Department for Business, Energy & Industrial Strategy

OFFSHORE OIL & GAS LICENSING 31ST SEAWARD ROUND

Habitats Regulations Assessment

Stage 1 – Block and Site Screenings

December 2018

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1 Introduction

1.1 Background and overview of plan

The plan/programme covering this and 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 following which a post-consultation report was produced. The post-consultation report summarises the comments received and provides further clarifications which has enabled 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. The OGA is offering 1,779 Blocks for licensing as part of a 31st Seaward Licensing Round covering mature and frontier areas of the UK continental shelf (UKCS).

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 has progressed through a series of Seaward Licensing Rounds. A Seaward Production Licence grants exclusive rights to the holders "to search and bore for, and get, petroleum" in the area covered by the Licence but does not constitute any form of approval for activities to take place in the Blocks, nor does it confer any exemption from other legal or regulatory requirements. Offshore activities are subject to a range of statutory permitting and consenting requirements, including, where relevant, activity-specific Appropriate Assessment (AA) under Article 6(3) of the Habitats Directive (Directive 92/43/EC).

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.

1.2 Purpose

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).

In this HRA, the Department has applied the Habitats Directive test[3] (elucidated by the European Court of Justice in the case of Waddenzee (Case C-127/02)[4]) 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.*

1.3 Approach to screening

This screening assessment is the first stage of the HRA to determine whether licensing of any of the Blocks offered in the 31st Seaward Round may have a significant effect on a relevant site, either individually or in combination[5] with other plans or projects. The screening assessment has been undertaken in accordance with the European Commission Guidance (EC 2000) and with reference to other guidance and reports, including the Habitats Regulations Guidance Notes (English Nature 1997, Defra 2012, SEERAD 2000), SNH (2015), the National Planning Policy Framework (DCLG 2012[6]), English Nature report, No. 704

[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 related 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).
[3] See Article 6(3) of the Habitats Directive.
[4] 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.
[5] 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 (2014a) and Judd *et al.* (2015).
[6] Which states that "listed or proposed Ramsar sites", should receive the same protection as European sites.

(Hoskin & Tyldesley 2006) and Natural England report NECR205 (Chapman & Tyldesley 2016).

The approach taken to screening has been to identify all relevant European sites with the potential to be affected by exploration/appraisal activities that could follow licensing (i.e. those sites with marine qualifying features or with a marine ecological linkage such as anadromous and catadromous fish) (see Section 3). These sites are screened for the likelihood of significant effects based on the nature and scale of potential activities (as outlined in Section 2). Consideration is also given as appropriate to the site-specific advice on operations. Those Blocks which are screened in will be subject to a second stage of HRA, Appropriate Assessment, if applied for and before licensing decisions are taken. It should be noted that even when a licensing decision has been taken, any activities that may follow licensing will be subject to activity-specific assessment and where necessary, an HRA.

This screening assessment report is organised as follows:

- Overview of the plan, including a list and map of the Blocks offered, summary of the licensing process and nature of the activities that could follow (see Section 2)
- Identification of all European sites potentially affected, together with their various interest features (Section 3 and Appendix A)
- Description of the screening assessment process used to identify likely significant effects on relevant European sites (Section 4)
- The screening assessment including a consideration of in-combination effects (Section 5)
- Summary of conclusions including list of Blocks from which likely significant effects on relevant European sites could not be discounted at the screening stage and for which further assessment (Appropriate Assessment) is required before licensing decisions are made (Section 6 and Appendix B)

2 Blocks offered and potential activities

2.1 Blocks offered

Offshore Blocks on offer during the 31st Seaward Licensing Round which are considered in this screening assessment are listed in Table 2.1 and shown on Figure 2.1. The Blocks are located primarily in frontier areas, including parts of the central and northern North Sea, West of Shetland and Rockall, the Irish Sea and North Channel, the South West Approaches and Celtic Sea, and the English Channel, though also include Blocks within the mature basins of the Irish Sea and Moray Firth.

2.2 Licensing

The exclusive rights to search and bore for petroleum in Great Britain, the territorial sea adjacent to the United Kingdom and on the UK Continental Shelf (UKCS) are vested in the Crown and the *Petroleum Act 1998* (as amended) gives the OGA the power to grant licences to explore for and exploit these resources. The main type of offshore Licence is the Seaward Production Licence. Offshore licensing for oil and gas exploration and production commenced in 1964 and has progressed through a series of Seaward Licensing Rounds. A Seaward Production Licence may cover the whole or part of a specified Block or a group of Blocks. A Seaward Production Licence grants exclusive rights to the holders "to search and bore for, and get, petroleum" in the area covered by the Licence but does not constitute any form of approval for activities to take place in the Blocks, nor does it confer any exemption from other legal or regulatory requirements. Offshore activities are subject to a range of statutory permitting and consenting requirements, including, where relevant, activity-specific AA under Article 6(3) of the Habitats Directive (Directive 92/43/EC).

Several sub-types of Seaward Production Licence were available in previous rounds (Traditional, Frontier and Promote) which have been replaced by the single "Innovate" licence[7]. 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:

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

- 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. 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)[8] through written submissions before licences are awarded[9]. 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.

2.3 Activity

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. There are three levels of drilling commitment:

[8] The Offshore Safety Directive Regulator is the Competent Authority 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.

[9] 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 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 all relevant activity-specific environmental assessments.

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

- A Drill or Drop (D/D) Drilling Commitment is a conditional commitment with the proviso 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[10] 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). Offshore activities (see Table 2.2) such as seismic survey or drilling are subject to relevant activity-specific environmental assessments by BEIS, and there are other regulatory provisions exercised by the Offshore Safety Directive Regulator and bodies such as the Health and Safety Executive. It is the licensee's responsibility to be aware of, and comply with, all regulatory controls and legal requirements.

The proposed work programmes for the Initial Term are detailed in the licence applications. For some activities, such as seismic survey, the potential impacts associated with noise could occur some distance from the licensed Blocks and the degree of activity is not necessarily proportional to the size or number of Blocks in an area. In the case of direct physical disturbance, the licence Blocks being applied for are relevant.

Table 2.1: List of Blocks offered in the 31st Seaward Licensing Round

Central and Northern North Sea									
1/4	1/5	1/9	1/10	1/14	1/15	1/19	1/20	1/23	1/24
1/25	1/28	1/29	1/30	2/1	2/2	2/3	2/6	2/7	2/8
2/9	2/10a	2/11	2/12	2/13	2/14	2/15b	2/16	2/17	2/18
2/19	2/20	2/21	2/22	2/23	2/24	2/25	2/26	2/27	2/28
2/29	2/30	2/4b	2/5c	3/1	3/11c	3/11d	3/12b	3/13c	3/16b
3/17b	3/18	3/21	3/22	3/23	3/26	3/27a	3/28c	3/2e	3/30
3/6b	3/7b	4/26	5/30	6/15	6/19	6/20	6/21	6/22	6/23
6/24	6/25	6/26	6/27	6/28	6/29	6/30	7/2	7/3	7/4

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

Table 2.1: List of Blocks offered in the 31st Seaward Licensing Round

7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14
7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24
7/25	7/26	7/27	7/28	7/29	7/30	8/1	8/2	8/3	8/4
8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14
8/15b	8/16	8/17	8/18	8/19	8/20	8/21	8/22	8/23	8/24
8/25	8/26	8/28a	8/29	8/30	9/1	9/6	9/7	9/11e	9/11h
9/12c	9/12d	9/16	9/17c	9/2d	11/23	11/24c	11/25b	11/27	11/28
11/29	11/30	12/5	12/9	12/10	12/12	12/13	12/14	12/15	12/16
12/17	12/18	12/19	12/20	12/21b	12/22	12/23	12/24	12/25	12/26
12/27	12/28b	12/29b	13/1	13/2	13/3	13/4	13/5	13/6	13/7
13/8	13/9	13/10	13/11	13/12	13/13	13/14	13/15	13/16c	13/18
13/19	13/20	13/22b	13/22c	13/24d	13/25b	13/26b	13/27	13/28b	13/29c
13/29d	14/1	14/2	14/3	14/4	14/5	14/6	14/7	14/11	14/12
14/15c	14/16	14/17	14/21	14/22	14/27b	15/1	15/4	15/5	15/6
15/11c	15/12a	15/13c	15/9b	17/4	17/5	18/1	18/2	18/3	18/4
18/5	18/9	18/10	19/1	19/2	19/3	19/4	19/6	19/8	19/9
19/10b	19/14	19/19	19/20	19/23	19/24	19/25	19/28	19/29	19/30
19/5b	20/13	20/14	20/16	20/17	20/18	20/19	20/20	20/21	20/22
20/23	20/24	20/25	20/26	20/27	20/28	20/29	20/2d	20/30	20/7d
25/25	26/2	26/3	26/4	26/5	26/6	26/7	26/8	26/9	26/10
26/11	26/12	26/13	26/14	26/15	26/16	26/17	26/18	26/19	26/20
26/21	26/22	26/23	26/24	26/25	26/26	26/27	26/28	26/29	26/30
27/1	27/2	27/6	27/7	27/8	27/11	27/12	27/13	27/14	27/15
27/16	27/17	27/18	27/19	27/20	27/21	27/22	27/23	27/24	27/25
27/26	27/27	27/28	27/29	27/30	28/2	28/3	28/7	28/11	28/12
28/13	28/14	28/16	28/17	28/18	28/19	28/21	28/22	28/23	28/24
28/25	28/26	28/27	28/28	28/29	28/30	29/21	29/22a	29/23a	29/24
29/25	29/26	29/29	29/30	30/21	30/22	30/23	30/26	30/27	30/28
30/29	30/30	34/3	34/4	34/5	34/10	34/15	34/20	34/25	34/30
35/1	35/2	35/3	35/4	35/5	35/6	35/7	35/8	35/9	35/10
35/11	35/12	35/13	35/14	35/15	35/16	35/17	35/18	35/19	35/20
35/21	35/22	35/23	35/25	35/26	35/27	36/1	36/2	36/3	36/4
36/5	36/6	36/7	36/8	36/9	36/10	36/11	36/12	36/13	36/14
36/15b	36/16	36/17	36/18	36/19	36/22	36/23	37/1	37/2	37/3
37/4	37/6	37/7	37/8	37/9	37/11b	37/12	37/13	37/14	37/15
37/20	37/25	37/28a	37/29a	37/30	38/2	38/3	38/4	38/5	38/6
38/7	38/8	38/9	38/10	38/11	38/12	38/13	38/14	38/15	38/16
38/17	38/18	38/19	38/20	38/21	38/22	38/23	38/24	38/25	38/26
38/29	38/30	39/6	39/7	39/11	39/12	39/16	39/17	39/21	39/26
40/5	41/1	41/2	43/3	43/4	43/5	44/1	44/4	44/5	44/3b
45/1	10/1a	209/1	209/2	209/3	209/4	209/5	209/6	209/7	209/8
209/9	209/10	209/11	209/12	209/13	209/14	209/15	209/16	209/17	209/18
209/19	209/20	209/21	209/22	209/23	209/24	209/25	209/26	209/27	209/28
209/29	209/30	210/1	210/2	210/3	210/6	210/7	210/8	210/11	210/12
210/13	210/14	210/15b	210/16	210/17	210/18	210/21	210/22	210/23	210/26
210/27	210/28	210/29b	210/30d	210/4b	210/5c	210/9b	211/13c	211/14b	211/18f
211/18g	217/1	217/2	217/3	217/4	217/5	217/6	217/7	217/8	217/9

