Department for Business, Energy & Industrial Strategy

OFFSHORE OIL & GAS LICENSING 31ST SEAWARD ROUND

Habitats Regulations Assessment

Draft Appropriate Assessment: English Channel

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1 Introduction

1.1 Background and purpose

The plan/programme covering this and potential future seaward licensing rounds 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 with further seaward oil and gas licensing rounds. As a result, on 10th July 2018, the OGA invited applications for licences relating to 1,779 Blocks in a 31st Seaward Licensing Round covering mature and frontier areas of the UK Continental Shelf (UKCS). Applications were received for licences covering 164 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 winter 2018, the Secretary of State undertook a screening assessment to determine whether the award of any of the Blocks offered would be likely to

[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).

have a significant effect on a relevant site, either individually or in combination[3] with other plans or projects (BEIS 2018a). In doing so, BEIS has applied the Habitats Directive test[4] (elucidated by the European Court of Justice 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 1,779 Blocks offered. The screening identified 525 whole or part Blocks as requiring further assessment prior to decisions on whether to grant licences (BEIS 2018a). Following the closing date for 31st Seaward Round applications, and the publication of the screening document, those Blocks identified as requiring further assessment were reconsidered against the list of actual applications. It was concluded that further assessment (Appropriate Assessment, AA) was required for 41 of the Blocks applied for. Because of the wide distribution of these Blocks around the UKCS, the AAs are documented in four regional reports as follows:

- Mid North Sea High
- Moray Firth
- Irish 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 recent 'Sweetman' case (Case C-258/11), which confirms those principles set out in the Waddenzee judgement.

- English Channel

1.2.1 English Channel Blocks

The English Channel Blocks applied for in the 31st Round and considered in this assessment are 98/11b and 98/12 (Figure 1.1).

1.3 Relevant Natura 2000 sites

The screening identified the relevant Natura 2000 sites and related Blocks requiring further assessment in the English Channel (refer to Appendix B of BEIS 2018a). Following a reconsideration of those Blocks and sites screened in against those Blocks applied for, nine Natura 2000 sites were identified as requiring further assessment in relation to two Blocks (Table 1.1 and Figure 1.1). Abbreviations and species common names follow those in Appendix A of BEIS (2018a).

Table 1.1: Relevant sites requiring further assessment

Relevant site Features	Relevant Blocks applied for	Potential effects
Special Protection Areas (SPAs)		
Poole Harbour SPA Breeding: Mediterranean gull, Sandwich tern, common tern Over winter: little egret, avocet, spoonbill, black-tailed godwit, shelduck Overwintering waterbird assemblage (including little egret, spoonbill, avocet, black-tailed godwit, dark-bellied brent goose, cormorant, curlew, dunlin, goldeneye, pochard, red-breasted merganser, redshank, greenshank, spotted redshank, shelduck, teal, black-headed gull)	98/11b, 98/12	Underwater noise
	98/11b, 98/12	Physical disturbance and drilling
Solent and Southampton Water SPA Breeding: Mediterranean gull, common tern, little tern, roseate tern, Sandwich tern Over winter: black-tailed godwit, dark-bellied brent goose, ringed plover, teal Overwintering waterbird assemblage (including dark-bellied brent goose, teal, ringed plover, black-tailed godwit)	98/11b, 98/12	Physical disturbance and drilling
Solent and Dorset Coast pSPA Breeding: sandwich tern, common tern, little tern	98/11b, 98/12	Physical disturbance and drilling

Relevant site Features	Relevant Blocks applied for	Potential effects
Chichester & Langstone Harbours SPA Breeding: Little tern, Sandwich tern, common tern Over winter: bar-tailed godwit, curlew, dark-bellied brent goose, dunlin, grey plover, pintail, red-breasted merganser, redshank, ringed plover, sanderling, shelduck, shoveler, teal, turnstone, wigeon Overwintering waterbird assemblage (including bar-tailed godwit, curlew, dark-bellied brent geese, dunlin, grey plover, pintail, red-breasted merganser, redshank, ringed plover, sanderling, shelduck, shoveler, teal, turnstone and wigeon)	98/11b, 98/12	Physical disturbance and drilling
Special Areas of Conservation (SACs)		
River Avon SAC Annex I habitat: running freshwater Annex II species: Desmoulin's whorl snail, sea lamprey, brook lamprey, Atlantic salmon, bullhead	98/11b, 98/12	Underwater noise
	98/12	Physical disturbance and drilling
Solent and Isle of Wight Lagoons SAC Annex I habitat: coastal lagoons	98/12	Physical disturbance and drilling
Solent Maritime SAC Annex I habitat: estuaries, salt meadows, sandbanks, mudlflats and sandflats, coastal lagoons, vegetation of drift lines, vegetation of stony banks, coastal dunes Annex II species: Desmoulin's whorl snail	98/12	Physical disturbance and drilling
South Wight Maritime SAC Annex I habitat: reefs, sea cliffs, sea caves	98/12	Physical disturbance and drilling
Studland to Portland SAC Annex I habitat: reefs	98/11b, 98/12	Physical disturbance and drilling

1.4 Assessment overview

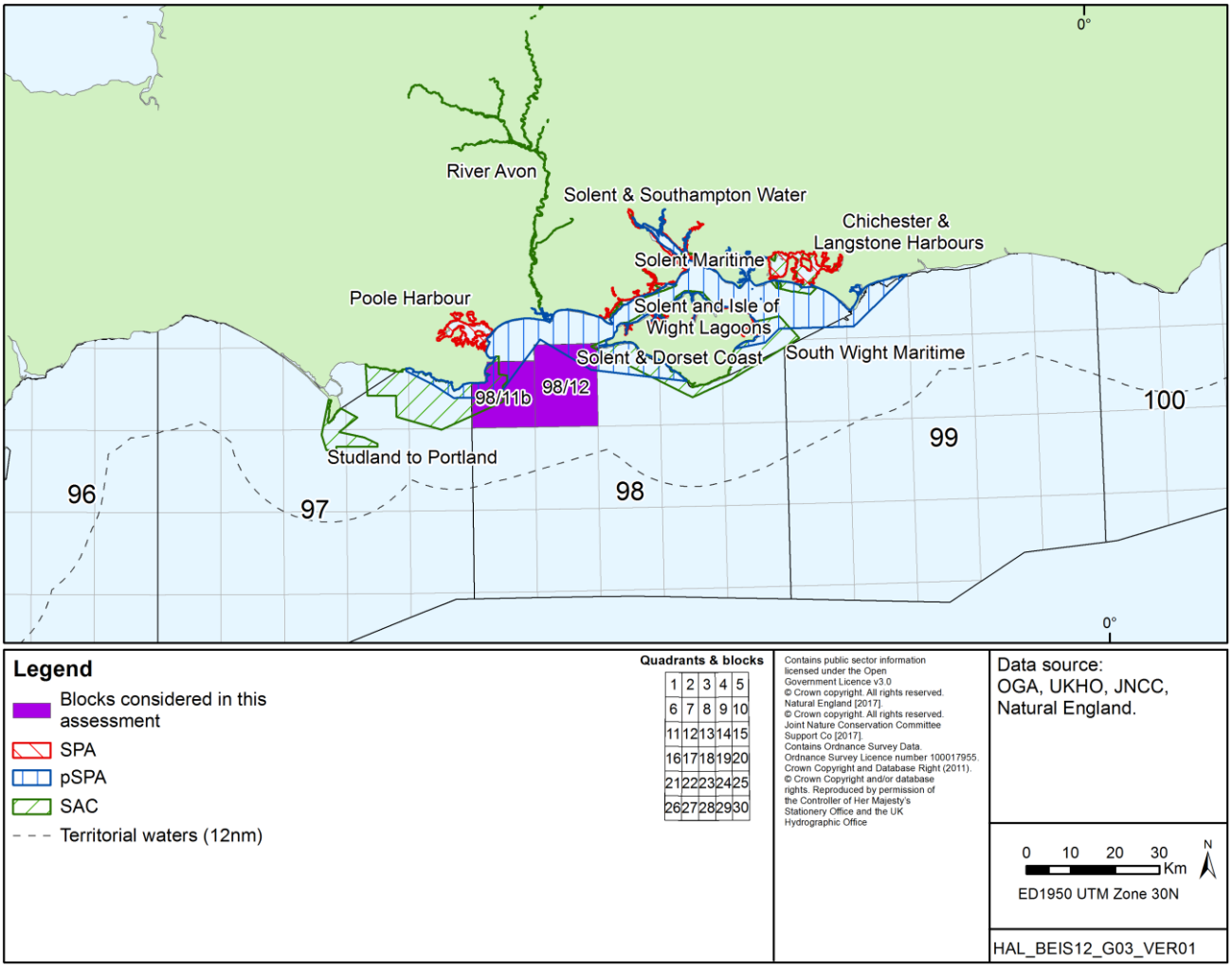
This document sets out the key assumptions and approach to the AA, the evidence base underpinning the assessment and the assessment of relevant Blocks and sites. The document is organised as follows:

- 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 (Sections 5-8)

- Overall conclusion (Section 9)

As part of this HRA process, the AA document is being subject to consultation with appropriate nature conservation bodies and the public and will be amended as appropriate in light of comments received. The final AA document will be available via the 31st Round Appropriate Assessment webpage of the gov.uk website.

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 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. 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 that may follow licensing are subject to a range of statutory permitting and consenting requirements, including, where relevant, activity specific AA as required under Article 6(3) of the Habitats Directive (Directive 92/43/EC).

Several sub-types of Seaward Production Licence were available in previous rounds (Traditional, Frontier and Promote) which have been replaced 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 9 and 6 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 the acquisition of new seismic could take place in this phase for the purpose of defining a 3D survey as part of Phase B, but normally this phase will not involve activities in the field)
- Phase B: shooting of new seismic 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 so as to implement the Innovate licences to be issued in the 31st Round.

Applicants may choose to spend up to 4 years on a single Phase in the Initial Term but cannot take more than 9 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]. 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.

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 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.

[7] The Offshore Safety Directive Regulator is the Competent Authority for the purposes of the Offshore Safety Directive comprising of the Department for Business, Energy and Industrial Strategy (BEIS) Offshore Petroleum Regulator for Gas Environment and Decommissioning (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 31st Round at: https://www.ogauthority.co.uk/licensing-consents/licensing-rounds/

- 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 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 31st Seaward Licensing Round and the various environmental assessments including HRA. Offshore activities such as drilling and seismic survey are subject to relevant activity specific environmental assessments by BEIS (see Figures 2.3 and 2.4), 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 Blocks being applied for are relevant.

2.2.1 Likely scale of activity

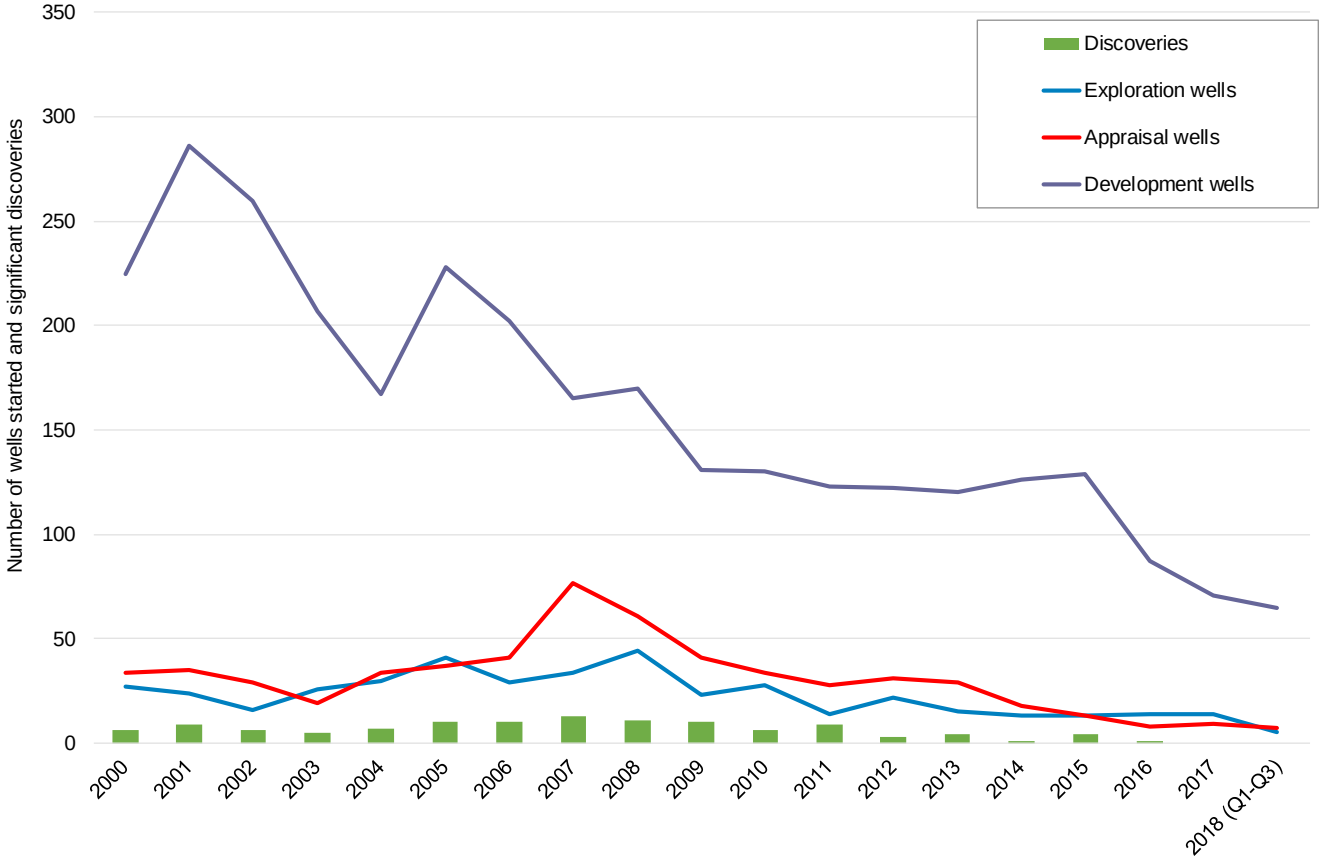
On past experience the activity that actually takes place is less than what is included in the work programmes at the licence application stage. A proportion of Blocks awarded may be relinquished without any offshore activities occurring. Activity after the Initial Term is much harder to predict, as 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 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,

[9] https://www.ogauthority.co.uk/media/4950/general-guidance-31st-seaward-licensing-round-july-2018.docx

although recent developments are mostly tiebacks to existing production facilities rather than stand-alone developments. For example, of the 39 current projects identified by the OGA's Project Pathfinder (as of 24th August 2018)[10], 13 are planned as subsea tie-backs to existing infrastructure, 3 involve new stand-alone production platforms and 10 are likely to be developed via Floating Production, Storage and Offloading facilities (FPSO). 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 31st Round Blocks.

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



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 (November 2018), Significant Offshore Discoveries (October 2018)

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

2.2.2 31st Round activities considered by the HRA

The nature, extent and timescale of development, if any, which may ultimately result from the licensing of 31st 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 refused if necessary. In this way the opinion of the Advocate General in ECJ (European Court of Justice) 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 will be 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.

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. It is noted that none of the indicative work programmes for the two relevant English Channel Blocks include the option to conduct 3D seismic survey and, therefore, potential underwater noise effects are restricted to those associated with drilling and well evaluation (e.g. site survey, vertical seismic profiling, rig and vessel movement, possible conductor piling). Additionally, the number of wells presented represents a worst-case scenario since both Blocks may be included in one licence and the drill or drop well/contingent well applies to the licence, i.e. it is possible that fewer wells will be drilled than indicated in Table 2.1.

Table 2.1: Indicative work programmes relevant to Blocks considered in this assessment

Relevant Blocks	Obtain[11] and/or reprocess 2D or 3D seismic data	Shoot 3D seismic	Drill or drop well/contingent well
98/11b	-	-	✓
98/12	-	-	✓

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 Habitats Directive.

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

Table 2.2: Potential activities and assessment assumptions

Potential activity	Description	Assumptions used for assessment
Initial Term Phase C: Drilling and well evaluation		
Rig tow out & de-mobilisation	Mobile rigs are towed to and from the well site typically by 2-3 anchor handling vessels.	The physical presence of a rig and related tugs during tow in/out is both short (a number of days depending on initial location of rig) and transient.
Rig placement/ anchoring	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 legs terminates in a spud-can (base plate) to prevent excessive sinking into the seabed. Unlike semi-submersible rigs, jack-up rigs do not require anchors to maintain station and these are not typically deployed for exploration activities, with positioning achieved using several tugs, with station being maintained by contact of the rig spudcans with the seabed. Anchors may be deployed to achieve precision siting over fixed installations or manifolds at production facilities, which are not considered in this assessment.	It is assumed that jack-up rigs will be three or four-legged rigs with ~20m diameter spudcans with an approximate seabed footprint of 0.001km^2 within a radius of *ca*. 50m of the rig centre. For the assessment it is assumed that effects may occur within 500m of a jack-up rig which would take account of any additional rig stabilisation (rock placement) footprint. The Environmental Statement for a proposed well in Block 98/11, included rig stabilisation as a worst-case contingency option (up to 1000 tonnes per rig leg) although the need for stabilisation was dependent on the outcome of the rig site survey.
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 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.

Potential activity	Description	Assumptions used for assessment
Conductor piling	Well surface holes are usually drilled "open-hole" with the conductor subsequently inserted and cemented in place to provide a stable hole through which the lower well sections are drilled. Where the nature of the seabed sediment and shallow geological formations are such that they would not support a stable open-hole (i.e. risking collapse), the conductor may be driven into the sediments. In North Sea exploration wells, the diameter of the conductor pipe is usually 26" or 30" (<1m), which is considerably smaller than the monopiles used for offshore wind farm foundations (>3.5m diameter), and therefore require less hammer energy and generate noise of a considerably lower amplitude. For example, hammer energies to set conductor pipes are in the order of 90-270kJ (see: Matthews 2014, Intermoor website), compared to energies of up to 3,000kJ in the installation of piles at some southern North Sea offshore wind farm sites. Direct measurements of underwater sound generated during conductor piling are limited. Jiang *et al.* (2015) monitored conductor piling operations at a jack-up rig in the central North Sea in 48m water depth and found peak sound pressure levels (L_{pk}) not to exceed 156dB re 1 µPa at 750m (the closest measurement to source) and declining with distance. Peak frequency was around 200Hz, dropping off rapidly above 1kHz; hammering was undertaken at a stable power level of 85 ±5 kJ but the pile diameter was not specified (Jiang *et al.* 2015). MacGillivray (2018) reported underwater noise measurements during the piling of six 26" conductors at a platform, six miles offshore of southern California in 365m water depth. After initially penetrating the seabed under its own weight, each conductor was driven approximately 40m further into the seabed (silty-clay and clayey-silt) with hammer energies that increased from 31 ±7 kJ per strike at the start of driving to 59 ±7 kJ per strike. Between 2.5-3 hours of active piling was required per conductor. Sound levels were recorded by fixed hydrophones positioned at distances of 10-1,475m from the source and in water depths of 20-370m, and by a vessel-towed hydrophone. The majority of sound energy was between 100-1,000Hz, with peak sound levels around 400Hz. Broadband sound pressure levels recorded at 10m from source and 25m water depth were between 180-190dB re 1µPa (SEL = 173-176dB re 1µPa·s), reducing to 149-155dB re 1µPa at 400m from source and 20m water depth (SEL = 143-147dB re 1µPa·s).	The need to pile conductors is well-specific and is not routine. It is anticipated that a conductor piling event would last between 4-6 hours, during which time impulses sound would be generated primarily in the range of 100-1,000Hz, with each impulse of a sound pressure level of approximately 150dB re 1µPa at 500m from the source.

