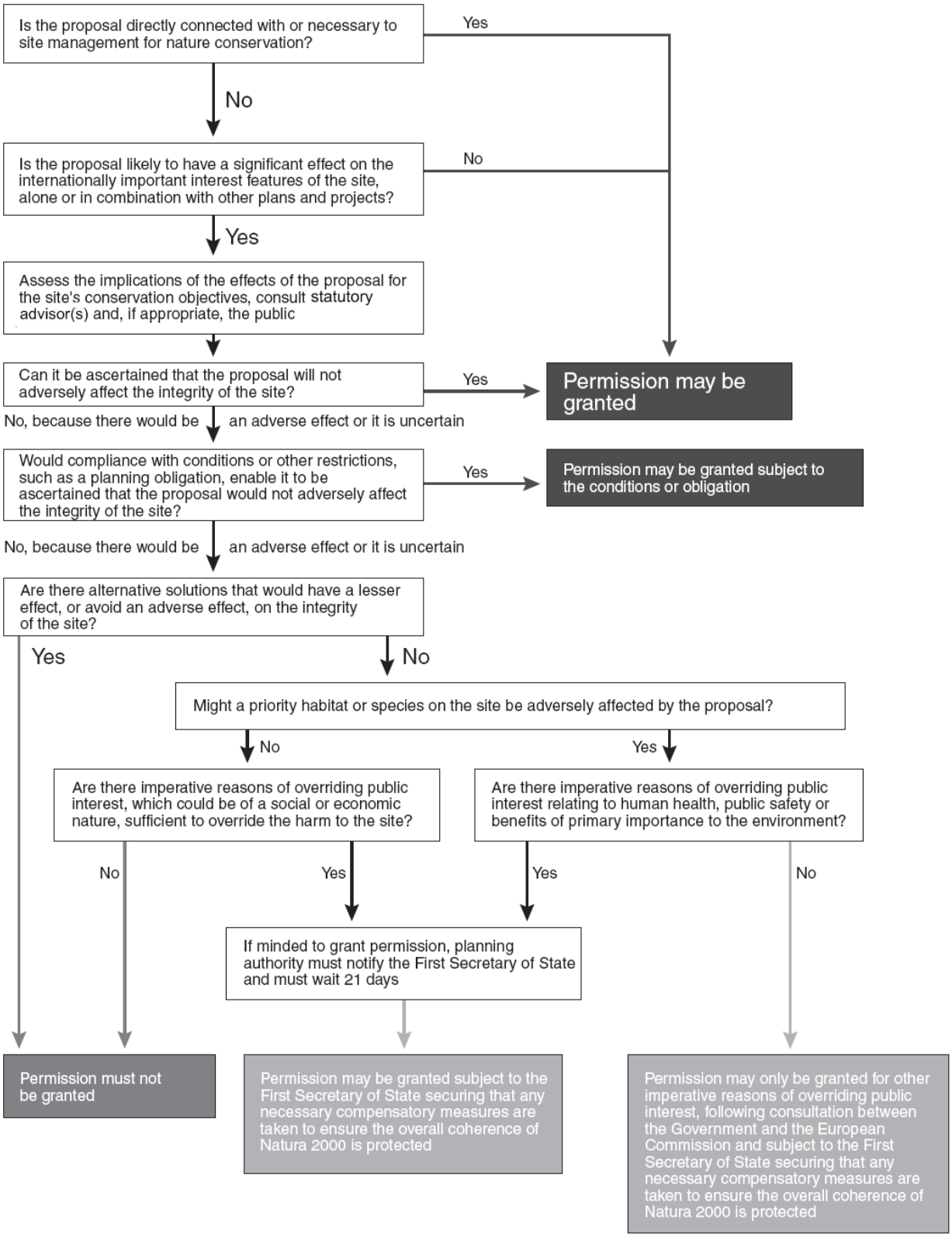
- Considered, on the basis of the precautionary principle, whether it could be concluded that the integrity of relevant European Sites would not be affected. This impact prediction involved a consideration of the cumulative and in-combination effects.
- Examined, in relation to elements of the plan where it was not possible to conclude that the integrity of relevant sites would not be affected, whether appropriate mitigation measures could be designed which cancelled or minimised any potential adverse effects identified.
- Considered the comments received from statutory advisers and others on the draft AA.
- Completed the AA, including DECC's conclusion 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 4.1 overleaf.

Figure 4.1: Summary of procedures under the Habitats Directive for consideration of plans or projects affecting Natura 2000 sites



Note: 'Statutory advisor(s)' refers to the relevant statutory Government advisor(s) on nature conservation issues. Source: After ODPM (2005).

4.2 Site integrity

Site integrity is defined in the SNH HRA guidance for plan making bodies in Scotland as: "the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified" (Tyldesley & Associates 2012). The integrity of the site can therefore be considered to be the structure and the functioning of its ecological systems, the features for which the site is designated (habitats and/or species) and the ability of the site to meet its conservation objectives. 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 across all parts of the site (Tyldesley & Associates 2012). As clarified by Section 4.6.3 of the EC Guidance (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. 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 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), 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.

4.3 Assessment

The approach to ascertaining the absence or otherwise of adverse effects on the integrity of a relevant site is set out in Section 4.1 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 Habitats Regulations guidance notes (e.g. SEERAD 2000), the Scottish Planning Policy (Scottish Government 2010), Circular 06/2005 (ODPM 2005), the English Nature Research Reports, No 704 (Hoskin & Tyldesley 2006) and the Scottish Natural Heritage Habitats Regulations Appraisal of Plans, No 1739 (Tyldesley & Associates 2012).

Appendix A lists and summarises the relevant sites as defined in Section 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 6 Blocks in question (see work programmes in Section 2.2) to result in a likely significant effect. Where potential effects are identified in Appendix B, more detailed information on the relevant sites including their conservation objectives is provided in Appendix C.