Table 2.1: List of Blocks offered in the 31st Seaward Licensing Round

217/10	217/11	217/12	217/13	217/14	217/15	217/16	217/17	217/18	217/19
217/20	218/1	218/2	218/3	218/4	218/5	218/6	218/7	218/8	218/9
218/10	218/11	218/12	218/13	218/14	218/15	218/16	218/17	218/18	218/19
218/20	218/21	218/22	218/23	218/24	218/25	218/26	218/27	218/28	218/29
218/30	219/1	219/2	219/3	219/4	219/6	219/7	219/8	219/9	219/10
219/11	219/12	219/13	219/14	219/15	219/16	219/17	219/18	219/19	219/20
219/21	219/22	219/23b	219/24b	219/25	219/26	219/27	219/28b	219/29	219/30
220/11	220/16	220/21	220/22	220/26	220/27	221/27	221/28	221/29	221/30
222/26	222/27	222/28	222/29	222/30	223/26	223/27	223/28		
West of Shetland and Rockall									
5/1	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9	5/10
6/1	6/6	128/1	128/2	128/3	128/4	128/5	128/6	128/7	128/8
128/9	128/10	129/1	129/2	129/3	129/4	129/5	129/6	129/7	129/8
129/9	129/10	129/15	130/1	130/2	130/3	130/4	130/5	130/6	130/7
130/8	130/9	130/10	130/11	130/12	130/13	130/14	130/15	131/1	131/2
131/3	131/4	131/5	131/6	131/7	131/8	131/9	131/10	131/11	131/12
131/13	131/14	131/15	131/18	131/19	131/20	132/1	132/2	132/3a	132/5b
132/6	132/7	132/8	132/11	132/12	132/13a	132/16	132/17	132/20b	132/25
133/1	133/2	133/3	133/4	133/5	133/6	133/7	133/8	133/9	133/10
133/11b	133/12	133/13	133/14	133/15	133/16	133/17	133/18	133/19	133/20
133/21	133/22	133/23	133/24	133/25	133/27	133/28	133/29	133/30	138/1
138/2	138/3	138/4	138/5	138/6	138/7	138/8	138/9	138/10	138/11
138/12	138/13	138/14	138/15	138/16	138/17	138/18	138/19	138/20	138/21
138/22	138/23	138/24	138/25	138/26	138/27	138/28	138/29	138/30	139/1
139/2	139/3	139/4	139/5	139/6	139/7	139/8	139/9	139/10	139/11
139/12	139/13	139/14	139/15	139/16	139/17	139/18	139/19	139/20	139/21
139/22	139/23	139/24	139/25	139/26	139/27	139/28	139/29	139/30	140/1
140/2	140/3	140/4	140/5	140/6	140/7	140/8	140/9	140/10	140/11
140/12	140/13	140/14	140/15	140/16	140/17	140/18	140/19	140/20	140/21
140/22	140/23	140/24	140/25	140/26	140/27	140/28	140/29	140/30	141/1
141/2	141/3	141/4	141/5	141/6	141/7	141/8	141/9	141/10	141/11
141/12	141/13	141/14	141/15	141/16	141/17	141/18	141/19	141/20	141/21
141/22	141/23	141/24	141/25	141/26	141/27	141/28	141/29	141/30	142/1
142/2	142/6	142/7	142/11	142/12	142/16	142/17	142/21	142/22	142/26
142/27	142/28b	142/29b	142/30	143/26	148/1	148/2	148/3	148/4	148/5
148/6	148/7	148/8	148/9	148/10	148/11	148/12	148/13	148/14	148/15
148/16	148/17	148/18	148/19	148/20	148/21	148/22	148/23	148/24	148/25
148/26	148/27	148/28	148/29	148/30	149/1	149/2	149/3	149/4	149/5
149/6	149/7	149/8	149/9	149/10	149/11	149/12	149/13	149/14	149/15
149/16	149/17	149/18	149/19	149/20	149/21	149/22	149/23	149/24	149/25
149/26	149/27	149/28	149/29	149/30	150/1	150/2	150/3	150/4	150/5
150/6	150/7	150/8	150/9	150/10	150/11	150/12	150/13	150/14	150/15
150/16	150/17	150/18	150/19	150/20	150/21	150/22	150/23	150/24	150/25
150/26	150/27	150/28	150/29	150/30	151/1	151/2	151/3	151/4	151/5
151/6	151/7	151/8	151/9	151/10	151/11	151/12	151/13	151/14	151/15
151/16	151/17	151/18	151/19	151/20	151/21	151/22	151/23	151/24	151/25
151/26	151/27	151/28	151/29	151/30	152/1	152/2	152/3	152/4	152/5

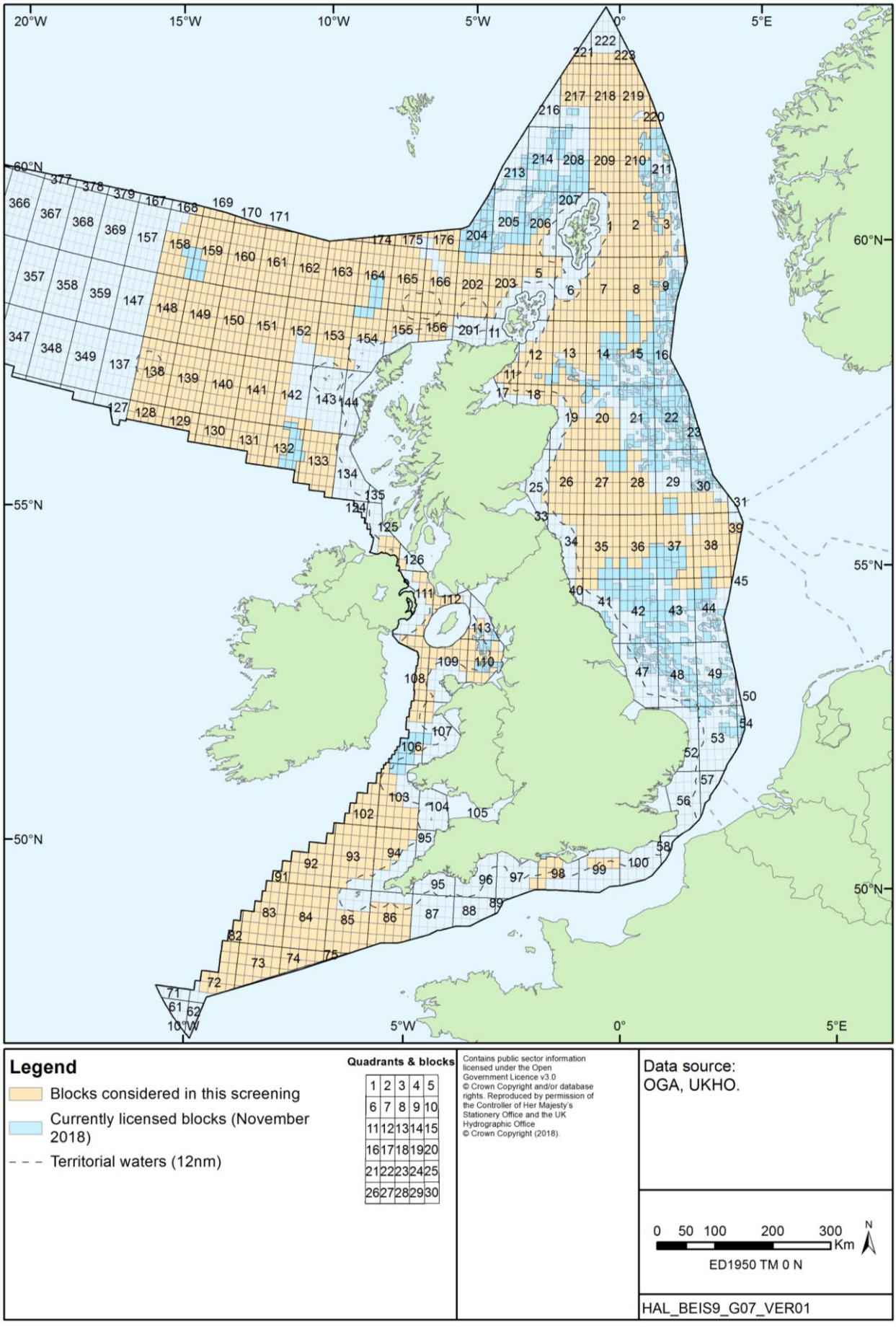
Table 2.1: List of Blocks offered in the 31st Seaward Licensing Round

152/6	152/7	152/8	152/9	152/10	152/11	152/12	152/13	152/14	152/15
152/16	152/17	152/19	152/20	152/21	152/22	152/26	152/27	153/1	153/2
153/3	153/4	153/5	153/6	153/7	153/8	153/9	153/10	153/11	153/12
153/13	153/14	153/15	153/16	153/17	153/18	153/19	153/20	153/21	153/22
153/23	153/24	153/25	153/29	153/30	154/4	154/5	154/6	154/7	154/8
154/9	154/10	154/11	154/12	154/13	154/14	154/15	154/26	155/1	155/2
155/3	155/4	155/5	155/6	155/7	155/8	155/9	155/10	155/11	156/1
156/2	156/3	156/4	156/5	156/6	156/7	156/8	156/9	156/11	156/12
156/13	156/14	158/4	158/5	158/8	158/9	158/10	158/11	158/12	158/13
158/14	158/15	158/16	158/17	158/18	158/21	158/22	158/23	158/24	158/26
158/27	158/28	158/29	159/1	159/2	159/3	159/4	159/5	159/6	159/7
159/8	159/9	159/10	159/11	159/12	159/13	159/14	159/15	159/17	159/18
159/19	159/20	159/23	159/24	159/25	159/28	159/29	159/30	160/1	160/2
160/3	160/4	160/5	160/6	160/7	160/8	160/9	160/10	160/11	160/12
160/13	160/14	160/15	160/16	160/17	160/18	160/19	160/20	160/21	160/22
160/23	160/24	160/25	160/26	160/27	160/28	160/29	160/30	161/1	161/2
161/3	161/4	161/5	161/6	161/7	161/8	161/9	161/10	161/11	161/12
161/13	161/14	161/15	161/16	161/17	161/18	161/19	161/20	161/21	161/22
161/23	161/24	161/25	161/26	161/27	161/28	161/29	161/30	162/1	162/2
162/3	162/4	162/5	162/6	162/7	162/8	162/9	162/10	162/11	162/12
162/13	162/14	162/15	162/16	162/17	162/18	162/19	162/20	162/21	162/22
162/23	162/24	162/25	162/26	162/27	162/28	162/29	162/30	163/1	163/2
163/3	163/4	163/5	163/6	163/7	163/8	163/9	163/10	163/11	163/12
163/13	163/14	163/15	163/16	163/17	163/18	163/19	163/20	163/21	163/22
163/23	163/24	163/25	163/26	163/27	163/28	163/29	163/30	164/1	164/2
164/3	164/4	164/5	164/6	164/7	164/8	164/9	164/10	164/11	164/12
164/13	164/14	164/15	164/16	164/17	164/20	164/21	164/22	164/25	164/26
164/27	164/30	165/1	165/2	165/3	165/4	165/6	165/7	165/8	165/9
165/10	165/11	165/12	165/13	165/14	165/15	165/16	165/17	165/18	165/19
165/20	165/21	165/22	165/23	165/24	165/25	165/26	165/27	165/28	165/29
165/30	166/3	166/4	166/5	166/6	166/9	166/10	166/11	166/12	166/14
166/15	166/16	166/17	166/18	166/19	166/20	166/21	166/22	166/23	166/24
166/25	166/26	166/27	166/28	166/29	166/30	168/30	169/26	169/27	169/28
169/29	169/30	170/26	170/27	170/28	170/29	170/30	171/26	171/27	171/28
171/29	171/30	173/28	173/29	173/30	174/26	174/27	174/28	174/29	174/30
175/21	175/22	175/23	175/24	175/25	175/26	175/27	175/28	176/20	176/21
176/22	176/23	176/24	176/25	176/27	176/28	176/29	176/30	202/1	202/6
202/7	202/8	202/9	202/10	202/11	202/12	202/13	202/14	202/15	202/16
202/17	202/18	202/19	202/20	202/21	202/22	202/23	202/24	202/25	202/26
202/27	202/28	202/29	202/30	203/1	203/2	203/3	203/4	203/5	203/6
203/7	203/8	203/9	203/10	203/11	203/12	203/13	203/14	203/15	203/16
203/17	203/18	203/21	203/22	203/26	205/28	205/29	205/30	206/18	206/19
206/22	206/23	206/26	206/27	206/28					
Irish Sea and North Channel									
106/3	106/4	106/5	106/8	106/9	106/10	106/25	107/1	107/6	108/2
108/3	108/4	108/5	108/7	108/8	108/9	108/10	108/14	108/15	108/19
108/20	108/24	108/25	108/29	108/30	109/1	109/2	109/3	109/4	109/5