Potential activity	Description	Assumptions used for assessment
Rig/vessel presence and movement	On site, the rig is supported by supply and standby vessels, and helicopters are used for personnel transfer.	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. A review of Environmental Statements for exploratory drilling suggests that the rig could be on location for up to 10 weeks. Support and supply vessels (50-100m in length) are expected to have broadband source levels in the range 165-180dB re 1µPa@1m, with the majority of energy below 1kHz (OSPAR 2009). Additionally, the use of thrusters for dynamic positioning has been reported to result in increased sound generation (>10dB) when compared to the same vessel in transit (Rutenko & Ushchipovskii 2015).
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 high-resolution seismic involving a much smaller source (mini-gun or four airgun cluster of 160 in^3) and a much shorter hydrophone streamer. Arrays used on site surveys and some Vertical Seismic Profiling (VSP) operations (see below) typically produce frequencies predominantly up to around 250Hz, with a peak source level of around 235dB re 1µPa @ 1m (Stone 2015).	A rig site survey typically covers 2-3km^2. The rig site survey vessel may also be used to characterise seabed habitats, biota and background contamination. Survey durations are usually of the order of four or five days.
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 around 500 in^3 and with a maximum of 1,200 in^3, Stone 2015) is deployed from the rig, and measurements are made using a series of geophones deployed inside the wellbore.	VSP surveys are of short duration (one or two days at most).

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 control measures which may be identified and employed to avoid likely significant effects on relevant sites. These further control measures are identified in Sections 5.2.3 and 5.3.3 with reference to the two main sources of effect identified.

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 Pipelines (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 potential sensitive habitats by such survey (including those under Annex I of the Habitats Directive) may influence BEIS'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 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.

[12] https://www.gov.uk/guidance/oil-and-gas-offshore-environmental-legislation
[13] See BEIS (2018). The Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 (as amended) – A Guide.

2.3.2 Underwater noise effects

Controls are in place to cover all significant noise generating activities on the UKCS, including geophysical surveying. Seismic surveys (including VSP and high-resolution site surveys), sub-bottom profile surveys and shallow drilling activities require an application for consent under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended) and cannot proceed without consent. These applications are supported by an EIA, which includes a noise assessment. Applications are made through BEIS's Portal Environmental Tracking System using a standalone Master Application Template (MAT) and Geological Survey Subsidiary Application Template (SAT). Regarding noise thresholds to be used as part of any assessment, applicants are encouraged to seek the advice of relevant SNCB(s) (JNCC 2017) in addition to referring to European Protected Species (EPS) guidance (JNCC 2010). Applicants are expected to be aware of recent research development in the field of marine mammal acoustics and the publication in the US of a new set of criteria for injury (NMFS 2016, referred to as NOAA thresholds).

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

It is a condition of consents issued under Regulation 4 of the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended) for oil and gas related seismic and sub-bottom profile surveys that the JNCC Seismic Guidelines are followed. Where appropriate, EPS disturbance licences may also be required under the *Conservation of Offshore Marine Habitats and Species Regulations 2017*[14]. JNCC have recently updated their guidelines (2017) and reaffirm that adherence to these guidelines constitutes best practice and will, in most cases, reduce the risk of deliberate injury to marine mammals to negligible levels. Applicants are expected to make every effort to design a survey that minimises sound generated and consequent likely impacts, and to implement best practice measures described in the guidelines.

In addition, potential disturbance of certain qualifying species (or their prey) may be avoided by the seasonal timing of offshore activities. For example, periods of seasonal concern for individual Blocks on offer have been highlighted with respect to seismic survey and fish spawning (see Section 2 of OGA's Other Regulatory Issues[15] which accompanied the 31st Round offer) which licensees should take account of. Licensees should also be aware that it may influence BEIS's decision whether or not to approve particular activities.

[14] Disturbance of European Protected Species (EPS) (i.e. those listed in Annex IV) is a separate consideration under Article 12 of the Habitats Directive, and is not considered in this assessment.
[15] https://www.ogauthority.co.uk/media/4942/other-regulatory-issues_june-2018.docx

Figure 2.2: Stages of plan level environmental assessment

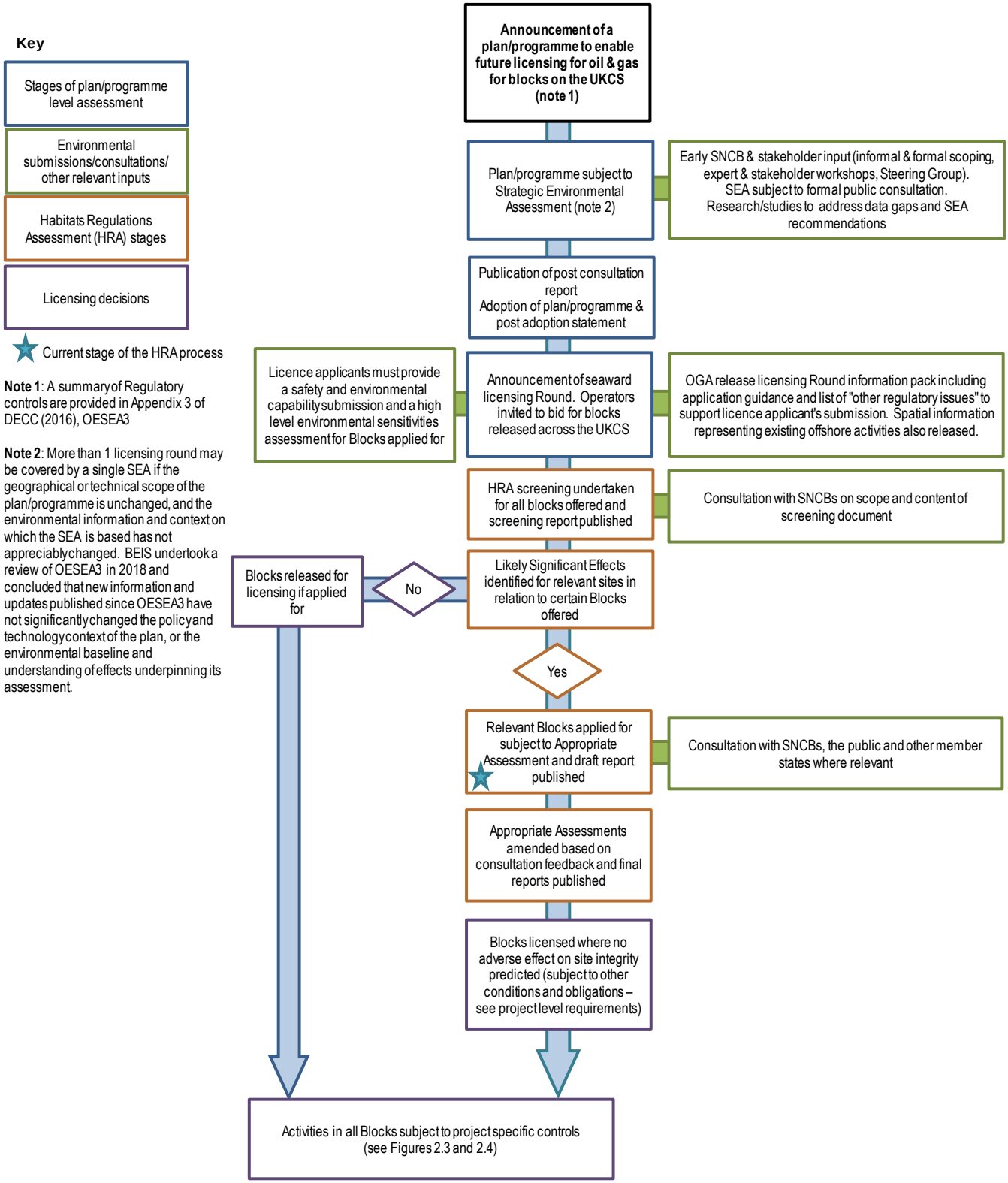
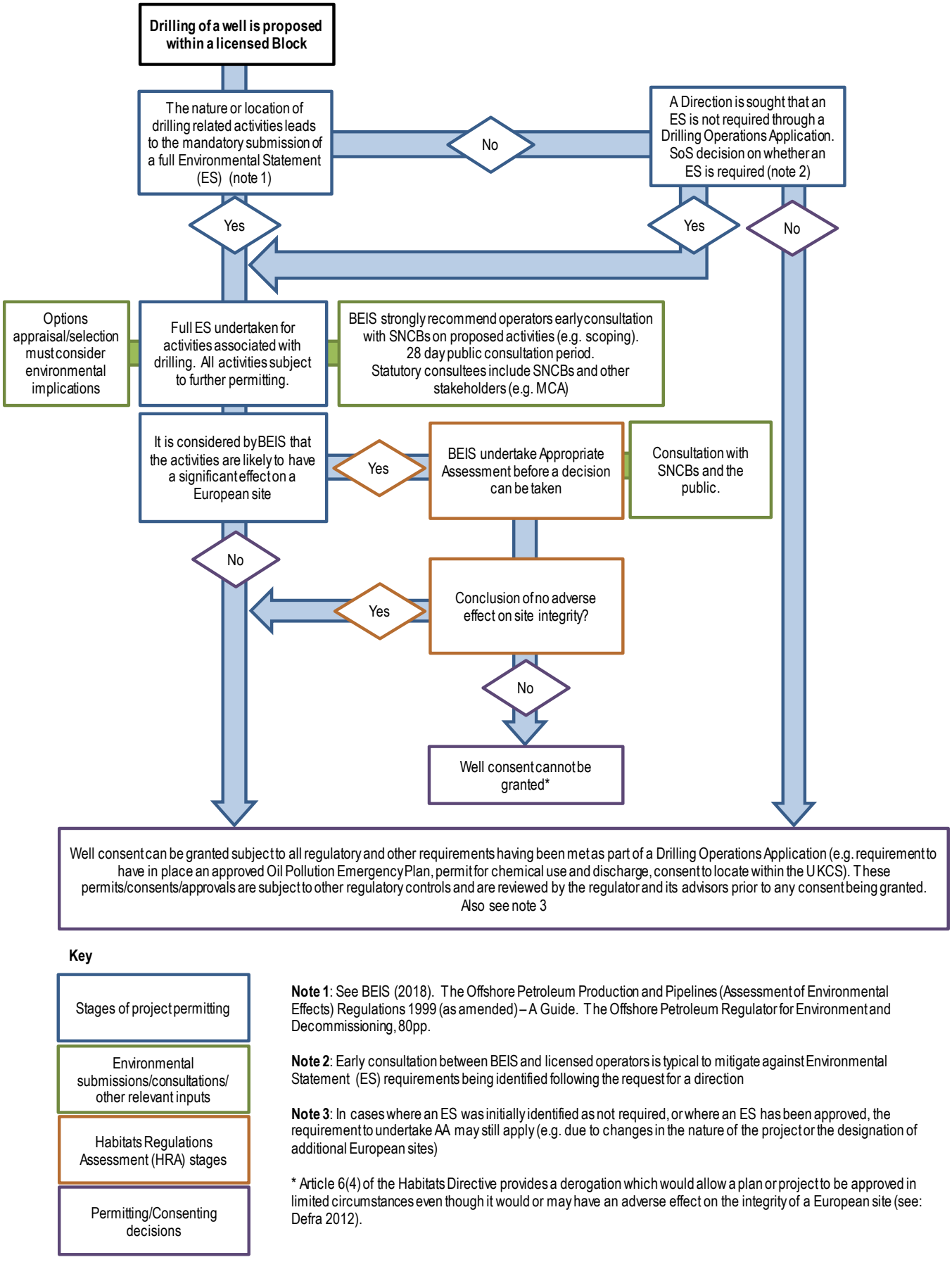


Figure 2.3: High level overview of exploration drilling environmental requirements



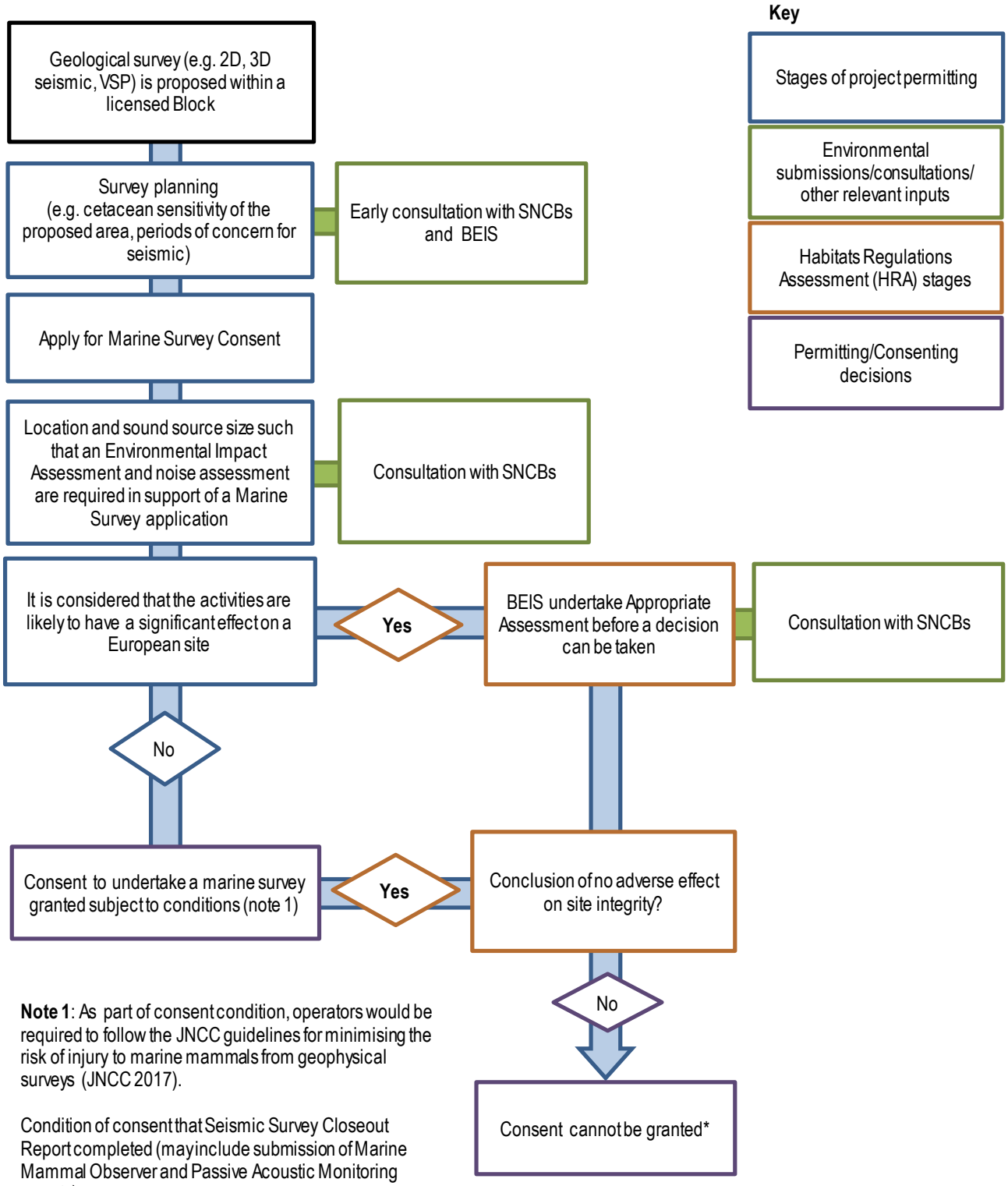
Note 1: See BEIS (2018). The Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 (as amended) – A Guide. The Offshore Petroleum Regulator for Environment and Decommissioning, 80pp.

Note 2: Early consultation between BEIS and licensed 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).

Figure 2.4: High level overview of seismic survey environmental requirements



Note 1: As part of consent condition, operators would be required to follow the JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC 2017).

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

* 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), BEIS 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.
- Subject to consultation on this document, drawn conclusions on whether or not it can agree to the grant of relevant licences.

In considering the above, BEIS 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 BEIS 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[16]) as being: *'…the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat,*

[16] 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.

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 in Article 1 of the Directive (JNCC 2002). As clarified by the European Commission (2000), the integrity of a site relates to the site's conservation objectives. These objectives are assigned at the time of designation to ensure that the site continues, in the long-term, to make an appropriate contribution to achieving favourable conservation status for the qualifying interest features. An adverse effect would be something that impacts the site features, either directly or indirectly, and results in altering the ecological structure and functioning of the site which 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[17]. 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 2000) 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 2012), 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 Sections 5-8. 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. 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
- Underwater noise effects
- In-combination effects

[17] Noting that those typical species of the protected Annex I habitat types (as defined in Article 1), and other species and habitats types to the extent that they are necessary for the conservation of Annex I habitats or Annex II species must also be considered in appropriate assessment (as clarified in ECJ Judgement on Case C-461/17 of *Holohan and others v An Bord Pleanála*).

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 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 activity/pressure approach now underpins advice on operations (e.g. as required under Regulation 37(3) of the *Conservation of Habitats and Species Regulations 2017*[18], Regulation 21 of the *Conservation of Offshore Marine Habitats and Species Regulations 2017* and those relevant to Regulations of the devolved administrations) for many of the sites included in this assessment. Where available, the advice on operations identifies a range of pressures for site features in relation to oil and gas exploration activity[19], along with a standard description of the

[18] Under this Regulation, advice must be provided by the appropriate nature conservation body to other relevant authorities as to: a European site's conservation objectives and any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated.
[19] Under the activity category, "oil and gas exploration and installation", pressures include: above water noise, abrasion/disturbance of the substrate on the surface of the seabed, penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion, habitat structure changes - removal of substratum (extraction), siltation rate changes, including smothering (depth of vertical sediment overburden), hydrocarbon & PAH contamination, introduction of other substances (solid, liquid or gas), synthetic compound contamination, transition elements & organo-metal (e.g. TBT) contamination, introduction or spread of non-indigenous species, litter, barrier to species movement, collision above/below water with static or moving objects not naturally found in

activity, pressure benchmarks, and justification text for the activity-pressure interaction (including with reference to source information). The relevance of the pressures to site specific features are identified; however, in many instances assessment of the sensitivity of a feature to a given pressure has not been made, or it has been concluded that there is insufficient evidence for a sensitivity assessment to be made at the pressure benchmark[20]. Whilst the matrices provided as part of the advice are informative and identify relevant pressures associated with hydrocarbon exploration, resultant impacts at a scale likely to give rise to significant effects are not inevitable consequences of activity, and they can often 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.

