Department for Business, Energy & Industrial Strategy

OFFSHORE OIL & GAS LICENSING 32ND SEAWARD ROUND

Habitats Regulations Assessment

Appropriate Assessment: Central North Sea

July 2020

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Contents

1 Introduction

1.1 Background and purpose

The plan/programme covering this seaward licensing round has been subject to a Strategic Environmental Assessment (OESEA3), completed in July 2016. The SEA Environmental Report includes detailed consideration of the status of the natural environment and potential effects of the range of activities which could follow licensing, including potential effects on conservation sites. The SEA Environmental Report was subject to an 8-week public consultation period, and a post-consultation report summarising comments and factual responses was produced as an input to the decision to adopt the plan/programme. This decision has allowed the Oil & Gas Authority (OGA) to progress further seaward oil and gas licensing rounds. On 11th July 2019, the OGA invited applications for licences relating to 796 Blocks in a 32nd Seaward Licensing Round covering mature areas of the UK Continental Shelf (UKCS), and applications were received for licences covering 234 Blocks/part Blocks.

The *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended) implement the requirements of Articles 6(3) and 6(4) of the Habitats Directive with respect to oil and gas activities in UK territorial waters and on the UK Continental Shelf. The *Conservation of Offshore Marine Habitats and Species Regulations 2017* cover other relevant activities in offshore waters (i.e. excluding territorial waters). Within territorial waters, the Habitats Directive is transposed into UK law via the *Conservation of Habitats and Species Regulations 2017* in England and Wales, the *Conservation (Natural Habitats, &c.) Regulations 1994* in Scotland (for non-reserved matters), and the *Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995* (as amended) in Northern Ireland.

As the petroleum licensing aspects of the plan/programme are not directly connected with or necessary for nature conservation management of European (Natura 2000[1]) sites, to comply with its obligations under the relevant regulations, the Department for Business, Energy and Industrial Strategy[2] (BEIS) is undertaking a Habitats Regulations Assessment (HRA). To comply with obligations under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended), in autumn 2019, the Secretary of State undertook a screening assessment to determine whether the award of any of the Blocks offered would be

[1] This includes 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.
[2] Note that while certain licensing and regulatory functions were passed to the OGA (a government company wholly owned by the Secretary of State for BEIS) on 1 October 2016, environmental regulatory functions are retained by BEIS, and are administered by the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED).

likely to have a significant effect on a relevant site, either individually or in combination[3] with other plans or projects (BEIS 2019). In doing so, the Department has applied the Habitats Directive test[4] (elucidated by the European Court of Justice (ECJ) in the case of Waddenzee (Case C-127/02)[5]) which 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 a 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.*

1.2 Relevant Blocks

The screening assessment (including consultation with the statutory conservation agencies/bodies) formed the first stage of the HRA process. The assessment was undertaken in the period within which applications for Blocks were being accepted, and therefore considered all 796 Blocks offered. The screening identified 239 whole or part Blocks as requiring further assessment prior to the OGA making decisions on whether to grant licences (BEIS 2019). Following the closing date for 32nd Seaward Round applications, and the publication of the screening document, those Blocks identified as requiring further assessment were reconsidered against the list of Blocks applied for. It was concluded that further assessment (Appropriate Assessment) was required for 82 Blocks that were applied for. 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 three regional reports as follows:

- Southern North Sea
- Central North Sea

[3] Note that "in-combination" and "cumulative" effects have similar meanings, but for the purposes of HRA, and in keeping with the wording of Article 6(3) of the Habitats Directive, "in-combination" is used to describe the potential for such effects throughout. More information on the definitions of "cumulative" and "in-combination" effects are available in MMO (2014) and Judd *et al.* (2015).

[4] See Article 6(3) of the Habitats Directive.

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

- West of Shetland

1.2.1 Central North Sea Blocks

The relevant central North Sea Blocks applied for in the 32nd Round and considered in this assessment are listed below in Table 1.1, and are shown in Figure 1.1.

Table 1.1: Blocks requiring further assessment

9/27b	9/28c	9/29b
15/19c	15/24	15/25d

1.3 Relevant Natura 2000 sites

The screening assessment identified the relevant Natura 2000 sites and related Blocks requiring further assessment in the central North Sea (refer to Appendix B of BEIS 2019). Following a reconsideration of the Blocks and sites screened in against those Blocks applied for, two Natura 2000 sites in the central North Sea were identified as requiring further assessment in relation to six Blocks (Table 1.2 and Figure 1.1).

Table 1.2: Relevant sites requiring further assessment

Relevant site Features	Relevant Blocks applied for	Potential effects
Braemar Pockmarks SAC Annex I habitat: Submarine structures made by leaking gases	9/27b, 9/28c, 9/29b	Physical disturbance and drilling
Scanner Pockmark SAC Annex I habitat: Submarine structures made by leaking gases	15/19c, 15/24, 15/25d	Physical disturbance and drilling

1.4 Assessment overview

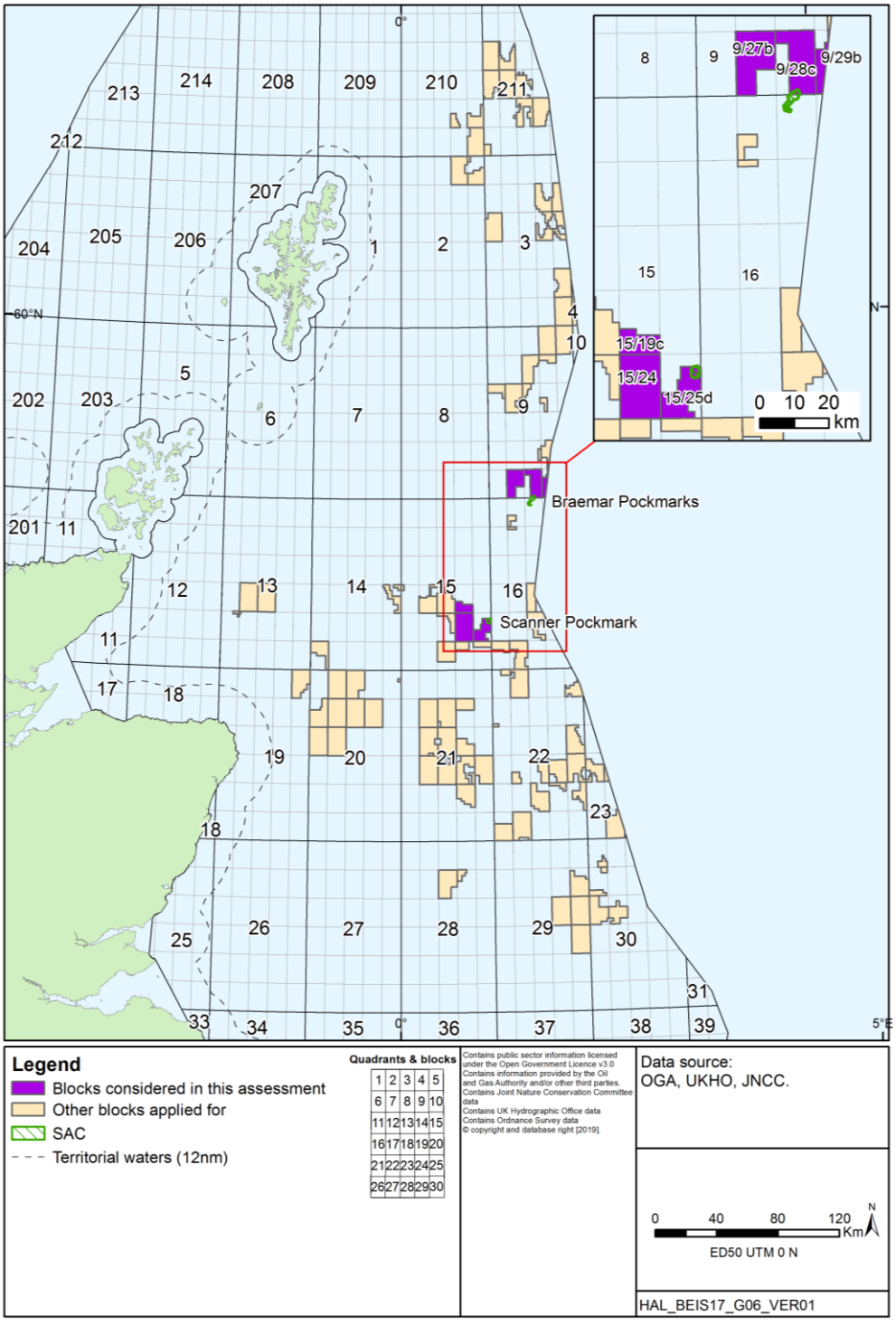
This document sets out the key assumptions and approach to the AA, the evidence base underpinning the assessment and the assessment of relevant Blocks and sites. The document is organised as follows:

- Overview of the licensing process and nature of the activities that could follow including assumptions used to underpin the AA process (Section 2)
- Description of the approach to ascertaining the absence or otherwise of adverse effects on the integrity of relevant European sites (Section 3)
- Evidence base on the environmental effects of offshore oil and gas activities to inform the assessment (Section 4)

- The assessment of effects on the integrity of relevant sites, including in-combination with other plans or projects (Section 5)
- Overall conclusion (Section 6)

As part of this HRA process, a draft of the AA document has been subject to consultation with appropriate nature conservation bodies and the public (via Consultation pages of the gov.uk website) and has been amended as appropriate in light of comments received.

Figure 1.1: Blocks and sites relevant to this Appropriate Assessment



2 Licensing and potential activities

2.1 Licensing

The exclusive rights to search and bore for 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 OGA 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 progressed through a series of Seaward Licensing Rounds. A Seaward Production 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. Offshore activities are subject to a range of statutory permitting and consenting requirements, including, where relevant, activity specific AA under Article 6(3) of the Habitats Directive (Directive 92/43/EC).