Table 2.1: List of Blocks offered in the 31st Seaward Licensing Round

109/6	109/7	109/8	109/9	109/10	109/11	109/15	109/26	110/1	110/2d
110/4	110/6	110/7b	110/8b	110/9c	110/10	110/11	110/12c	110/14e	110/14f
110/16	110/17	110/18	110/21a	110/21b	110/23	111/3	111/4	111/9	111/10
111/15	111/25	111/29	111/30	112/11	112/12	112/13	112/14	112/16	112/17
112/29	112/30	113/22	113/26c	113/27f	125/18	125/19	125/20	125/23	125/24
125/25	125/30	126/26							
South West Approaches and Celtic Sea									
72/4	72/5	72/8	72/9	72/10	72/13	72/14	72/15	72/17	72/18
72/19	72/20	72/22	72/23	72/24	72/25	73/1	73/2	73/3	73/4
73/5	73/6	73/7	73/8	73/9	73/10	73/11	73/12	73/13	73/14
73/15	73/16	73/17	73/18	73/19	73/21	74/1	74/2	74/3	74/4
74/5	74/6	74/7	74/8	74/9	74/10	74/11	74/12	75/1	75/2
75/3	82/20	82/25	82/29	82/30	83/3	83/4	83/5	83/8	83/9
83/10	83/12	83/13	83/14	83/15	83/16	83/17	83/18	83/19	83/20
83/21	83/22	83/23	83/24	83/25	83/26	83/27	83/28	83/29	83/30
84/1	84/2	84/3	84/4	84/5	84/6	84/7	84/8	84/9	84/10
84/11	84/12	84/13	84/14	84/15	84/16	84/17	84/18	84/19	84/20
84/21	84/22	84/23	84/24	84/25	84/26	84/27	84/28	84/29	84/30
85/1	85/6	85/11	85/12	85/13	85/14	85/15	85/16	85/17	85/18
85/19	85/20	85/21	85/22	85/23	85/24	85/25	85/26	85/27	85/28
85/29	85/30	86/6	86/7	86/8	86/9	86/10	86/11	86/12	86/13
86/14	86/15	86/16	86/17	86/18	86/19	86/20	86/21	86/22	86/23
86/24	86/25	86/26	91/25	91/29	91/30	92/5	92/10	92/13	92/14
92/15	92/16	92/17	92/18	92/19	92/20	92/21	92/22	92/23	92/24
92/25	92/26	92/27	92/28	92/29	92/30	93/1	93/2	93/3	93/4
93/5	93/6	93/7	93/8	93/9	93/10	93/11	93/12	93/13	93/14
93/15	93/16	93/17	93/18	93/19	93/20	93/21	93/22	93/23	93/24
93/25	93/26	93/27	94/1	94/2	94/3	94/4	94/5	94/6	94/7
94/8	94/9	94/11	94/12	94/13	94/16	94/17	102/10	102/14	102/15
102/18	102/19	102/20	102/22	102/23	102/24	102/25	102/27	102/28	102/29
102/30	103/1	103/6	103/7	103/11	103/12	103/16	103/17	103/18	103/21
103/22	103/23	103/24	103/25	103/26	103/27	103/28	103/29	103/30	
English Channel									
97/25	97/30	98/11b	98/12	98/13	98/16	98/17	98/18	98/21	98/26
99/12	99/13	99/14	99/15						

Figure 2.1: Location of Blocks offered in the context of existing licences



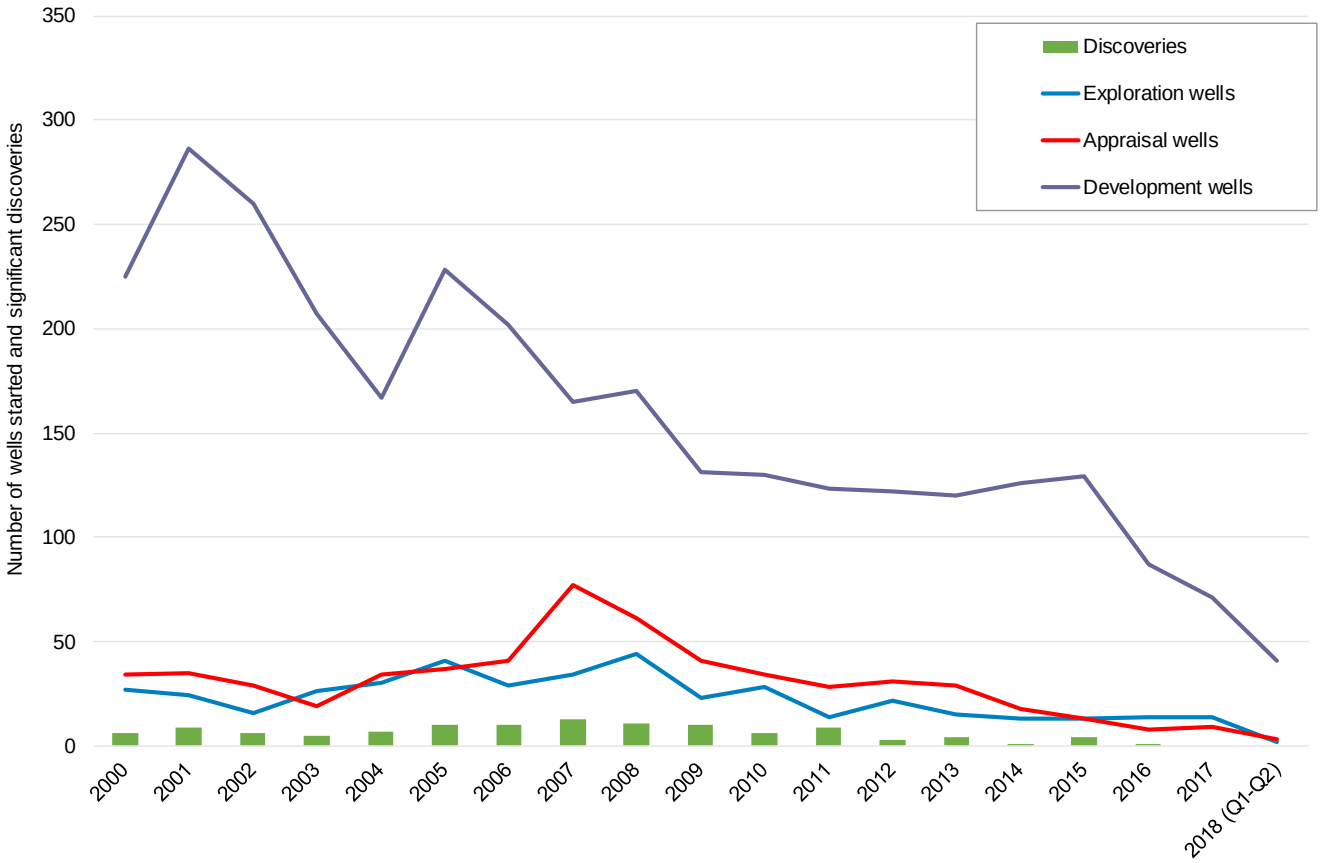
2.3.1 Likely scale of activity

This assessment has been undertaken at the stage at which Blocks are offered for licensing. To place the scale of the 31st Round in context, recent seaward licensing rounds (i.e. those having taken place in the last 10 years) have attracted applications for between 9% and 28% of the Blocks offered (for the 29th and 30th Rounds, covering frontier and mature areas respectively). On past experience the activity that actually takes place is less than what is included in the work programme at the licence application stage. A proportion of Blocks awarded may be relinquished without any offshore activities occurring. Activity after the Initial Term is much harder to predict, as this depends on the results of the initial phase, which is, by definition, exploratory. Typically less than half the wells drilled reveal hydrocarbons, and of that, less than half will have a potential to progress to development. For example, the OGA analysis of exploration well outcomes from the Moray Firth & Central North Sea between 2003 and 2013 indicated an overall technical success rate of 40% with respect to 150 exploration wells and 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 2.2 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 development drilling, installation of infrastructure such as wellheads, pipelines and possibly fixed platform production facilities, although recent developments are mostly tiebacks to existing production facilities rather than stand-alone developments. For example, of the 39 current projects identified by the OGA's Project Pathfinder (as of 24th August 2018)[11], 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 2.2 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.

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

Figure 2.2: UKCS Exploration, appraisal & development wells, and significant discoveries since 2000



Note: The description "significant" generally refers to the flow rates that were achieved (or would have been reached) in well tests (15 mmcfgd or 1000 BOPD). It does not indicate the commercial potential of the discovery.

Source: OGA Drilling Activity (July 2018), Significant Offshore Discoveries (April 2017)

2.3.2 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 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 HRA (see Table 2.2).

For the purposes of this screening assessment, the implications of geophysical survey and drilling are considered in a generic way for all the Blocks offered; a generic description of the nature and scale of these activities is given in Table 2.2 below. The screening assessment considers:

- The potential physical disturbance and drilling effects associated with the drilling of an exploration or appraisal well within each Block offered.
- The potential underwater noise effects associated with undertaking a seismic survey within each Block offered (as well as undertaking site-specific seismic operations including rig site survey and Vertical Seismic Profiling).
- The potential for in-combination effects.

Subsequent Appropriate Assessment (AA) of Blocks applied for, for which a likely significant effect cannot currently be excluded will consider an approach based on the maximum likely work programme associated with the Initial Term and its associated Phases A-C.

Table 2.2: Indicative overview of potential activities that could arise from Block licensing

Potential activity	Description
Initial Term Phase B: Geophysical survey	
Seismic (2D and 3D) survey	2D seismic involves a survey vessel with an airgun array and a towed hydrophone streamer (up to 12 km long), containing several hydrophones along its length. The reflections from the subsurface strata provide an image in two dimensions (horizontal and vertical). Repeated parallel lines are typically run at intervals of several kilometres (minimum *ca*. 0.5km) and a second set of lines at right angles to the first to form a grid pattern. This allows imaging and interpretation of geological structures and identification of potential hydrocarbon reservoirs. 3D seismic survey is similar but uses several hydrophone streamers towed by the survey vessel. Thus closely spaced 2D lines (typically between 25 and 75m apart) can be achieved by a single sail line. These deep-geological surveys tend to cover large areas (300-3,000km^2) and may take from several days up to several weeks to complete. Typically, large airgun arrays are employed with 12-48 airguns and a total array volume of 3,000-8,000 in^3. From available information across the UKCS, arrays used on 2D and 3D seismic surveys produce most energy at frequencies below 200Hz, typically peaking at 100Hz, and with a peak source level of around 256dB re 1µPa @ 1m (Stone 2015). While higher frequency noise will also be produced which is considerably higher than background levels, these elements will rapidly attenuate with distance from source; it is the components < 1,000Hz which propagate most widely.
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	Semi-submersible rigs use either anchors (deployed and recovered by anchor handler vessels) or dynamic positioning (DP) to manoeuvre into and stay in position over the well location. Eight to 12 anchors attached to the rig by cable or chain are deployed radially from the rig (anchor spreads are typically up to 1.5km long in the North Sea and 3km long in deep waters such as to the west of Shetland); part of the anchoring hold is provided by a proportion of the cables or chains lying on the seabed (catenary). In the deepest waters to the west of the UK DP drill ships are typically used. Jack-up rigs are used in shallower waters (normally <120m, for example in the southern and central North Sea and Irish Sea) and jacking the rig legs to the seabed supports the drilling deck. 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. Unlike semi-submersible rigs, jack-up rigs do not require anchors to maintain station. Jack-up rigs deployed for exploration activities do not typically use anchors as positioning is achieved using tugs and 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. A review of 18 Environmental Statements, six of which included drilling operations in the Irish Sea since 2009 (in quadrants 110 and 113) and the rest covering wells in the southern North Sea since 2007 (in quadrants 42, 43, 44, 47, 48, 49 and 53), indicated that rig stabilisation was either not considered necessary and/or assessed as a worst case contingency option. Where figures were presented, the spatial scale of potential rock placement operations was estimated at between 0.001-0.004km^2 per rig siting. A BEIS study due to report this year will compare the rock volumes estimated in operator applications (e.g. drilling application) with those actually used (from close-out returns).

Potential activity	Description
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 purposes of the screening assessment it is assumed that effects may occur within 500m of the well location covering an area in the order of 0.8km^2.
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 be 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.
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).

Potential activity	Description
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).

3 Relevant Natura 2000 sites

Sites were considered for inclusion/exclusion in the screening process with respect to whether there was an impact pathway[12] between the marine features for which they are designated and potential exploration/appraisal activities which could arise following Block licensing (see Table 2.2). Sites considered include designated Natura 2000 sites and potential sites for which there is adequate information on which to base an assessment.

Guidance in relation to sites which have not yet been submitted to the European Commission is given by Circular 06/2005 (ODPM 2005) which states that: "*Prior to its submission to the European Commission as a cSAC, a proposed SAC (pSAC) is subject to wide consultation. At that stage it is not a European site and the Habitats Regulations do not apply as a matter of law or as a matter of policy. Nevertheless, planning authorities should take note of this potential designation in their consideration of any planning applications that may affect the site*." In accordance with the National Planning Policy Framework (DCLG 2012), devolved policy (e.g. Scottish Planning Policy) and Marine Policy Statement (HM Government 2011), the relevant sites considered here include classified and potential SPAs, designated and candidate SACs and Sites of Community Importance (SCIs), and any proposed site extensions. The full details of all sites including their type, status and qualifying features are provided in Appendix A.

If further Natura 2000 sites are established during this HRA process, they will be subject to screening and if necessary included in subsequent Appropriate Assessment stages. The primary sources of site data were the latest JNCC SAC[13] and SPA[14] summary data (versions as of 1st June 2018). Interest features and site characteristics were filtered for their coastal and marine relevance (also noting the separate data on Natura 2000 sites with marine components, versions as of 1st June 2018 and 4th December 2017 respectively[15]). The websites of the relevant Statutory Nature Conservation Bodies (SNCBs) were also reviewed to verify and augment site information including SNH[16], Natural England[17,18,] Natural Resources

[12] Based on knowledge of potential sources of effect resulting from the activities (from previous BEIS AAs and SEAs), and pathways by which these effects may impact receptors present on the site (from previous BEIS AAs and SEAs, Statutory Nature Conservation Body advice on operations and literature sources etc). Also refer to Section 4.2.