Detailed assessments are made in Sections 5 and 6 of the implications for the integrity of the relevant sites (in terms of their qualifying features and species, and the site's conservation objectives) were a licence (or licences) to be granted for the 6 Central North Sea Blocks. The assessment is based on an indication of the proposed work programmes for the Blocks and likely hydrocarbon resources if present (crude oil), along with the characteristics and specific environmental conditions of the relevant sites as described in the Appendices. As noted in Section 2.2, the proposed work programme is taken as the maximum of any application for that Block; however, on past experience, less activity actually takes place than is bid at the licence application stage. 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 other effects (e.g. rig siting, marine discharges).

- In-combination effects (e.g. cumulative and synergistic and secondary/indirect effects).

Whilst the work programme for Block 9/27 includes new 3D seismic survey, the potential for acoustic effects on the conservation objectives of Natura 2000 sites is mitigated by the distance of the Block from Natura 2000 sites supporting features sensitive to noise (e.g. marine mammals or migratory fish). The closest relevant Natura 2000 sites are in Shetland and Orkney, which are over 150km from Block 9/27. The conservation objectives and advice on operations for both the Scanner Pockmark and Braemar Pockmarks SCI (JNCC 2012a, b) sites indicate that there is no known vulnerability of the qualifying features to noise.

The qualifying features of the Natura 2000 sites listed in Table 3.1 are not particularly vulnerable to oil spills. Given the distance from the Blocks to shore, it was considered that the integrity of coastal Natura 2000 sites would not be adversely affected by oil spills from any of the Central North Sea Blocks. Following licensing, specific activities require permitting and those considered to present a risk to European Sites would be evaluated by DECC under mandatory contingency planning and HRA 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.

Use has been made of advice prepared by the conservation agencies under the various Habitats Regulations, since this typically includes advice on operations that may cause deterioration or disturbance to relevant features or species. Advice given under Regulation 35[7] (formerly Regulation 33) includes an activities/factors matrix derived from MarLIN (www.marlin.ac.uk) where applicable. Several of the "probable" effects highlighted in the MarLIN matrices are not inevitable consequences of oil and gas exploration and production, since through the regulatory Environmental Impact Assessment (EIA) and permitting processes they are mitigated by timing, siting or technology requirements (or a combination of one or more of these). There is a requirement that these options would also be evaluated in the environmental assessments necessary as part of activity consenting.

The conservation objectives identified for features of the SCI sites considered in the AA are listed in Table 4.1. These objectives, in relation to the specific qualifying features of each site, and the conservation status of these features, have been considered during this AA.

Table 4.1: Conservation objectives for Annex I habitats represented in SCI sites

Conservation objectives	
For Annex I Habitats	Subject to natural change, restore[a] the submarine structures made by leaking gases to favourable condition, such that: • The natural environmental quality[b] is restored; • The natural environmental processes[c] are maintained; • The extent[d], physical structure[e], diversity[f], community structure[g] and typical species[h] representative of **the submarine structures made by leaking gases** in the Northern North Sea are restored.

Explanatory notes *to conservation objectives (JNCC 2012):*

[7] The Conservation of Habitats and Species Regulations 2010.

a) *Maintain or restore. Maintain implies that, based on our existing understanding, the feature is regarded as being in favourable condition and will, subject to natural change, remain in this condition at designation. Restore implies that the feature is likely to have been degraded to some degree. In the absence of direct evidence of damage or deterioration, where activities associated with pressures to which the feature is sensitive overlap the feature, they may need to be managed to reduce or eliminate potential negative impact(s). The first step for a 'restore' objective may be to seek new information on the current condition of the site feature and/or more-detailed information on the potential overlap of activities with the feature(s) at the site. Restoration in the marine environment generally refers to natural recovery to favourable condition through the reduction or removal of adverse impacts. JNCC considers that maintenance or restoration of the following parameters (b - h) will take account of the maintenance or restoration of natural structures and functions and ecological processes.*
b) *Natural environmental quality e.g. chemical quality parameters of water, suspended sediment levels, radionuclide levels etc. should not deviate from baseline levels at designation (if data is available) or from reference conditions.*
c) *Natural environmental processes e.g. circulation, sediment deposition and erosion etc. should not deviate from baseline levels at designation (if data is available) or from reference conditions.*
d) *Extent - the area covered by the habitat and communities.*
e) *Physical structure - the shape, form and composition of the habitat and its substrata.*
f) *Diversity - the number of different biological communities or number of species within a given community.*
g) *Community structure - e.g. age classes, sex ratios, distribution of species, abundance, biomass, reproductive capacity, recruitment, range and mobility.*
h) *Typical species – see Appendix III for criteria for identifying typical species*

High level controls and mitigation measures are in place for each of the broad sources of effect listed above (see Table 4.2, Figures 2.2 and 2.3). These mitigation measures, which are discussed in more detail in Sections 5 and 6, should *inter alia* help to avoid the deterioration of any qualifying habitats, and habitats supporting species, and seek to prevent undermining any of the conservation objectives for a given site in relation to the features for which it is designated. These high-level mitigation measures can be partly interpreted as "...conditions or other restrictions such as a planning obligation, [compliance with which would] enable it to be ascertained that the proposal would not adversely affect the integrity of the site" (see Figure 4.1, above), and some also represent other non-statutory guidance etc. with regards to the avoidance of significant effects on sites. Where it is considered conservation objectives would not be undermined by any of the given sources of effect for a particular species or habitat (e.g. due to animal behaviour and/or the location/characteristics of a particular habitat), certain sites may be screened out of the assessment, and these are listed in Appendix B.