Several sub-types of Seaward Production Licence (Traditional, Frontier and Promote) were replaced after the 28th Round by the single "Innovate" licence[6]. As per previous licensing structures, the Innovate licence is made up of three terms covering exploration (Initial Term), appraisal and field development planning (Second Term), and development and production (Third Term). The lengths of the first two terms are flexible but have a maximum duration of nine and six years respectively. The Third Term is granted for 18 years but may be extended if production continues beyond this period. The Innovate licence introduces three Phases to the Initial Term, covering:

- Phase A: geotechnical studies and geophysical data reprocessing (note that this phase will not involve activities in the field)
- Phase B: acquisition of new seismic data and other geophysical data
- Phase C: exploration and appraisal drilling

Applicants may propose the Phase combination in their submission to the OGA. Phase A and Phase B are optional and may not be appropriate in certain circumstances, but every application must propose a Phase C, except where the applicant does not think any exploration is needed (e.g. in the development of an existing discovery or field re-development) and proposes to go straight to development (i.e. 'straight to Second Term'). The duration of the Initial Term and the Phases within it are agreed between the OGA and the applicant.

[6] *The Petroleum and Offshore Gas Storage and Unloading Licensing (Amendment) Regulations 2017* amend the Model Clauses to be incorporated in Seaward Production Licences.

Applicants may choose to spend up to 4 years on a single Phase in the Initial Term but cannot take more than nine years to progress to the Second Term. Failure to complete the work agreed in a Phase, or to commit to the next Phase means the licence ceases, unless the term has been extended by the OGA.

Financial viability is considered prior to licence award for applicants proposing to start at Phase A or B, but further technical and financial capacity for Phase C activities would need to be demonstrated before the licence could enter Phase C and drilling could commence. If the applicant proposes to start the licence at Phase C or go straight to the Second Term, the applicant must demonstrate that it has the technical competence to carry out the activities that would be permitted under the licence during that term, and the financial capacity to complete the Work Programme, before the licence is granted. It is noted that the safety and environmental capability and track record of all applicants are considered by the OGA (in consultation with the Offshore Safety Directive Regulator)[7] through written submissions before licences are awarded[8].

As part of these written submissions operators must demonstrate that they have the relevant safety and environmental capabilities to undertake the proposed work programme (e.g. company environmental policies, awareness of statutory safety and environment provisions, and has environmental management systems). Where full details cannot be provided via the written submissions at the application stage, licensees must provide supplementary submissions that address any outstanding environmental and safety requirements before approvals for specific offshore activities such as drilling can be issued. In all instances applicants must submit an environmental sensitivity assessment, demonstrating at the licence application stage that they are aware of environmental sensitivities relevant to the Blocks being applied for and the adjacent areas, and understand the constraints and potential impacts they might have on the proposed work programme.

2.2 Activities that could follow licensing

As part of the licence application process, applicants provide the OGA with details of work programmes they propose in the Initial Term. These work programmes are considered along with a range of other factors by the OGA before arriving at a decision on whether to license the Blocks and to whom. Activities detailed in work programmes may include the purchase, reprocessing or shooting of 2D or 3D seismic data (Phases A and B) and the drilling of wells (Phase C). There are three levels of drilling commitment:

- A Firm Drilling Commitment is a commitment to the OGA to drill a well. Firm drilling commitments are preferred on the basis that, if there were no such commitment, the OGA

[7] The Offshore Safety Directive Regulator is the Competent Authority for the purposes of the Offshore Safety Directive comprising OPRED and the Health and Safety Executive (HSE) working in partnership.
[8] Refer to OGA technical guidance and safety and environmental guidance on applications for the 32nd Round at: https://www.ogauthority.co.uk/licensing-consents/licensing-rounds/

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 relevant activity specific environmental assessments.

- A Contingent Drilling Commitment is also a commitment to the OGA to drill a well, but it includes specific provision for the OGA 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 (unless otherwise decided by the OGA) 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.

The OGA general guidance[9] makes it clear that an award of a Production Licence does not automatically allow a licensee to carry out any offshore petroleum-related activities from then on (this includes those activities outlined in initial work programmes, particularly Phases B and C). Figure 2.2 provides an overview of the plan process associated with the 32nd Seaward Licensing Round and the various environmental assessments including HRA. Offshore activities such as drilling are subject to relevant activity specific environmental assessments by the Department (see Figure 2.3), and there are other regulatory provisions exercised by the Offshore Safety Directive Regulator and 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 Initial Term are detailed in the licence applications. For some activities, such as seismic survey, the potential impacts associated with noise could 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.

2.2.1 Likely scale of activity

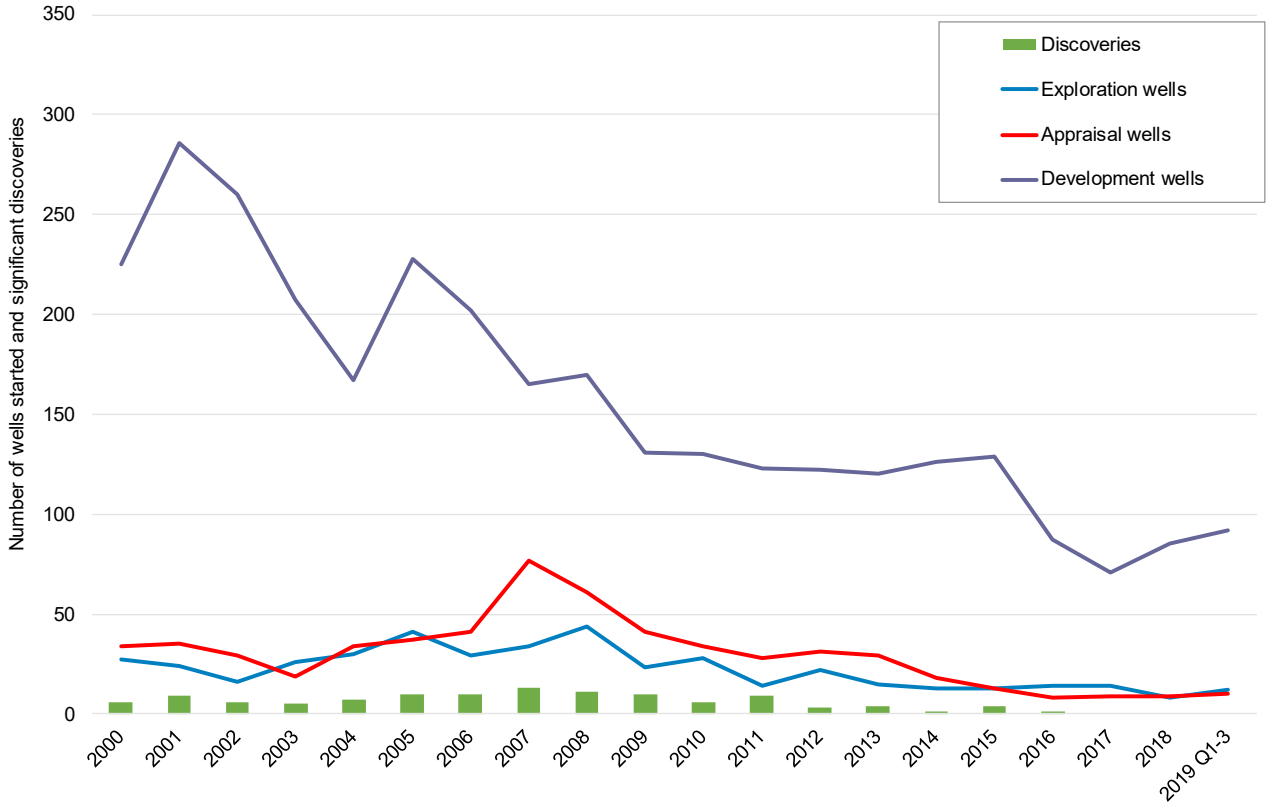
On past experience the activity that actually takes place is less than what is included in the work programme at the licence application stage. A proportion of Blocks awarded may be relinquished without any offshore activities occurring. Activity after the Initial Term is much harder to predict, as this 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, less than half will have a potential to progress to development. For example, the OGA analysis of exploration well outcomes from the Moray Firth & Central North Sea between 2003 and 2013 indicated an overall technical success rate of 40% with respect to 150 exploration wells and

[9] https://www.ogauthority.co.uk/media/5888/general-guidance-32nd-seaward-licensing-round-june-2019.pdf

side-tracks (Mathieu 2015). 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 on the UKCS each year since 2000 as well as the number of significant discoveries made (associated with exploration activities).

Discoveries that progress to development may require further drilling, installation of infrastructure such as wellheads, pipelines and possibly fixed platform production facilities, although recent developments are mostly tiebacks to existing production facilities rather than stand-alone developments. For example, of the 40 current projects identified by the OGA's Project Pathfinder (as of 13th December 2019)[10], 20 are planned as subsea tie-backs to existing infrastructure, four involve new stand-alone production platforms and four are likely to be developed via Floating Production, Storage and Offloading (FPSO) facilities. The final form of development for many of the remaining projects is not decided, with some undergoing re-evaluation of development options but some are likely to be subsea tie-backs. Figure 2.1 indicates that the number of development wells has declined over time and this pattern is likely to continue. The nature and scale of potential environmental impacts from the drilling of development wells are similar to those of exploration and appraisal wells and thus the screening criteria described in Section 4 are applicable to the potential effects of development well drilling within any of the 32nd Round Blocks.

Figure 2.1: UKCS Exploration, appraisal & development wells, and significant discoveries since 2000



[10] https://itportal.ogauthority.co.uk/eng/fox/path/PATH_REPORTS/pdf

Note: "significant" generally refers to the flow rates that were achieved (or would have been reached) in well tests (15 mmcfgd or 1000 BOPD) and does not indicate commercial potential of the discovery. Source: OGA Drilling Activity (October 2019), Significant Offshore Discoveries (October 2018)

2.2.2 32nd Round activities considered by the HRA

The nature, extent and timescale of development, if any, which may ultimately result from the licensing of 32nd Round Blocks is uncertain, and therefore it is 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 where appropriate an HRA, allowing the opportunity for further mitigation measures to be identified as necessary, and for permits to be potentially be refused. In this way the opinion of the Advocate General in ECJ case C-6/04, on the 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. Therefore, only activities as part of the work programmes associated with the Initial Term and its associated Phases A-C are considered in this AA (see Table 2.2).

Potential accidental events, including spills, are not considered in the AA as they are not part of the work plan. Measures to prevent accidental events, response plans and potential impacts in the receiving environment would be considered as part of the environmental impact assessment (EIA) process for specific projects that could follow licensing when the location, nature and timing of the proposed activities are available to inform a meaningful assessment of such risks. Additionally, as no relevant sites were identified in relation to underwater noise, activities related to this source of effect (e.g. seismic survey) are not considered further here.