A review of the range of pressures identified in SNCB advice for the relevant sites was undertaken for the purpose of this assessment[21]. The review concluded that the evidence base for potential effects of oil and gas exploration from successive Offshore Energy SEAs and the review of the OESEA3 Environmental Report (BEIS 2018b) covers the range of pressures identified in the advice for the relevant sites (as summarised in Sections 4.2-4.3) and has therefore been used to underpin the assessment against site specific information. It is noted that, existing controls are in place for many relevant pressures (e.g. hydrocarbon & PAH contamination, introduction of other substances (solid, liquid or gas), synthetic compound contamination (including antifoulants), transition elements & organo-metal contamination, introduction or spread of non-indigenous species, and litter), either directly in relation to oil and gas activities (as outlined in Section 2.3) or generally in relation to shipping controls (e.g. MARPOL Annex I and V controls on oil and garbage respectively, and the Ballast Water Management Convention). In addition to Natura 2000 site advice on operations, the conservation objectives and any Supplementary Advice on Conservation Objectives (SACO) have been taken into account.

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 which may result from exploration activities and cause physical disturbance and drilling effects on the relevant Natura 2000 sites assessed in Section 5.3 are described below.

the marine environment (e.g., boats, machinery, and structures), introduction of light, visual disturbance, underwater noise changes and vibration.

[20] 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 the Habitats Regulations.

[21] https://www.gov.uk/government/publications/eastern-channel-marine-area-index-map-and-site-packages

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

Jack-up rigs are likely to be used in the English Channel Blocks due to water depths (<120m). Such rigs leave three or four seabed depressions from the feet of the rig (the spud cans) around 15-20m in diameter. The form of the footprint depends on factors such as the spudcan shape, the soil conditions, the footing penetration and methods of extraction, with the local sedimentary regime affecting the longevity of the footprint (HSE 2004). For example, swathe bathymetry data collected as part of FEPA monitoring of the Kentish Flats wind farm off the Kent coast indicated a set of six regular depressions in the seabed at each of the turbine locations resulting from jack-up operations. Immediately post-construction, a January 2005 survey recorded these depressions as having depths of between 0.5 and 2.0m. By November 2007, these depths had reduced by an average of 0.6m indicating that the depressions were naturally infilling as a result of the mobile sandy sediments present across the area (Vattenfall 2009). In locations with an uneven or soft seabed, material such as grout bags or rocks may be placed on the seabed to stabilise the rig feet, and recoverable mud mats may be used in soft sediment (see Section 4.2.4).

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 spud can placement, 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 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).

4.2.2 Abrasion/disturbance of the substrate on the surface of the seabed and habitat structure changes – removal of substratum

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. These cuttings are derived from shallow geological formations and a proportion will be similar to surficial sediments in composition and characteristics. The persistence of cuttings discharged at the seabed is largely determined by the potential for it to be redistributed by tidal and other currents. 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)).

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 2018b).

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).

4.2.3 Physical change to another seabed type

As noted, there may be a requirement for jack-up rig stabilisation (e.g. rock placement or use of mud mats) depending on local seabed conditions. In soft sediments, rock deposits may cover existing sediments resulting in a physical change of seabed type (note that the Channel and relevant Blocks are dominated by coarse seabed sediments). The introduction of rock into an area with a seabed of sand and/or gravel can in theory 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 such “stepping stones” are already widespread and numerous for example in the form of rock outcrops, glacial dropstones and moraines, relicts of periglacial water flows, accumulations of large mollusc shells, carbonate cemented rock etc., and these are often revealed in rig site and other (e.g. pipeline route) surveys.

4.2.4 Contamination[22]

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

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

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 and developed a monitoring strategy which aims 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 Irish Sea, and surveys around specific single and multi-well sites. In contrast with the mature North Sea and Irish Sea hydrocarbon basins, relatively few wells have been drilled in the English Channel, and all have been for exploration and appraisal with development drilling and production exclusively taking place onshore.

In contrast to historic oil based mud discharges[23], effects on seabed fauna resulting from the discharge of cuttings drilled with water based muds (WBM) and of the excess and spent mud itself are usually subtle or undetectable (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). 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. Modelling of WBM cutting discharges has indicated that deposition of material is generally thin and quickly reduces away from the well. Due to the relatively shallow depths (<60m) and high tidal strengths across much of the English Channel and relevant Blocks, combined with limited offshore drilling, cuttings piles are not expected to be a feature of activities within the Channel Blocks.

OSPAR (2009) concluded that the discharge of water-based muds and drill cuttings 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

[23] 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.

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).

4.2.5 Introduction or spread of non-indigenous species

Through the transport and discharge of vessel ballast waters (and associated sediment), and to a lesser extent fouling organisms on vessel/rig hulls, non-native species may be introduced to the marine environment. Should these introduced species survive and form established breeding populations, they can result in negative effects on the environment. These include: displacing native species by preying on them or out-competing them for resources; irreversible genetic pollution through hybridisation with native species, and increased occurrence of harmful algal blooms (as reviewed in Nentwig 2006). The economic repercussions of these ecological effects can also be significant (see IPIECA & OGP 2010, Lush *et al*. 2015, Nentwig 2007). In response to these risks, a number of technical measures have been proposed such as the use of ultraviolet radiation to treat ballast water or procedural measures such as a mid-ocean exchange of ballast water (the most common mitigation against introductions of non-native species). 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 entered into force in 2017[24]. The Convention includes Regulations with specified technical standards and requirements (IMO Globallast website[25]). 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 (e.g. rigs may move between the Irish Sea and North Sea), and the risk from hull fouling is low, given the geographical working region and scraping of hulls for regular inspection.

[24] http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-(BWM).aspx
[25] http://archive.iwlearn.net/globallast.imo.org/the-bwmc-and-its-guidelines/index.html

4.2.6 Visual disturbance and above water noise

Blocks may support important numbers of birds at certain times of the year including overwintering birds and those foraging from coastal SPAs. Therefore, the presence and/or movement of vessels and aircraft from and within Blocks during exploration and appraisal activities could temporarily disturb birds from relevant SPA sites. In areas where helicopter transits are regular, a degree of habituation to disturbance amongst some birds has been reported (see Smit & Visser 1993). Established helicopter routes are not present due to the low level of hydrocarbon activity in the Channel, however the anticipated level of helicopter traffic associated with Block activity (2-3 trips per week, see Table 2.2) is likely to be insignificant in the context of other existing activity in the area.

Physical disturbance of seaduck and other waterbird flocks by vessel and aircraft traffic associated with hydrocarbon exploration and appraisal is possible, particularly in SPAs established for shy species (e.g. common scoter). Such disturbance can result in repeated disruption of bird feeding, loafing and roosting. For example, large flocks of common scoter were observed being put to flight at a distance of 2km from a 35m vessel, though smaller flocks were less sensitive and put to flight at a distance of 1km (Kaiser 2002, also see Schwemmer *et al.* 2011). Larger vessels would be expected to have an even greater disturbance distance (Kaiser *et al.* 2006). Mendel *et al.* (2019) further note behavioural response in red-throated diver within 5km of ships. With respect to the disturbance and subsequent displacement of seabirds in relation to offshore wind farm (OWF) developments, the Joint SNCB interim displacement advice[26] recommends for most species a standard displacement buffer of 2km with the exception of the species groups of divers and sea ducks. Divers and sea ducks have been assessed as being the most sensitive species groups to offshore development and associated boat and helicopter traffic. Therefore, for divers and sea ducks a 4km displacement buffer is recommended. Whilst displacement effects for divers have been detected at greater distances (e.g. 5-7km, Webb 2016; significant changes noted at 10-16.5km, Mendel *et al.* 2019), this relates to the construction and operation of offshore wind farms which have a much larger spatial and temporal footprint than oil and gas exploration activities.

4.2.7 Introduction of light

A significant number of bird species migrate across the English Channel region twice a year or use the area for feeding, resting or overwintering. Some species crossing or using the area may become attracted to offshore light sources, especially in poor weather conditions with restricted visibility (e.g. low clouds, mist, drizzle, Wiese *et al*. 2001), and this attraction can potentially result in mortality through collision (OSPAR 2015). As part of navigation and worker safety, and in accordance with international requirements, drilling rigs and associated vessels are lit at night and the lights will be visible at distance (some 10-12nm in good visibility). Guidelines (applicable to both existing and new offshore installations) aimed at reducing the impact of offshore installations lighting on birds in the OSPAR maritime area are available (OSPAR 2015). Exploration drilling activities are temporary so a drilling rig will be present at a

[26] http://jncc.defra.gov.uk/pdf/Joint_SNCB_Interim_Displacement_AdviceNote_2017.pdf

location for a relatively short period (e.g. up to 10 weeks), limiting the potential for significant interaction with migratory bird populations. Given the seasonal nature of the sensitivity, where relevant it is more appropriate to consider this in project level assessment (e.g. EIA and HRA where necessary), when the location and timing of activities are known.

4.3 Underwater noise effects

The current level of understanding of sources, measurement, propagation, ecological effects and potential mitigation of underwater noise associated with hydrocarbon exploration and production have been extensively reviewed, assessed and updated in each of the successive offshore energy SEAs (see DECC 2009, 2011, 2016). The following description of noise sources and potential effects builds on these previous publications, augmented with more recent literature sources.

4.3.1 Noise sources and propagation

Of those oil and gas activities that generate underwater sound, deep geological seismic survey (2D and 3D) is of primary concern due to the high amplitude, low frequency and impulsive nature of the sound generated over a relatively wide area. Typical 2D and 3D seismic surveys consist of a vessel towing a large airgun array, made up of sub-arrays or single strings of multiple airguns, along with towed hydrophone streamers. Total energy source volumes vary between surveys, most commonly between 1,000 and 8,000 inches^3, with typical broadband source levels of 248-259 dB re 1µPa (OGP 2011). Most of the energy produced by airguns is low frequency: below 200Hz and typically peaking around 100Hz; source levels at higher frequencies are low relative to that at the peak frequency but are still loud in absolute terms and relative to background levels. As detailed in Section 2.2.2, none of the work programmes relating to the English Channel Blocks applied for in the 31st Round include the intention to conduct a 3D seismic survey.

In addition to seismic surveys, relevant sources of impulsive sound are restricted to the smaller volume air-guns and sub-bottom profilers used in site surveys and well evaluation (i.e. Vertical Seismic Profiling, VSP), and also from occasional pile-driving of conductors during drilling. Compared to deep geological survey, these smaller volume sources tend to generate sound of lower amplitude, are typically complete within several hours on a single day, are conducted from either a fixed point (VSP) or cover a small area (site surveys) and, in the case of some sub-bottom profilers, operate at a higher frequency than air guns[27]. Consequently, the overall magnitude and area of risk from sound effects is considerably smaller than in the case of deep geological seismic surveys.

[27] It should be noted that airgun (including VSP) and sub-bottom profiling site surveys undertaken in relation to licences issued under the *Petroleum Act 1998* require consent under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended), but side-scan sonar and multibeam echosounder surveys only require to be notified to the Regulator (JNCC 2017).

Drilling operations and support vessel traffic are sources of continuous noise (non-impulsive), of a comparable amplitude, dominated by low frequencies and of a lower amplitude than deep geological seismic survey. Sound pressure levels of between 120dB re 1µPa in the frequency range 2-1,400Hz (Todd & White 2012) are probably typical of drilling from a jack-up rig, with slightly higher source levels likely from semi-submersible rigs due to greater rig surface area contact with the water column. In general, support and supply vessels (50-100m) are expected to have broadband source levels in the range 165-180dB re 1µPa@1m, with the majority of energy below 1kHz (OSPAR 2009). Additionally, the use of thrusters for dynamic positioning has been reported to result in increased sound generation (>10dB) when compared to the same vessel in transit (Rutenko & Ushchipovskii 2015).

For all sources, there is now a reasonable body of evidence to quantify sound levels associated with these activities and to understand the likely propagation of these sounds within the marine environment, even in more complex coastal locations (DECC 2016).

4.3.2 Potential ecological effects

Potential effects of anthropogenic noise on receptor organisms range widely, from masking of biological communication and small behavioural reactions, to chronic disturbance, physiological injury and mortality. While generally the severity of effects tends to increase with increasing exposure to noise, it is important to draw a distinction between effects from physical (including auditory) injury and those from behavioural disturbance. In addition to direct effects, indirect effects may also occur, for example via effects on prey species, complicating the overall assessment of significant effects. Marine mammals, and in particular the harbour porpoise, are regarded as particularly sensitive to underwater noise effects therefore it is considered appropriate to focus on marine mammals when assessing risk from underwater noise; however, high amplitude impulsive noise also potentially presents a risk to fish and diving birds. Within the English Channel region there are no relevant sites with marine mammal qualifying features, therefore the section below is focussed on fish and diving birds.

Fish

Many species of fish are highly sensitive to sound and vibration and broadly applicable sound exposure criteria have recently been published (Popper *et al.* 2014). Studies investigating fish mortality and organ damage from noise generated during seismic surveys are very limited and results are highly variable, from no effect to long-term auditory damage (reviewed in Popper *et al.* 2014). Behavioural responses and effects on fishing success ("catchability") have been reported following seismic surveys (Pearson *et al.* 1992, Skalski *et al.* 1992, Engås *et al.* 1996, Wardle *et al*. 2001). Potential effects on migratory diadromous fish is an area of significant interest for which empirical evidence is still limited, especially as salmonids and eels are sensitive to particle motion (not sound pressure) (Gill & Bartlett 2010). Atlantic salmon *Salmo salar* have been shown through physiological studies to respond to low frequency sounds (below 380Hz), with best hearing at 160Hz (threshold 95 dB re 1 µPa). More recently, Harding *et al.* (2016) note a lower sensitivity at 100Hz than previously reported (Hawkins & Johnstone 1978), and greater sensitivity at frequencies of >200Hz, with evidence of some response at 400-800Hz. However, the authors qualify their results with differences in methodological approach, and the use of fish maintained in tanks receiving low frequency ambient sound

within the greatest range of sensitivity (<300Hz) for some time in advance of the experiments taking place. The ability of salmon to respond to sound pressure is regarded as relatively poor with a narrow frequency span, a limited ability to discriminate between sounds, and a low overall sensitivity relative to other fish species (Hawkins & Johnstone 1978, cited by Gill & Bartlett 2010, Harding *et al.* 2016).

In addition to considering direct effects on fish as qualifying features of Natura 2000 sites, fish also form important prey items of seabird, marine mammal and fish qualifying features. Fish species of known importance to both diving seabirds and marine mammals in the North Sea include sandeels, pelagic species such as herring and sprat, and young gadoids. Sandeels lack a swim bladder, which is considered to be responsible for their observed low sensitivity to underwater noise (Suga *et al*. 2005) and minor, short-term responses to exposure to seismic survey noise (Hassel *et al*. 2004), although data are limited. By contrast, herring are considered hearing specialists, detecting a broader frequency range than many species. Sprat are assumed to have similar sensitivities to herring due to their comparable morphology, although studies on this species are lacking. Observed responses of herring to underwater noise vary. For example, Peña *et al*. (2013) did not observe any changes in swimming speed, direction, or school size as a 3D seismic vessel slowly approached schools of feeding herring from a distance of 27km to 2km; conversely, Slotte *et al*. (2004) observed herring and other mesopelagic fish to be distributed at greater depth during periods of seismic shooting than non-shooting, and a reduced density within the survey area. Evidence for and against avoidance of approaching vessels by herring has been reported (e.g. Skaret *et al*. 2005, Vabø *et al*. 2002), with the nature of responses believed to be related to the activity of the school at the time.

Following a review of relevant studies, MMS (2004) consider that the “consensus is that seismic airgun shooting can result in reduced trawl and longline catch of several species when the animals receive levels as low as 160dB”. These reduced catches are temporary in nature and likely reflect temporary displacement and/or altered feeding behaviour. No associations of lower-intensity, continuous drilling noise and fishing success have been demonstrated, and large numbers of fish are typically observed around producing installations in the North Sea (e.g. Løkkeborg *et al*. 2002, Fujii 2015) and elsewhere (e.g. Stanley & Wilson 1991).

Diving birds

Direct effects from seismic exploration noise on diving birds could potentially occur through physical damage, or through disturbance of normal behaviour, although evidence for such effects is very limited. Deeper-diving species which spend longer periods of time underwater (e.g. auks) may be most at risk of exposure to high-intensity noise from seismic survey and consequent injury or disturbance, but all species which routinely submerge in pursuit of prey and benthic feeding opportunities (i.e. excluding shallow plunge feeders) may be exposed to anthropogenic noise. A full list of relevant species occurring in the UK is provided in Box 4.1, all of which are qualifying species of one or more relevant sites considered in this HRA (see Appendix A).

Very high amplitude low frequency underwater noise may result in acute trauma to diving seabirds, with several studies reporting mortality of diving birds in close proximity (i.e. tens of

metres) to underwater explosions (Yelverton *et al*. 1973, Cooper 1982, Stemp 1985, Danil & St Leger 2011). However, mortality of seabirds has not been observed during extensive seismic operations in the North Sea and elsewhere. While seabird responses to approaching vessels are highly variable, flushing disturbance would be expected to displace most diving seabirds from close proximity to seismic airgun arrays, particularly among species more sensitive to visual disturbance such as scoter, divers and cormorant (Garthe & Hüppop 2004). Therefore, the potential for acute trauma to diving birds from seismic survey is considered to be very low.

Data relating to the potential behavioural disturbance of diving birds due to underwater noise are very limited. The reported in-air hearing sensitivity for a range of diving duck species, red-throated diver and gannet have been tested for tone bursts between frequencies of 0.5-5.7kHz; results revealed a common region of greatest sensitivity from 1-3kHz, with a sharp reduction in sensitivity >4kHz (Crowell e*t al.* 2015). Similar results were observed for African penguin; tests of in-air hearing showed a region of best sensitivity of 0.6-4kHz, consistent with the vocalisations of this species (Wever *et al*. 1969). Testing on the long-tailed duck underwater showed reliable responses to high intensity stimuli (> 117 dB re 1µPa) from 0.5-2.9kHz (Crowell 2014). An underwater hearing threshold for cormorant of 70-75 dB re 1µPa rms for tones at tested frequencies of 1-4kHz has been suggested (Hansen *et al*. 2017). The authors argue that this underwater hearing sensitivity, which is broadly comparable to that of seals and small odontocetes at 1-4kHz, is suggestive of the use of auditory cues for foraging and/or orientation and that cormorant, and possibly other species which perform long dives, are sensitive to underwater sound. The use of acoustic pingers mounted on the corkline of a gillnet in a salmon fishery, emitting regular impulses of sound at *ca.* 2kHz, was associated with a significant reduction in entanglements of guillemot, but not rhinoceros auklet (Melvin *et al*. 1999). In a playback experiment on wild African penguins, birds showed strong avoidance behaviour (interpreted as an antipredator response) when exposed to killer whale vocalisations and sweep frequency pulses, both focussed between 0.5-3kHz (Frost *et al*. 1975).