[13] http://jncc.defra.gov.uk/page-1461

[14] http://jncc.defra.gov.uk/page-1409

[15] http://jncc.defra.gov.uk/page-4661

[16] http://gateway.snh.gov.uk/sitelink/index.jsp

[17] http://publications.naturalengland.org.uk/category/6490068894089216

[18] https://www.gov.uk/government/collections/conservation-advice-packages-for-marine-protected-areas

Wales (NRW)[19] and the Department of Agriculture, Environment and Rural Affairs (DAERA)[20]. Any sites designated in the future would also be considered as necessary in subsequent project-specific assessments.

The sites included in the screening process include:

- Coastal and marine Natura 2000 sites along the coasts of the United Kingdom and in territorial waters
- Offshore Natura 2000 sites (i.e. those largely or entirely beyond 12nm from the coast)
- Riverine Natura 2000 sites designated for migratory fish and/or the freshwater pearl mussel
- Relevant sites in adjacent states
- Coastal Ramsar sites

A number of Natura 2000 sites are designated for mobile species (seabirds, marine mammals and fish) which may be present beyond site boundaries. These are considered in Section 4.6.

In addition, Natura 2000 sites in the waters of other member states at or adjacent to the UK median line have been considered. All relevant sites are shown in Figures 3.1 to 3.10 overleaf with further site details in Appendix A.

[19] http://naturalresourceswales.gov.uk/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/find-protected-areas-of-land-and-seas/designated-sites/?lang=en

[20] https://www.daera-ni.gov.uk/topics/biodiversity-land-and-landscapes/protected-areas

Figure 3.1: SPAs included in the screening process: central and northern North Sea

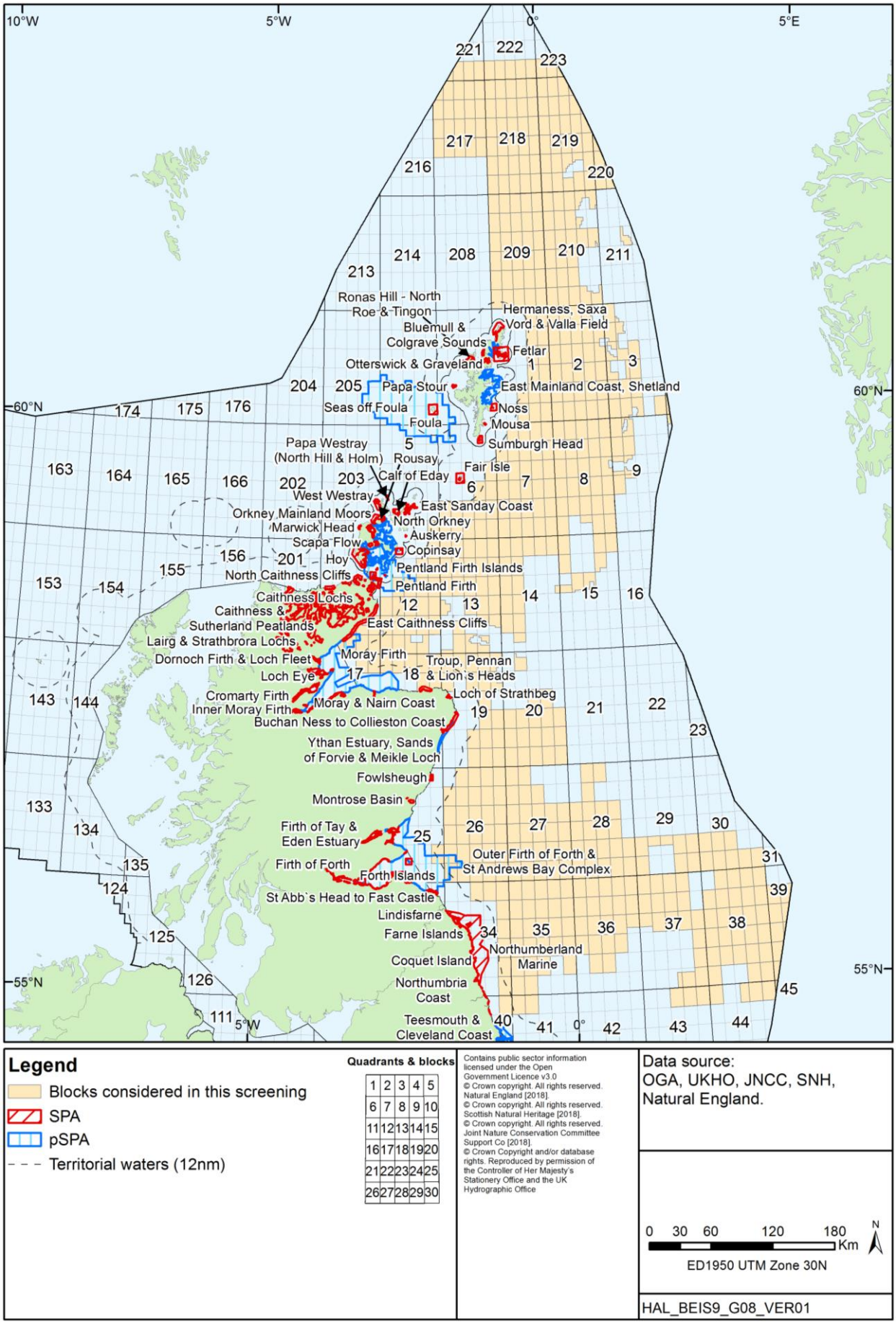


Figure 3.2: SPAs included in the screening process: west of Shetland and Rockall

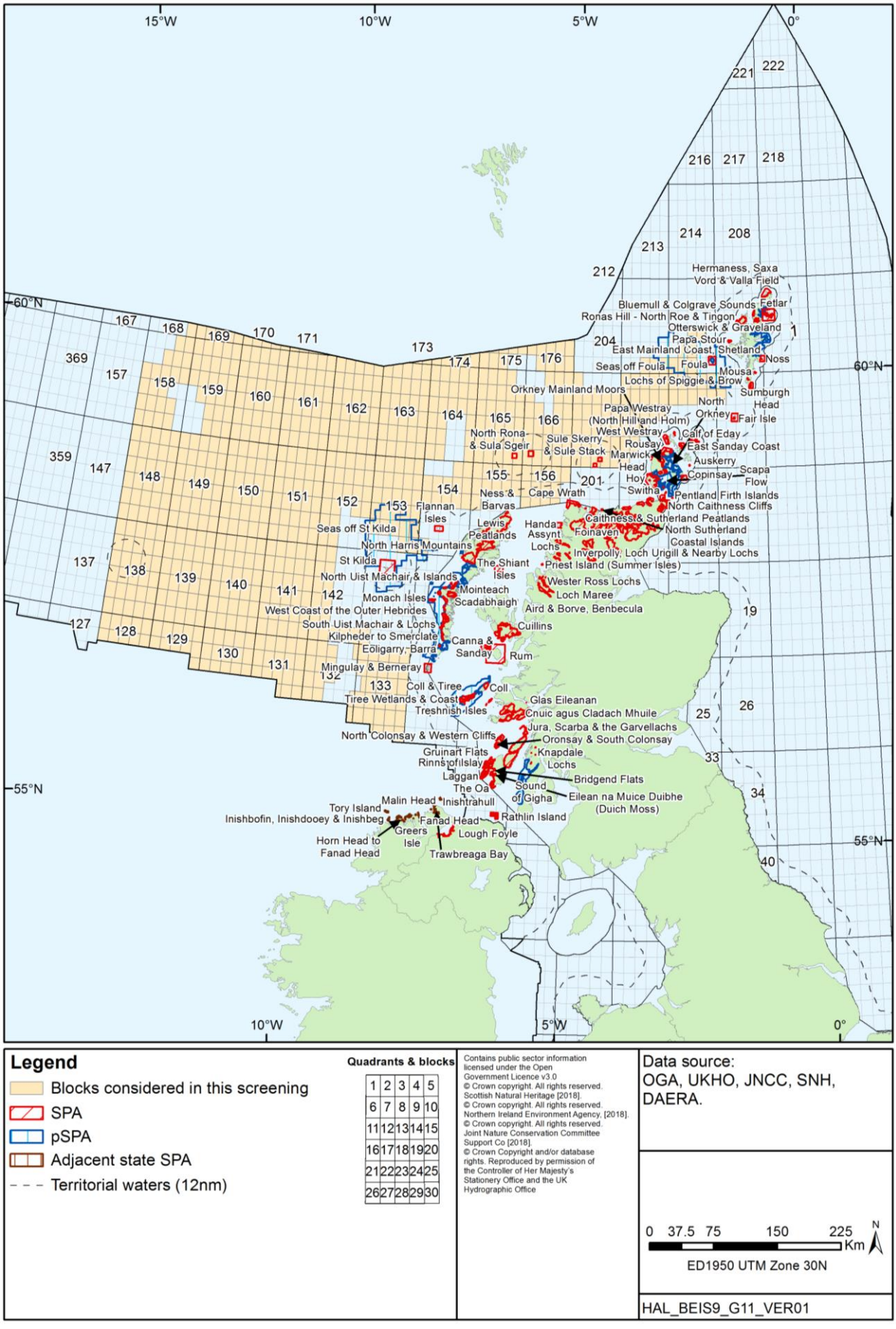


Figure 3.3: SPAs included in the screening process: Irish Sea and North Channel

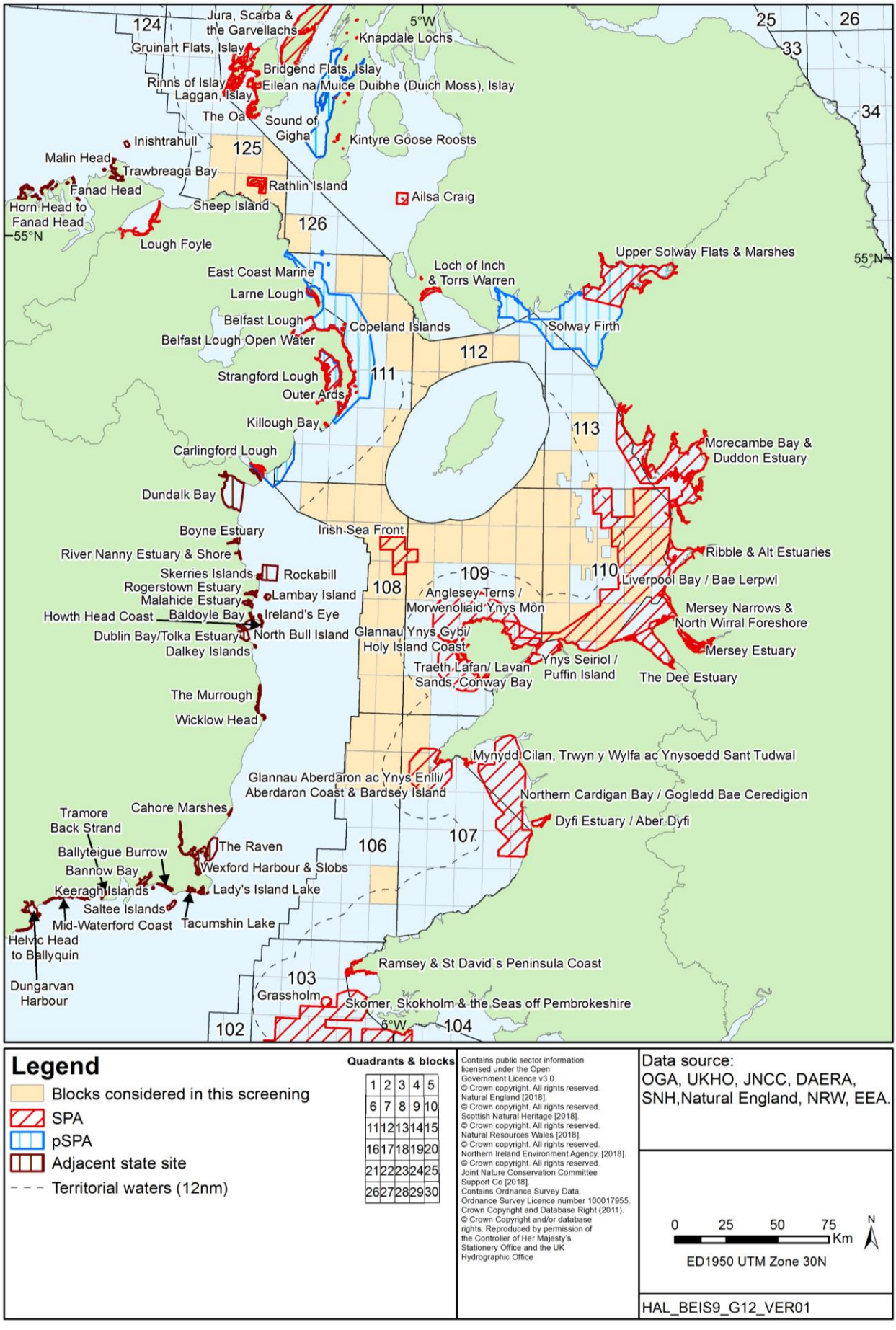


Figure 3.4: SPAs included in the screening process: South West Approaches and Celtic Sea