The approach used in this assessment 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 estimates of work commitments for the relevant Blocks from the applications received by the OGA are shown in Table 2.1. Two or more of the Blocks may be part of a single licence application, such that the level of activity suggested in Table 2.1 may be greater than that which occurs, e.g. drilling will only take place in one licence area rather than in every Block applied for, although seismic survey may cover parts of several or all Blocks comprising a single licence.

Table 2.1: Indicative work programme activity for the Blocks applied for

Relevant Blocks	Obtain[11] and/or reprocess 2D or 3D seismic data	Shoot 3D seismic	Drill or drop well/contingent well
9/27b	-	✓	✓
9/28c	-	✓	✓
9/29b	-	✓	✓
15/19c	-	-	✓
15/24	-	-	✓
15/25d	-	-	✓

Completion of the work programmes is likely to involve one or more of the activities summarised in Table 2.2. A series of assumptions has been developed on the nature and scale of activities to be assessed based on the evidence base for potential effects presented in Section 4 as well as reviews of exemplar Environmental Statements of relevant activities. Subsequent development activity is contingent on successful exploration and appraisal and may or may not result in the eventual installation of infrastructure. Where relevant, such future activities will themselves be subject to activity specific screening procedures and tests under the relevant legislation.

Table 2.2: Potential activities and assessment assumptions

Potential activity	Description	Assumptions used for assessment
Initial Term Phase C: Drilling and well evaluation		
Rig placement/ anchoring	Semi-submersible rigs are used in deeper waters (normally >120m). Mooring is achieved using 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 twelve anchors attached to the rig by cable or chain are deployed radially from the rig; part of the anchoring hold is provided by a proportion of the cables or chains lying on the seabed (catenary).	Semi-submersible rig anchors (if used) may extend out to a radius of 1.5km in North Sea waters of the UK. It is assumed that the seabed footprint of these is in the order of 0.06km^2.

[11] To obtain seismic data means purchasing or otherwise getting the use of existing data and does not involve shooting new seismic.

Potential activity	Description	Assumptions used for assessment
Marine discharges	Typically, around 1,000 tonnes of cuttings (primarily rock chippings) result from drilling an exploration well. Water-based mud cuttings are typically 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 through water reactive shales, would require onshore disposal or treatment offshore to the required standards prior to discharge.	The footprint of cuttings and other marine discharges, or the distance from source within which smothering or other effects may be considered is generally a few hundred metres. For the assessment it is assumed that effects may occur within 500m of the well location covering an area in the order of 0.8km^2.

2.3 Existing regulatory requirements and controls

The AA assumes that the high-level controls described below are applied as standard to activities since they are legislative requirements. These are distinct from further mitigation measures which may be identified and employed to avoid likely significant effects on relevant sites (see Section 5.2.3).

2.3.1 Physical disturbance and drilling

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 Environmental Impact Assessment (EIA) under the *Offshore Petroleum Production and Pipe-lines (Assessment of Environmental Effects) Regulations 1999* (as amended) as part of the Drilling Operations Application through the Portal Environmental Tracking System and, where relevant, HRA to inform decisions on those applications[12].

There is a mandatory requirement to have sufficient recent and relevant data to characterise the seabed in areas where activities are due to take place (e.g. rig placement)[13]. If required, survey reports must be made available to the relevant statutory bodies on submission of a relevant permit application or Environmental Statement for the proposed activity, and the identification of any sensitive habitats by such survey (including those under Annex I of the Habitats Directive) may influence the Department's decision on a project level consent.

Discharges from offshore oil and gas facilities have been subject to increasingly stringent regulatory controls over recent decades (see review in DECC 2016, and related Appendices 2 and 3). As a result, 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 banned), with discharges of

[12] https://www.gov.uk/guidance/oil-and-gas-offshore-environmental-legislation
[13] See BEIS (2020). The Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 (as amended) – a guide.

chemicals and oil exceeding permit conditions or any unplanned release, potentially constituting a breach of the permit conditions and an offence. Drilling chemical use and discharge is subject to strict regulatory control through permitting, monitoring and reporting (e.g. the mandatory Environmental and Emissions Monitoring System (EEMS) and annual environmental performance reports). The use and discharge of chemicals must be risk assessed as part of the permitting process (e.g. Drilling Operations Application) under the *Offshore Chemicals Regulations 2002* (as amended), and the discharge of chemicals which would be expected to have a significant negative impact would not be permitted.

At the project level, discharges would be considered in detail in project-specific EIAs, (and where necessary through HRAs) and chemical risk assessments under existing permitting procedures.

Figure 2.2: Stages of plan level environmental assessment

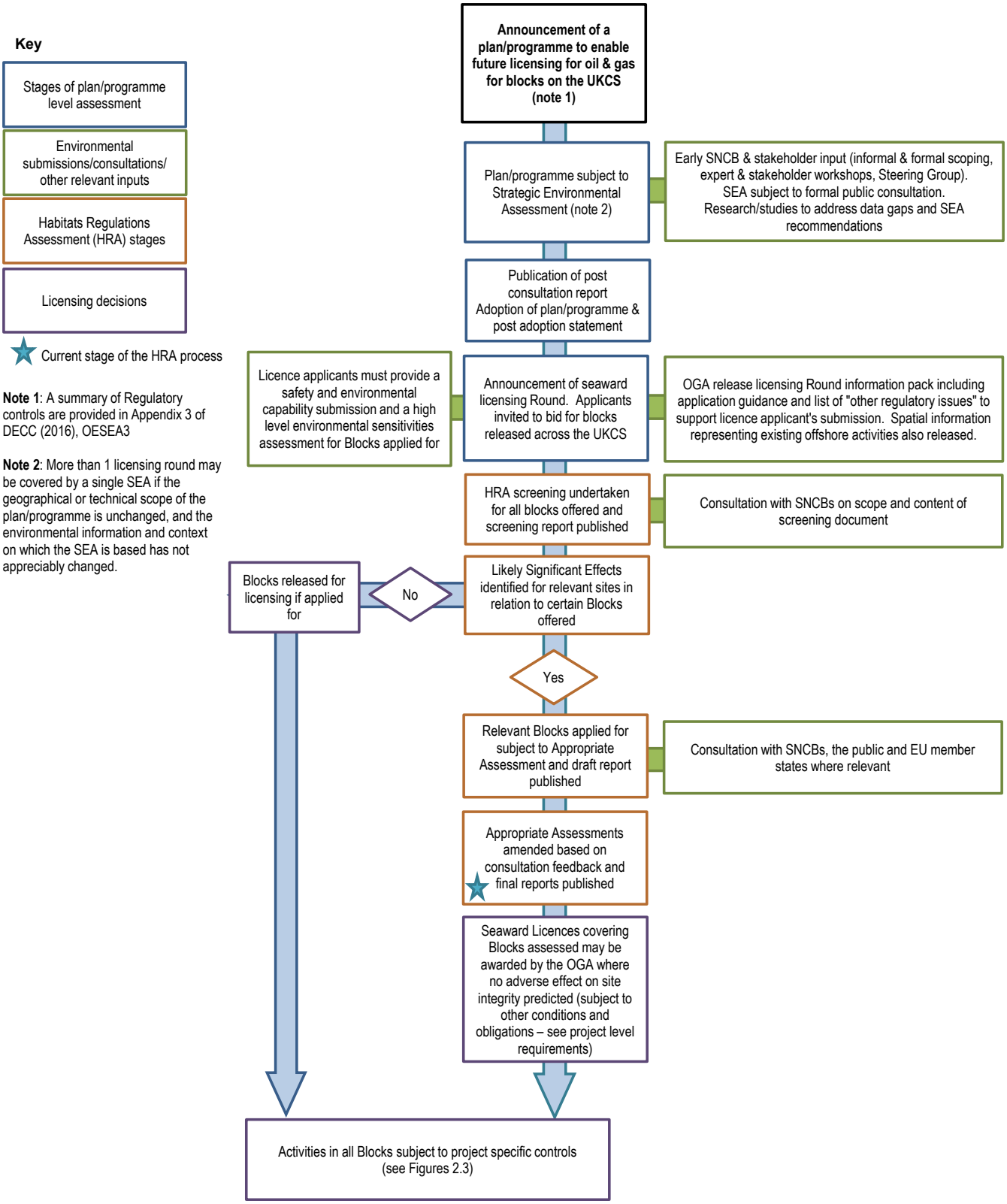
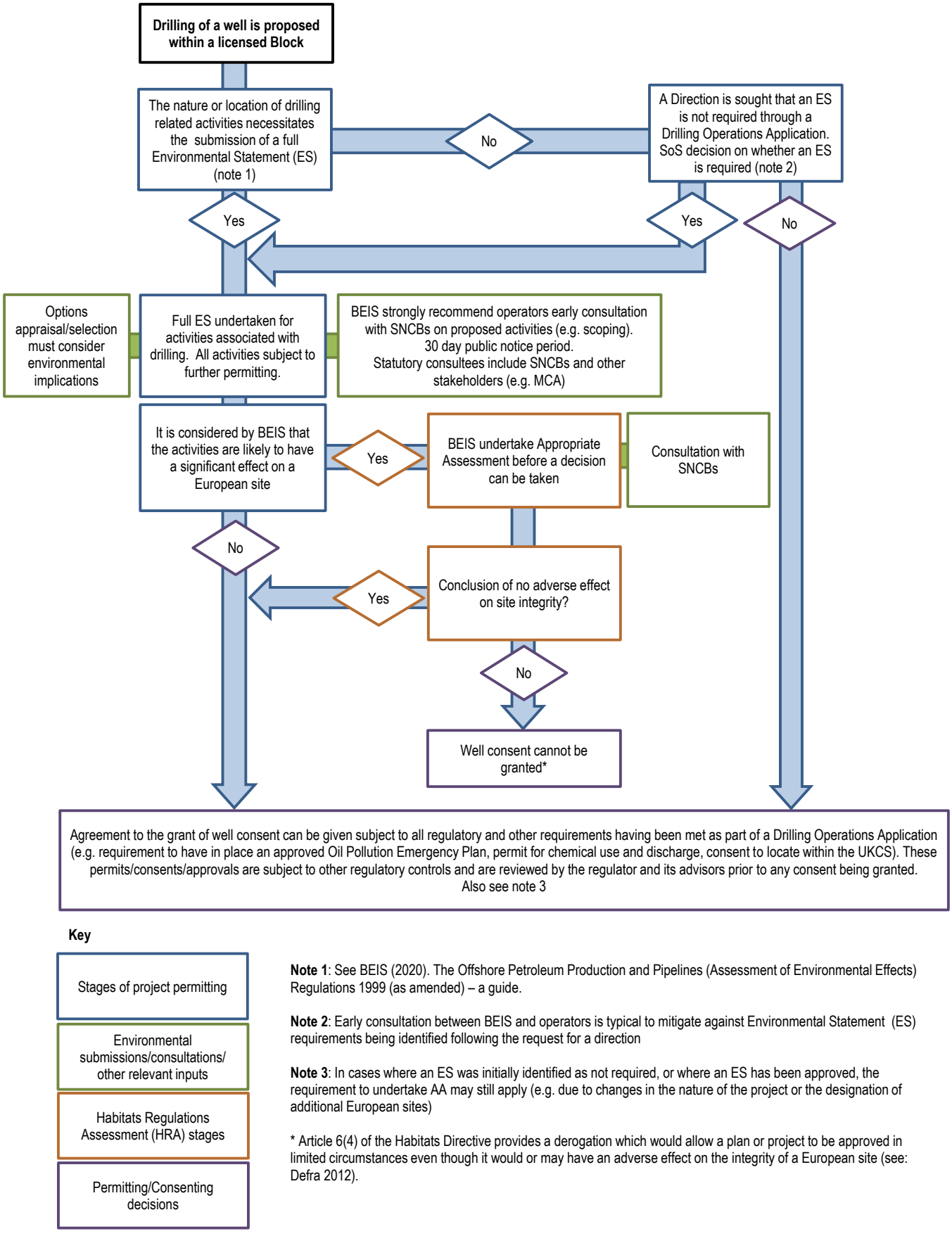