McCauley (1994) inferred from vocalisation ranges that the threshold of perception for low frequency seismic noise in some species (e.g. penguins, considered as a possible proxy for auk species) would be high, hence individuals might be adversely affected only in close proximity to the source. A study investigated seabird abundance in Hudson Strait (Atlantic seaboard of Canada) during seismic surveys over three years (Stemp 1985). Comparing periods of shooting and non-shooting, no significant difference was observed in abundance of fulmar, kittiwake and thick-billed murre (Brünnich's guillemot). More recently, Pichegru *et al*. (2017) used telemetry data from breeding African penguins to document a shift in foraging distribution concurrent with a 2D seismic survey off South Africa. Pre/post shooting, areas of highest use (indicated by the 50% kernel density distribution) bordered the closest boundary of the seismic survey; during shooting, their distribution shifted away from the survey area, with areas of higher use at least 15km distant to the closest survey line. However, insufficient information was provided on the spatio-temporal distribution of seismic shooting or penguin distribution to determine an accurate displacement distance. It was reported that penguins quickly reverted to normal foraging behaviour after cessation of seismic activities, suggesting a relatively short-term influence of seismic activity on these birds' behaviour and/or that of their prey (Pichegru *et al*. 2017).

These data are limited, but the observed regions of greatest hearing sensitivity for cormorants in water and other diving birds in air are above those low frequencies (i.e. <500Hz) which dominate and propagate most widely from geological survey. While there is some evidence of noise-induced changes in the distribution and behaviour of diving birds in response to impulsive underwater noise, these have been temporary and may be a direct disturbance or reflect a change in prey distribution during that period (possibly as a result of seismic activities).

Box 4.1: Migratory and/or Annex I diving bird species occurring in the UK considered potentially vulnerable to underwater noise effects

Divers and grebes	**Diving ducks**
Great northern diver *Gavia immer* Red-throated diver *Gavia stellata* Black-throated diver *Gavia arctica* Little grebe *Tachybaptus ruficollis* Great crested grebe *Podiceps cristatus* Slavonian grebe *Podiceps auritus* **Seabirds** Manx shearwater *Puffinus puffinus* Gannet *Morus bassanus* **Cormorant *Phalacrocorax carbo carbo*** Shag *Phalacrocorax aristotelis* Guillemot *Uria aalge* Razorbill *Alca torda* Puffin *Fratercula arctica*	**Pochard *Aythya ferina*** Tufted duck *Aythya fuligula* Scaup *Aythya marila* Eider *Somateria mollissima* Long-tailed duck *Clangula hyemalis* Common scoter *Melanitta nigra* Velvet scoter *Melanitta fusca* **Goldeneye *Bucephala clangula*** **Red-breasted merganser *Mergus serrator*** Goosander *Mergus merganser*

*Note: Includes species which are known to engage in pursuit diving or benthic feeding in marine, coastal and estuarine waters at least during part of the year. Species in **bold** are those of relevance to the sites and Blocks considered within this AA.*

5 Assessment

The screening process (BEIS 2018a) identified a number of sites in the English Channel where there was the potential for likely significant effects associated with proposed activities that could follow licensing of Blocks offered in the 31st Round. The further assessment of nine sites in relation to two Blocks applied for in the English Channel is given below. This assessment has been informed by the evidence base on the environmental effects of relevant oil and gas activities (Section 4) and the assumed nature and scale of potential activities (Table 2.2).

5.1 Relevant sites

A description of each of the relevant sites is provided below based on the site citation and site selection information which has been augmented by additional information from grey and primary sources relevant to site qualifying features, which are cited throughout. The assessment of these sites in relation to the 31st Round English Channel Blocks is documented in Sections 5.2-5.4.

Poole Harbour SPA

Poole Harbour SPA is a large natural harbour comprising; subtidal channels, extensive tidal sandflats, mudflats and saltmarshes, with associated reedbeds, freshwater marshes and wet grassland. With a narrow entrance and a small tidal range, it has many of the qualities of a large lagoon (Humphreys & May 2005 cited by Natural England 2016a). The north side is largely urbanised while the west and south side abut heath, mire or grassland. Extensive intertidal mudflats provide an important feeding habitat for overwintering waterbirds while the fringing saltmarshes and reedbeds provide roosting areas and a feeding habitat for a variety of bird species. Saltmarsh islands in the north west of the harbour are the main nesting sites for Mediterranean gull (64 pairs in 2015) which nest within the large colony of black-headed gulls, (Natural England 2016a). During the breeding season, Mediterranean gull increase their dependency upon freshwater habitats (Pickess 2007, cited by NE conservation advice[28]). The sheltered muddy shores also provide a food resource for aggregations of non-breeding waterbirds. In addition, the areas of open water are essential for fish-eating species to feed and rest, e.g. goldeneye, red-breasted merganser and cormorant, which are components of the waterbird assemblage (assemblage total of 25,176 birds, 5 year peak mean 2009/10-2013/14). Several breeding tern species, primarily common (178 pairs, 5-year mean, 2010-2014) and Sandwich (181 pairs, 5-year mean, 2010-2014) terns use the waters around their colonies on Brownsea Island in significant densities (Natural England 2016b). The seaward boundary of the site was modified in November 2017 to include all marine habitats within the

28 https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9010111&SiteName=poole%20harbour&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

harbour entrance which includes these tern foraging areas. However, both species of tern also forage extensively in the open sea outside the harbour entrance (Aspinall & Tasker 1990) and these are protected through the Solent and Dorset Coast pSPA. The Poole Harbour Site Improvement Plan[29] indicates that one of the main threats to the site is water pollution with nutrient enrichment having resulted in extensive algal mats across the mudflats with potential consequential impacts on bird prey availability and bird foraging behaviour.

Solent and Southampton Water SPA

The Solent and Southampton Water SPA lies between the Isle of Wight and the mainland, and stretches from Hurst Spit to Hill Head across Hampshire, and on the north coast of the Isle of Wight from Yarmouth to Whitecliff Bay[30]. The Solent and its inlets have an unusual tidal regime, including double tides and long periods of tidal stand at high and low tide[31]. The site comprises a series of estuaries and harbours with extensive mud-flats and saltmarshes with adjacent coastal habitats including saline lagoons, shingle beaches, reedbeds, damp woodland and grazing marsh. The mud-flats support seagrass beds and have a rich invertebrate fauna that forms the food resource for the estuarine birds. In summer, the site is of importance for breeding seabirds, including gulls and four species of terns (common, little, roseate and Sandwich), with important tern breeding areas at Hurst Point to Pitts Deep, and the North Solent and foraging areas including Hurst and Lymington, Brading Marshes, Cowes, and Medina estuary[32]. Terns also forage in marine areas outside of the site and these are covered by the Solent and Dorset Coast pSPA. In winter, the SPA holds a large and diverse assemblage of 43,987 waterbirds (5-year peak mean 2009/10 - 2013/14), including geese, ducks and waders. Relevant threats identified by the Site Improvement Plan for the Solent[33] which includes this SPA, include disturbance of birds by aircraft, water pollution and the introduction of invasive non-native species through shipping.

Solent and Dorset Coast pSPA

Solent and Dorset Coast pSPA is proposed to protect important foraging areas at sea used by three species of tern (common, Sandwich and little) which are qualifying interest features from colonies within adjacent, already classified SPAs. These SPAs are: Poole Harbour (common and Sandwich terns), Solent and Southampton Water SPA (common, Sandwich and little terns) and Chichester & Langstone Harbours SPA (common, Sandwich and little terns).

The process by which important marine areas for the tern species were identified is described in the departmental brief for the site and based on information generated from a programme of surveys of tern sites in the UK (Natural England 2016c). For relevant sites with little tern as a qualifying feature, the alongshore foraging extent was a generic value derived from all of the surveys i.e. 3.9km. The seaward foraging extent was also a generic value of 2.2km. For the

[29] http://publications.naturalengland.org.uk/file/5692032358023168
[30] http://jncc.defra.gov.uk/default.aspx?page=2037
[31] http://publications.naturalengland.org.uk/file/5064469629632512
[32] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9011061&SiteName=solent&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=#backgroundinfo
[33] http://publications.naturalengland.org.uk/file/5319610920337408

larger tern species which have a greater foraging range, habitat association models of tern usage were used to predict species specific tern usage patterns around the breeding colony SPAs based on a number of predictor variables: i) distance to colony, ii) distance to shore, and iii) bathymetry. These models were informed by the JNCC programme of boat-based visual tracking of foraging birds from UK sites.

The seaward and alongshore extent of the Solent and Dorset Coast pSPA was determined wholly by the modelled foraging distributions of Sandwich terns; from west to east by the distributions of birds originating from: Poole Harbour SPA (colony at Brownsea Island), Solent and Southampton Water SPA (colony at Pitts-Deep-Hurst) and Chichester & Langstone Harbours SPA. The same generic model of Sandwich tern usage was used to generate relative density maps around each of these colonies. The boundaries to the areas predicted to support most of the foraging activity by little terns from colonies within the Solent and Southampton Water SPA, and Chichester & Langstone Harbours SPA are contained entirely within the composite boundary of the pSPA, as are the areas predicted to support most of the foraging activity by common terns from colonies within the Chichester & Langstone Harbours SPA, the Solent and Southampton Water SPA and Poole Harbour SPA. For both Sandwich and common terns from the relevant sites, very substantial areas of sea within the wider area (outside of the pSPA), defined by the mean maximum foraging range of the species (e.g. Thaxter *et al.* 2012) were predicted to have very little or no usage by foraging terns.

Chichester & Langstone Harbours SPA

Chichester and Langstone Harbours SPA covers two large, sheltered estuarine basins. Urban development surrounds the west of Langstone Harbour, whereas farmland surrounds the majority of Chichester Harbour. Both Chichester and Langstone Harbours contain extensive intertidal mudflats and sandflats with areas of seagrass beds, saltmarsh, shallow coastal waters, coastal lagoons, coastal grazing marsh and shingle ridges and islands. These habitats support internationally and nationally important numbers of overwintering and breeding bird species. The overwintering waterbird assemblage of 72,666 birds (5-year peak mean 2009/10-2013/14) includes bar-tailed godwit, curlew, dark-bellied brent geese, dunlin, grey plover, pintail, red-breasted merganser, redshank, ringed plover, sanderling, shelduck, shoveler, teal, turnstone and wigeon[34].

At low tide the mudflats are exposed, the water is drained by channels and creeks which meet to form narrow exits into the Solent. The sediments support rich populations of intertidal invertebrates, which provide an important food source for overwintering birds. Several small freshwater streams flow into the harbours; however, these contribute relatively little freshwater input compared to the tidal flows. There are more than 300ha of seagrass beds in the SPA which are an important food source for dark-bellied brent geese (Marsden & Chesworth 2014 cited by NE conservation advice). Overwintering birds also feed and roost in the saltmarsh areas, which are dominated by cordgrass (*Spartina*) swards, as well as on coastal grazing

[34] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9011011&SiteName=chiches&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=#SiteInfo

marsh. The shingle ridges and islands within the site provide important nesting habitat for three species of tern (common, little and sandwich tern) during the summer breeding season. Adult terns use the shallow coastal waters in the harbours and the wider Solent to forage for small fish to feed themselves and their chicks (where they fall within the Solent and Dorset Coast pSPA summarised above).

River Avon SAC

The River Avon and its tributaries (Nadder, Wylye, and Bourne) flow through narrow chalk valleys to converge at Salisbury, thence over a wide floodplain to Christchurch, Dorset. The river supports over 180 species of plants including water crowfoot and starworts (related to the water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation qualifying feature), which in turn support a rich invertebrate community including mayfly and snails, and fish and bird species. Fish qualifying features of the SAC are sea lamprey, brook lamprey, Atlantic salmon and bullhead. The fish species of most relevance are sea lamprey and Atlantic salmon, as they are migratory spending part of their life cycle in the marine environment. Historical management of the river, including realignment, straightening and deepening, has led to habitat loss, and nutrient enrichment continues to be a problem for the site. These issues are being addressed through the River Avon and Valley Site Improvement Plan, with targets for water quality and flows made through common standards monitoring guidance and the implementation of the Water Framework Directive.

Solent and Isle of Wight Lagoons SAC

The site contains percolation (those at Bembridge Harbour), isolated (those in the Keyhaven to Lymington area and Farlington Marshes in Langstone Harbour) and sluiced (at Gilkicker, near Gosport) lagoons with a range of salinities and substrates. The lagoons have a diverse fauna and include the foxtail stonewort *Lamprothamnium papulosum,* lagoon sand shrimp *Gammarus insensibilis* and starlet sea anemone *Nematostella vectensis*.

Solent Maritime SAC

The site includes four coastal plain estuaries (Yar, Medina, King's Quay Shore, Hamble) and four bar-built estuaries (Newtown Harbour, Beaulieu, Langstone Harbour, Chichester Harbour), with a tidal regime unique in the UK, of four tides a day and long periods of tidal stand at high and low tide. Habitats include estuarine flats often with intertidal areas supporting *Zostera* spp., green algae and sand and shingle spits. The mudflat salinity varies from low to variable in the estuary upper reaches to the more sheltered and almost fully marine muds of Chichester and Langstone Harbours. The site also includes a number of coastal lagoons, sand dunes at East Head and a population of Desmoulin's whorl snail *Vertigo moulinsiana*.

Solent Maritime is the only UK site designated for smooth cord-grass *Spartina alterniflora* and is one of only two with significant amounts of small cord-grass *S. maritima*. Townsend's cord-grass *S. x townsendii* and common cord-grass *S. anglica* are also present. The Solent contains the second-largest aggregation of Atlantic salt meadows in south and south-west England. There are a large number of separate ungrazed saltmarsh areas, with communities dominated by sea-purslane *Atriplex portulacoides*, common sea-lavender *Limonium vulgare* and thrift *Armeria maritima*, and which show rare and unusual transitions to freshwater

reedswamp alluvial woodland and coastal grassland. Additionally, more typical Atlantic salt meadow communities remain widespread.

South Wight Maritime SAC

The subtidal chalk reefs to the west and south-west of the Isle of Wight represent over 5% of Europe's coastal chalk exposures, including the extensive tide-swept reef off the Needles and examples at Culver Cliff and Freshwater Bay. Other reef habitats within the site include areas of large boulders off the coast around Ventnor, and a large reef of limestone off Bembridge and Whitecliff Bay where the horizontal and vertical faces and crevices provide a range of habitats. The bedrock is extensively bored by bivalves (e.g. *Pholas dactylus, Barnea candida, Hiatella arctica*), the presence of which provides shelter and enhances habitat diversity. The chalk provides a sufficiently stable substratum for long-lived, slow growing species of axinellid sponge and soft corals, while the softer Wealden sandstone is easily eroded and is colonised by rapidly growing and relatively short-lived species such as encrusting sponges and bryozoans. At Bembridge, and elsewhere in the site, littoral pools support a number of rare or unusual seaweeds such as the shepherd's purse seaweed *Gracilaria bursa-pastoris*.

The cliffs to the south of the Isle of Wight contain contrasting Cretaceous hard cliffs, semi-stable soft cliffs and mobile soft cliffs. The western and eastern extents of the site contain exposed chalk cliffs with relatively sheltered species rich calcareous grassland. In combination with the adjoining Isle of Wight Downs, the west of the site has an unusual combination of maritime and chalk grassland, and the most exposed cliffs contain assemblages of nationally rare lichens such as *Fulgensia fulgens*. The longest section of cliffs comprises slumping acidic sandstones and neutral clays with mixed acidic and mesotrophic grasslands with some scrub and thrift *Armeria maritima*. Having minimal sea defence works, the area forms one of the longest sections of naturally-developing soft cliffs in the UK. The calcareous geology of the South Wight Maritime SAC and exposure to wave energy, has resulted in the formation of a number of sea caves from the Needles to Watcombe Bay, and also in Culver Cliff. Rare algal species, and a range of mollusc species and the horseshoe worm *Phoronis hippocrepia* are present in the sea cave habitats.

Studland to Portland SAC

The site comprises a mosaic of two areas containing Annex I reef habitat, Studland Bay to Ringstead Bay Reefs and Portland Reefs. The former exhibits much geological variety ranging from exposed chalk east of Ringstead Bay to shales and clays, limestone and cementstone ledges, and boulders around Kimmeridge to Durlston, with chalk present again to the east between Ballard cliffs and Handfast point (Natural England 2012).

The reefs from St Albans Head to Lulworth Cove are characterised by flat bedrock with inshore areas of boulders and gravel. The bryozoan ross coral *Pentapora fascialis* is recorded extensively along with sponges, including *Axinella* sp, other bryozoans (*Flustra foliacea* dominant), deadmans fingers *Alcyonium digitatum*, hydroids and tunicates (including large patches of *Stolonica socialis*). Colonies of the pink sea fan *Eunicella verrucosa* are also recorded in this area.

A series of limestone ledges (up to 15m across) protrude from shelly gravel at Worbarrow Bay. The smooth and gently sloping upper surface supports a rich sponge and sea fan community. The broken reef edge includes encrusting sponges *Pachymatisma johnstonia*, hydroids and clusters of the trumpet anemone *Aiptasia mutabilis.* The shoreward edge of the reefs grade into shelly sand with scallops and occasional small rocks or artillery shells covered in a bryozoan/hydroid turf. Shale reefs extend from Kimmeridge and support high densities of the brittlestar *Ophiothrix fragilis*.

St Albans Ledge (reef) extends over 10km offshore and is subject to strong tidal action. The dominant biotopes found in this area are bryozoan and colonial ascidians on tide swept moderately wave exposed circalittoral rock. East of St Albans Ledge is an area of large limestone blocks known as the “seabed caves” dominated by red/brown algal turf, sponges (such as *Polymastia boletiformis*), *Bispira* fanworms, and Weymouth carpet coral *Hoplangia durotrix*.

Evans Rock is a gently sloping mound within the outer limits of Swanage Bay, with a diverse cover of sponges (*Esperiopsis fucorum, Hemimycale columella, Dysidea fragilis, Tethya aurantium*), hydroids (*Nemertesia* sp, *Plumularia setacea*, *Aglaophenia* sp.), bryozoans and tunicates (*Aplidium* sp., *Lissoclinum perforatum*). Other notable species include the fanworm *Bispira volutacornis,* cowrie *Trivia arctica,* the boring phase of the sponge *Cliona celata*, and a patch of the horseshoe worm, *Phoronis* sp.