Table 4.2: High level mitigation measures identified for potential sources of effect

	High level Mitigation
Physical disturbance	The Blocks under consideration are far offshore and remote from coastal Natura 2000 sites. The Blocks are close to the Braemar Pockmarks SCI and Scanner Pockmark SCI and drilling and other activities could cause potential physical disturbance to the Annex I habitat. However, there are well proven methods to prevent significant impacts and mitigation would be defined at the project level (e.g. following rig site surveys), and activities would be subject to project specific EIA and HRA as necessary.
Marine Discharges	Discharges from offshore oil and gas facilities have been subject to increasingly stringent regulatory controls over recent decades, and oil and other contaminant concentrations in the major streams (drilling wastes and produced water) have been substantially reduced or eliminated. Discharges would be considered in detail in project-specific EIA and HRA (where necessary) and chemical risk assessments under existing permitting procedures.
Other effects	The IMO International Convention for the Control of Ballast Water and Sediment, serves to mitigate against the possible introduction of invasive alien species through shipping ballast, which may degrade sensitive local habitats and

High level Mitigation	
	communities. Measures include the mid-ocean exchange of ballast water (with ultra-violet irradiation of ballast a proposed alternative). The potential for disruption or interruption of the gas or fluid flow on which the pockmark features depend would be assessed during project specific EIA and HRA as necessary.
In-combination effects	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.

5 Consideration of sites & potential physical & other effects

5.1 Introduction

Several activities associated with oil and gas exploration and production can lead to physical disturbance, damage, alteration or contamination of seabed habitats and geomorphological features, with consequent effects on benthic communities. The prime potential sources of effect are summarised below, followed by a consideration of the foreseeable effects on the relevant sites assessed to be at potential risk (the Braemar Pockmarks SCI and the Scanner Pockmark SCI) and whether these could adversely affect the integrity of these sites.

5.2 Physical damage at the seabed

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

- **Anchoring of semi-submersible rigs**. Semi-submersible rigs use anchors to hold position, typically between 8 and 12 in number at a radius depending on the water depth, and cause seabed disturbance from the anchors and chain or cables, and in cohesive sediments, leave 'anchor mounds' after their retrieval. The water depths in the Blocks are considered too deep for a jack-up 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 therefore removed although post-well sediments may vary in the immediate vicinity of the well compared to the surrounding seabed. The time taken for full seabed recovery will depend on location, sediment type, and water depth.

Activities following the initial term (platform/subsea template installation and pipelay) would only take place following successful appraisal of potential hydrocarbon reserves, and would be subject to further assessment including HRA (where appropriate) at that stage.

The use of anchors by drill rigs will produce a linear scar along the trajectory from anchor placement and recovery. A larger overall surface scrape may be expected from catenary action of anchor chains or cables though this is dependent upon water depth, anchor spread and tension of the chain or cable. Anchor handling may also cause some re-suspension of sediments. The duration of physical impact on the seabed will, however, be short due to the temporary nature of anchor placement. The time taken for the recovery of the seabed is difficult to accurately determine and is dependent on severity of impact, location, sediment type, and water depth (e.g. Foden *et al.* 2009).

Environmental Statements report a typical area that will be affected by such anchor scarring as some 2.4km^2 (e.g. Iona Energy 2012), while it is estimated that areas affected by anchor scarring will recover within 1-5 years (DECC 2011). Anchoring and catenary scarring are not expected to result in significant changes to sediment properties and rapid recovery of faunal communities within the disturbed area may be expected through a combination of larval settlement and immigration of animals from the adjacent seabed. Infill of scars can, however, produce alteration of sediment type within the feature which is longer-term than the topographic expression of the scar, since the infill is usually of finer sediment (e.g. Robinson *et al*. 2005). Anchoring in areas of stiff clay can result in long lasting mounds of sediment.

DECC oil and gas SEAs have compared the physical disturbance effects of oilfield activities to those of fishing and natural events in shallow water (e.g. storm wave action), and concluded that oilfield effects are typically minor on a regional scale. It is generally accepted that the principal source of human physical disturbance of the seabed and seabed features is bottom trawl fishing (Hall-Spencer *et al*. 2002). Trawl scarring is a major cause of concern with regard to conservation of shelf and slope habitats and species (e.g. Witbaard & Klein 1993, de Groot and Lindeboom 1994, Kaiser *et al*. 2002a, Kaiser *et al*. 2002b, Gage *et al*. 2005). The long-term effects of bottom fishing disturbance is less well understood due to the complex nature of the changes and the lack of pre-impact or control data (Frid *et al.* 2000, Bradshaw *et al.* 2002). Analysis of 101 experimental fishing impact studies undertaken by Kaiser *et al.* (2006) predicted recovery times in sand and gravel habitats after a scallop trawl as *ca.* 8 years; muddy sand as *ca.* 1.6 years and reef as *ca.* 3.2 years), with the scallop trawl being particular severe in terms of benthic disturbance (Mason 1983). Beam and otter trawling of sandy and muddy sediments exhibited a quicker recovery rate of the benthic species. However, the recovery rate of muddy sand after beam and otter trawl is still predicted at *ca.* 0.6-0.65 years respectively (Kaiser *et al.* 2006).

Block 15/25c impinges upon the Scanner Pockmark SCI and the proposed work programme for Block 15/25c and 15/20f indicates the drilling of a firm well. JNCC (2012a) advice on operations indicates that oil and gas industry activity occurs within the site which may expose the feature and its associated biological communities to a low level of smothering by drill cuttings. The feature lies in a low-energy environment and as such the cuttings may not be removed by currents and this can lead to localised smothering. However, due to regulatory and consenting processes there is a low risk of physical loss through smothering (JNCC 2012a).