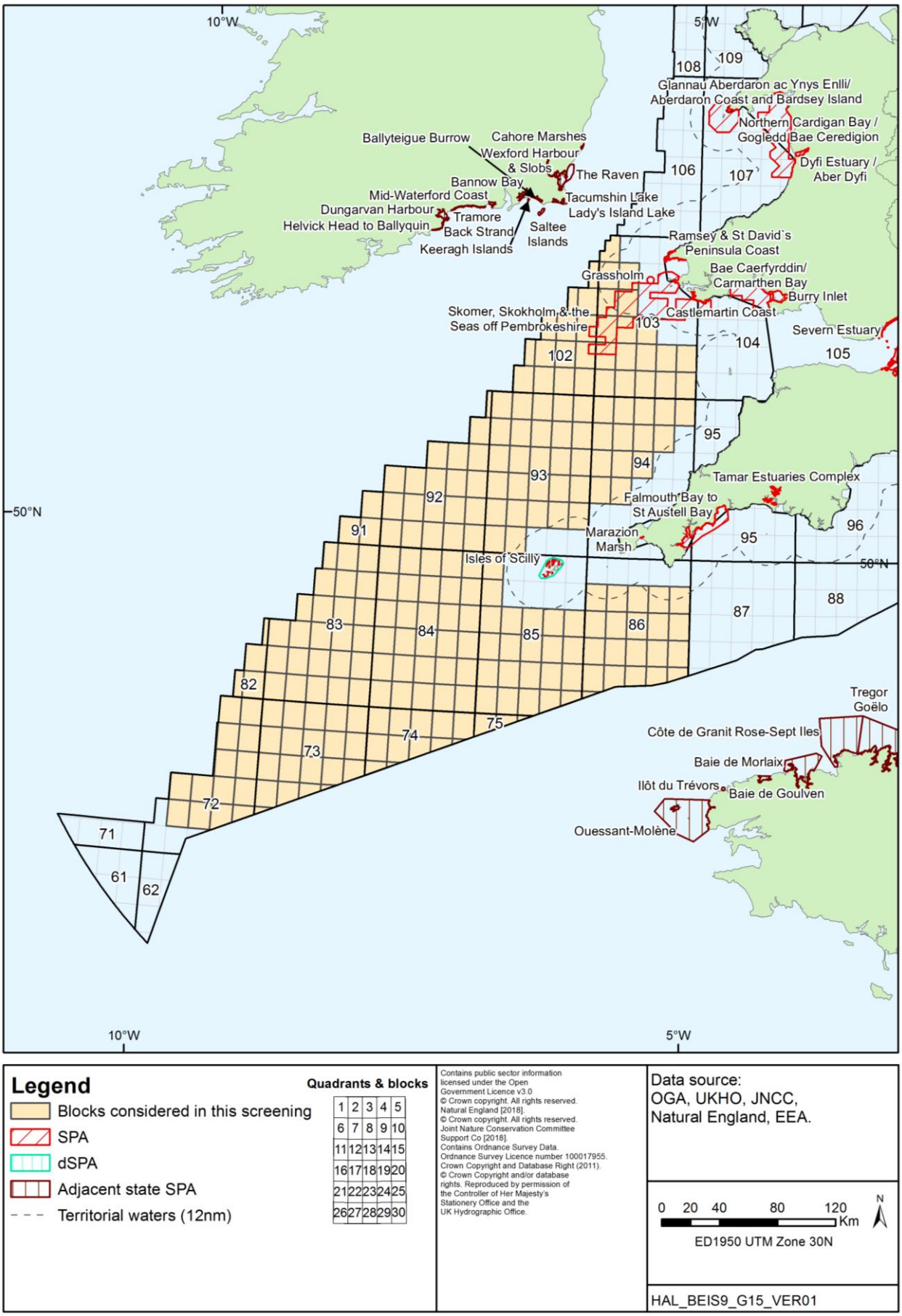


Figure 3.5: SPAs included in the screening process: English Channel

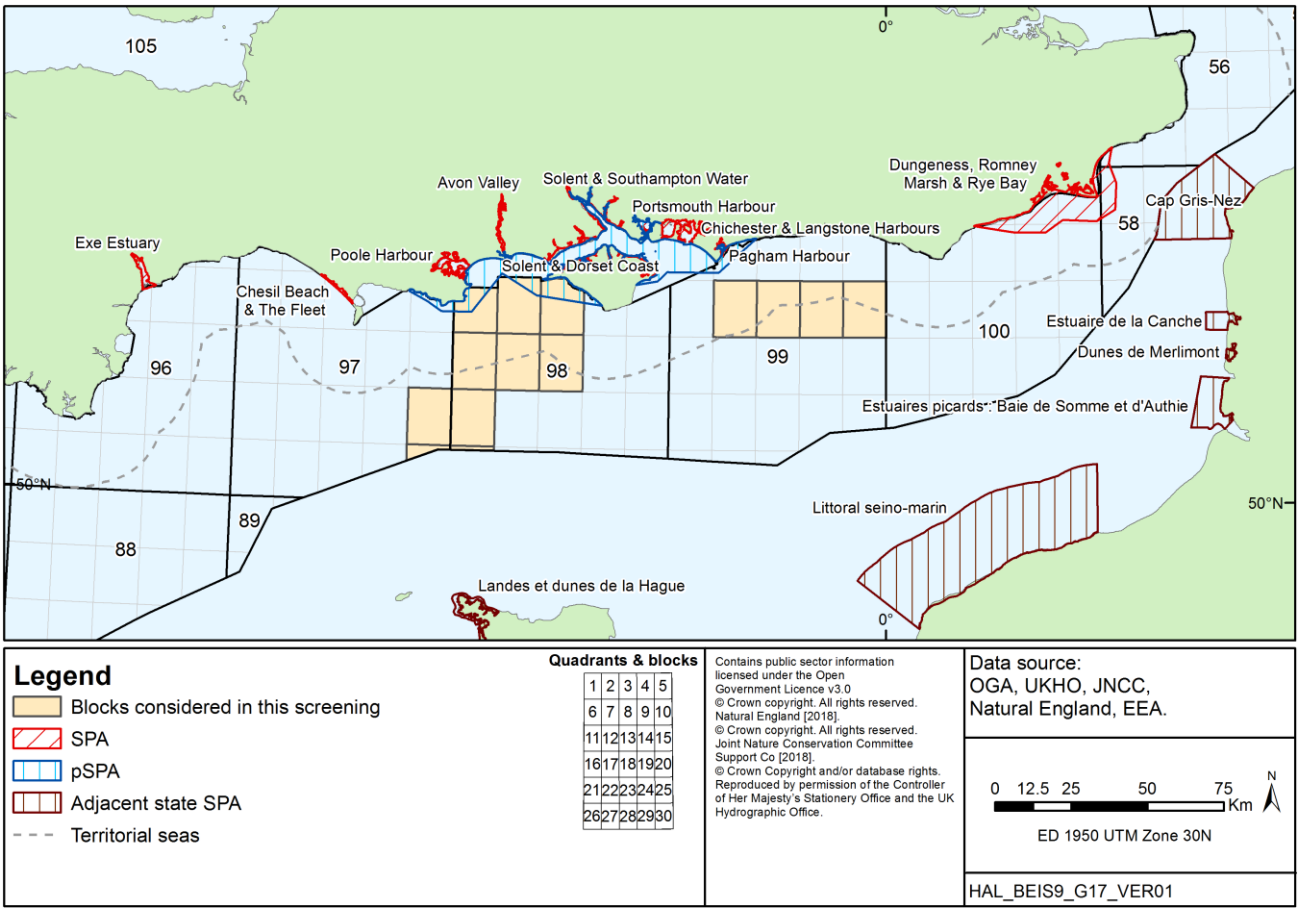


Figure 3.6: SACs included in the screening process: central and northern North Sea