Figure 2.3: High level overview of exploration drilling environmental requirements



Note 1: See BEIS (2020). The Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 (as amended) – a guide.

Note 2: Early consultation between BEIS and operators is typical to mitigate against Environmental Statement (ES) requirements being identified following the request for a direction

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

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

3 Appropriate assessment process

3.1 Process

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

In considering the above, the Department 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 the Department 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.

3.2 Site integrity

The integrity of a site is defined by government policy, in the Commission's guidance and clarified by the courts (Cairngorms judicial review case[14]) 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[/designated].'* This is consistent with the definitions of favourable conservation status

[14] World Wild Life Fund & Others, Re application for judicial review of decisions relating to the protection of European Sites at Cairngorm Mountain, by Aviemore and proposals for construction of a funicular railway thereon.

in Article 1 of the Directive (JNCC 2002). As clarified by the European Commission (2019), 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 assessment has been undertaken in accordance with the European Commission Guidance (EC 2019) and with reference to other guidance, reports and policy, including the Habitats Regulations Guidance Notes (English Nature 1997, Defra 2012, SEERAD 2000), SNH (2015), the National Planning Policy Framework (MHCLG 2019), the Marine Policy Statement (HM Government 2011), English Nature report No. 704 (Hoskin & Tyldesley 2006) and Natural England report NECR205 (Chapman & Tyldesley 2016).

The assessment of effects on site integrity is documented in Section 5. It has been informed by an evidence base on the environmental effects of oil and gas activities on the UKCS and elsewhere (Section 4), and has utilised a number of assumptions on the nature and scale of potential activities that could follow licensing (Table 2.2), along with the characteristics and specific environmental conditions of the relevant sites (see Section 5). 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 5.1)
- In-combination effects (Section 5.2)

4 Evidence base for assessment

4.1 Introduction

The AAs are informed by an evidence base on the environmental effects of oil and gas activities derived from the scientific literature, relevant Strategic Environmental Assessments (e.g. DECC 2009, 2011 and 2016, and the review of OESEA3 in BEIS 2018) and other literature. Recent operator Environmental Statements for offshore exploration and appraisal activities on the UKCS have also been reviewed, providing for example a more specific indication of the range of spatial footprints associated with relevant drilling activities to inform the further consideration of those sites where physical disturbance and drilling effects may be considered likely.

In recent years, much work has been undertaken in the area of sensitivity assessments and activity/pressure (i.e. mechanisms of effect) matrices (e.g. Tillin *et al*. 2010, JNCC 2013, Tillin & Tyler-Walters 2014, Defra 2015, Robson *et al.* 2018, the Scottish Government Feature Activity Sensitivity Tool, FeAST, the MarESA tool, Tyler-Walters *et al*. 2018). These matrices are intended to describe the types of pressures that act on marine species and habitats from a defined set of activities and are related to benchmarks where the magnitude, extent or duration is qualified or quantified in some way and against which sensitivity may be measured – note that benchmarks have not been set for all pressures. The sensitivity of features to any pressure is based on tolerance and resilience, and can be challenging to determine (e.g. see Tillin & Tyler-Walters 2014, Pérez-Domínguez *et al.* 2016, Maher *et al.* 2016), for example due to data limitations for effect responses of species making up functional groups and/or lack of consensus on expert judgements. Outputs from such sensitivity exercises can therefore be taken as indicative.

This approach underpins the advice on operations for the sites included in this assessment (Braemar Pockmarks SAC[15] and Scanner Pockmark SAC[16]). The advice identifies a range of pressures for the sites in relation to oil and gas exploration activity, but it does not include a sensitivity assessment, or conclude that there is insufficient evidence for a sensitivity assessment to be made at the pressure benchmark[17]. Whilst the matrices provided as part of the advice are informative and note relevant pressures associated with hydrocarbon exploration, resultant effects are not inevitable consequences of activity since often they can be mitigated through timing, siting or technology (or a combination of these). The Department expects that these options would be evaluated by the licensees and documented in the environmental assessments required as part of the activity specific consenting regime.

On review of the identified pressures for the relevant sites (e.g. relating to abrasion/disturbance of surface/subsurface substrate, siltation rate changes, introduction of contaminants) and their

[15] http://archive.jncc.gov.uk/default.aspx?page=6529
[16] http://archive.jncc.gov.uk/default.aspx?page=6541
[17] Note that pressure benchmarks are used as reference points to assess sensitivity and are not thresholds that identify a likely significant effect within the meaning of Habitats Regulations (JNCC 2017c)

justifications, it is regarded that the evidence base on the potential effects of oil and gas exploration (e.g. as considered in successive SEAs, and summarised in Section 4.2), comprehensively covers the range of pressures identified in the advice and the most recent 2018 JNCC pressures-activities database[18], and is used to underpin the assessment against site specific information.

The following sections provide a summary of the evidence informing the site-specific assessment of effects provided in Section 5. To focus the presentation of relevant information, the sections take account of the environments in which those Blocks and relevant Natura 2000 sites to be subject to further assessment are located (Figure 1.1).

4.2 Physical disturbance and drilling effects

The pressures[19] which may result from exploration activities and cause physical disturbance and drilling effects on relevant Natura 2000 sites assessed in Section 5.2 are described below with respect to rig siting and drilling discharges.

4.2.1 Rig siting

Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion and abrasion/disturbance of the substrate on the surface of the seabed

Semi-submersible rigs normally use anchors to hold position, typically between eight and twelve in number at a radius related to water depth, seabed conditions and anticipated metocean conditions. The seabed footprint associated with semi-submersible rig anchoring results from a combination of anchor scars caused by anchors dragging before gaining a firm hold, and scraping by the cable and/or chain linking the anchor to the rig, where these contact the seabed (the catenary contact). In the central North Sea area, semi-submersible drilling rigs are likely to be used due to water depths (>120m), and therefore there is the potential for seabed disturbance resulting from anchor deployment. This would likely involve between eight and twelve anchors extending to a radius of up to 1.5km, and an associated footprint in the order of 0.06km^2 (see Table 2.2).

The response of benthic macrofauna to physical disturbance has been well characterised in peer-reviewed literature, with increases in abundance of small opportunistic fauna and decreases in larger more specialised fauna (Eagle & Rees 1973, Newell *et al.* 1998, van Dalfsen *et al.* 2000, Dernie *et al*. 2003).

Habitat recovery from temporary disturbance (caused by anchor scarring, anchor mounds) will depend primarily on re-mobilisation of sediments by current shear (as reviewed by Newell *et al*. 1998, Foden *et al.* 2009). Subsequent benthic population recovery takes place through a combination of migration, re-distribution and larval settlement. On the basis that seabed

[18] https://jncc.gov.uk/our-work/marine-activities-and-pressures-evidence/
[19] Relevant pressures identified from advice on operations for sites and JNCC PAD (2018).

disturbance is qualitatively similar to the effects of wave action from severe storms, it is likely that in most of the shallower parts of the UKCS, sand and gravel habitat recovery from anchor scarring, anchor mounds and cable scrape is likely to be relatively rapid (1-5 years) (van Dalfsen *et al.* 2000, Newell & Woodcock 2013).

Mud habitats, by contrast, are more sensitive to physical disturbance than the coarser sediments typical of high wave- and current-energy areas. The muddy sediments of deeper or quieter waters support benthic communities often characterised by large burrowing crustaceans and pennatulid sea-pens (*Virgularia mirabilis* and *Pennatula phosphorea*). Pennatulid mortality may be high following physical disturbance, but crustaceans are probably able to restore burrow entrances following limited physical disturbance of the sediment surface (a few cm). *P. phosphorea* spawns annually and its fecundity is high (Edwards & Moore 2008), information on the reproduction of *V. mirabilis* is sparse but based on its wide distribution and abundance is considered likely to be similarly fecund. Gates & Jones (2012) suggest that re-establishment of pennatulids is likely to take in excess of five years due to their slow growth rate (based on the Arctic species *Halipteris willemoesi*).

Physical change to another seabed type

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. On the UK continental shelf natural "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., and these are often revealed in rig site and other (e.g. pipeline route) surveys. The potential for man-made structures to act as stepping stones in the North Sea and the impact of their removal during decommissioning is being investigated as part of the INSITE[20] programme. Phase 1 projects (2015-2017) are now complete; those of relevance suggest that man-made structures may influence benthic community structure and function but only on a limited spatial scale. Modelling indicates the potential for biological connectivity between structures in the North Sea, but this has not been validated by empirical data (ISAB 2018). The Department is supporting Phase 2 of the INSITE research, which aims to tackle gaps in understanding of the role of man-made structures in marine ecosystems. Key areas to be investigated in the second phase include enhancing the understanding of the larval biology of ecologically significant biofouling species, the contribution of man-made structures as artificial reefs, and approaches to the monitoring and environmental assessment of drill cuttings piles, renewable energy installation footings, and cables.