The Braemar Pockmarks SCI is relatively close to Block 16/2c and the proposed work programme for this Block (which also includes Block 9/27) is for a drill or drop well. JNCC (2012b) advice for the site indicates that as the site covers a large proportion of the Braemar gas reservoir, there is a requirement to carry out routine inspections, and preventative and

remedial maintenance on the existing well and sub-sea infrastructure. Routine activities include the locating of a drilling rig to gain access to the wellhead for maintenance activity. These operations may expose the feature to physical disturbance or abrasion at a low level. Vulnerability to physical loss through removal (nearby oil and gas extraction) and toxic contamination through the introduction of synthetic- and non-synthetic compounds is currently unknown (JNCC 2012b). Given that the well will not be drilled in the same Block as the Braemar Pockmarks SCI it is unlikely that drilling activities would impact the qualifying feature.

The routine sources of potential physical damage are assessed and controlled through a range of regulatory processes, such as EIA and Petroleum Offshore Notices for drilling activities (PON15B) and, where relevant, HRA to underpin those applications. Provisions under the Marine and Coastal Access Act (2009) include certain activities such as decommissioning operations previously covered by the Food and Environment Protection Act which are now permitted through a Marine Licence. Based on the results of the assessments including HRA, DECC may require additional mitigation measures to avoid or minimise any adverse effects, or where this is not possible, refuse consent. Drilling activities outlined above require individual survey of the proposed rig location, reports from which are used to inform the technical feasibility of drilling. Additional survey work may be required, such as limited benthic survey, but this is considered on a case by case basis. Subject to the results of such surveys, the location of activities could be altered and/or additional survey work undertaken. Such reports are used to underpin operator environmental submissions (e.g. PON15B and Environmental Statements) and are typically made available to nature conservation bodies during the consultation phases of these assessments.

5.3 Marine discharges

As described in previous DECC oil and gas SEAs, marine discharges from exploration and production activities include produced water, sewage, cooling water, drainage, drilling wastes and surplus water based mud (WBM), which in turn may contain a range of hydrocarbons in dissolved and suspended droplet form, various production and utility chemicals, metal ions or salts (including Low Specific Activity radionuclides). Discharges during the exploration phase are restricted to those associated with drilling and related support activities.

Drilling wastes are a major component of the total waste streams from offshore exploration and production, with typically around 1,000 tonnes of cuttings resulting from an exploration or development well. Water-based mud cuttings are discharged at, or relatively close to sea surface during “closed drilling” (i.e. when steel casing and a riser is in place), whereas surface hole cuttings will be discharged at seabed during “open-hole” drilling. Use of oil based mud systems, for example in highly deviated sections or in water reactive shale sections, would require the onshore disposal, offshore treatment prior to discharge or reinjection of a proportion of waste material (DECC 2011).

Dispersion of mud and cuttings is influenced by various factors, including particle size distribution and density, vertical and horizontal turbulence, current flows, and water depth. In deep water, the range of cuttings particle size results in a significant variation in settling velocity, and a consequent gradient in the size distribution of settled cuttings, with coarser material close to the discharge location and finer material very widely dispersed away from the location, generally at undetectable loading (DECC 2009).

In contrast to historic oil based mud discharges, effects on seabed fauna of the discharge of cuttings drilled with 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 (e.g. Cranmer 1988, Neff *et al.* 1989, Hyland *et al.* 1994, Daan & Mulder 1996). Considerable data has been gathered from the North Sea and other production areas, indicating that localised physical effects are the dominant mechanism of ecological disturbance where water-based mud and cuttings are discharged (DECC 2011).

Currie & Isaacs (2005) reported that water based drilling muds and associated cuttings modified population densities of benthic infaunal species at sampling sites up to 200m from an exploration well in the Minerva field, Australia. The most pronounced effects were evident within 100m of the well-head, where declines in density of most abundant species exceeded 70% immediately following drilling. However, effects on the community structure at sites 100 and 200m from the wellhead did not persist beyond four months as natural species recruitment swamped residual effects over the same period. In contrast, benthic communities at the well-head site remained modified 11 months after drilling, in spite of recoveries in species diversity and abundance. This persistent community difference was likely due to the physical modification of the sediment at this site by drill cuttings discharge.

The physical disturbance of benthic ecosystems by water-based drill cuttings was examined in a series of mesocosm (Trannum *et al.* 2010) and field experiments (Trannum *et al.* 2011). The mesocosm experiments highlighted a potential reduction in number of taxa, abundance, biomass and diversity of macrofauna with increasing thickness of drill cuttings possibly as a result of oxygen depletion. However, comparison with the field-based experiments indicated that this was probably due to the lack of continuous water flow over the sediment surface in the mesocosm experiments (Trannum *et al.* 2011). The field experiments found that the difference in faunal composition between the controls and those treated with drill cuttings was of small magnitude 6 months after drill cuttings deposition indicating a relatively rapid recovery process following discharge of water-based drill cuttings. This corresponds with field studies where complete recovery was recorded within 1–2 years after deposition of water-based drill cuttings (Daan & Mulder 1996, Currie & Isaacs 2005).

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. The impacts from such discharges are localised and transient, but may be of concern in areas with sensitive benthic fauna, for example corals and sponges.

In addition to these mainly drilling rig-derived discharges, a range of discharges are associated with support vessels (sewage, cooling and drainage waters). Discharges from offshore oil and gas facilities have been subject to increasingly stringent regulatory controls over recent decades, and oil concentrations in the major streams (drilling wastes and produced water) have been substantially reduced or eliminated. Amendments to the Offshore Chemicals Regulations 2002 made in 2011 clarify the definition of chemical discharges to include a “discharge” as captured under the relevant operational permit, and a “release” which is any other emission of chemicals outside of that covered by the permit whether as a result of operational requirements or accident.