The chalk bedrock occurring between Ballard Cliffs and Handfast Point is encrusted with red algae (*Calliblepharis ciliata* dominant), *Saccorhiza polyschides* and *Dictyota dichotoma*. Overhangs provide shelter for a variety of fauna including the sponges *D. fragilis, E. fucorum, Dercitus bucklandii* and *H. columella*, the fanworm *B. volutacornis*, deadmans fingers *A. digitatum*, crabs and squat lobsters (*Galathea* sp.).

Studland Bay contains a number of small shallow water reefs characterised by having a silty veneer and surrounded by a sandy seabed. The rocks are covered in a rich turf of brown and red algae (mostly *C. celata*), sponges, particularly *E. fucorum* and *H. columella*, hydroids, deadmans fingers *A. digitatum* and bryozoans (*Flustra* and *Bugula*) with the fanworm *B. volutacornis* frequently recorded in the crevices. The seabed near the reefs is covered in a dense layer of the slipper limpet, *Crepidula fornicata*.

The Portland Reefs are characterised by flat bedrock, limestone ledges (Portland stone), large boulders and cobbles. On the western side of Portland Bill, rugged limestone boulders provide deep gullies and overhangs. Mussel beds (*Mytilus edulis*) occur in very high densities on bedrock associated with strong currents to the southeast of Portland Bill.

5.2 Assessment of physical disturbance and drilling effects

5.2.1 Blocks and sites to be assessed

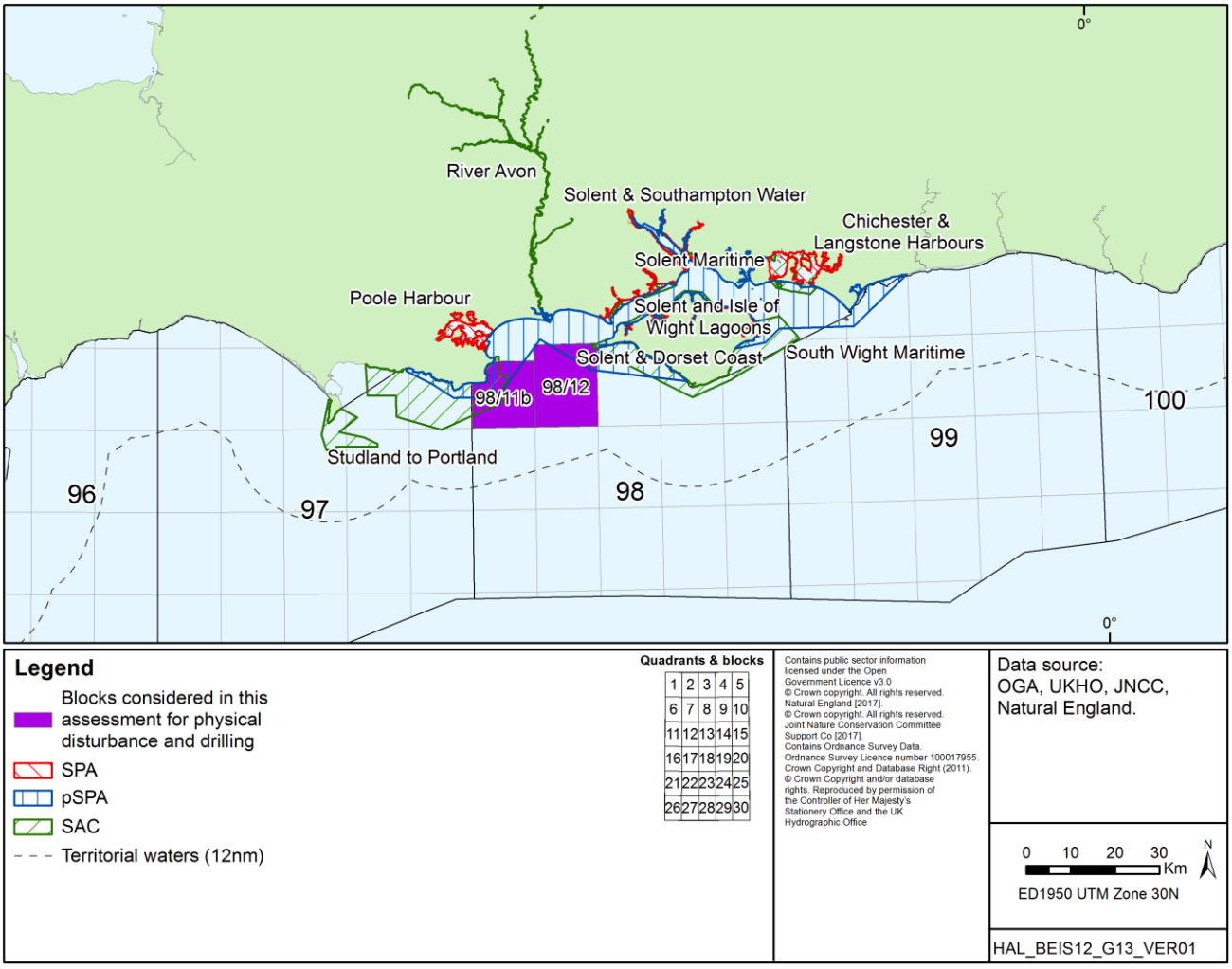
The nature and extent of potential physical disturbance and drilling effects are summarised in Section 4.2. On the basis of this information, in conjunction with the locations of the English Channel Blocks applied for in the 31st Round and sites with relevant qualifying features,

potential likely significant effects are considered to remain for two Blocks (or part Blocks), in respect of nine 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. Relevant pressures have been identified and assessed based on information presented in Section 4.2 including the nature of likely activities, the qualifying features likely to be impacted and conservation advice (from relevant site packages[35]). 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 in the English Channel to be subject to further assessment for physical disturbance and drilling effects



[35] https://www.gov.uk/government/publications/eastern-channel-marine-area-index-map-and-site-packages

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

Poole Harbour SPA
Site information
Area (ha): 4,158 **Relevant qualifying features**: Breeding Mediterranean gull, Sandwich tern and common tern; overwintering little egret, spoonbill, shelduck, avocet and black-tailed godwit; overwintering waterbird assemblage (including little egret, spoonbill, avocet, black-tailed godwit, dark-bellied brent goose, cormorant, curlew, dunlin, goldeneye, pochard, red-breasted merganser, redshank, greenshank, spotted redshank, shelduck, teal, black-headed gull). See Natura 2000 standard data form for details of qualifying features[36]. **Conservation objectives**: With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified, and subject to natural change; Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features, and, • The distribution of the qualifying features within the site. Attributes and related targets have been set for the site features which are presented in the site SACO[37]. These include a number of targets to restore the extent, distribution and availability of suitable habitats which support the breeding and overwintering qualifying features.
Relevant Blocks for physical disturbance and drilling effects
Direct: 98/11b, 98/12 **Indirect:** 98/11b, 98/12 due to proximity to Solent and Dorset Coast pSPA which has connectivity for breeding tern qualifying features.
Assessment of effects on site integrity
Potential effects on the breeding common and Sandwich tern qualifying features when foraging outside of the SPA within the Solent and Dorset Coast pSPA are considered against that site separately below. **Rig siting** (***Relevant pressures:*** *penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion; physical change (to another seabed type), introduction or spread of non-indigenous species).* Blocks 98/11b and 98/12 are 6 and 10km respectively from the site boundary and given the assumed distance from a jack-up rig within which effects may occur (500m, see Table 2.2), rig installation will not significantly impact the extent and distribution of the habitats of the qualifying features, and no adverse effects on site integrity are predicted. There may be a requirement for rig stabilisation depending on local seabed conditions. The relatively strong tidal currents over the Blocks and coarse nature of seabed sediments (circalittoral coarse[38]) would suggest that rig stabilisation will not be required. However, it is assumed that rock placement (if required) would be within a spatial footprint of 0.8km^2 (500m of a rig, Table 2.2). It should be noted that the advice on operations does not identify physical change (to another seabed type) as a relevant pressure. Given that the Blocks are at least 6km from the site boundary, the potential for loss of extent of any supporting habitat is limited. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the

[36] http://jncc.defra.gov.uk/pdf/SPA/uk9010111.pdf

[37] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9010111&SiteName=poole&SiteNameDisplay=Poole+Harbour+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

[38] https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/

assessment would be informed by specific rig siting information.

As noted in Section 4.2.3, management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
*(**Relevant pressures:** abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes – removal of substratum, contamination).*

It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.2). Therefore, drilling discharges will not significantly impact the extent and distribution or the structure and function of the habitats of the qualifying features for any Blocks identified as relevant as these are at least 6km from the site boundaries. In any case, the small scale and temporary nature of potential smothering, and mandatory control requirements with respect to drilling chemical use and discharge (Section 2.3.1), will ensure that site conservation objectives are not undermined and there is no adverse effect on site integrity.

Other effects
*(**Relevant pressures:** visual disturbance and above water noise).*

Blocks 98/11b and 98/12 are not located within the site and the potential for disturbance to impact the distribution of qualifying features is therefore primarily associated with the movement of supply vessels and helicopters to drilling rigs. Of the qualifying features likely to be present within the site, overwintering cormorant and goldeneye are highly sensitive to disturbance by ship and helicopter traffic with the breeding tern features of moderate sensitivity (Garthe & Hüppop 2004, Furness *et al.* 2013). Shipping densities over the Blocks are low (or no data)[39]. The temporary and localised nature of drilling activities and limited number of associated supply vessel and helicopter trips (see Table 2.2) are unlikely to represent a significant increase in disturbance of the qualifying features. Further control measures are also available (Section 5.2.3) and will be required, where appropriate, to ensure that site conservation objectives are not undermined and there is no adverse effect on site integrity.

In-combination effects
No intra-plan in-combination effects are likely with respect to the spatial footprints associated with rig siting and drilling discharges given that both Blocks are well outside of the site boundaries. Therefore, the likelihood of in-combination footprint effects is low. There is also the potential for in-combination effects associated with the presence and movement of supply vessels and rigs within each of the Blocks. However, drilling operations for the wells are unlikely to coincide either spatially or temporally to such an extent that the level of disturbance would lead to significant adverse impacts on the population or distribution of sensitive qualifying features. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

Solent and Southampton Water SPA

Site information

Area (ha): 5,401
Relevant qualifying features: Breeding Mediterranean gull, Sandwich tern, roseate tern, common tern and little tern; overwintering black-tailed godwit, dark-bellied brent goose, ringed plover and teal; overwintering waterbird assemblage (including dark-bellied brent goose, teal, ringed plover, black-tailed godwit). See Natura 2000 standard data form for details of qualifying features[40].

Conservation objectives:
With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified, and subject to natural change;
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

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

[39] https://www.ogauthority.co.uk/media/1419/29r_shipping_density_table.pdf, https://data.gov.uk/dataset/vessel-density-grid-2015
[40] http://jncc.defra.gov.uk/pdf/SPA/UK9011061.pdf

- The distribution of the qualifying features within the site.

Attributes and related targets have been set for the site features which are presented in the site SACO[41]. These include a number of targets to restore or maintain the extent, distribution and availability of suitable habitats which support the breeding and overwintering qualifying features.

Relevant Blocks for physical disturbance and drilling effects

Direct: 98/12
Indirect: 98/11b, 98/12 due to proximity to Solent and Dorset Coast pSPA which has connectivity for breeding tern qualifying features.

Assessment of effects on site integrity

Potential effects on the breeding tern qualifying features when foraging outside of the SPA within the Solent and Dorset Coast pSPA are considered against that site separately below.

Rig siting
*(**Relevant pressures:** penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion; physical change (to another seabed type), introduction or spread of non-indigenous species).*

Block 98/12 is at least 5km from the site boundary and given the assumed distance from a jack-up rig within which effects may occur (500m, see Table 2.2), rig installation will not significantly impact the extent and distribution of the habitats of the qualifying features, and no adverse effects on site integrity are predicted.

There may be a requirement for rig stabilisation depending on local seabed conditions. The relatively strong tidal currents over the Block and coarse nature of seabed sediments (circalittoral coarse[42]) would suggest that rig stabilisation will not be required. However, it is assumed that rock placement (if required) would be within a spatial footprint of 0.8km^2 (500m of a rig, Table 2.2). It should be noted that the advice on operations does not identify physical change (to another seabed type) as a relevant pressure. Given that the Block is at least 5km from the site boundary, the potential for loss of extent of any supporting habitat is limited. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by specific rig siting information.

Drilling discharges
*(**Relevant pressures:** abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes – removal of substratum, contamination).*

It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.2). Therefore, drilling discharges will not significantly impact the extent and distribution or the structure and function of the habitats of the qualifying features for any Blocks identified as relevant as these are at least 5km from the site boundaries. In any case, the small scale and temporary nature of potential smothering, and mandatory control requirements with respect to drilling chemical use and discharge (Section 2.3.1), will ensure that site conservation objectives are not undermined and there is no adverse effect on site integrity.

Other effects
*(**Relevant pressures:** visual disturbance and above water noise)*

Blocks 98/12 is not located within the site and the potential for disturbance to impact the distribution of qualifying features is therefore primarily associated with the movement of supply vessels and helicopters to drilling rigs. Of the qualifying features likely to be present within the site, the breeding tern qualifying features are moderately sensitive to disturbance by ship and helicopter traffic (Garthe & Hüppop 2004, Furness *et al.* 2013). Shipping densities over the Block are low[43]. The temporary and localised nature of drilling activities and limited number of

41 https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9011061&SiteName=solent&SiteNameDisplay=Solent+and+Southampton+Water+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

42 https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/

43 https://www.ogauthority.co.uk/media/1419/29r_shipping_density_table.pdf, https://data.gov.uk/dataset/vessel-density-grid-2015

associated supply vessel and helicopter trips (see Table 2.2) are unlikely to represent a significant increase in disturbance of the qualifying features. Further control measures are also available (Section 5.2.3) and will be required, where appropriate, to ensure that site conservation objectives are not undermined and there is no adverse effect on site integrity.

In-combination effects
No intra-plan in-combination effects are likely as only Block 98/12 has been screened in for physical disturbance and drilling effects. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

Solent and Dorset Coast pSPA

Site information

Area (ha): 87,532
Relevant qualifying features: Breeding sandwich tern, common tern and little tern

Conservation objectives:
With regard to the potential SPA and the individual species and/or assemblage of species for which the site has been classified, and subject to natural change;
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

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

Relevant Blocks for physical disturbance and drilling effects

Direct: 98/11b, 98/12
Indirect: None

Assessment of effects on site integrity

No advice on operations has been issued for the pSPA as yet. To inform the assessment, advice on operations from those adjacent SPA sites from which the breeding tern qualifying features originate has been reviewed.

Rig siting
(***Relevant pressures:*** *penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion; physical change (to another seabed type), introduction or spread of non-indigenous species).*

Blocks 98/11b and 98/12 partly overlap the southern boundary of the proposed site. The seaward boundary of the pSPA was determined by the modelled foraging distributions of Sandwich terns from Poole Harbour SPA (where overlaps with Block 98/11b) and Solent and Southampton Water SPA (where overlaps with 98/12) with terns from Chichester and Langstone Harbours SPA unlikely to be present in the area based on the modelled foraging distributions. Common terns from these two sites may also partly overlap with the Blocks although to a lesser extent than the Sandwich tern foraging distribution. The assumed distance from a jack-up rig within which effects may occur is small (0.8km^2, see Table 2.2) and given the tidal currents over the Blocks (0.5-1.5m/s spring peak flow[44]), recovery of any supporting habitats which are impacted is likely to be relatively rapid. Given that the pSPA encompasses the main areas of usage by the qualifying species and the relevant Blocks have significant areas outside of the site in which rig siting would be possible, the potential to impact the extent or distribution of supporting habitats is limited. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by the specific timing and location of the rig.

There may be a requirement for rig stabilisation depending on local seabed conditions. The relatively strong tidal currents over the Blocks and coarse nature of seabed sediments (circalittoral coarse[45]) would suggest that rig stabilisation will not be required. As above, the potential for interaction with habitats of the qualifying features (as defined by the site boundaries which encompass the main areas of usage of the features) is limited given that the

[44] https://www.renewables-atlas.info/explore-the-atlas/
[45] https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/

Blocks have significant areas outside the site where rig siting could occur. Also, in the event that a rig was located within the site, the potential loss of habitat is small (0.8km^2, see Table 2.2) compared to the extent of similar habitat types across the site and the wider region. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by specific rig siting information.

As noted in Section 4.2.3, management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
*(**Relevant pressures:** abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes – removal of substratum, contamination).*

Given that the site encompasses the main areas of usage by the qualifying species and that the relevant Blocks have significant areas outside of the site in which rig siting would be possible, the potential for interaction with respect to drilling discharges is limited. It is assumed that effects relating to drilling discharges occur within 500m of the well location (0.8km^2, see Table 2.2) and given the tidal currents over the Blocks (0.5-1.5m/s spring peak flow[46]), recovery of any supporting habitats which are impacted is likely to be relatively rapid. Given that the pSPA encompasses the main areas of usage by the qualifying species and the relevant Blocks have significant areas outside of the site in which rig siting would be possible, the potential to impact the extent or distribution of supporting habitats is limited. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by the specific timing and location of the rig.

Other effects
*(**Relevant pressures:** visual disturbance, above water noise)*

The qualifying features most relevant to the Blocks (common and Sandwich tern) are of moderate sensitivity to disturbance by ship and helicopter traffic (Garthe & Hüppop 2004, Furness *et al.* 2013). Given that the Blocks have significant areas outside of the site boundaries, the potential for visual disturbance or above water noise to impact the distribution of qualifying features within the site is primarily associated with the movement of supply vessels and helicopters to drilling rigs (that may be located outside of the site). Shipping densities over the Blocks are low (or no data)[47]. The temporary and localised nature of drilling activities and limited number of associated supply vessel and helicopter trips (see Table 2.2) are unlikely to represent a significant increase in disturbance of the moderately sensitive qualifying features. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity.

In-combination effects
No intra-plan in-combination effects are likely with respect to the spatial footprints associated with rig siting and drilling discharges given that the Blocks have significant areas outside of the site boundaries in which rig siting and drilling discharges would be possible. Therefore, the likelihood of in-combination footprint effects is low. There is the potential for in-combination effects associated with the presence and movement of supply vessels to rigs within each of the Blocks. However, given the low densities of existing vessel traffic, the limited and temporary vessel and helicopter traffic likely as part of Block activities (see Table 2.2) and the moderate sensitivity of the qualifying features, intra-plan effects are not considered likely for the Blocks. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

Chichester & Langstone Harbours SPA

Site information

Area (ha): 5,811
Relevant qualifying features: Breeding common tern, little tern, Sandwich tern; overwintering bar-tailed godwit, curlew, dark-bellied brent goose, dunlin, grey plover, pintail, red-breasted merganser, redshank, ringed plover, sanderling, shelduck, shoveler, teal, turnstone, wigeon; overwintering waterbird assemblage (including bar-tailed

[46] https://www.renewables-atlas.info/explore-the-atlas/
[47] https://www.ogauthority.co.uk/media/1419/29r_shipping_density_table.pdf, https://data.gov.uk/dataset/vessel-density-grid-2015

godwit, curlew, dark-bellied brent geese, dunlin, grey plover, pintail, red-breasted merganser, redshank, ringed plover, sanderling, shelduck, shoveler, teal, turnstone and wigeon). See Natura 2000 standard data form for details of qualifying features[48].