The use of semi-submersible rigs in the water depths and hydrographic conditions within and around the central North Sea Blocks considered in this AA removes the possible need for stabilisation material for rig siting.

[20] https://www.insitenorthsea.org/

4.2.2 Drilling discharges

Abrasion/disturbance of the substrate on the surface of the seabed, smothering and siltation rate changes and habitat structure changes – removal of substratum

The pressures described in this section relate to physical ones associated with the discharge and settlement of cuttings during exploration well drilling rather than potential chemical pressures (described below). Water-based mud cuttings are typically discharged at, or relatively close to the 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. Surface hole cuttings are derived from shallow geological formations and a proportion will be similar to surficial sediments in composition and characteristics. 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 2016, JNCC PAD 2018). In contrast to historic oil based mud discharges, potential smothering effects due to the discharge of cuttings drilled with water based muds (WBM) are usually subtle or undetectable, although the presence of drilling material at the seabed is often detectable close to the drilling location (<500m).

The extent and potential impact of drilling discharges have been reviewed in successive SEAs, OESEA, OESEA2 and OESEA3 (DECC 2009, 2011 and 2016, respectively, also see BEIS 2018).

Relevant information on the recovery of benthic habitats to smothering mainly comes from studies of dredge disposal areas (see Newell *at al.* 1998). Recovery following disposal occurs through a mixture of vertical migration of buried fauna, together with sideways migration into the area from the edges, and settlement of new larvae from the plankton. The community recolonising a disturbed area is likely to differ from that which existed prior to construction. Opportunistic species will tend to dominate initially and on occasion, introduced and invasive species may then exploit the disturbed site (Bulleri & Chapman 2010). Harvey *et al.* (1998) suggest that it may take more than two years for a community to return to a closer resemblance of its original state (although if long lived species were present this could be much longer). Shallow water (<20m) habitats in wave or current exposed regimes, with unconsolidated fine grained sediments have a high rate of natural disturbance and the characteristic benthic species are adapted to this. Species tend to be short lived and rapid reproducers and it is generally accepted that they recover from disturbance within months. By contrast a stable sand and gravel habitat in deeper water is believed to take years to recover (see Newell *et al.* 1998, Foden *et al*. 2009).

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 (seabed 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 (see for example, Jones *et al*. (2012)).

Contamination[21]

The past discharge to sea of drill cuttings contaminated with oil-based drill mud (OBM) resulted in well documented acute and chronic effects at the seabed (e.g. Davies *et al.* 1989, Olsgard & Gray 1995, Daan & Mulder 1996). These effects resulted from the interplay of a variety of factors of which direct toxicity (when diesel based muds were used) or secondary toxicity as a consequence of organic enrichment (from hydrogen sulphide produced by bacteria under anaerobic conditions) were probably the most important. Through OSPAR and other actions, the discharge of oil-based and other organic phase fluid contaminated material is now effectively banned. The "legacy" effects of contaminated sediments on the UKCS resulting from OBM discharges have been the subject of joint industry work (UKOOA 2002) and reporting to OSPAR.

The UK Government/Industry Environmental Monitoring Committee has reviewed UK offshore oil and gas monitoring requirements with an aim to ensure that adequate data is available on the environmental quality status in areas of operations for permitting assurance and to meet the UK's international commitments to report on UK oil industry effects. This strategy has been implemented since 2004 and has included regional studies in various parts of the North Sea, and surveys around specific single and multi-well sites. The most recent survey was undertaken as part of the Department's SEA monitoring with a survey in the Fladen Ground in late 2015 (see Appendix 1b of OESEA3).

Overall, there are positive indications of recovery of sediments and communities in both the Fladen Ground and East Shetland Basin from the historic effects of oil-based mud discharges. The total PAH and total n-alkane concentrations in Fladen Ground sediments were all lower in 2001 than in 1989 and are now at levels which are considered below 'background'. The results of the most recent Fladen Ground survey confirm this general pattern of recovery.

In contrast to historic oil based mud discharges[22], 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 is often detectable chemically close to the drilling location (<500m) (e.g. Cranmer 1988, Neff *et al.* 1989, Hyland *et al.* 1994, Daan & Mulder 1996, Currie & Isaacs 2005, OSPAR 2009, Bakke *et al*. 2013, DeBlois *et al*. 2014, Aagaard-Sørensen *et al.* 2018). Considerable data has been

[21] Including contamination from transition elements and organo-metals, hydrocarbons and PAHs, synthetic compounds and the introduction of other substances (solid, liquid or gas).
[22] 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.

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 (see above).

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. 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).

Finer particles may be dispersed over greater distances than coarser particles although exposure to WBM cuttings in suspension will in most cases be short-term (Bakke *et al.* 2013). Chemically inert, suspended barite has been shown under laboratory conditions to potentially have a detrimental effect on suspension feeding bivalves. Standard grade barite, the most commonly used weighting agent in WBMs, was found to alter the filtration rates of four bivalve species (*Modiolus modiolus, Dosinia exoleta, Venerupis senegalensis* and *Chlamys varia*) and to damage the gill structure when exposed to 0.5mm, 1.0mm and 2.0mm daily depth equivalent doses (Strachan 2010, Strachan & Kingston 2012). All three barite treatments altered the filtration rates leading to 100% mortality. The horse mussel (*M. modiolus*) was the most tolerant to standard barite with the scallop (*C. varia*) the least tolerant. Fine barite, at a 2mm daily depth equivalent, also altered the filtration rates of all species, but only affected the mortality of *V. senegalensis*, with 60% survival at 28 days. The bulk of WBM constituents (by weight and volume) are on the OSPAR list of substances used and discharged offshore which are considered to Pose Little or No Risk to the Environment (PLONOR). Barite and bentonite are the materials typically used in the greatest quantities in WBMs and are of negligible toxicity. Field studies undertaken by Strachan (2010) showed that the presence of standard grade barite was not acutely toxic to seabed fauna but did alter benthic community structure. When the suspended barite levels used in laboratory studies are translated to field conditions (i.e. distances from the point of discharge) it is clear that any effects will be very local to a particular installation (in the case of oil and gas facilities, well within 500m).

5 Assessment

The screening process (BEIS 2019) identified a number of sites where there was the potential for likely significant effects associated with proposed activities that could follow licensing of Blocks offered in the 32nd Round. The further assessment of two sites in relation to six Blocks applied for in the central North Sea is given below. This assessment has been informed by the evidence base on the environmental effects of relevant oil and gas activities (Section 4.2) and the assumed nature and scale of potential activities (Table 2.2).

5.1 Relevant sites

The relevant Blocks and sites are shown in Figure 5.1.

The Braemar pockmarks are a series of crater-like depressions on the sea floor at a depth of ~120m and are believed to be formed by the venting of biogenic/petrogenic fluids or gases into the water column. The site contains 48 pockmarks ranging in size from 20m to 200m diameter and 0.32-5.77m in depth, which are irregular in shape due to multiple venting points or sidewall slumping. Six contain verified records of the Annex I habitat with a further 14 showing strong acoustic reflectance which is indicative of the habitat type (Gafeira & Long 2015a, JNCC 2017a). Large blocks, pavement slabs and smaller fragments of methane derived authigenic carbonate (MDAC) (a type of the Annex I habitat, submarine structures made by leaking gases) have formed through precipitation during the oxidation of methane gas. These MDAC and carbonate structures are ecologically significant because they provide a habitat for marine fauna usually associated with rocky reef, and chemosynthetic organisms which feed off both methane (seeping from beneath the sea floor) and its microbial degradation by-product under anaerobic conditions, hydrogen sulphide. Larger blocks of carbonate also provide shelter for fish species such as wolf-fish and cod[23].

The Scanner Pockmark SAC site contains a total of 67 pockmarks, four of which have a considerably larger volume than those others within the site boundaries (Judd & Hovland 2007). The formation processes of these pockmarks are analogous to that of the Braemar Pockmarks described above, and MDAC has also been recorded at the base of several pockmarks. These carbonate structures are colonised by large numbers of anemones (*Urticina felina* and *Metridium senile*) and squat lobsters (Dando *et al.* 1991) and also support chemosynthesizers (Judd 2001). The gutless nematode *Astomonema southwardorum* occurs at this site, where it was first described, and may have a symbiotic relationship with chemosynthetic bacteria (Austen *et al.* 1993). Various fish (hagfish, haddock, wolf-fish and small redfish) appear to use the pockmarks and MDAC for shelter.

[23] http://jncc.defra.gov.uk/page-6529

In the south of the site, the Scanner Pockmark complex contains two large pockmarks with a combined area of some 320,000m^2 and depths of up to 16.7m (Gafeira & Long 2015b). To the north of these and still within the site boundaries, the Scotia pockmark complex contains two deeper features with active methane seeps (Dando 2001). Survey data (Rance *et al.* 2017) indicates the presence of harder substrate within the Scotia complex but further work is needed to confirm if this is MDAC (Gafeira & Long 2015b). Both the Braemar Pockmarks and Scanner Pockmark sites are likely to have been impacted by fishing, with evidence provided by VMS data and the presence of trawl scarring within the Scanner Pockmark site (Rance *et al.* 2017). Some pockmark slope failure is evident in both sites, but it is not known if this is the result of anthropogenic or natural processes (Gafeira & Long 2015a, b).

The features for which both sites have been designated are presently regarded to be in unfavourable condition due to the influence of demersal trawling activity (JNCC 2019).

5.2 Assessment of physical disturbance and drilling effects

5.2.1 Blocks and sites to be assessed

The nature and extent of potential physical disturbance and drilling effects are summarised in Section 4.2. On the basis of this information, in conjunction with the locations of central North Sea Blocks applied for in the 32nd Round and the sites with relevant qualifying features, potential likely significant effects are considered to remain for six Blocks (or part Blocks), in respect of two sites (Figure 5.1). These are assessed in Section 5.2.2.