Advice on operations for the Scanner Pockmarks and Braemar Pockmark (JNCC 2012a, b), though acknowledging the potential for a low level of smothering from drill cuttings from oil and gas activity in proximity to the sites, judges the exposure to such a sensitivity to be low. Despite actual and proposed licensing of the blocks which contain these SAC features, mitigation is possible, for instance individual rig site survey and rig placement. Licence conditions will also be put in place for activities in proximity to these features, which includes project level AA where a significant effect is likely. The effects of marine discharges are judged to be negligible in the context of proposed licensing and the Natura 2000 sites in the area and are not considered

further here. Such discharges would also be considered in detail in project-specific Environmental Statements, HRAs (where necessary) and chemical risk assessments[8] (e.g. PONs) under existing permitting procedures.

5.4 Other effects

Through the transport and discharge of vessel ballast waters (and associated sediment), and to a lesser extent fouling organisms on vessel/rig hulls, non-native species may be introduced to the marine environment. Should these introduced species survive and form established breeding populations, they can exert a variety of negative effects on the environment. These include: displacing native species by preying on them or out-competing them for resources such as prey and habitat; irreversible genetic pollution through hybridisation with native species; increased occurrence of toxic algal blooms. The economic repercussions of these ecological effects can also be very significant. In response to these risks, a number of technical and procedural measures have been proposed (such as the use of ultraviolet radiation to treat ballast water) or 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[9] 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.

The qualifying features of the Scanner Pockmark and Braemar Pockmarks SCIs may be affected by the interruption of the gas or fluid flow on which they depend. JNCC (2012a, b) advice on operations for the Scanner Pockmark and Braemar Pockmarks SCI sites indicates that whilst not ideal, physical loss is the pressure regarded by JNCC as the most appropriate under which to assess the feature's potential loss of source methane. Dry well 15/25b-1A is located immediately north of the Scanner Pockmark and appears to have been drilled on the margin of the shallow gas reservoir. There has also been further offshore gas industry activity approximately 8km north of the site. Potentially, if the Methane Derived Authigenic Carbonates (MDAC) methane source was derived from gas reservoirs which have historically been or continue to be extracted, the feature's methane supply on which the chemosynthetic bacteria and MDAC formation may depend would have been disrupted (JNCC 2012a). Similarly, there is some anecdotal evidence to suggest that there is currently active methane seepage and subsequent accretion of MDAC occurring within Braemar Pockmarks SCI. The submarine structures are considered to be sustained by shallow biogenic gas seepage (John Hartley, pers. comm., 2005, cited by JNCC 2012b); however, if deeper petrogenic gas supports the structures, there is potential for a reduction in seepage if the underlying reservoir is depleted through commercial activities (Oil and Gas UK 2008, cited by JNCC 2012b). Such interference with or interruption of the methane supply could alter the dependent ecosystem and the continued

[8] Note that most chemicals used offshore are regarded to Pose Little or No Risk (PLONOR) to the marine environment. Chemicals containing substances marked for substitution (as shown on OSPAR prescribed lists) are due to be phased out by 2016 where their continued use cannot be justified (e.g. due to there being no technical alternative). Offshore operators are currently required to justify the use and/or discharge of candidates for substitution each time that they submit an application for a chemical permit (e.g. PON15B) – see Figure 2.2.

[9] Number of states required to ratify the Convention for it to come into force.

accretion and restoration of the structure in areas where damage may have occurred. There is a gas condensate production facility consisting of an export pipeline from a wellhead just 90m from the southern boundary of the site, and a platform approximately 12km to the south east. Advice for both sites indicates that without confirmation of the source of the methane and whether or not it is currently being extracted, it is not possible to assess the exposure to physical loss from this activity (JNCC 2012a, b).

Holmes & Stoker (2005) investigated the origin of shallow gas in Blocks 15/20c and 15/25d, the latter containing the Challenger Pockmark Complex, the Scanner Pockmark Complex (now an SCI) and the Scotia Pockmark and concluded that "if suitable precautions are taken, drilling operations in these areas should not significantly affect the supply of shallow gas to the active pockmarks". The findings of Holmes & Stoker (2005) are relevant to the consideration of the gas supply to the Braemar Pockmarks; they recommended that future development operations should not disturb the shallow gas reservoir and that where a geological fault is the conduit for gas transfer from depth to the overlying gas-charged sediments and to active pockmarks that drilling operations should not disturb such faults. These recommendations provide for specific mitigation measures to ensure that the conservation objectives for the SCIs are not compromised by oilfield activities which could follow licensing. An understanding of the location of shallow gas reservoir(s) and transfer routes to active pockmarks, allows for mitigation measures to be implemented such as the location of the well and its trajectory to prevent interruption of the flow of shallow gas supplying and maintaining the features. Such measures would be identified during the activity consenting process and could include consent refusal.

5.5 Implications for relevant sites

The re-screening process (Appendix B) identified the potential for physical disturbance and marine discharge effects at the Braemar Pockmarks and Scanner Pockmark SCI sites. The sites could be affected by a variety of activities arising from the work programmes, including rig/installation placement and drilling discharges, which can result in direct physical damage, loss and smothering effects. Any proposed drilling activities in this area would require extensive survey to characterise the seabed allowing potential interactions to be assessed.

Table 5.1 provides a consideration of potential physical and other impacts associated with the Block work programmes and the conservation objectives of relevant sites.

5.6 Conclusions

Likely significant effects identified with regards to physical effects on the seabed, marine discharges and other disturbance effects when aligned with project level mitigation and relevant activity permitting, will not have an adverse effect on the integrity of the Natura 2000 sites considered in this assessment. There is a legal framework, via e.g. EIA regulations and those implementing the Habitats Directive, to ensure that there are no adverse effects on the integrity of Natura 2000 sites. These would be applied at the project level, at which point there will be sufficient definition to make an assessment of likely significant effects, and for applicants to propose project specific mitigation measures.

Taking into account the information presented above and in the Appendices, it is concluded that activities arising from the licensing of Blocks 9/27, 15/20f, 15/24a, 15/25c, 16/2c and 16/16 will not cause an adverse effect on the integrity of the Braemar Pockmarks SCI or Scanner Pockmark SCI, 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 placement of a mobile rig, will not have an adverse effect on the integrity of relevant sites.