Conservation objectives:
With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified, and subject to natural change;
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

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

Attributes and related targets have been set for the site features which are presented in the site SACO[49]. These include a number of targets to restore or maintain the extent, distribution and availability of suitable habitats which support the breeding and overwintering qualifying features.

Relevant Blocks for physical disturbance and drilling effects

Direct: None
Indirect: 98/11b, 98/12 due to proximity to Solent and Dorset Coast pSPA which has connectivity for breeding tern qualifying features.

Assessment of effects on site integrity

Blocks 98/11b and 98/12 are at least 43km from the site boundary. Potential effects on the breeding tern qualifying features when foraging outside of the SPA within the Solent and Dorset Coast pSPA are considered against that site separately above.

River Avon SAC

Site information

Area (ha): 498.2
Relevant qualifying features: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, Desmoulin's whorl snail, sea lamprey, brook lamprey, Atlantic salmon, bullhead. See Natura 2000 standard data form for details of qualifying features[50].

Conservation objectives:
With regard to the SAC and the natural habitats and/or species for which the site has been designated, and subject to natural change;
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

Relevant Blocks for physical disturbance and drilling effects

98/12

Assessment of effects on site integrity

Rig siting

[48] http://jncc.defra.gov.uk/pdf/SPA/UK9011011.pdf
[49] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9011011&SiteName=chiches&SiteNameDisplay=Chichester+and+Langstone+Harbours+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=
[50] http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0013016.pdf

(***Relevant pressures:*** *penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion; physical change (to another seabed type), introduction or spread of non-indigenous species).*

The site does not contain any coastal or marine habitats so there is no pathway for direct physical disturbance effects to supporting habitats within the site from rig siting activities in the Block. The conditions experienced by salmon on their marine migration (through the saline transition zone, estuary, coastal waters and into the high seas) are critical to the well-being of populations within the river, and vice versa. Similarly, river and sea lamprey require safe passage through coastal waters and estuaries (Natural England 2018). Block 98/12 is at least 6km from the site and may contain supporting habitats during the migration of the qualifying feature to and from the site. The salmon and lamprey features are generally present in the site between April and September (Natural England 2018). Given the maximum spatial footprint of sub-surface abrasion/penetration pressure associated with jack-up rig siting is small (0.8km^2, see Table 2.2) and temporary, and the potentially supporting habitats within the Blocks are extensive across the region, the site conservation objectives will not be undermined and there will be no adverse effect on site integrity.

There may be a requirement for rig stabilisation depending on local seabed conditions. The relatively strong tidal currents over the Block and coarse nature of seabed sediments (circalittoral coarse[51]) would suggest that rig stabilisation will not be required. However, it is assumed that rock placement (if required) would be within a spatial footprint of 0.8km^2 (500m of a rig, Table 2.2). Given that the Block is at least 6km from the site boundary, the potential loss of extent of any supporting habitat would be small compared to the extent of the circalittoral coarse habitat across the Block and the wider region. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by specific rig siting information.

As noted in Section 4.2.3, management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(***Relevant pressures:*** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes – removal of substratum, contamination).*

The site does not contain any coastal or marine habitats so there is no pathway for direct physical disturbance effects to supporting habitats within the site from drilling discharges in the Block. As indicated above, the Block may contain supporting habitats during the migration of some of the qualifying features (Atlantic salmon, river and sea lamprey) to and from the site. It is assumed that effects relating to drilling discharges occur within 500m of the well location (0.8km^2, see Table 2.2) and given the tidal currents over the Block (0.5-1.5m/s spring peak flow[52]), recovery of any supporting habitats which are impacted is likely to be relatively rapid. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by the specific timing and location of the rig.

Other effects
None

In-combination effects
No intra-plan in-combination effects are likely as only Block 98/12 has been screened in for physical disturbance and drilling effects. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

Solent and Isle of Wight Lagoons SAC

Site information

Area (ha): 37.9
Relevant qualifying features: Coastal lagoons. See Natura 2000 standard data form for details of qualifying features[53].

[51] https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/
[52] https://www.renewables-atlas.info/explore-the-atlas/
[53] http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0017073.pdf

Conservation objectives:
With regard to the SAC and the natural habitats and/or species for which the site has been designated, and subject to natural change;
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats
- The structure and function (including typical species) of qualifying natural habitats, and
- The supporting processes on which qualifying natural habitats rely

Attributes and related targets have been set for the site feature which are presented in the site SACO[54]. These include a number of targets to maintain the total extent of the coastal lagoons and the presence and spatial distribution of coastal lagoon communities.

Relevant Blocks for physical disturbance and drilling effects

98/12

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; physical change (to another seabed type), introduction or spread of non-indigenous species).*

Block 98/12 is at least 8km from the site boundary and given the assumed distance from a jack-up rig within which effects may occur (500m, see Table 2.2), rig installation will not significantly impact the extent and distribution of qualifying natural habitats, and no adverse effects on site integrity are predicted.

There may be a requirement for rig stabilisation depending on local seabed conditions. The relatively strong tidal currents over the Block and coarse nature of seabed sediments (circalittoral coarse[55]) would suggest that rig stabilisation will not be required. However, it is assumed that rock placement (if required) would be within a spatial footprint of 0.8km^2 (500m of a rig, Table 2.2). It should be noted that the advice on operations does not identify physical change (to another seabed type) as a relevant pressure. Given that the Block is at least 8km from the site boundary, the potential for loss of extent of qualifying natural habitat is limited. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by specific rig siting information.

As noted in Section 4.2.3, management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(***Relevant pressures:*** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes – removal of substratum, contamination).*

It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.2). Therefore, drilling discharges will not significantly impact the extent and distribution or the structure and function of the qualifying natural habitats as Block 98/12 is at least 8km from the site boundaries. In any case, the small scale and temporary nature of potential smothering, and mandatory control requirements with respect to drilling chemical use and discharge (Section 2.3.1), will ensure that site conservation objectives are not undermined and there is no adverse effect on site integrity.

Other effects
None

In-combination effects

54 https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0017073&SiteName=solent&SiteNameDisplay=Solent+and+Isle+of+Wight+Lagoons+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

55 https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/

No intra-plan in-combination effects are likely as only Block 98/12 has been screened in for physical disturbance and drilling effects. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects

Solent Maritime SAC

Site information

Area (ha): 11,243.1
Relevant qualifying features: Annual vegetation of drift lines**,** Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**,** coastal lagoons, estuaries, mudflats and sandflats not covered by seawater at low tide, perennial vegetation of stony banks, *Salicornia* and other annuals colonising mud and sand, sandbanks which are slightly covered by sea water all the time, shifting dunes along the shoreline with *Ammophila arenaria* ("White dunes") *Spartina* swards (*Spartinion maritimae*), Desmoulin's whorl snail (*Vertigo moulinsiana*). See Natura 2000 standard data form for details of qualifying features[56].

Conservation objectives:
With regard to the SAC and the natural habitats and/or species for which the site has been designated, and subject to natural change;
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

Attributes and related targets have been set for the site feature which are presented in the site SACO[57]. These include a number of targets to maintain the total extent and spatial distribution of the qualifying features.

Relevant Blocks for physical disturbance and drilling effects

98/12

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; physical change (to another seabed type), introduction or spread of non-indigenous species).*

Block 98/12 is at least 5.5km from the site boundary and given the assumed distance from a jack-up rig within which effects may occur (500m, see Table 2.2), rig installation will not significantly impact the extent and distribution of qualifying natural habitats and the habitats of qualifying species, and no adverse effects on site integrity are predicted.

There may be a requirement for rig stabilisation depending on local seabed conditions. The relatively strong tidal currents over the Block and coarse nature of seabed sediments (circalittoral coarse[58]) would suggest that rig stabilisation will not be required. However, it is assumed that rock placement (if required) would be within a spatial footprint of 0.8km^2 (500m of a rig, Table 2.2). It should be noted that the advice on operations does not identify physical change (to another seabed type) as a relevant pressure. Given that the Block is at least 5.5km from the site boundary, the potential for loss of extent of qualifying natural habitat is limited. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by specific rig siting information.

As noted in Section 4.2.3, management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

[56] http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0030059.pdf
[57] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030059&SiteName=solent&SiteNameDisplay=Solent+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=
[58] https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/

Drilling discharges
*(**Relevant pressures:** abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes – removal of substratum, contamination).*

It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.2). Therefore, drilling discharges will not significantly impact the extent and distribution or the structure and function of the qualifying natural habitats as Block 98/12 is at least 5.5km from the site boundaries. In any case, the small scale and temporary nature of potential smothering, and mandatory control requirements with respect to drilling chemical use and discharge (Section 2.3.1), will ensure that site conservation objectives are not undermined and there is no adverse effect on site integrity.

Other effects
None

In-combination effects
No intra-plan in-combination effects are likely as only Block 98/12 has been screened in for physical disturbance and drilling effects. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

South Wight Maritime SAC

Site information

Area (ha): 19,866.1
Relevant qualifying features: Reefs, submerged or partially submerged sea caves, vegetated sea cliffs of the Atlantic and Baltic coasts. See Natura 2000 standard data form for details of qualifying features[59].

Conservation objectives:
With regard to the SAC and the natural habitats and/or species for which the site has been designated, and subject to natural change;
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

Attributes and related targets have been set for the site feature which are presented in the site SACO[60]. These include a number of targets to maintain the total extent, spatial distribution and types of reef (and each of its sub-features); and maintain the total extent and spatial distribution of all caves and individual dimensions of each cave across the site. Both targets subject to natural variation in sediment veneer.

Relevant Blocks for physical disturbance and drilling effects

98/12

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; physical change (to another seabed type), introduction or spread of non-indigenous species).*

Block 98/12 partly overlaps the site although seabed substrates are circalittoral rock and other hard substrata and therefore rig siting is unlikely in this area. Block 98/12 has significant areas outside of the site in which rig siting would be possible. The assumed distance from a jack-up rig within which effects may occur is small (500m, see Table 2.2) and temporary given the tidal currents over the Block (0.5-1.5m/s spring peak flow). Therefore, the

[59] http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0030061.pdf
[60] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030061&SiteName=solent&SiteNameDisplay=South+Wight+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

potential to impact the extent and distribution of qualifying natural habitats and habitats of qualifying species is limited, allowing the conclusion that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by the specific timing and location of the rig.

There may be a requirement for rig stabilisation depending on local seabed conditions. The relatively strong tidal currents over the Block and coarse nature of seabed sediments (circalittoral coarse[61]) would suggest that rig stabilisation will not be required. However, it is assumed that rock placement (if required) would be within a spatial footprint of 0.8km^2 (500m of a rig, Table 2.2). It should be noted that the advice on operations does not identify physical change (to another seabed type) as a relevant pressure. If located outside of the site, the potential for loss of extent of qualifying natural habitat is limited. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by specific rig siting information.

As noted in Section 4.2.3, management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges
(***Relevant pressures:*** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes – removal of substratum, contamination).*

Block 98/12 has significant areas outside of the site in which rig siting would be possible. It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.2) and these are likely to be temporary given the tidal currents over the Block (0.5-1.5m/s spring peak flow). Therefore, the potential for drilling discharges to impact the extent or distribution of the qualifying natural habitats is limited. In any case, the small scale and temporary nature of potential smothering, and mandatory control requirements with respect to drilling chemical use and discharge (Section 2.3.1), will ensure that site conservation objectives are not undermined and there is no adverse effect on site integrity.

Other effects
None

In-combination effects
No intra-plan in-combination effects are likely as only Block 98/12 has been screened in for physical disturbance and drilling effects. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

Studland to Portland SAC

Site information

Area (ha): 33184.3
Relevant qualifying features: Reefs. See Natura 2000 standard data form for details of qualifying features[62].

Conservation objectives:
With regard to the SAC and the natural habitats and/or species for which the site has been designated, and subject to natural change;
Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

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

Attributes and related targets have been set for the site feature which are presented in the site SACO[63]. These

[61] https://www.emodnet-seabedhabitats.eu/access-data/launch-map-viewer/
[62] http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0030382.pdf

include a number of targets to maintain the total extent of reef (subject to natural variation in sediment veneer), and the presence and spatial distribution of reef communities.

Relevant Blocks for physical disturbance and drilling effects

98/11b, 98/12

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; physical change (to another seabed type), introduction or spread of non-indigenous species).*

Block 98/11b partly overlaps the site although seabed substrates are circalittoral rock and other hard substrata and therefore rig siting is unlikely in this area but Block 98/11b has significant areas outside of the site in which rig siting would be possible. Block 98/12 is over 5km from the site boundary. The assumed distance from a jack-up rig within which effects may occur is small (500m, see Table 2.2) and temporary given the tidal currents over the Block (0.5-1.5m/s spring peak flow). Therefore, the potential to impact the extent and distribution of qualifying natural habitats and habitats of qualifying species is limited, allowing the conclusion that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by the specific timing and location of the rig.

There may be a requirement for rig stabilisation depending on local seabed conditions. The relatively strong tidal currents over the Blocks and nature of seabed sediments (rock or circalittoral coarse) would suggest that rig stabilisation will not be required. However, it is assumed that rock placement (if required) would be within a spatial footprint of 0.8km^2 (500m of a rig, Table 2.2). It should be noted that the advice on operations does not identify physical change (to another seabed type) as a relevant pressure. If located outside of the site, the potential for loss of extent of qualifying natural habitat is limited. It is concluded that the site conservation objectives will not be undermined and there will be no adverse effect on site integrity. Further assessment, including HRA where appropriate, would be undertaken at the project level, at which stage the assessment would be informed by specific rig siting information.

As noted in Section 4.2.3, management of the spread of non-native species from vessels and rigs is being progressed through international measures, and the risk is limited by the operational range of rigs on the UKCS.

Drilling discharges

(***Relevant pressures:*** *abrasion/disturbance of the substrate on the surface of the seabed; habitat structure changes – removal of substratum, contamination).*

Both Blocks have significant areas outside of the site in which rig siting would be possible. It is assumed that effects relating to drilling discharges occur within 500m of the well location (Table 2.2) and these are likely to be temporary given the tidal currents over the Block (0.5-1.5m/s spring peak flow). Therefore, the potential for drilling discharges to impact the extent or distribution of the qualifying natural habitats is limited. In any case, the small scale and temporary nature of potential smothering, and mandatory control requirements with respect to drilling chemical use and discharge (Section 2.3.1), will ensure that site conservation objectives are not undermined and there is no adverse effect on site integrity.

Other effects

None

In-combination effects

No intra-plan in-combination effects are likely with respect to the spatial footprints associated with rig siting and drilling discharges given that the Blocks have significant areas outside of the site boundaries in which rig siting and drilling discharges would be possible. Therefore, the likelihood of in-combination footprint effects is low. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

63 https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030382&SiteName=studland&SiteNameDisplay=Studland+to+Portland+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

5.2.3 Further mitigation measures

Further mitigation measures are available which are identified through the EIA process and operator's environmental management system and the BEIS permitting processes. These considerations are informed by project specific 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 rig leg positions) to ensure sensitive seabed surface features (such as reefs) are avoided and potential rig stabilisation issues (e.g. from scouring around spud cans, or soft sediment conditions) are minimised. Where rig stabilisation is required, BEIS will expect operators to provide adequate justification for the stabilisation option proposed, minimise the volume of rock deposited or consider utilising systems (e.g. anti-scour mats, mud mats) that can be removed following drilling. For those Blocks where proposed activities could result in the physical disturbance of sensitive qualifying features by vessels and aircraft traffic, available mitigation measures include strict use of existing shipping and aircraft routes, and timing controls on temporary activities to avoid sensitive periods.

In all instances, consent for project-level activities will not be granted unless the operator can demonstrate that the proposed exploration activities will not have an adverse effect on the integrity of relevant sites. The information provided by operators in their applications must be detailed enough for BEIS (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 (see Sections 2.3 and 5.2.3), will not have an adverse effect on the integrity of the Natura 2000 sites considered in this assessment. There is a legal framework through the implementation of the EIA Regulations[64] and the Habitats Directive, to ensure that there are no adverse effects on the integrity of Natura 2000 sites. These would be applied at the project level, at which point there will be sufficient definition to make an assessment of likely significant effects, and for applicants to propose project specific mitigation measures.

Taking into account the information presented above, it is concluded that activities arising from the licensing of Blocks 98/1b and 98/12, in so far as they may generate physical disturbance and drilling effects, will not cause an adverse effect on the integrity of the relevant sites identified. Following award of any licence, consent for activities will not be granted unless the operator can demonstrate that the proposed activities will not have an adverse effect on the integrity of relevant sites.

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

5.3 Assessment of underwater noise effects

5.3.1 Blocks and sites to be assessed

The nature and extent of potential underwater noise effects are summarised in Section 4.3. On the basis of this information, the location of English Channel Blocks applied for in the 31st Round and the sites with relevant qualifying features, potential likely significant effects are considered to remain for one Block and one part Block, in respect of two sites (Figure 5.2).

5.3.2 Implications for site integrity of relevant sites

The site conservation objectives and other relevant information relating to site selection and advice on operations has been considered against indicative Block work programmes (see Section 2.2.1) to determine whether they could adversely affect site integrity, i.e. impacts the site features, either directly or indirectly, and results in altering the ecological structure and functioning of the site and/or affects the ability of the site to meet its conservation objectives. The results are given in Table 5.2 below. All mandatory control requirements (as given in Section 2.3.2) are assumed to be in place as a standard for all activities assessed at this stage.