5.2.2 Implications for site integrity of relevant sites

The conservation objectives of relevant sites and other relevant information relating to site selection and advice on operations has been considered against the work programmes for the Blocks applied for to determine whether they could adversely affect site integrity. The results are given in Table 5.1 below. All mandatory control requirements (as given in Section 2.3.1) are assumed to be in place as a standard for all activities assessed here.

Figure 5.1: Sites and Blocks to be subject to further assessment for physical disturbance and drilling effects

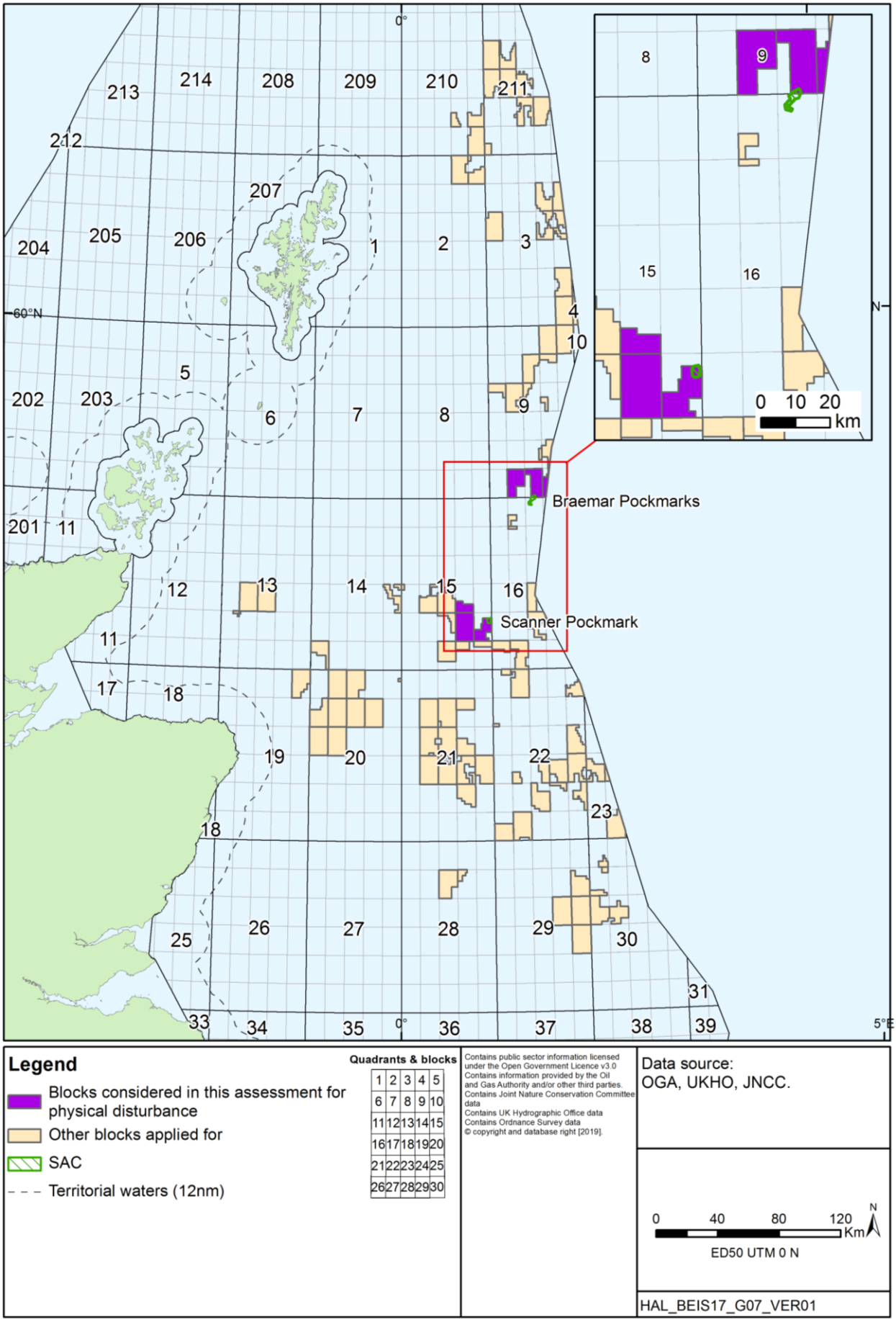


Table 5.1: Consideration of potential physical disturbance and drilling effects and relevant site conservation objectives

Braemar Pockmarks SAC

Site information

Area (ha): 1,143
Relevant qualifying features: Submarine structures made by leaking gases

Conservation objectives:
For the feature to be in favourable condition thus ensuring site integrity in the long term and contribution to Favourable Conservation Status of Annex I Submarine structures made by leaking gases. This contribution would be achieved by maintaining or restoring, subject to natural change:

- The extent and distribution of the qualifying habitat in the site;
- The structure and function of the qualifying habitat in the site; and
- The supporting processes on which the qualifying habitat relies.

Relevant Blocks for physical disturbance and drilling effects

9/27b, 9/28c, 9/29b

Assessment of effects on site integrity

Rig siting
(***Relevant pressures:*** *penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion and abrasion/disturbance of the substrate on the surface of the seabed*)

Whilst not assessed in the advice on operations, the qualifying feature is likely to be sensitive to penetration and/or disturbance of the seabed surface and subsurface (e.g. through anchoring)[24]. Faint channels close to an abandoned wellhead have been interpreted as probably being from anchor mooring cables (Rance *et al.* 2017), and JNCC (2017a) consider such activities have the potential to impact the site. Much of Block 9/28c is outside the site boundaries, rig siting in this part would avoid interaction with the site. If located within the site, anchoring and well placement could affect the extent and distribution, and structure and function of the qualifying habitat. The likelihood and scale of impact will depend on the proposed location of drilling activities and further mitigation measures are available (see Section 5.2.3) and will be required, where appropriate, to ensure site conservation objectives are not undermined and there is no adverse effect on site integrity. Blocks 9/27b and 9/29b are located outside of the site (8km and 5km away respectively) and given the assumed anchor radius of a semi-submersible drilling rig in the central North Sea (1.5km, see Table 2.2), no physical damage to the qualifying feature could occur from rig installation thereby ensuring site conservation objectives are not undermined and there is no adverse effect on site integrity from rig siting in these Blocks.

Drilling discharges
(Relevant pressures: *Abrasion/disturbance of the substrate on the surface of the seabed, smothering and siltation rate changes (light), habitat structure changes – removal of substratum (extraction) and contamination)*

Whilst not assessed, the qualifying feature is likely to be sensitive to the abrasion/disturbance of the seabed surface, smothering and siltation rate changes and habitat structure changes associated with the discharge of cuttings. As the feature lies in a low energy environment, drill cuttings may not be removed by currents and the feature's associated biological community is unlikely to be accustomed to changing sediment levels[25]. For the assessment it is assumed that effects associated with drilling discharges may occur within 500m of the well location (Table 2.2). Block 9/28c partly overlaps the site and smothering from drill cuttings could impact the extent and distribution, and structure and function of the qualifying habitat. The likelihood and scale of impact will depend on the proposed location of drilling activities and further mitigation measures are available (see Section 5.2.3) and will be required, where appropriate and in addition to mandatory requirements with respect to drilling chemical use and discharge (Section 2.3.1), to ensure site conservation objectives are not undermined and there is no adverse effect on site integrity. Blocks 9/27b and 9/29b are located 8km and 5km from the site respectively and are therefore outside of the footprint of effects for drilling discharges.

Other effects

[24] http://archive.jncc.gov.uk/docs/BraemarPockmarks_AdviceOnOperations_V1.0.xlsx
[25] http://nsrac.org/wp-content/uploads/2013/07/Paper-8.3-Braemar-Pockmarks-Site.pdf

The qualifying feature is considered to be sustained by shallow biogenic gas seepage but the structures may also be supported by deeper petrogenic gas and there is the potential for a reduction in seepage and subsequent accretion of MDAC if the supply of methane is interrupted, e.g. by drilling. Shallow seismic data across the area appears to show evidence (acoustic turbidity etc.) consistent with the presence of gas within the shallow sediments with an acoustic feature beneath one of the pockmarks suggestive of a vertical gas migration pathway (Marathon & Hartley Anderson 2002, Gafeira & Long 2015a). Block 9/28c partly overlaps the site and drilling activities have the potential to interfere with or interrupt the supply of shallow gas thereby impacting the extent, physical structure, diversity and community structure of the qualifying feature. The likelihood and scale of impact will depend on the proposed location of drilling activities and further mitigation measures are available (see Section 5.2.3) and will be required, where appropriate, to ensure site conservation objectives are not undermined and there is no adverse effect on site integrity. Recommendations are made regarding conditions to be included in the licence for Block 9/28c in relation to the Braemar Pockmarks SAC (refer to Section 5.2.4).

In-combination effects
In-combination effects from the licensing of the three Blocks are not considered to be likely, as activity in only one Block has the potential to interact with the site. Section 5.3 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

Scanner Pockmark SAC

Site information

Area (ha): 674
Relevant qualifying features: Submarine structures made by leaking gases

Conservation objectives:
For the feature to be in favourable condition thus ensuring site integrity in the long term and contribution to Favourable Conservation Status of Annex I Submarine structures made by leaking gases. This contribution would be achieved by maintaining or restoring, subject to natural change:

- The extent and distribution of the qualifying habitat in the site;
- The structure and function of the qualifying habitat in the site; and
- The supporting processes on which the qualifying habitat relies.

Relevant Blocks for physical disturbance and drilling effects

15/19c, 15/24, 15/25d

Assessment of effects on site integrity

Rig siting
(***Relevant pressures:*** *penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion and abrasion/disturbance of the substrate on the surface of the seabed*)

Whilst not assessed in the advice on operations, the qualifying feature is likely to be sensitive to penetration and/or disturbance of the seabed surface and subsurface (e.g. through anchoring)[26]. Much of Block 15/25d is outside the site boundaries, rig siting in this part would avoid interaction with the site. If located within the site, anchoring and well placement could affect the extent and distribution, and structure and function of the qualifying habitat. The likelihood and scale of impact will depend on the proposed location of drilling activities and further mitigation measures are available (see Section 5.2.3) and will be required, where appropriate, to ensure site conservation objectives are not undermined and there is no adverse effect on site integrity. Blocks 15/19c and 15/24 are located outside of the site (10km and 9km away respectively) and given the assumed anchor radius of a semi-submersible drilling rig in the central North Sea (1.5km, see Table 2.2), no physical damage to the qualifying feature could occur from rig installation thereby ensuring site conservation objectives are not undermined and there is no adverse effect on site integrity from rig siting in these Blocks.