Table 5.1: Consideration of potential physical and other impacts and relevant site conservation objectives

Relevant sites	Relevant qualifying features	Relevant Blocks	Consideration against conservation objectives
Braemar Pockmarks SCI	Submerged structures made by leaking gases	16/2c, 9/27	**Conservation Objectives**: Subject to natural change, restore the submarine structures made by leaking gases to favourable condition, such that: • The natural environmental quality is restored; • The natural environmental processes are maintained; • The extent, physical structure, diversity, community structure and typical species representative of **the submarine structures made by leaking gases** in the Northern North Sea are restored. **Rig installation/ placement** Qualifying feature is highly sensitive to removal and obstruction although low exposure to these pressures. The blocks are sufficiently distant from the site that rig anchoring and wellhead placement would not impinge on the site or affect its conservation objectives. **Drilling discharges** Qualifying feature is moderately sensitive to smothering and to the introduction of synthetic and non-synthetic compounds. Discharge of drill cuttings and water-based fluids may cause smothering of habitats in the near vicinity of the well location. The impacts from such discharges are localised and transient (Section 5.3). The well will not be drilled in the same Block as the site, and based on cuttings dispersion modelling for other wells in similar depths and current regimes, the drilling discharges would not impact the extent, physical structure or biota of the qualifying feature, given project-level controls. Drilling chemical use and discharge is subject to strict regulatory control. Use and discharge must be risk assessed as part of permitting, discharge of chemicals which would be expected to have a significant negative impact would not be permitted. Consequently the natural environmental quality would not be adversely affected. **Additional mitigation** N/A
Scanner Pockmark SCI	Submerged structures made by leaking gases	15/25c (& 15/20f, 15/24a & 16/16)	**Conservation Objectives**: Subject to natural change, restore the submarine structures made by leaking gases to favourable condition, such that: • The natural environmental quality is restored; • The natural environmental processes are maintained; • The extent, physical structure, diversity, community structure and typical species representative of **the submarine structures made by leaking gases** in the Northern North Sea are restored. **Rig installation/ placement** Qualifying feature is highly sensitive to removal and obstruction. Exposure and vulnerability of the feature to physical loss through removal or obstruction is currently unknown. With the exception of 15/25c, the blocks are sufficiently distant from the site that rig anchoring and wellhead placement would not impinge on the site or affect its conservation objectives. Block 15/25c includes the site. Although the seabed footprint associated with semi-submersible drilling rig is relatively small and temporary (Section 5.2), the likelihood and scale of impact will be determined by the location of drilling activities, and additional mitigation required is described below.

Relevant sites	Relevant qualifying features	Relevant Blocks	Consideration against conservation objectives
			Drilling discharges Qualifying feature is moderately sensitive to smothering and to the introduction of synthetic and non-synthetic compounds. Discharge of drill cuttings and water-based fluids may cause smothering of habitats in the near vicinity of the well location. The impacts from such discharges are localised and transient (Section 5.3). With the exception of Block 15/25c, the wells will not be drilled in the same Block as the site, and based on cuttings dispersion modelling for other wells in similar depths and current regimes, these drilling discharges would not impact the extent, physical structure or biota of the qualifying feature, given project-level controls. Drilling chemical use and discharge is subject to strict regulatory control. Use and discharge must be risk assessed as part of permitting, discharge of chemicals which would be expected to have a significant negative impact would not be permitted. Consequently the natural environmental quality would not be adversely affected. Exposure and vulnerability of the feature to these pressures is low or unknown. With respect to Block 15/25c, the likelihood and scale of impact will be determined by the location of drilling activities, and additional mitigation required is described below. **Additional Mitigation** With respect to Block 15/25c, DECC will expect the operator to provide sufficient information on the potential impact of the proposed activity on the qualifying site in the application. Based on the advice from SNCBs, 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 refuse consent.

6 In-combination effects

Potential incremental, cumulative, synergistic and secondary effects from a range of operations, discharges, emissions, and accidents were considered in the Offshore Energy SEAs (DECC 2009, 2011; see also OSPAR 2000, 2010).

6.1 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 were identified by the OESEA2 as anchoring of semi-submersible rigs; wellhead placement and recovery; production platform jacket installation and piling; subsea template and manifold installation and piling; pipeline, flowline and umbilical installation and trenching and decommissioning of infrastructure (DECC 2011).

In general, cumulative effects are likely to be dominated by trawling, with potential scour and physical damage from cable laying associated with potential offshore wind and marine renewable developments likely to be more important in the future, although there is currently no renewable activity in the area. JNCC (2012b) indicates that the TAT14 telecommunication cable runs west to east across the Braemar Pockmarks SCI site, overlaying approximately 1km of the area.

Given the forecast scale of activity, and licence conditions related to blocks associated with the SCIs, it is likely that there will be considerable spatial and temporal separation between disturbance “footprints” and a low probability of incremental overlap of affected areas. Recovery of affected seabed through sediment mobility, and faunal recovery and recolonisation is expected to be rapid (less than five years) where the source of effects is transient (e.g. anchoring).

6.2 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 rotating turbine blades and considerations of their locations and spatial distribution indicate a higher potential for physical presence effects. There is no renewable energy presence in the vicinity of these Blocks.

6.3 Marine discharges

Previous discharges of WBM cuttings in the UKCS have been shown to disperse rapidly and to have minimal ecological effects (Section 5.3). Dispersion of further discharges of mud and cuttings could lead to localised accumulation in areas where reduced current allows the particles to settle on the seabed. The proximity of the Braemar Pockmarks SCI and Scanner Pockmark SCI to the Blocks means that a level of mitigation will be required to ensure that direct effects are minimised. This is of particular importance in Block 15/25c, in which the Scanner Pockmark SCI is present. However, in view of the scale of the region, the water depths and currents, and probability of reinjection of drill cuttings from any major field development, this is considered unlikely to be detectable and to have negligible cumulative ecological effect (DECC 2011).