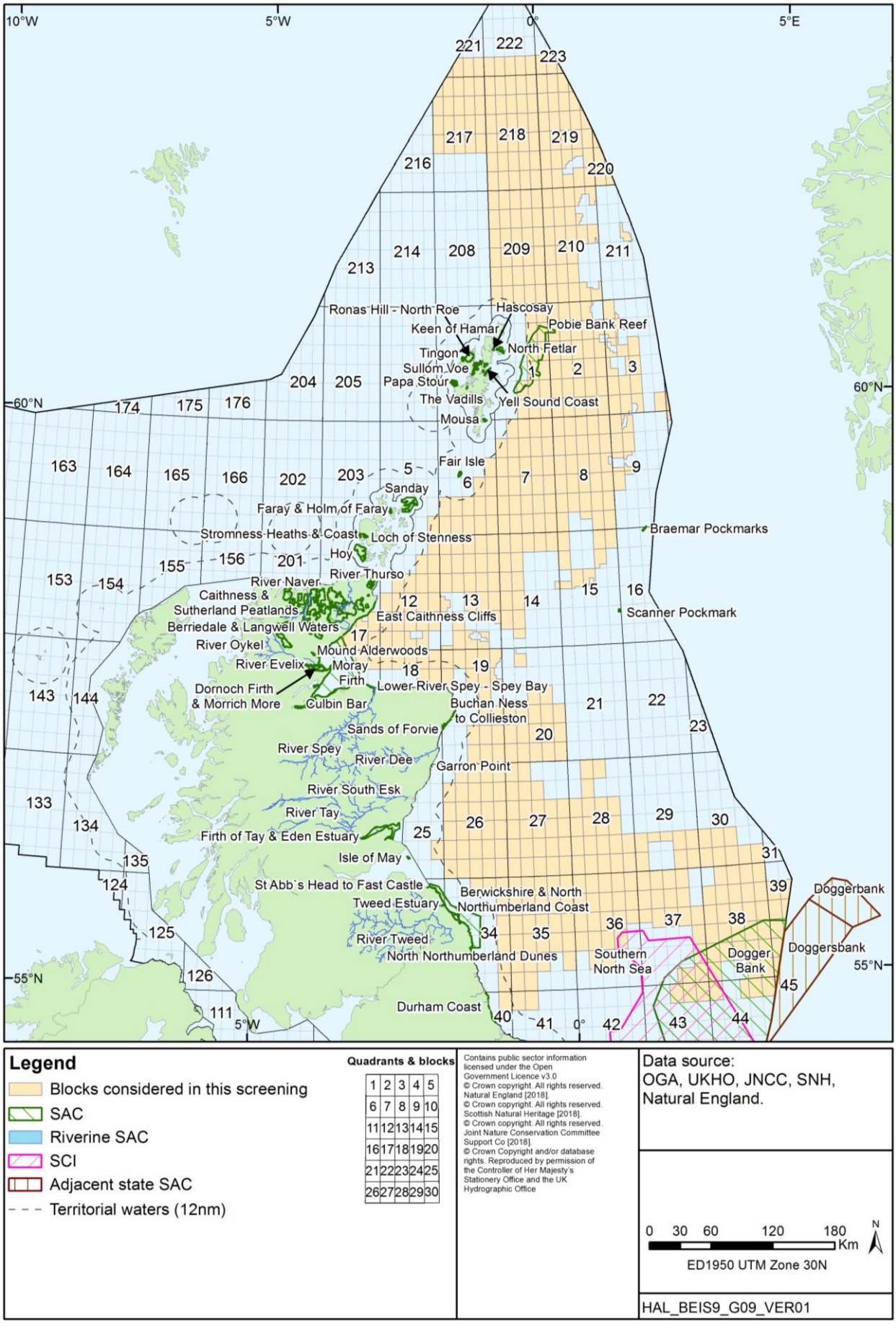


Figure 3.7: SACs included in the screening process: west of Shetland and Rockall

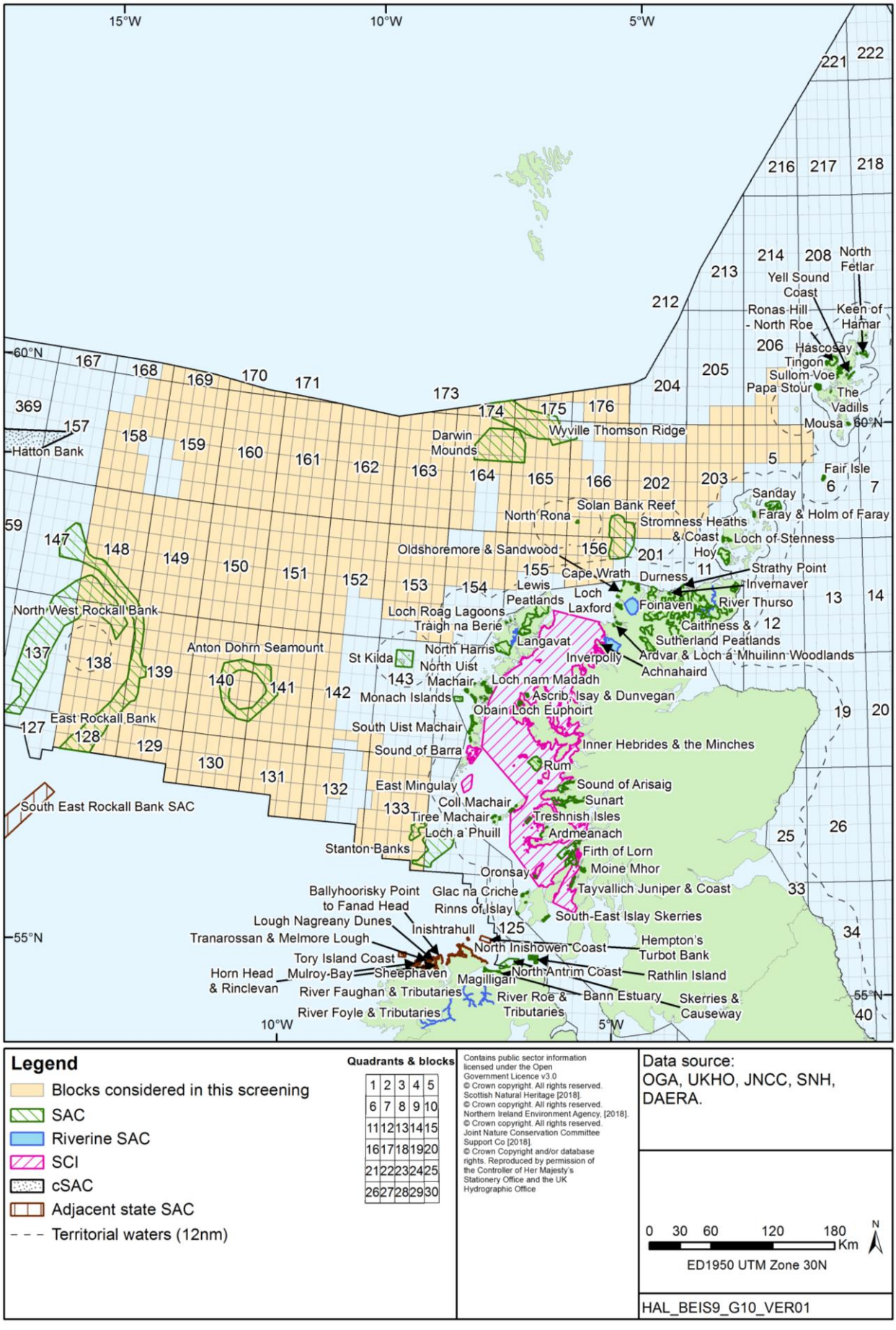


Figure 3.8: SACs included in the screening process: Irish Sea and North Channel

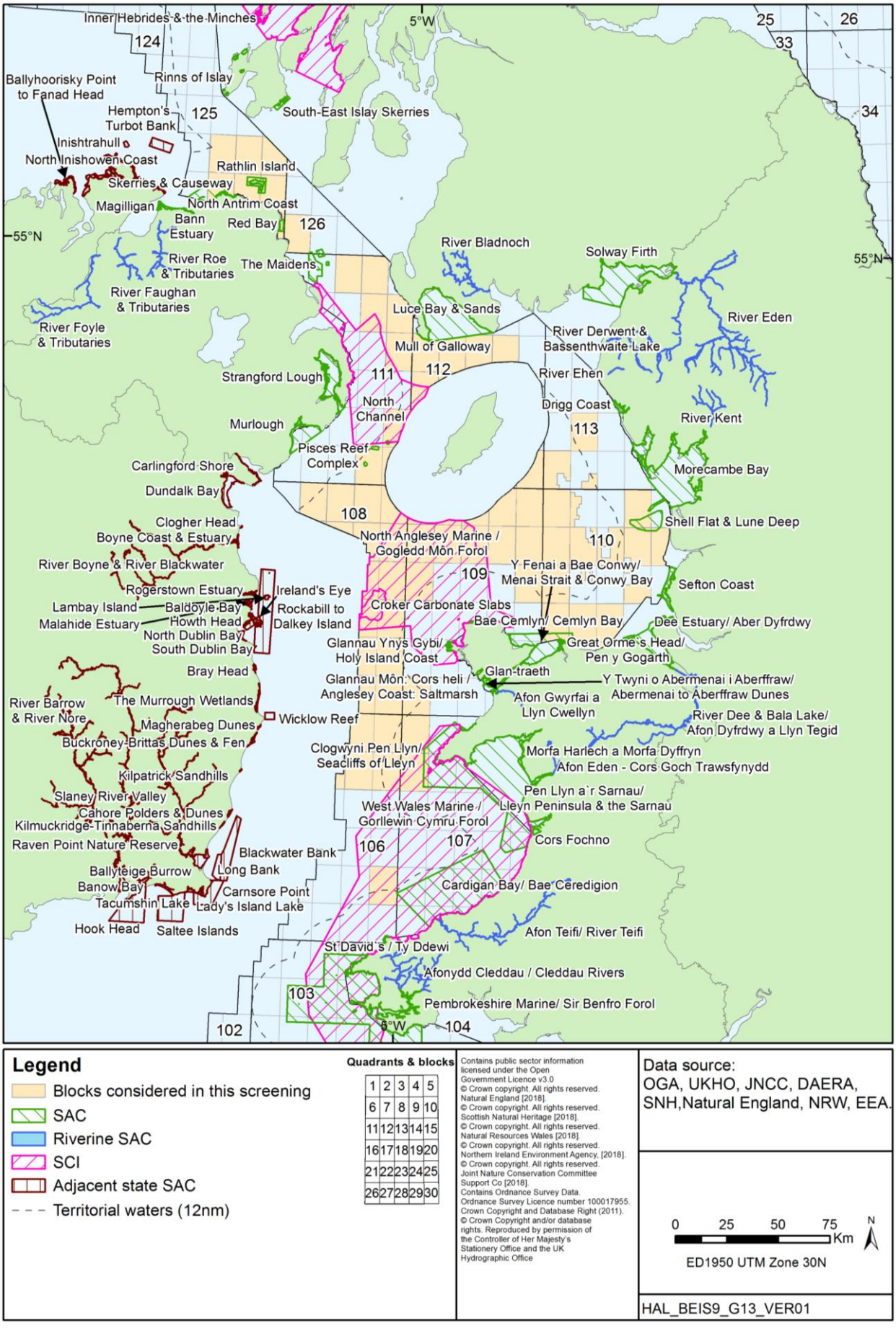


Figure 3.9: SACs included in the screening process: South West Approaches and North Channel

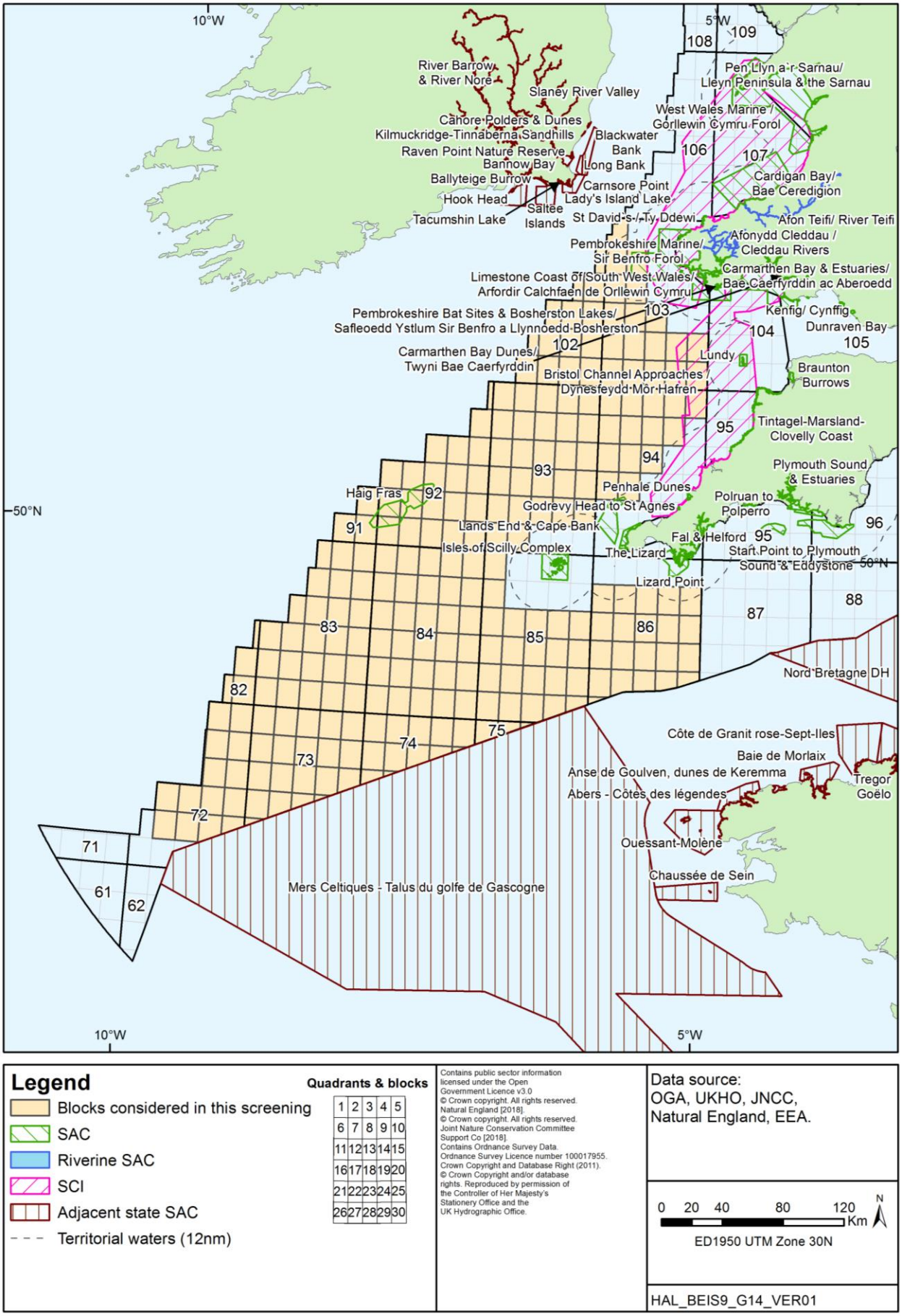
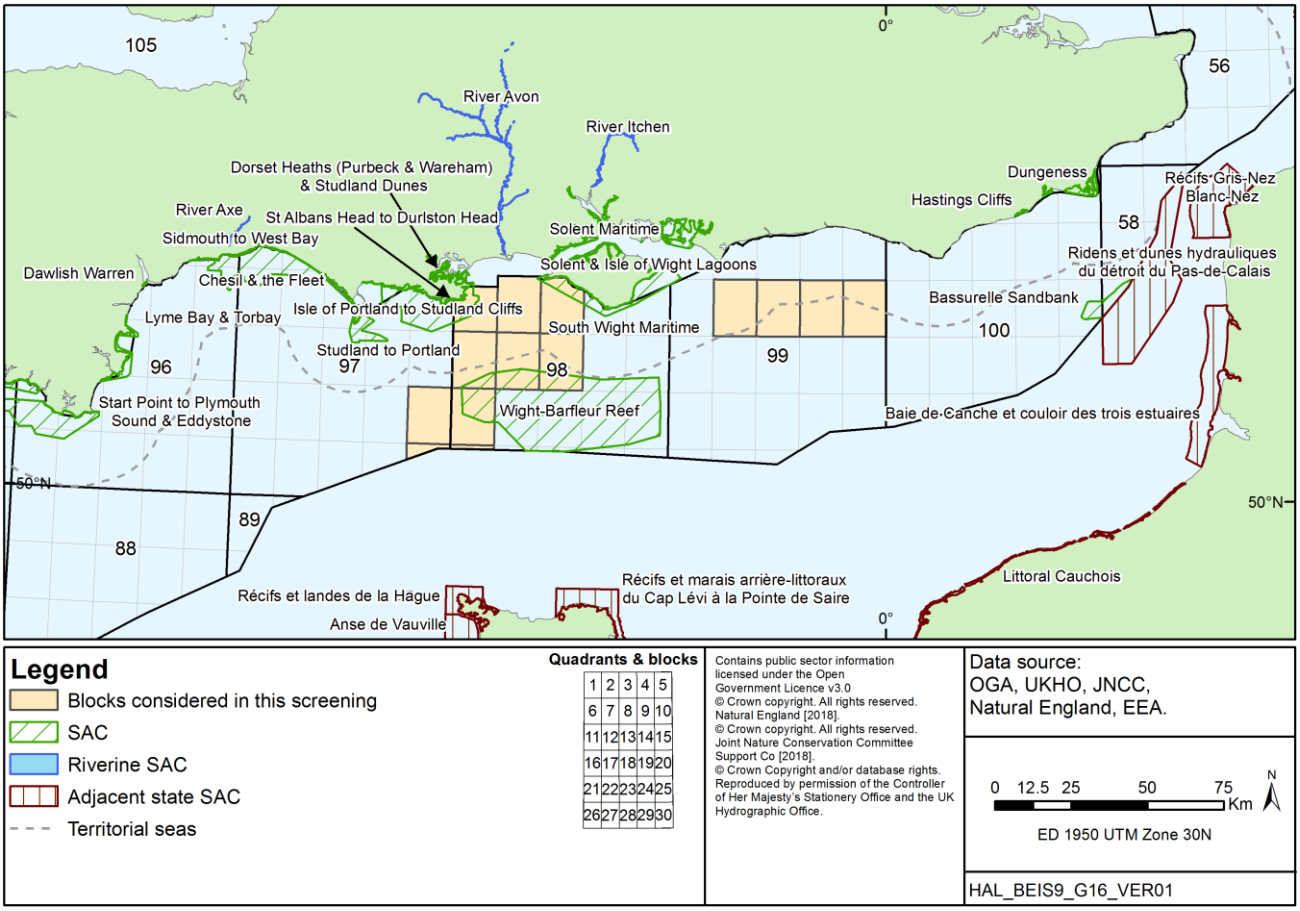


Figure 3.10: SACs included in the screening process: English Channel



4 Screening Assessment Process

4.1 Introduction

This screening assessment is the first stage of an HRA to determine whether licensing of any of the Blocks offered in the 31st Round is likely to have a significant effect on a relevant European site, either individually or in combination with other plans or projects. The approach to the screening assessment has been undertaken in accordance with the European Commission Guidance (EC 2000) augmented by reference to a range of other guidance and reports (see list in Section 1.3).