Drilling discharges
(Relevant pressures: *Abrasion/disturbance of the substrate on the surface of the seabed, smothering and siltation rate changes (light), habitat structure changes – removal of substratum (extraction) and contamination)*

Whilst not assessed, the qualifying feature is likely to be sensitive to the abrasion/disturbance of the seabed surface, smothering and siltation rate changes and habitat structure changes associated with the discharge of cuttings. As the feature lies in a low energy environment, drill cuttings may not be removed by currents. For the

[26] http://archive.jncc.gov.uk/docs/ScannerPockmark_AdviceOnOpeations_V1.0.xlsx

assessment it is assumed that effects associated with drilling discharges may occur within 500m of the well location (Table 2.2). Block 15/25d partly overlaps the site and smothering from drill cuttings could impact the extent and distribution, and structure and function of the qualifying habitat. The likelihood and scale of impact will depend on the proposed location of drilling activities and further mitigation measures are available (see Section 5.2.3) and will be required, where appropriate and in addition to mandatory requirements with respect to drilling chemical use and discharge (Section 2.3.1), to ensure site conservation objectives are not undermined and there is no adverse effect on site integrity. Blocks 15/19c and 15/24 are located 10km and 9km from the site respectively and are therefore outside of the footprint of effects for drilling discharges.

Other effects
The qualifying feature is considered to be sustained by shallow biogenic gas seepage (Holmes & Stoker 2005) although the structures may also be supported by deeper petrogenic gas and there is the potential for a reduction in seepage and subsequent accretion of MDAC if the supply of methane is interrupted, e.g. by drilling. Shallow seismic data acquisition across the area appears to show evidence (acoustic turbidity etc.) consistent with the presence of gas within the shallow sediments (Gafeira & Long 2015b). Block 15/25d partly overlaps the site and drilling activities have the potential to interfere with or interrupt the supply of shallow gas thereby impacting the extent, physical structure, diversity and community structure of the qualifying feature. Recommendations are made regarding conditions to be included in the licence for Block 15/25d in relation to the Scanner Pockmark SAC (refer to Section 5.2.4).

In-combination effects
In-combination effects from the licensing of the three Blocks are not considered to be likely, as activity in only one Block has the potential to interact with the site. Section 5.3 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

5.2.3 Further mitigation measures

Further mitigation measures are available which would be identified through the EIA process and operator's environmental management system and the Departmental 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 re-siting of activities (e.g. wellhead or anchor positions) to ensure sensitive seabed surface or subsurface features (such as shallow gas accumulations) are avoided. Survey reports are used to underpin operator environmental submissions (e.g. EIAs) and where requested, survey reports are made available to nature conservation bodies during the statutory consultation phase on these assessments[27].

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

Holmes & Stoker (2005) investigated the origin of shallow gas in Blocks 15/20c and 15/25d, the latter containing the Scanner 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 recommendations made by Holmes & Stoker (2005) on

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

protection of the pockmark gas supply are regarded to be equally applicable to the Scanner Pockmark and Braemar Pockmarks SACs, and provide for specific mitigation measures to ensure that the conservation objectives of the sites are not compromised by drilling activities which could follow licensing.

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 the Department (and its advisors) to make a decision on whether the activities could lead to a likely significant effect.

5.2.4 Conclusions

Likely significant effects identified with regards to physical damage to the seabed, drilling discharges and other effects (see Section 5.2.2) when considered along with project level mitigation (Section 5.2.3) and relevant activity permitting requirements (see Section 2.3), will not have an adverse effect on the integrity of the Natura 2000 sites considered in this assessment. At the project level, there is a legal framework through the implementation of the EIA Regulations[28] and the Habitats Directive, to ensure that there are no adverse effects on the integrity of Natura 2000 sites. Their application at the project level allows for an assessment to be made of likely significant effects on the basis of detailed project-specific information and allows for applicants to propose project specific mitigation measures.

The AA recommends that the following conditions be attached to any licences for Block 15/25d and for Block 9/28c[29]:

- No drilling will be permitted through the shallow gas accumulations supplying the pockmarks or through the migration pathways to them;
- The operator will liaise with JNCC in advance of any activities within the Block;
- The operator should note that, in advance of consenting decisions, the Competent Authority (the Department) will undertake an HRA of the potential effects of the proposed activity(ies) on the relevant SAC site if the activity(ies) are likely to have a significant effect on the site (either alone or in combination with other plans or projects).

Taking into account the information presented above, it is concluded that activities arising from the licensing of Blocks 9/27b, 9/28c, 9/29b, 15/19c, 15/24, 15/25d, insofar as they may generate physical disturbance and drilling effects, will not cause an adverse effect on the integrity of the Braemar Pockmarks SAC or Scanner Pockmark SAC. 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 drilling rig, will not have an adverse effect on the integrity of relevant sites.

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[28] The *Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 (as amended)*

[29] Note that these conditions are already indicated for Block 15/25d in the 32nd Round other regulatory issues: https://www.ogauthority.co.uk/media/6047/other-regulatory-issues_sept-05-2019.pdf

5.3 In-combination effects

5.3.1 Introduction

Potential incremental, cumulative, synergistic and secondary effects from a range of operations, discharges and emissions (including noise) were considered in the latest Offshore Energy SEA (DECC 2016; see also OSPAR 2000, 2010[30]). There are a number of potential interactions between activities that may follow licensing and those existing or planned activities in the central North Sea, for instance in relation to fishing, shipping and other oil and gas exploration and production activity. These activities are subject to individual permitting or consenting mechanisms or are otherwise managed at a national or international level. Marine planning in Scotland is set out in the Scottish National Marine Plan, adopted in March 2015. Relevant plan policies are referred to in the assessment documented in the following sections.

5.3.2 Sources of potential effect

Projects for which potential interactions with operations that could arise from the licensing of 32nd Round Blocks 9/27b, 9/28c, 9/29b, 15/19c, 15/24 and 15/25d have been identified. Interactions were identified on the basis of the nature and location of existing or proposed activities and spatial datasets in a Geographic Information System (GIS). The principal sources of in-combination effects are regarded to be from physical disturbance related to oil and gas exploration, production and decommissioning and fisheries.

5.3.3 Physical disturbance and drilling

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 Section 5.1 and include the siting of semi-submersible drilling rigs, drilling discharges and wellhead placement and recovery.

Existing or proposed oil & gas projects

Though existing oil and gas infrastructure is widespread in the central North Sea (Figure 5.2), the relative density and footprint of these is small. The main interaction relates to the Braemar field infrastructure which is located to the east of the Braemar Pockmarks SAC, just outside of the site boundary. The infrastructure is presently subject to decommissioning planning[31] and has been subject to EIA (Marathon Oil 2017), which concluded that physical impacts of wellhead removal would not directly or indirectly affect the site. It is also noted that a decommissioning programme has recently been submitted for the Heimdal (Norway sector) to Brae A pipeline, which passes minimum of 8km east of the Braemar Pockmarks. Relevant activities associated with this programme include the deposit of stabilisation materials to protect any exposed spans; the environmental appraisal of such activities highlighted the highly localised nature of any seabed disturbance (within a 100m radius of the pipeline) and negligible anticipated effects on seabed features (Equinor 2020). No active oil and gas surface

[30] Note that an intermediate assessment was published by OSPAR in 2017: https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/

[31] https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines

infrastructure is located within the Scanner Pockmark SAC or within the Blocks being assessed in relation to this site, the closest infrastructure being 8km to the north west and 9km to the south east, associated with the Donan and Balmoral fields respectively.

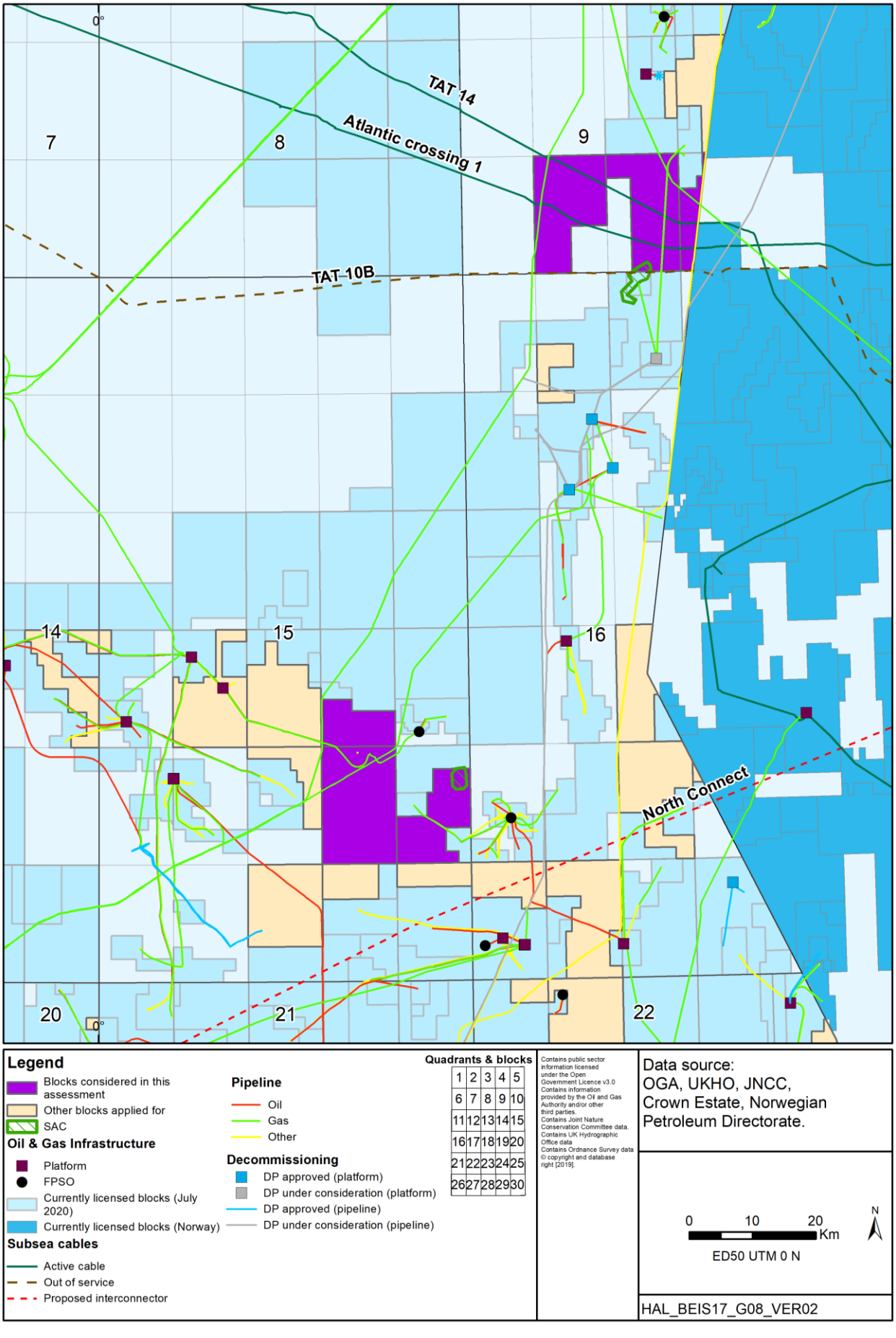
When considered against the potential scale of activity which could follow the licensing of relevant 32nd Round blocks (as assessed in Section 5.2), and the proposed conditions for Blocks 9/28c and 15/25d (Section 5.2.4), likely cumulative physical effects from existing activity are not envisaged.