6.4 Conclusions

Available evidence from other areas of the UKCS (see e.g. UKBenthos database and OSPAR 2000) for the Central North Sea indicates that past oil and gas activity and discharges has not led to adverse impacts on the integrity of relevant sites in the area. 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 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 the integrity of relevant sites. Therefore, bearing this in mind, it is concluded that the in-combination of effects from activities arising from the licensing of Blocks 9/27, 15/20f, 15/24a, 15/25c, 16/2c and 16/16 with those from existing and planned activities will not adversely affect the integrity of the relevant sites.

7 Overall conclusion

Taking account of all the matters discussed, the Secretary of State is able to grant consent to the plan/programme (as defined) under the Habitats Directive and award the licences covering Blocks 9/27, 15/20f, 15/24a, 15/25c, 16/2c and 16/16 (considered further in Sections 5 and 6). 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, taking account of the mitigation measures that will be required in the licence covering Block 15/25c or can be imposed through existing permitting mechanisms on the planning and conduct of activities.

These mitigation measures are incorporated in respect of the habitat interest features through the range of legislation and guidance (see https://www.gov.uk/oil-and-gas-offshore-environmental-legislation and https://www.gov.uk/oil-and-gas-petroleum-operations-notices) 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 Sites of Community Importance

Map A.1: Location of offshore Sites of Community Importance

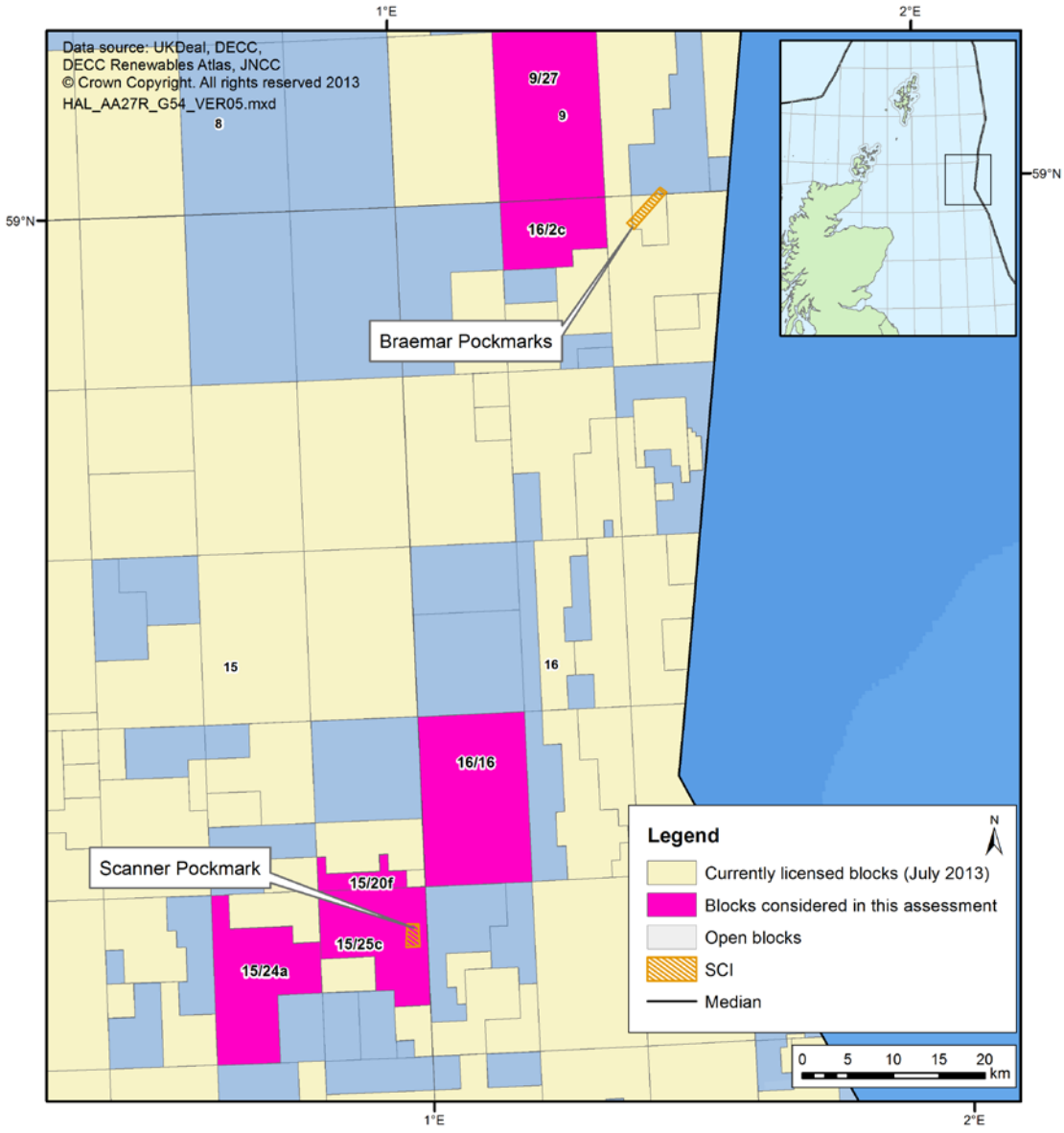

Table A.1: Offshore SCIs in the Central North Sea and their Qualifying Features

Site Name	Area (ha)	Annex I Habitat	Annex II Species
Braemar Pockmarks SCI	518	Submerged structures made by leaking gases	N/A
Scanner Pockmark SCI	335	Submerged structures made by leaking gases	N/A

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

In the original screening assessment, the implications of geophysical survey, drilling and physical effects were considered in a generic way for all Blocks applied for in the 27th Round (DECC 2012) for sites where there was a foreseeable possibility of interactions[10]. Subsequent to the publication of the screening assessment (DECC 2012), proposed work programmes for the Blocks have been confirmed by the applicant companies (see below), or in some cases applications made for Blocks have been withdrawn.