The approach taken to screening has been to:

- Define the likely location and nature of exploration/appraisal activities that could follow licensing, together with their potential to result in likely significant effects on European sites – see Section 2.
- Identify all relevant European sites and their qualifying primary and non-primary features with the potential to be affected by exploration/appraisal activities (i.e. those sites with marine features or with a marine ecological linkage) – see Section 3 and Appendix A.
- Screen the relevant sites for the likelihood of significant effects that could result from the licensing of individual Blocks offered, based on the nature and scale of potential effects from exploration and appraisal activities and mapping in a geographic information system (GIS) – see Section 5. Consideration is also given as appropriate to the potential for mobile qualifying species (e.g. seabirds, marine mammals and fish) to be present beyond relevant site boundaries – see Section 4.6.
- Screen the relevant sites for likely significant effects that could result from the licensing of individual Blocks offered, in combination with other marine activities and plans – see Sections 4.7 and 5.
- Those Blocks which are screened in (i.e. for which likely significant effects on relevant European sites could not be discounted at the screening stage) will be subject to a second stage of HRA, Appropriate Assessment, if applied for and before decisions on whether to grant licences are taken – see Section 6 and Appendix B.

4.2 Sources of effect considered in this screening

As outlined in Section 2.3, activities which may be undertaken during the initial term of a Seaward Production Licence will comprise exploration activities in the form of seismic survey and exploration or appraisal drilling. The foreseeable interactions from these activities with the potential to result in likely significant effects on relevant Natura 2000 sites are therefore

assessed in this report. These activities, their environmental effects, and relevant legal and other controls are extensively described in the previous SEA Environmental and Technical Reports[21] and are not duplicated in detail here.

Subsequent field 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 a screening procedure and tests under the Habitats Directive.

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 of the *Conservation of Habitats and Species Regulations 2017*[22]*,* 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[23], along with a standard description of the 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

[21] https://www.gov.uk/guidance/offshore-energy-strategic-environmental-assessment-sea-an-overview-of-the-sea-process

[22] 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.

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

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[24]. 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. The review concluded that the evidence base for potential effect of oil and gas exploration from successive Offshore Energy SEAs covers the range of pressures identified in the advice for the relevant sites (as summarised in Sections 4.4-4.6) 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 4.3) 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 have been taken into account during the screening process.

Consideration of the potential for activities to result in likely significant effects was made, informed by the evidence base in the scientific literature, relevant BEIS Strategic Environmental Assessments, and recent Environmental Statements for the relevant activities. Based on this consideration, this screening assessment addresses those sources of impact generally considered to have the potential to affect relevant Natura 2000 sites, specifically:

- Physical disturbance and drilling effects (e.g. from rig siting, marine discharges, rig/vessel presence and movement)
- Underwater noise effects
- In-combination effects

Potential accidental events, including spills, are not considered in this HRA screening 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 process for specific projects that could potentially follow licensing when the location, nature and timing of the proposed activities are available to inform a meaningful assessment of such risks.

[24] 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.

4.3 Existing regulatory requirements and controls

The HRA screening assumes that the high level controls described below are applied as standard to activities since they are legislative requirements which if not adhered to would constitute an offence. These are distinct from mitigation measures which may be identified and employed at a project-specific level to avoid adverse effects on site integrity.

4.3.1 Physical disturbance and drilling effects

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)[25]. 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 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 environmental impact assessments, (where necessary through HRAs) and chemical risk assessments under existing permitting procedures.

4.3.2 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

[25] See BEIS (2018). The Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 (as amended) – a guide.

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 should 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*[26]. 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[27] 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.

4.4 Physical disturbance and drilling effects

Exploration activities may exert the following pressures[28] which have the potential to cause physical disturbance and drilling effects on Natura 2000 sites:

- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion from jack-up drilling rig spud can placement, semi-submersible drilling rig anchor placement, dragging and the contact of anchor cables and chains with the seabed (see Section 4.4.1)

[26] 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.
[27] https://www.ogauthority.co.uk/media/4942/other-regulatory-issues_june-2018.docx
[28] Following those noted in Section 4.2.

- Physical change to another seabed type through rock placement around jack-up legs for rig stabilisation (see Section 4.4.2)
- Abrasion/disturbance of the substrate on the surface of the seabed and smothering through the discharge of surface hole cuttings around the well, placement of wellhead assembly, and smothering by settlement of drill cuttings onto the seabed following discharge near sea surface (see Section 4.4.2)
- Visual disturbance (and underwater noise changes, covered in Section 4.5), introduction of light and collision associated with the presence and movement of vessels causing displacement of sensitive receptors (see Section 4.4.3)

These are described briefly below and have informed the setting of screening criteria for physical disturbance and drilling effects (Section 4.4.4).

4.4.1 Physical damage to benthic habitats

Semi-submersible rigs typically use anchors to hold position, typically between 8 and 12 in number at a radius related to water depth, seabed conditions and anticipated metocean conditions. The seabed footprint associated with semi-submersible rig anchoring results from a combination of anchor scars caused by anchors dragging before gaining a firm hold, and scraping by the cable and/or chain linking the anchor to the rig, where these contact the seabed (the catenary contact). In relatively shallow North Sea depths, rig anchors extend to a radius of up to *ca*. 1,500m (note that semi-submersible rigs are typically not used in water depths of less than 120m). In contrast, in the Faroe-Shetland Channel, a rig drilling in 1,200m water depth had anchors extending to a radius of some 2,750m (which accords with Gulf of Mexico experience, see Continental Shelf Associates 2006). In the deeper waters to the west of the UK, the use of anchors could be avoided through the use of dynamically positioned (DP) drill ships or DP semi-submersible rigs. These use a number of thrusters and accurate positioning information to maintain their station.

Jack-up rigs, normally used in shallower water (<120m), 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, as part of the Walney Extension wind farm geophysical survey in April-July 2011 in the Irish Sea, sidescan sonar identified spud can depressions associated with two well locations (113/26b-3 and 113/27b-6), drilled in April 2010 and November 2009 respectively (Gardline Geosurvey 2013). No information on the depths of the depressions was provided. 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 below).

4.4.2 Physical loss of benthic habitats and smothering

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).

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

The UK Government/Industry Environmental Monitoring Committee has reviewed UK offshore oil and gas monitoring requirements 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 surveys around specific single and multi-well sites. The most recent survey was undertaken as part of BEIS SEA monitoring with a survey in the Fladen Ground in late 2015 (see Appendix 1b of OESEA3).

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

In contrast to historic oil based mud discharges[29], 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. Jones *et al.* (2006, 2012) compared pre- and post-drilling ROV surveys of a West of Shetland exploration well in Block 206/1a in *ca*. 600m water depth and documented physical smothering effects within 100m of the well. Outside the area of smothering, fine sediment was visible on the seafloor up to at least 250m from the well. After 3 years, there was significant reduction of cuttings material visible particularly in the areas with relatively low initial deposition (Jones *et al*. 2012). The area with complete cuttings cover had reduced from 90m to 40m from the drilling location, and faunal density within 100m of the well had increased considerably and was no longer significantly different from conditions further away.

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 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

[29] 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.

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).

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).

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. 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.

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[30]. The Convention includes Regulations with specified technical standards and requirements (IMO Globallast website[31]). 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.

4.4.3 Presence and movement of vessels

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). 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 existing helicopter, military and civilian aircraft activity levels. However, some Blocks on offer are in less-explored areas and helicopter traffic may deviate from established main routes (e.g. in the central and northern North Sea[32]), causing temporary disturbance of birds not previously exposed to this pressure.

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[33] 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

[30] 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
[31] http://archive.iwlearn.net/globallast.imo.org/the-bwmc-and-its-guidelines/index.html
[32] https://www.pplir.org/magazine/public-files/enr-6-1-15-5-10-may-07-nosa/download
[33] http://jncc.defra.gov.uk/pdf/Joint_SNCB_Interim_Displacement_AdviceNote_2017.pdf

farms which have a much larger spatial and temporal footprint than oil and gas exploration activities.

A significant number of various bird species migrate across the North Sea region twice a year or use the area as a feeding and resting area (OSPAR 2015). 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 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.

The presence and/or movement of vessels from and within Blocks during exploration and appraisal activities could also potentially disturb marine mammals foraging within or close to designated or potential SACs for which they are a qualifying feature. Reported responses include avoidance, changes in swimming speed, direction and surfacing patterns, alteration of the intensity and frequency of calls and increases in stress-related hormones (Rolland *et al.* 2012, Dyndo *et al.* 2015, Veirs *et al.* 2016). Harbour porpoises, white-sided dolphins and minke whales have been shown to respond to survey vessels by moving away from them, while white-beaked dolphins have shown attraction (Palka & Hammond 2001). A study on captive harbour porpoises in a semi-natural net-pen complex in a Danish canal, recorded their behaviour while simultaneously measuring underwater noise of vessels passing the enclosure; reaction to noise was defined to occur when a highly stereotyped ‘porpoising’ behaviour was observed. Porpoising occurred in response to almost 30% of vessel passages; the most likely behavioural trigger were medium- to high- frequency components (0.25–63 kHz octave bands) of vessel noise, while low- frequency components of vessel noise and additional pulses from echo-sounders could not explain the results (Dyndo *et al*. 2015). A tagging study of a small number of free-ranging porpoises in Danish coastal waters estimated that porpoises encountered vessel noise 17–89% of the time (from evaluation of the wideband sound and movement tag recordings). Occasional high-noise levels (coinciding with a fast ferry) were associated with vigorous fluking, bottom diving, interrupted foraging and even cessation of echolocation, leading to significantly fewer prey capture attempts at received levels greater than 96 dB re 1 mPa (16 kHz third-octave, Wisniewska *et al.* 2018).

More evidence is available on bottlenose dolphins, especially for coastal populations. Shore-based monitoring of the effects of boat activity on the behaviour of bottlenose dolphins off the US South Carolina coast, indicated that slow moving, large vessels, like ships or ferries, appeared to cause little to no obvious response in bottlenose dolphin groups (Mattson *et al*. 2005). Pirotta *et al*. (2015) used passive acoustic techniques to quantify how boat disturbance

affected bottlenose dolphin foraging activity in the inner Moray Firth. The presence of moving motorised boats appeared to affect bottlenose dolphin buzzing activity (foraging vocalisations), with boat passages corresponding to a reduction by almost half in the probability of recording a buzz. The boat effect was limited to the time where a boat was physically present in the sampled area and visual observations indicated that the effect increased for increasing numbers of boats in the area (Pirotta *et al.* 2013). Dolphins appeared to temporarily interrupt their activity when disturbed, staying in the area and quickly resuming foraging as the boat moved away.