A review of field development and decommissioning projects[32] indicates that, except for the Braemar decommissioning noted above, a number of proposed developments are present in Quadrants 9 (Bentley: 9/3b, Harding North: 9/23b) and 15 (Marigold & Sunflower: 15/13a & b, Perth: 15/21c), though these are distant from the Blocks (9/27b, 9/28c, 9/29b, 15/19c, 15/24 & 15/25d) and sites relevant to this assessment (at least 23km). Additionally, several other Blocks adjacent or partly overlapping the sites (and within the distances where effects could be considered likely) were licensed in previous rounds, including Block 16/3e (30th Round) and 15/25c (27th Round). A well was drilled in the western part of Block 15/25c, ~5.6km away from the Scanner Pockmark SAC in 2014, but no further activity has taken place. No well has been drilled in Block 16/3e associated with the current licence (P2370) to date, but the licence conditions are such that any well would be subject to the same controls in relation to drilling in proximity to the Braemar Pockmarks SAC as noted in Section 5.2.4.

Seventy-five new production licences were awarded in Norwegian waters in January 2018, 45 of which are in the Norwegian North Sea. The nearest Block awarded a licence is approximately 14km to the east of the Braemar Pockmarks SAC, with a phased licence to reprocess 3D seismic with decisions to progress further in subsequent phases. A further licensing round covering the Norwegian North Sea was undertaken in 2019[33], with 33 production licences issued in February 2020; all such Blocks are ≥ 19km from the nearest relevant UK site, the Braemar Pockmark SAC. Given the small and temporary seabed footprint associated with drilling activities which may follow the licensing of 32nd Round Blocks and those standard and additional mitigation measures set out already in Section 2.3 and 5.2.3, significant in-combination effects associated with those limited other oil and gas projects discussed is not expected.

[32] See https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines
[33] https://www.npd.no/en/facts/production-licences/licensing-rounds/apa-2019/

Figure 5.2: Other projects relevant to this AA



With respect to drilling discharges, previous discharges of WBM cuttings in the UKCS have been shown to disperse rapidly and to have minimal ecological effects (See Section 4.2). 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. The proximity of Block 9/28c to the Braemar Pockmarks SAC means that a level of mitigation may be required to ensure that cumulative effects with previous discharges associated with the discovery and development of the Braemar Field are minimised. As described in Section 5.2.3, such mitigation could include the relocation of the cuttings discharge point further away from the site, discharge near the seabed rather than near sea surface, or zero discharge.

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 2016). Similarly, the potential for in-combination effects relating to chemical usage and discharge from exploratory drilling is controlled by the existing legislative and permitting mechanism, which the UK Marine Strategy[34] has identified as making an ongoing contribution to managing discharges.

Fisheries

Fishing and particularly bottom trawling has historically contributed to seabed disturbance over extensive areas and was identified as an ongoing problem in the UK initial assessment for MSFD[35]. The updated UK assessment, which was subject to consultation between May and June 2019, indicates that while there have been some improvements in commercial fish stocks, there remain issues such that Good Environmental Status (GES) will not be achieved by 2020[36]. This is in keeping with an earlier request by the UK for an exemption to achieving GES by 2020 due to the time it would take stocks to respond to measures to be implemented by the UK. Specific to the consideration of conservation sites, the initial assessment of 2012 noted that depending on the nature of future measures (e.g. in relation to MPA management in the wider environment and within MPAs[37]), the effects of fisheries are likely to be reduced and therefore some improvement in benthic habitats could be expected[38]. The management of fisheries in relation to Article 6 of the Habitats Directive is fundamentally different to other activities such as offshore energy development, and a revised approach to the management of commercial fisheries in European sites[39] has sought to implement steps to ensure that they are managed in accordance with Article 6.

[34] https://www.gov.uk/government/publications/marine-strategy-part-three-uk-programme-of-measures
[35] https://www.gov.uk/government/publications/marine-strategy-part-one-uk-initial-assessment-and-good-environmental-status
[36] https://consult.defra.gov.uk/marine/updated-uk-marine-strategy-part-one/
[37] For example, see the MMO strategic management table for MPAs: https://www.gov.uk/government/publications/marine-protected-areas-strategic-management-table and measures proposed by the Scottish Government: https://www.gov.scot/Topics/marine/marine-environment/mpanetwork/SACmanagement
[38] https://www.gov.uk/government/publications/marine-strategy-part-three-uk-programme-of-measures
[39] https://www.gov.uk/government/publications/revised-approach-to-the-management-of-commercial-fisheries-in-european-marine-sites-overarching-policy-and-delivery and see http://www.gov.scot/Topics/marine/marine-environment/mpanetwork/SACmanagement

In Scotland, fisheries management is coordinated by Marine Scotland (note that for the present any measure which may influence vessels of EU Member States can only be adopted after consultation with the Commission, EU Member States and the Regional Advisory Councils) and for offshore sites beyond 12nm from the coast, measures are required to be proposed by the European Commission in accordance with the CFP[40]. In relation to specific sites of relevance to this AA, JNCC (2017a, b) note that the Braemar Pockmarks SAC and Scanner Pockmark SAC are likely to have been impacted by bottom trawling, evidenced by VMS data and trawl scars (Rance *et al.* 2017), and JNCC (2019) note that the condition of the qualifying features of both pockmark sites are considered unfavourable for this reason. Proposals have been made for the management of these sites[41], with measures including the closure of all demersal fisheries (mobile and static gear), with vessels monitored across the site at 10-minute intervals. These form part of a wider set of measures covering sites in the North Sea which have been under development since 2013 and were most recently subject to assessment with EU Member States in 2016.

A safety zone with a radius of 500m extends around an oil and gas surface structure (fixed and floating installations). These are created under the *Petroleum Act 1987* and excludes other activities from taking place within the zone, including fisheries. This covers mobile drilling rigs and is notified to other users of the sea (e.g. through notices to mariners and Kingfisher charts).

Whilst fishing may be linked to historical damage to site features, and presents an ongoing risk to these, future management measures should limit the potential for in-combination effects with other activities, particularly when considered in addition to mitigation which is available to avoid effects on sites from exploration activity (see Sections 2.3.1 and 5.2.3), and other oil and gas related activities which are subject to statutory environmental impact assessment and where appropriate, an HRA.

5.3.4 Conclusions

Available evidence (see e.g. UKBenthos database and OSPAR 2010) for the central North Sea indicates that past oil and gas activity and discharges has not led to adverse impacts on the integrity of European sites in the area. Any activities relating to the work programmes, and any subsequent development that may occur if exploration/appraisal is successful, will be judged on its own merits and in the context of wider development in the North Sea (i.e. any potential incremental effects). The current regulatory 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.

[40] See: http://ec.europa.eu/environment/nature/natura2000/marine/docs/fish_measures.pdf and also refer to Regulation (EU) No. 1380/2013 on the Common Fisheries Policy. Note the approach to the management of fisheries in UK waters may change within the timescale of the 32nd Round depending on the nature of the UK's exit from the EU.

[41] http://www.gov.scot/Topics/marine/marine-environment/mpanetwork/SACmanagement/offshoreseptember2017

The Department will consider the potential for in-combination effects whilst considering project specific EIAs and, where appropriate, through HRAs. This process will ensure that, if consented, projects will not result in adverse effects on integrity of European sites. Therefore, it is concluded that the in-combination effects from activities arising from the licensing of Blocks 9/27b, 9/28c, 9/29b, 15/19c, 15/24 and 15/25d with those from existing and planned activities in the central North Sea will not adversely affect the integrity of relevant European Sites.

6 Overall conclusion

Taking account of the evidence and assessment presented above, the report determines that the licensing through the 32nd Licensing Round of the six Blocks considered in this AA will not have an adverse effect on the integrity of the relevant sites (identified in Section 1.3), and the Department have no objection to the OGA awarding seaward licences (subject to meeting application requirements) covering Blocks 9/27b, 9/28c, 9/29b, 15/19c, 15/24 and 15/25d. This is because there is certainty, within the meaning of the ECJ Judgment in the Waddenzee case, that implementation of the plan will not adversely affect the integrity of relevant European Sites (as described in Section 5), taking account of the control measures that can be imposed through existing permitting mechanisms on the planning and conduct of activities (as described in Section 2.3.1 and 5.2.3).

These control measures are incorporated in respect of habitat and species interest features through the range of legislation and guidance (see https://www.gov.uk/guidance/oil-and-gas-offshore-environmental-legislation) which apply to activities which could follow licensing. Where necessary, project-specific HRA based on detailed project proposals would be undertaken by the Department to ensure that permits/consents are only granted where the proposed activity will not result in adverse effects on integrity of relevant sites.

Even where a site/interest feature has been screened out, or where a conclusion of no adverse effect on site integrity has been reached at plan level, the potential for likely significant effects on any relevant site would need to be revisited at the project level, once project plans are known. New relevant site designations, new information on the nature and sensitivities of interest features within sites, and new information about effects including in-combination effects may be available to inform future project level HRA.

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