Proposed work programmes for the Blocks from the range of licence applications received are as follows, (see also Section 2.2 for details):

- 9/27 & 16/2c – Drill or drop well, shoot 3D seismic
- 15/20f & 15/25c – Firm well
- 15/24a – Drill or drop well
- 16/16 – Firm well

[10] Coastal and marine sites along the coasts of the United Kingdom and in territorial waters, Offshore sites (i.e. those largely or entirely beyond 12nm from the coast), Riverine sites designated for migratory fish and/or the freshwater pearl mussel, sites designated for breeding red-throated divers, sites in the waters of other member states at or adjacent to the UK median line.

In light of the proposed work programmes, and confirmation of those Blocks proposed to be taken forward for licensing, 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 (listed in Appendix A) is considered in the table below and where relevant, the location of further appropriate assessment is clearly signposted. More information on the conservation objectives and status of those sites identified as requiring consideration in the AA is provided in Appendix C. 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 other effects (e.g. rig siting, marine discharges)
- Underwater noise (in particular, deep geological seismic and other site surveys, and VSP)
- Oil spills (including all liquid phase hydrocarbons)
- In-combination effects (e.g. cumulative and synergistic and secondary/indirect effects)

B1 Offshore Sites of Community Importance

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
Braemar Pockmarks SCI	✓	-	-	✓	-	✓	**Qualifying features:** Submerged structures made by leaking gases **Consideration of likely significant effects:** Blocks 9/27 and 16/2c are within 10km of the site. Certain activities in, or related to, the Blocks could potentially undermine site conservation objectives through physical damage or loss from interruption or alteration of gas supply to the pockmarks and the installation of infrastructure and cables although mitigation would be possible. Potential in-combination effects with previous oil and gas activities and infrastructure, demersal fishing and telecommunication cables. **Appropriate Assessment:** See Sections 5 and 6. Further, project specific mitigation measures would be defined by subsequent Habitats Regulations Assessment once project plans are known.

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
Scanner Pockmark SCI	✓	-	-	✓	-	✓	**Qualifying features:** Submerged structures made by leaking gases **Consideration of likely significant effects:** Block 15/25c overlaps the site, and Blocks 15/20f, 15/24a and 16/16 are within 10km of the site. Certain activities in, or related to, the Blocks (particularly 15/25c) could potentially undermine site conservation objectives through physical damage or loss from interruption or alteration of gas supply to the pockmarks, rig installation/placement, smothering by drilling discharges, the installation of infrastructure and cables although mitigation would be possible. Potential in-combination effects with previous oil and gas activities and infrastructure, and demersal fishing. **Appropriate Assessment:** See Sections 5 and 6. Further, project specific mitigation measures would be defined by subsequent Habitats Regulations Assessment once project plans are known.

Appendix C – Detailed information on Natura 2000 sites where the potential for effects have been identified

C1 Sites of Community Importance

Site Name: Braemar Pockmarks SCI[11]	
Location	Latitude 58º 59'12"N Longitude 01º 28'34"E
Area (ha)	518
Summary	The Braemar pockmarks are a series of crater-like depressions, two of which contain submarine structures made by leaking gases. Also within the site boundary, and to the south-west of these pockmarks, there is an additional submarine structure that is not associated with a pockmark. These large carbonate blocks and pavement slabs are formed during the oxidation of methane gas. The habitat created supports chemosynthetic organisms that feed off the bubbling methane and provides shelter for fish species such as wolf-fish and cod.
Qualifying features for which the site is designated:	
Annex I Habitat Submarine structures made by leaking gases ***Annex II Species*** None	
Conservation objectives:	
Subject to natural change, restore the feature in favourable condition, such that: • The natural environmental quality is restored • The natural environmental processes are maintained • The extent, physical structure, diversity, community structure and typical species representative of Submarine structures made by leaking gases in the northern North Sea are restored.	

[11] Site of Community Importance - For more information on this designation, see http://www.jncc.gov.uk/page-1456

Site Name: Scanner Pockmark SCI[12]	
Location	Latitude 58º 17'07"N Longitude 00º 58'16"E
Area (ha)	335
Summary	Scanner pockmark is a large seabed depression in the northern North Sea which contains large areas of the Annex I habitat Submarine structures made by leaking gases. The blocks lie in the base of the pockmark and support fauna more typically associated with rocky reef. These features appear to support micro-organisms known as 'chemosynthesizers' which utilise the discharged methane and its by-product, hydrogen sulphide. The gutless nematode *Astomonema southwardorum*, which may have a symbiotic relationship with chemosynthetic bacteria, is unique to this site. Fish (hagfish, haddock, wolf-fish and small redfish) also appear to be using the pockmark depressions and the carbonate structures for shelter. This site also contains the Scotia pockmark complex in the north, a composite feature composed of two deeper sections with active methane seeps. The volumes of these pockmarks are considerably greater than the normal pockmarks in the area.
Qualifying features for which the site is designated:	
Annex I Habitat Submarine structures made by leaking gases ***Annex II Species*** None	
Conservation objectives:	
Subject to natural change, restore the feature in favourable condition, such that: • The natural environmental quality is restored • The natural environmental processes are maintained • The extent, physical structure, diversity, community structure and typical species representative of Submarine structures made by leaking gases in the northern North Sea are restored.	

[12] Site of Community Importance - For more information on this designation, see http://www.jncc.gov.uk/page-1456

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