Figure 5.2: Sites and Blocks in the English Channel to be subject to further assessment for underwater noise effects

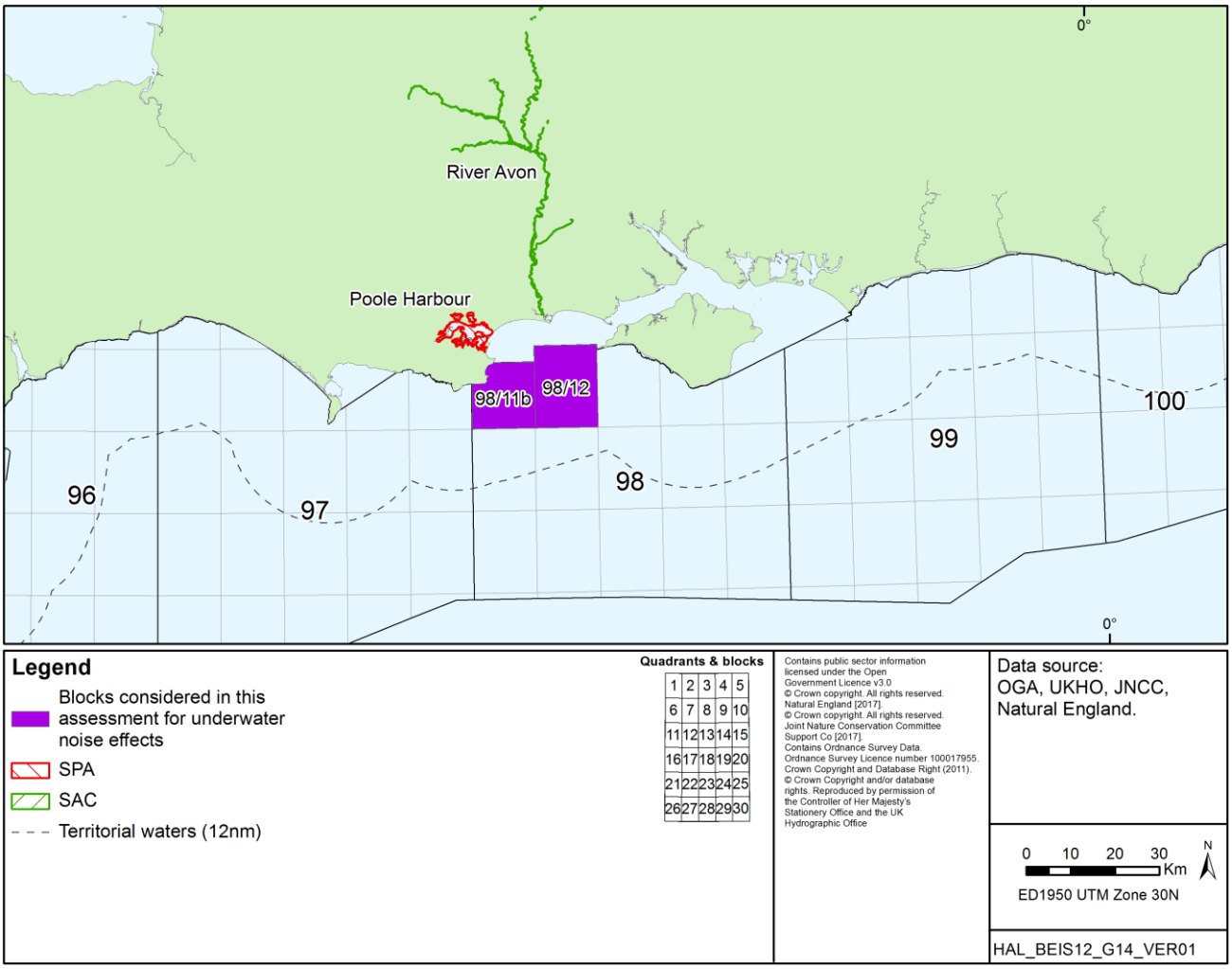


Table 5.2: Consideration of potential underwater noise effects and relevant site conservation objectives

Poole Harbour SPA
Site information
Area (ha): 2,271.99 **Relevant qualifying features (diving species listed only):** Overwintering waterbird assemblage (including cormorant, red-breasted merganser, pochard, goldeneye) **Conservation objectives:** See Table 5.1 above.
Relevant Blocks for underwater noise effects
98/11b, 98/12
Assessment of effects on site integrity
None of the relevant Blocks overlap the site. Blocks 98/11b and 98/12 are a minimum of 5km and 10km from the site boundary (at the mouth of the harbour), respectively. The relevant qualifying species show a preference for rocky shore, coastal lagoon and estuary habitats, and are therefore likely to primarily occur within the site and adjacent inshore waters.

Impulsive noise (rig site survey, VSP, conductor piling)
*(**Relevant pressures:** underwater noise change, vibration)*

The licence applications for the relevant Blocks do not propose any new 3D seismic survey within their work programmes. Consequently, rig site survey, VSP and conductor piling are the relevant sources of impulsive noise, all of which are of a lower amplitude, shorter duration and smaller geographic footprint compared to larger scale 2D or 3D seismic survey.

As detailed in Section 4.3.2, there is very little evidence of impacts of underwater noise on diving birds. Mortality of seabirds has not been observed during extensive seismic operations in the North Sea and elsewhere, and flushing disturbance associated with the physical presence of survey vessels and rigs would be expected to displace most diving seabirds from close proximity to noise sources. Such avoidance behaviour is also expected to reduce the potential for diving birds to be exposed to noise levels which may result in potential behavioural disturbance, although it is noted that very little evidence for such effects exist and, should they occur, they would be expected to be short-term, temporary and of limited spatial extent.

Negative indirect effects of impulsive noise on qualifying features may arise through effects on prey species, primarily small fish, if those prey are subject to injury or disturbance which reduce their availability to qualifying seabirds. Such effects are not anticipated for goldeneye, as their diet in coastal habitats is largely restricted to molluscs and crustaceans. While there is some evidence that a reduction in fish catches can be associated with seismic survey activity, these effects are temporary in nature. Any such, effects associated with VSP or rig site survey are expected to be minor, considering their shorter duration, smaller spatial extent and lower amplitude source relative to 2D and 3D seismic surveys (to which most reported effects relate). The disturbance of sensitive spawning periods for potential fish prey species will also be considered through the activity consenting process. Consequently, any underwater noise effects on fish associated with the licensing of relevant Blocks are not anticipated to result in significant effects on the food resources of the qualifying features.

Considering the noise source characteristics, the location of the Blocks relative to the site and likely distribution of qualifying features when using adjacent waters, and the short duration of the activities; when combined with mandatory control measures (Section 2.3.2), any disturbance to qualifying diving bird species or their prey will be highly localised, short-term, and will not result in an adverse effect on site integrity.

Continuous noise (drilling, vessel & rig movements)
*(**Relevant pressures:** underwater noise change, vibration)*

No significant effects on the qualifying species are anticipated from continuous underwater noise from drilling and vessel movements due to the lower amplitude and non-impulsive nature of the sound resulting in no potential for acute trauma, and no evidence of significant disturbance to diving birds from such sources.

In-combination effects
Intra-plan in-combination underwater noise effects are considered highly unlikely given the low potential for effects identified above and the likely temporal and spatial separation of any 31st Round activities which could take place in the Blocks. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

River Avon SAC

Site information

Area (ha): 416.57
Relevant qualifying features: Sea lamprey, Atlantic salmon

Conservation objectives: See Table 5.1 above.

Relevant Blocks for underwater noise effects

98/11b, 98/12

Assessment of effects on site integrity

The River Avon SAC flows into Christchurch Harbour, which is a minimum of 6km to Block 98/12 and 10km to Block 98/11b. Little is known of the distribution of the relevant qualifying species - sea lamprey and Atlantic salmon - in adjacent marine waters, but it can be assumed that they will at least transit adjacent coastal waters when migrating to and from the site, with most smolts leaving rivers between April-June, and most adults returning to rivers from late summer to winter. The documented marine feeding habitats of Atlantic salmon (towards the Arctic circle) are distant, while sea lamprey utilise estuaries and nearshore coastal waters for feeding prior to returning to freshwater to spawn (Silva *et al.* 2014).

Impulsive noise (rig site survey, VSP, conductor piling)
*(**Relevant pressures:** underwater noise change, vibration)*

The licence applications for the relevant Blocks do not propose any new 3D seismic survey within their work programmes. Consequently, rig site survey, VSP and conductor piling are the relevant sources of impulsive noise, all of which are of a lower amplitude, shorter duration and smaller geographic footprint compared to larger scale 2D or 3D seismic survey.

Given the proximity of the Blocks to the site, salmon migrating to and from the site have the potential to be exposed to underwater noise, while sea lamprey may also be exposed when present in coastal waters adjacent to the site. However, it is noted that the relevant Blocks are ≥6km from the mouth of the river, where the qualifying features are likely to be most concentrated during migration. Considering the evidence for salmon having a low sensitivity to underwater noise compared to other species (Section 4.3.2), the likely noise levels generated by activities such as VSP, rig site survey and conductor piling, and the relatively short duration and small geographic footprint of these activities, it is concluded that adverse effect on site integrity will not occur.

Continuous noise (drilling, vessel & rig movements)
*(**Relevant pressures:** underwater noise change, vibration)*

No significant effects on Atlantic salmon or sea lamprey are anticipated from continuous underwater noise from drilling and vessel movements due to the lower amplitude and non-impulsive nature of the sound resulting in no potential for acute trauma, and no evidence of significant disturbance.

In-combination effects
Intra-plan in-combination underwater noise effects are considered highly unlikely given the low potential for effects identified above and the likely temporal and spatial separation of any 31st Round activities which could take place in the Blocks. Section 5.4 provides a consideration of potential Block activities in-combination with other relevant plans and projects.

5.3.3 Further mitigation measures

The assessment concluded that no further mitigation measures were required beyond existing regulatory controls (see Section 2.3.2) in order to avoid adverse effects on the integrity of the relevant sites. BEIS require operators to provide sufficient information in the EIA on the potential impact of proposed activities on relevant sites and their qualifying features as well as proposed further mitigation measures in their applications for a Geological Survey consent, though it should be noted that no 3D seismic survey has been proposed for any of the English Channel Blocks. The information provided by operators must be detailed enough for BEIS to make a decision on whether the activities could lead to a likely significant effect, and whether the activities should require HRA. Depending on the nature and scale of the proposed activities (e.g. area of survey, source size, timing and proposed mitigation measures) and whether likely effects have been identified for these, BEIS may undertake further HRA to assess the potential for adverse effects on the integrity of sites at the activity specific level. A standard consent condition requires operators to follow the JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys.

Consent for project-level activities will not be granted unless the operator can demonstrate that the proposed activities, which may include small-scale geophysical rig site survey, VSP and drilling (including conductor piling), will not have an adverse effect on the integrity of relevant sites.

5.3.4 Conclusion

The risks of injury and disturbance to relevant qualifying features is limited both by the nature of the indicative work programmes for the Blocks applied for and controls currently in place, such that it is concluded that activities arising from the licensing of Blocks 98/11b and 98/12, in so far as they may generate underwater noise effects, will not cause an adverse effect on the integrity of the relevant sites identified. Consent for project specific activities will not be granted unless the operator can demonstrate that the proposed activities will not have an adverse effect on the integrity of relevant sites. These activities may be subject to activity level EIA and where appropriate, HRA.

5.4 In-combination effects

5.4.1 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[65] and BEIS 2018b). There are a number of potential interactions between activities that may follow licensing and those existing or planned activities in the English Channel, for instance in relation to renewable energy, fishing, aggregate extraction and shipping. These activities are subject to individual permitting or consenting mechanisms or are otherwise managed at a national or international level. The South Marine Plans were adopted in May 2018 and set out objectives and policies to guide development in parts of the English Channel over a 20-year period, and relevant to the English Channel.

The potential for intra-plan in-combination effects was considered for those sites subject to AA in Sections 5.2 and 5.3 (i.e. that multiple Blocks have the potential to be licensed within the same site). The following section considers the potential for in-combination effects with other relevant plans and programmes.

5.4.2 Sources of potential effect

Projects for which potential interactions with operations that could arise from the licensing of 31st Round Blocks (see Table 1.1) 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 related to noise, physical disturbance, and physical presence, primarily arising from aggregate extraction, fisheries and other oil & gas projects. While renewables developments, and in particular OWF development, will introduce noise and disturbance sources (particularly during construction) and present an additional physical presence in the marine environment, consented or proposed areas are some distance from the Blocks applied for which limit the potential for in-combination effects. The Crown Estate released information on its plans for a further round of offshore wind leasing (Round 4) in November 2018, that identified five regions

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

that are proposed to be included, which include areas of the eastern English Channel, with the area to the west of the Isle of Wight being excluded[66]. The round has not been formally announced, and there are no Agreements for Lease of draft project plans to consider at this stage. Additionally, The Crown Estate intend to conduct an HRA to support Round 4 which will consider the likely significant of the plan in due course. Figure 5.3 indicates the location of other relevant projects in relation to the Blocks subject to this assessment and relevant Natura 2000 sites.

Early engagement with other users (e.g. through fisheries liaison, vessel traffic surveys, consultation with the MoD or holders of other Crown Estate offshore interests)[67] where scheduling overlaps may occur should allow both for developer cooperation, and the mitigation of potential cumulative or in-combination effects. This is also reflected in the South Inshore and South Offshore Marine Plans (paragraphs 63 and 64) which state, "*Future oil and gas proposals may require access to the same area of seabed as other proposals. Proposals located in or around a licensed block should demonstrate they can co-locate with any oil and gas activities. Due to the small footprint of oil and gas infrastructure any actual conflict or impact may be minimal*.

Early engagement is recommended with the oil or gas licence holder especially where a Seaward Production licence exists, as there may be requirement for negotiation between parties involved, the Oil and Gas Authority and the Department for Business, Energy and Industrial Strategy. Where conflict arises, public authorities should take account of the full range of benefits and risks, the national policy on development of oil and gas resources and arrangements in place for managing conflicts." This is supported by plan policy S-CO-1 which promotes the minimisation in the use of space and the consideration for opportunities to co-exist, which should also be interpreted in the context of policy S-OG-1, "*Proposals in areas where a licence for oil and gas has been granted or formally applied for should not be authorised unless it is demonstrated that the other development or activity is compatible with the oil and gas activity*."

Table 5.3: Projects relevant to the in-combination effects assessment

Relevant projects	Project summary	Project status/ indicative timing	Relevant sites[1]
Oil & Gas			
Colter appraisal well	An appraisal well will be drilled into the Colter discovery in Block 98/11a about 6km east-northeast from Studland by Corallian Energy Ltd. The well will be drilled using a jack-up drilling rig and is expected to be on location for up to 45 days. A check shot survey may be undertaken as part of the appraisal work.	Consented. To be undertaken in early 2019	Studland to Portland SAC, Solent and Dorset Coast pSPA, Poole Harbour SPA

[66] https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2018-the-crown-estate-shares-further-detail-on-plans-for-round-4-including-proposed-locations-to-be-offered-for-new-seabed-rights/
[67] https://www.ogauthority.co.uk/licensing-consents/overview/the-crown-estate-interests/

Relevant projects	Project summary	Project status/ indicative timing	Relevant sites[1]
Aggregates			
South West Isle of Wight production area (127/1, 127/2, 127/3)	Areas of low to high intensity aggregate production. As part of the wider South Coast aggregate production area dredging took place over 14.85km^2 or approximately 10.7% of the licensed area in 2017, with high intensity dredging (greater than 1 hour 15 minutes) taking place over 2.5km^2.	Active production areas.	Solent and Dorset Coast pSPA
South Isle of Wight production area (500/1, 500/2, 500/4)			-
South of Needles Channel (500/3)			Solent and Dorset Coast pSPA, South Wight Maritime SAC
Needles Isle of Wight production area (137)			
West Wight exploration/ option area (522)	No production to date	n/a	Solent and Dorset Coast pSPA, South Wight Maritime SAC
Offshore Renewables			
Portland Bill tidal stream lease	The agreement/option for lease with Marine Current Turbines Ltd. is at a pre-application stage and no firm project proposals have been made to date.	n/a	Studland to Portland SAC
Perpetuus Tidal Energy Centre (PTEC) tidal lease	The PTEC proposes to bring together a number of turbine manufacturers and turbine designs in a 5km^2 30MW array off the south of the Isle of Wight. The project was granted consent in 2016 however the timescale for its implementation is presently unknown.	Consented. Work potentially commencing 2020	South Wight Maritime SAC, Solent and Dorset Coast pSPA
Cables			
IFA2	The installation of a HVDC link with a capacity of 1000MW between the UK (Lee-on-the-Solent) and France (Merville-Franceville-Plage), to be undertaken by National Grid and RTE. Cables are to be trenched and buried, and debris clearance, boulder movement and UXO target identification have all been undertaken.	Consented. Under construction. Commissioning expected 2019	Solent and Dorset Coast pSPA, Solent and Southampton Water SPA
Aquind	A HVDC interconnector with a capacity of 2000MW connecting the UK (Lovedean) and France (Barnabos). It is proposed that the cables will be buried and that route clearance may be required.	Pre-application. Commissioning expected 2023 subject to assessment.	Solent and Dorset Coast pSPA, Chichester and Langstone Harbours SPA

Sources: relevant Development Consent Orders and related post-consent modifications (https://infrastructure.planninginspectorate.gov.uk/ – accessed 4/12/2018), The Crown Estate and BMAPA (2018), MMO Marine Case Management System (https://marinelicensing.marinemanagement.org.uk/ – accessed 3/12/2018), BEIS Oil and Gas Environmental statements reviewed (https://www.gov.uk/guidance/oil-and-gas-environmental-statements-reviewed – accessed 3/12/2018)

Notes: [1] – those sites considered to be relevant to 31st seaward round exploration activities

5.4.3 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 5.2 and include the siting of jack-up drilling rigs, drilling discharges and wellhead placement and recovery.

Existing or proposed oil & gas projects

No existing offshore oil and gas infrastructure is located in the English Channel. The Wytch Farm oil field is located within Block 98/6a immediately to the north of the English Channel 31st Round Blocks but is produced onshore from horizontal wells drilled from an onshore location. The Beacon oil field is located to the east of Wytch Farm in Block 98/7a but is yet to be developed. Block 98/11a contains the Colter oil discovery found in 1986. Appraisal activity is scheduled to take place in early 2019 to assess the commercial potential of the discovery, which includes the use of a jack-up drilling rig. There is the potential for further exploration and appraisal drilling to take place within the other licensed Blocks, with physical impacts in the seabed from anchoring and the use of stabilisation material comparable to that described in Table 2.2 and Section 4.2. A review of field development projects (as of December 2018) published by OGA's Oil & Gas Pathfinder[68] indicates that no other projects are presently proposed within the other licensed Blocks in the English Channel. Any future development of these areas has the potential to be developed either offshore or, like Wytch Farm, from an onshore site.

When considered against the potential scale of activity which could follow the licensing of relevant 31st Round blocks (as assessed in Section 5.2), likely cumulative physical effects from existing or proposed activity are not envisaged. Given the small and temporary seabed footprint associated with drilling activities which may follow the licensing of 31st Round Blocks and those standard control measures and additional mitigation set out in Section 2.3 and 5.2.3 respectively, significant in-combination effects associated with other oil and gas projects is not expected.

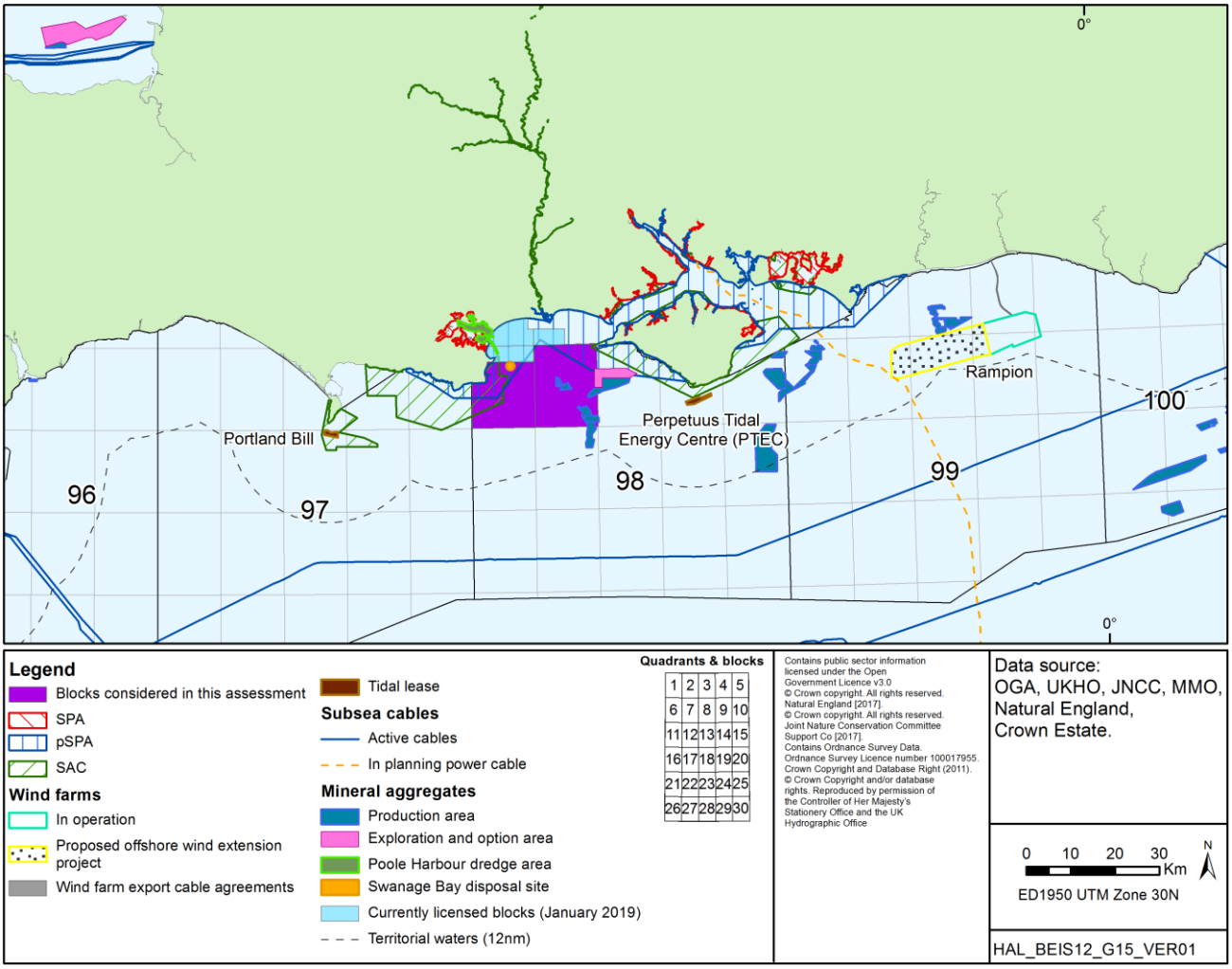
With respect to drilling discharges, previous discharges of WBM cuttings in the UKCS have been shown to disperse rapidly and to have minimal ecological effects (See Section 4.2). Dispersion of further discharges of mud and cuttings could lead to localised accumulation in areas where reduced current allows the particles to accumulate on the seabed, however given the water depths (up to 50m), currents and potential for storm wave base interactions across the area within which Blocks have been applied for, accumulations of cuttings are not considered likely. As noted in Section 2.3.1, oil and other contaminant concentrations in drilling wastes and discharges have been substantially reduced or eliminated, for example the discharge of oil based muds and contaminated cuttings is effectively banned. As such, any contaminated cuttings, for example through the use of oil-based muds where these are a technical requirement, are typically recovered and returned to shore for treatment and

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

disposal, and cuttings cleaning equipment can also be used to remove contaminants prior to discharge.

In view of the scale of the proposed activity, extent of the region, the water depths and currents, discharges are 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 limited by the existing legislative and permitting controls that are in place, which the UK Marine Strategy[69] has identified as making an ongoing contribution to managing discharges.

Figure 5.3: Other projects relevant to the English Channel



Aggregate extraction, maintenance and capital dredging and disposal

Block 98/12 coincides with a number of aggregate production areas (South West Isle of Wight 127/1/, 127/2, 127/3 & 500/4, and South Wight 500/1 & 500/2) and one exploration/option area (West Wight 522), which also partly overlaps the Solent & Dorset Coast pSPA. Of the wider production areas shown in Figure 5.3, in 2017 dredging took place over 14.85km^2 or

[69] https://www.gov.uk/government/publications/marine-strategy-part-three-uk-programme-of-measures

approximately 10.7% of the licensed area, with high intensity dredging (greater than 1 hour 15 minutes) taking place over 2.5km^2 (TCE & BMAPA 2018). Additionally, the cumulative footprint of aggregate extraction in the area has shown a significant reduction in new area dredged over the period 1998-2012, with 0.4km^2 additional area dredged in 2012 (TCE & BMAPA 2014). Despite the spatial overlap between Block 98/12 and these aggregate extraction areas, there remains significant area outside of the licence boundaries in which to avoid interactions, consistent with South Marine Plan policies S-AGG-1, S-AGG-2 and S-AGG-3. In view of the small and temporary footprint of any drilling rig that may be used following the licensing of any Block (see Table 2.2), and the potential to site any rig away from the aggregate production areas, it is not regarded that a physical change significant enough to lead to an adverse effect on the integrity of any of the relevant sites could occur.

This area, and the wider future areas of technical opportunity highlighted in the South Marine Plans, are yet to either be formally licensed for production or exploration. Any changes to the status of these licences would be considered at the project level once plans are known, for example in relation to rig siting.

A dredge disposal site is located in Swanage Bay (site WI110) and within the northern part of Block 98/11b. The site primarily receives material from Poole Harbour maintenance dredging and more recently from Weymouth, though capital dredging deposits have also been made here and are likely to be so in the future (MMO 2013). Existing marine licences are in place for the disposal site, for example associated with the Port of Poole masterplan and maintenance dredging for the Port of Poole and other smaller marinas. Additionally, The Needles (WI090) disposal site is located immediately to the east of Block 98/12, and is similarly used for dredge disposal (e.g. from Yarmouth and Hythe). Marine licences have been subject to their own assessment and HRAs during the application and consenting processes. In view of the relatively small area which the dredge disposal site occupies in Block 98/11b there remains significant area within the block to site a rig away from the site, which would be undertaken consistent with South Marine Plan policy S-DD-1. In view of the relatively small and temporary nature of any disturbance generated by the rig, any incremental disturbance is not regarded to be a source of significant in-combination effects capable of generating an adverse effect on sites including Studland to Portland SAC, South Wight Maritime SAC and Solent and Dorset Coast pSPA.

Fisheries

Fishing and particularly bottom trawling has historically contributed to seabed disturbance over extensive areas, and was identified as an ongoing issue in the UK initial assessment for MSFD[70]. Depending on the nature of future measures (e.g. in relation to MPA management in the wider environment and within MPAs), such effects are likely to be reduced and therefore some improvement in benthic habitats could be expected. The management of fisheries in relation to Article 6 of the Habitats Directive is fundamentally different to other activities such

[70] https://www.gov.uk/government/publications/marine-strategy-part-one-uk-initial-assessment-and-good-environmental-status

as offshore energy development, and a revised approach to the management of commercial fisheries in European sites[71] has sought to implement steps to ensure that they are managed in accordance with Article 6.

In England, management is coordinated between the Inshore Fisheries and Conservation Authorities and the Marine Management Organisation for sites within 12nm[72] (note that any measure which may influence vessels of other member states can only be adopted after consultation with the Commission, other 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[73]; note that none of the relevant sites considered in this assessment are located beyond 12nm. In relation to specific sites of relevance to this AA, the Southern IFCA has undertaken HRA for certain fishing activities[74] (potting, clam and oyster dredging, and light otter trawls) in relation to sites relevant to the 31st Round including Chichester & Langstone Harbours SPA, Solent and Southampton Water SPA, Solent Maritime SAC, South Wight Maritime SAC and Studland to Portland SAC. It was concluded in each of these HRAs that either current types and levels of activity alone or in-combination with other plans and programmes would not lead to an adverse effect on site integrity, or else would not lead to an adverse effect subject to management measures which include the closure of certain areas permanently (for example intertidal areas which are feeding habitats for birds associated with the Chichester and Langstone Harbours SPA) and temporal and spatial restrictions (for example number of days and times that bottom towed gear can be used in the Solent Maritime SAC) in relation to clam dredging. A series of Southern IFCA byelaws including the Bottom Towed Fishing Gear Byelaw 2016, the Solent Dredge Fishing Byelaw 2016 and Oyster Close Season byelaw implement management measures in relation to the sites[75].

It should be noted that while the above reflects the current approach to fisheries management in relation to Marine Protected Areas in English waters, the UK is expected to formally leave the CFP on its exit from the EU in March 2019. The Fisheries White Paper, "Sustainable Fisheries for Future Generations" [76], outlines the UK Government's present vision for how fisheries would be managed when the UK no longer participates in the CFP.

Whilst fishing may be linked to historical damage to site features, and presents a continuing risk to these, future management measures should limit the potential for in-combination effects

[71] https://www.gov.uk/government/publications/revised-approach-to-the-management-of-commercial-fisheries-in-european-marine-sites-overarching-policy-and-delivery
[72] For example see bylaws of the Southern IFCA covering bottom towed fishing gear, the Prohibition of Gathering (Sea Fisheries Resources) in Seagrass Beds, and the Sussex IFCA Chichester Harbour European Marine Site (Specified Areas) Prohibition of Fishing Method Byelaw.
[73] 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.
[74] http://www.southern-ifca.gov.uk/management-of-mpas
[75] See the Marine Protected Areas Strategic Management Table at http://www.southern-ifca.gov.uk/management-of-mpas
[76] See: https://www.gov.uk/government/consultations/fisheries-white-paper-sustainable-fisheries-for-future-generations and also the draft Fisheries Bill: https://services.parliament.uk/bills/2017-19/fisheries.html

with other activities. Effects on sites from exploration activity can be reduced or avoided (see Sections 2.3.1 and 5.2.3), and other oil and gas related activities are subject to statutory environmental impact assessment and, where appropriate, HRA.

When an oil and gas surface structure (fixed and floating installations) becomes operational, a safety zone with a radius of 500m is created under the *Petroleum Act 1987* and other activities are excluded from taking place within the zone, including fisheries. This includes mobile drilling rigs and is notified to other users of the sea (e.g. through notices to mariners and Kingfisher charts). In view of the differences in relative scale of physical impacts resulting from trawling and from oil and gas exploration (both spatially and temporally), significant incremental effects may be considered unlikely.

Offshore renewables and cables

There are few offshore renewables projects in The Channel, those closest being two tidal stream lease areas, Portland Bill and Perpetuus Tidal Energy Centre (PTEC), some 30km to the west and 19km to the east of Blocks 98/11b and 98/12 respectively. The Portland Bill zone is at a pre-application stage and no development proposal has been made, and while consent was granted for the 30MW PTEC to the south of the Isle of Wight in 2016, the timing of any project construction work remains uncertain. The MMO considered the potential for likely significant effects of PTEC in relation to all of the relevant sites considered in this assessment (River Avon SAC, South Wight Maritime SAC, Solent Maritime SAC, Studland to Portland SAC, Chichester and Langstone Harbours SPA, Solent and Dorset Coast pSPA, Solent and Southampton Water SPA and Poole Harbour SPA) and concluded that significant effects were not considered likely for any other than the reef feature of the South Wight Maritime SAC in relation to the export cable installation. The MMO undertook AA and concluded that, subject to conditions, there would not be an adverse effect on site integrity along or in-combination with other projects.

The qualifying features of both Studland to Portland SAC and South Wight Maritime SAC[77] which either completely overlap or are adjacent to the two tidal lease areas, are both sensitive to pressures linked to physical disturbance including abrasion/physical disturbance of substrates on the surface of the seabed and below the seabed, physical change (to another seabed type) and loss. The closest offshore wind farm is Rampion and its proposed 400MW extension[78]. These OWF projects are ~65km to the east of the nearest 31st Round Channel Block (98/12), and are 10km distant from the nearest relevant site (Solent and Dorset Coast pSPA), limiting the potential for in-combination effects.

There are no subsea cables in close proximity to the 31st Round Channel Blocks. The closest is the consented IFA2 interconnector at 29km to the east of Block 98/12 which is scheduled to be installed in 2019, and the proposed Aquind interconnector that follows a similar route to IFA2 but with a different landfall. The latter is in the early stages of project planning and

[77] https://www.gov.uk/government/publications/eastern-channel-marine-area-index-map-and-site-packages
[78] https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2018-the-crown-estate-completes-initial-assessment-of-offshore-wind-extension-applications/

environmental assessment[79], but is expected to be commissioned by 2023. The surface area of such cables is extremely small, they are distant from the 31st Round Blocks, and have/will be subject to their own HRA processes.

In view of the small and temporary footprint of any drilling rig that may be used following the licensing of any Block, and the distance separating the relevant renewables and cables projects and the Blocks applied for, it is therefore not regarded that any activity which would take place in the initial term of licences would lead to a physical change significant enough to cause an adverse effect on the integrity of any relevant site, either on its own alone or in-combination with the other projects.

5.4.4 Physical presence

Physical presence of offshore infrastructure and support activities may potentially cause behavioural responses in fish, birds and marine mammals (see Section 5.6 of BEIS 2018a). Previous SEAs have considered the majority of behavioural responses resulting from interactions with offshore oil and gas infrastructure (whether positive or negative) to be insignificant; in part because the number of surface facilities is relatively small (of the order of a few hundred) and because the majority are at a substantial distance offshore. The larger numbers of individual surface or submerged structures associated with offshore wind developments, the presence of rotating turbine blades and considerations of their location and spatial distribution (e.g. in relation to coastal breeding or wintering locations for waterbirds and important areas for marine mammals), indicate a higher potential for physical presence effects. Potential displacement and barrier effects have been an important consideration at the project level for the Rampion wind farm (Figure 5.3) and formed an important part of associated HRA[80].

Shipping densities vary over the Blocks, generally being low (weekly average ~15 vessels) to their southern extents and higher in the north (maximum weekly average of 197), towards the entrance to the Solent in the east and from Durlston Head to Poole Harbour in the west[81]. The Blocks contain several high density navigation routes or ferry routes identified in relation to South Marine Plan policy S-PS-3, "*Proposals that require static sea surface infrastructure or that significantly reduce under-keel clearance which encroach upon high density navigation routes, or that pose a risk to the viability of passenger ferry services, must not be authorised unless there are exceptional circumstances*." Additional vessels associated with drilling and site survey will represent a small increment to the existing levels of shipping traffic, for example typical supply visits to rigs while drilling may be in the order of 2 to 3 per week.

It is not regarded that the temporary addition of a drilling rig and associated shipping will lead to adverse effects on the integrity of relevant sites considered in this AA alone or in-combination with other relevant plans and projects. As noted in Section 5.4.3 above, The

[79] https://infrastructure.planninginspectorate.gov.uk/projects/south-east/aquind-interconnector/?ipcsection=docs
[80] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010032/EN010032-001702-Rampion%20Environmental%20Assessment%20Report.pdf
[81] Based on 2015 AIS yearly average density grid: https://data.gov.uk/dataset/vessel-density-grid-2015

Crown Estate intend to consider new leasing areas for offshore wind as part of a fourth round of offshore wind leasing. Details on the specific nature and location of projects is not known at this time and new proposals within the Blocks or in close proximity to them is unlikely as the area to the west of the Isle of Wight has been excluded from the round. Such interactions would need to be considered as part of assessments, including in HRA where appropriate, for project-level activity.

5.4.5 Underwater noise

A number of projects are relevant to the consideration of in-combination effects with activities which may follow the licensing of 31st Round Blocks (see Table 5.3). The associated activities can generate noise levels which are known to have the potential to result in disturbance or injury to animals associated with relevant sites (see DECC 2016). Given the spatially limited, temporary nature and limited scale of noise generating activity associated with the 31st Round Blocks (see Section 5.2, note that no 3D seismic survey is proposed), and the distance of the Blocks to any other relevant project, significant in-combination effects are considered to be unlikely.

There is the potential for seismic surveys to take place in adjacent Blocks 98/6a, 98/7a and 98/11a which are yet to be fully explored or which have been developed (not covered by the plan being assessed). The timing, location and scale of any such surveys are unknown and a meaningful assessment of these cannot be made at this time, but they will be subject to activity specific permitting, including HRA where appropriate. The only known survey is a check-shot survey to be undertaken as part of the Colter well appraisal. However, in view of the timing of this activity (early 2019), this would likely be complete before any of the Blocks applied for could be licensed and therefore before any 31st Round activities could take place.

In addition to those activities which may follow licensing of the English Channel Blocks and the other potentially relevant projects listed in Table 5.3, there are a variety of other existing (e.g. oil and gas exploration, fishing, shipping, military exercise areas) and planned (e.g. aggregate extraction) noise-producing activities in overlapping or adjacent areas. Despite this, BEIS is not aware of any projects or activities which are likely to cause cumulative and in-combination effects that, when taken in-combination with the likely number and scale of activities likely to result from Block licensing (Section 2.2), would adversely affect the integrity of the relevant sites. This is due to the presence of effective regulatory mechanisms (Section 5.2 and also Appendix 3 of DECC 2016) which ensure that operators, BEIS and other relevant consenting authorities take such considerations into account during activity permitting. These mechanisms generally allow for public participation in the process, and this has been strengthened by recent Regulations[82] amending the offshore EIA regime which came into force in May 2017. These reflect Directive 2014/52/EU which provides for closer co-ordination between the EIA and Habitats Directives, with a revised Article 3 indicating that biodiversity

[82] The *Offshore Petroleum Production and Pipe-lines (Environmental Impact Assessment and other Miscellaneous Provisions) (Amendment) Regulations 2017*

within EIA should be described and assessed “with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC”.

5.4.6 Conclusions

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

BEIS will consider the potential for in-combination effects whilst considering project specific EIAs and, where appropriate, through HRAs. This process will ensure that activities, if consented, will not result in adverse effects on integrity of European sites. Therefore, it is concluded that the in-combination effects from activities arising from the licensing of Blocks in the English Channel (Table 1.1) with those from existing and planned activities 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 31st Licensing Round of the two Blocks considered in this AA will not have a significant adverse effect on the integrity of the relevant sites (identified in Section 1.3), and BEIS have no objection to the OGA awarding seaward licences (subject to meeting application requirements) covering those Blocks listed in Table 1.1. This is because there is certainty, within the meaning of the ECJ Judgment in the Waddenzee case, that implementation of the plan will not adversely affect the integrity of relevant European Sites (as described in Sections 5-8), 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, and in Sections 5.2.3 and 5.3.3).

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 BEIS 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 integrity has been reached at plan level, it is likely that a 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 changed at the project level.

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