Of primary concern for this HRA, is whether vessels linked to potential operations result in a significant increase to overall local traffic. New *et al*. (2013) developed a mathematical model simulating the complex social, spatial, behavioural and motivational interactions of coastal bottlenose dolphins in the Moray Firth to assess the biological significance of increased rate of behavioural disruptions caused by vessel traffic. A scenario was explored in which vessel traffic increased from 70 to 470 vessels a year but despite the more than six fold increase traffic, the dolphins' behavioural time budget, spatial distribution, motivations and social structure remained unchanged. While harbour porpoises appear to be more sensitive to potential disturbance than bottlenose dolphins, the increase in vessel traffic linked to the proposed plan is expected to be negligible (see Table 2.2). In UK waters, a modelling study indicated a negative relationship between the number of ships and the presence and abundance of harbour porpoises within relevant management units when shipping intensity exceeded a suggested threshold of approximately 50 ships per day (within any of the model's 5km grid cells) in the Celtic Sea/Irish Sea and 80 ships per day in the North Sea (Heinänen & Skov 2015). The Marine Management Organisation commissioned project "Mapping UK shipping density and routes from AIS" (MMO 2014b) and the 2015 national dataset of marine vessel traffic[34] provides relevant shipping density information[35]. From 2015 AIS-derived ship density data, the approaches to major ports such as in the Humber and Thames regions had estimated shipping densities of up to 500 vessels per week, with the majority of coastal waters (10-25 vessels per week) and offshore waters (<5 vessels per week) supporting much lower densities. Jones *et al.* (2017) used the MMO (2014b) data to highlight areas where high rates of co-occurrence between seals at-sea and shipping coincided with SACs. They predicted exposure to shipping (and associated shipping noise) was likely to be high in areas where very high intensities of spatial overlap occurred for one or both species of seals such as Orkney (e.g. Faray and Holm of Faray SAC), Shetland (e.g. Yell Sound Coast SAC), east coast of Scotland and England (e.g. Berwickshire and North Northumberland Coast SAC, Humber Estuary SAC, the Wash and North Norfolk Coast SAC), west Scotland (South East Islay Skerries SAC) and north Wales (no adjacent SAC with seals as a feature).

Worldwide, collisions with vessels are a potential source of mortality to marine mammals, primarily cetaceans. Whales are occasionally reported to be struck and killed, especially by

[34] https://data.gov.uk/dataset/vessel-density-grid-2015
[35] Note that shipping densities are low over the majority of Blocks with higher densities primarily in coastal waters close to major ports.

fast-moving ferries but smaller cetacean species and seals can also be impacted by propeller strikes from smaller vessels. In the UK certain areas experience very high densities of commercial and recreational shipping traffic, some of which may also be frequented by large numbers of marine mammals; despite this, relatively few deaths are recorded as results of collisions (Hammond *et al.* 2008). Between 2000 and 2009, only 11 out of 1,100 post-mortems on harbour porpoises and common dolphins identified collision as the cause of death (UKMMAS 2010). Draft advice on operations for the Southern North Sea cSAC[36] indicates that post mortem investigations of harbour porpoise deaths have revealed death caused by trauma (potentially linked with vessel strikes) is not currently considered a significant risk.

4.4.4 Screening criteria for physical and drilling effects

With respect to **physical and drilling effects**, any Block should be screened in that is within or overlaps with a Natura 2000 site, together with any Block within a buffer of 10km from a Natura 2000 site where there is a potential interaction between site features and exploration/appraisal activities in the Block.

Blocks and relevant Natura 2000 sites screened in on the basis of physical and drilling effects are shown in Figures 5.1 (SPAs) and 5.2 (SACs), and listed in Appendix B2. The relevant impact pathways to be considered at the AA stage will depend on the location of the Blocks applied for and the qualifying features of the relevant sites. The potential for interactions of mobile qualifying species (primarily seabirds, marine mammals and fish) with exploration and appraisal activities when outside of relevant Natura 2000 site boundaries is considered in Section 4.6. Where appropriate, additional Blocks >10km from relevant site boundaries may be screened in.

4.5 Underwater noise

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.

4.5.1 Noise sources and propagation

Of those activities which could follow licensing (Table 2.2), geological seismic survey is of primary concern for noise effects. Other noise levels associated with activities potentially resulting from licensing of Blocks such as rig site survey, Vertical Seismic Profiling (VSP), pile-

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

driving of conductors, drilling and vessel movements, are of a considerably lower magnitude and duration than those resulting from a seismic survey. There is now a reasonable body of evidence to quantify noise levels associated with these activities and to understand the likely propagation of such noise within the marine environment, even in more complex coastal locations (DECC 2016). Table 2.2 (Section 2.3) provides an overview of the source levels and other characteristics of underwater noise generated by activities which could follow licensing.

4.5.2 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 the most 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.

Marine mammals

The risk of physical injury (hearing loss) from an activity can be assessed by modelling the propagation of sound from an activity and using threshold criteria corresponding to the sound levels at which permanent hearing loss (permanent threshold shift, PTS) would be expected to occur. For marine mammals, the latest SEA (DECC 2016) reflects the injury thresholds criteria developed by Southall *et al.* (2007), including the subsequent update for harbour porpoises in Lepper *et al*. (2014), based on the work by Lucke *et al.* (2009). Since then, NOAA has further updated the acoustic thresholds, including alternative frequency-weighting functions (NMFS 2016). It is recognised that geophysical surveys (primarily 2D and 3D seismic) have the potential to generate sound that exceeds thresholds of injury, but only within a limited range from source (tens to hundreds of metres); for site surveys and VSP, the range from source over which injury may occur will be even smaller. Within this zone, JNCC (2017) provide guidelines which are thought sufficient in minimising the risk of injury to marine mammals to negligible levels.

With respect to disturbance, it has proved much more difficult to establish broadly applicable threshold criteria based on exposure alone; this is largely due to the inherent complexity of animal behaviour where the same sound level is likely to elicit different responses depending on an individual's behavioural context and exposure history. For compliance with the Habitat Directive, the guidance for the protection of marine European Protected Species from injury and disturbance (JNCC 2010) recommends that 'disturbance' is interpreted as sustained or chronic disruption of behaviour scoring five or more in the Southall *et al*. (2007) behavioural

response severity scale[37]. This is to highlight that a disturbance offence is unlikely to occur from sporadic changes in behaviour with negligible consequences on vital rates and population effects (i.e. trivial disturbance). While it is possible to envisage how some behavioural effects may ultimately influence vital rates, evidence is currently limited. The focus of field studies has been on measuring displacement and changes in vocalisation with the assumption that these may influence vital rates mainly via a reduction in foraging opportunities.

Evidence of the effects of seismic surveys on odontocetes and pinnipeds is limited but of note are studies in the Moray Firth observing responses to a 10 day 2D seismic survey (Thompson *et al.* 2013a). The 2D seismic survey took place in September 2011 and exposed a 200km^2 area to noise throughout that period; peak-to-peak source levels generated by the 470 cubic inch airgun array were estimated to be 242-253 dB re 1 µPa at 1m and are therefore representative of the volume of a typical array used in VSP, and larger than that used in rig-site survey. Within 5-10km from the source, received peak-to-peak SPLs were estimated to be between 165 and 172 dB re 1 µPa, with SELs for a single pulse between 145 and 151 dB re 1 µPa^{2}s. A relative decrease in the density of harbour porpoises within 10km of the survey vessel and a relative increase in numbers at distances greater than 10km was reported; however, these effects were short-lived, with porpoise returning to affected areas within 19 hours after cessation of activities. Overall, it was concluded that while short-term disturbance was induced, the survey did not lead to long-term or broad-scale displacement (Thompson *et al*. 2013a). Further acoustic analyses revealed that for those animals which stayed in proximity to the survey, there was a 15% reduction in buzzing activity associated with foraging or social activity; however, a high level of natural variability in the detection of buzzes was noted prior to survey (Pirotta *et al*. 2014). Passive acoustic monitoring provided evidence of short-term behavioural responses also for bottlenose dolphins, but no measurable effect on the number of dolphins using the Moray Forth SAC could be revealed (Thompson *et al*. 2013b).

As concluded in OESEA3 (DECC 2016), a conservative assessment of the potential for marine mammal disturbance of seismic surveys will assume that firing of airguns will affect individuals within 10km of the source, resulting in changes in distribution and a reduction of foraging activity but the effect is short-lived. The precautionary criterion applied during initial Block screening (15km from relevant sites) is maintained here to identify the Blocks applied for to be considered with respect to likely significant effects in this assessment (see Section 5.2); this is to reflect the degree of uncertainty and the limited direct evidence available and to allow for a greater potential for disturbance when large array sizes are used.

Recent evidence on harbour porpoise responses to impact piling during wind-farm construction is also relevant since the impulsive character of the sound generated during piling is comparable with that from seismic airguns and for assessing in-combination effects with wind farms currently planned or under construction across the North Sea. Empirical studies during the construction of OWFs in the North and Baltic Seas (Carstensen *et al*. 2006, Tougaard *et al*. 2009, Brandt *et al*. 2011, 2018, Dähne *et al.* 2013) have all observed displacement of harbour

[37] See Table 4 (p450) of Southall *et al.* (2007) for a full description of response scores.

porpoises in response to pile-driving. The magnitude of the effect (spatial extent and duration) varied between studies as a function of the many factors including exposure level, duration of piling and ecological importance of the area. Nonetheless, from the available evidence it has been concluded that impact piling will displace individual harbour porpoises within an area of approximately 20km radius; however, once piling ceases, harbour porpoises are expected to return readily (hours to days) (DECC 2016). Current SNCB advice assumes a distance of 26km as the zone of disturbance for pile-driving (Joint SNCB response to 29th Round draft AA, February 2017). At Horns Rev wind farm, off the Danish North Sea coast, a study using satellite telemetry showed that harbour seals were still transiting the site during periods of piling but no conclusive results could be obtained from analysis of habitat use with regard to a change in response to piling (Tougaard *et al*. 2006). Evidence of a response was obtained by Edrén *et al.* (2010) at a haul-out site 4km away from the Danish Nysted windfarm; during piling, numbers hauling out were reduced by 10-60% but the effect was only of short duration since the overall number of seals increased slightly during the whole construction phase. Russell *et al*. (2016) used telemetry data from 23 harbour seals to investigate potential avoidance of seals to the construction of the Lincs wind farm in The Wash off the east coast of England, including pile-driving of mono-pile foundations. While there was no significant displacement during construction as a whole, seal abundance during piling was significantly reduced up to 25km from the piling activity, with a 19-83% (95% confidence intervals) reduction in usage compared to breaks in piling activity. This displacement was shown to be temporary, with seals returning to their non-piling distribution within two hours of the cessation of piling.

Information on the potential effects of other geophysical surveys (e.g. sub-bottom profilers) is currently very limited and the most recent OESEA (DECC 2016) concluded that effects are negligible but with a high level of uncertainty. Laboratory and field measurements on similar equipment are part of a US project. Outputs from these studies will be considered in due course to reduce uncertainty in assessments. With regard to conductor piling, the low hammer energy, narrow diameter of pipes and short duration of piling, combined with field measurements of sound propagation from this activity (Jiang *et al*. 2015, MacGillivray 2018), suggest a very low potential for significant disturbance of marine mammals.

Noise from vessels and drilling activity is audible to marine mammals but are not of the characteristics sufficient to cause injury. Vessel noise may elicit low-level disturbance effects in marine mammals (e.g. changes in vocalisation rates and dive behaviour)[38]; however, such effects are temporary, of limited spatial extent.

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*

[38] Note that in studies of animals in the wild it is difficult to determine the relative contribution of noise and physical presence of vessels in the observed responses, with the latter discussed in Section 4.2.3.

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). 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*	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*
Seabirds	
Manx shearwater *Puffinus puffinus* Gannet *Morus bassanus* Cormorant *Phalacrocorax carbo carbo* Shag *Phalacrocorax aristotelis* Guillemot *Uria aalge* Razorbill *Alca torda* Puffin *Fratercula arctica*	

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.

4.5.3 Screening criteria for underwater noise effects

With respect to **underwater noise effects**, any Block that is within 15km of a SAC with qualifying features regarded as sensitive to underwater noise (e.g. marine mammals, diving birds and migratory fish) should be screened in. In the context of measurements and modelling for the different sound sources; established injury threshold criteria; and, relevant studies of observed effects, including those in the UKCS, 15km is considered to be a conservative estimate of a maximum distance within which likely significant effects could be expected from the loudest noise sources associated with seismic survey activities. Blocks within 15km of an SPA designated for diving birds (see Box 4.1) should also be screened in.

Blocks and relevant Natura 2000 sites screened in on the basis of underwater noise effects and the relevant Natura 2000 sites are shown in Figures 5.3 (SPAs) and 5.4 (SACs) and listed in Appendix B3. The potential for interactions of mobile qualifying species (primarily seabirds, marine mammals and fish) with exploration and appraisal activities when outside of relevant Natura 2000 site boundaries is considered in Section 4.6. Where appropriate, additional Blocks >15km from relevant site boundaries may be screened in.

4.6 Consideration of mobile species

There is the potential for mobile qualifying species (primarily seabirds, marine mammals and fish) of relevant sites to interact with exploration and appraisal activities which could occur in 31st Round Blocks while those species are outside of Natura 2000 sites. An overview of the current understanding of the foraging ranges of relevant species is given below, including a discussion of their potential interaction with work programme activities at distance from relevant sites. An important distinction is made in this section between a potential interaction with site features and those exploration and appraisal activities which may follow 31st Round Licensing, and the potential for likely significant effects (i.e. those which undermine the site's conservation objectives).

4.6.1 Seabirds

Marine SPAs designated for foraging aggregations of seabirds and their 'source' SPAs

Efforts over the past decade to identify important foraging aggregations of seabirds for the purpose of SPA designation (e.g. Kober *et al*. 2010, 2012, Lawson *et al*. 2018) have resulted in a number of designated and proposed marine SPAs. It is recognised that bird aggregations within these marine SPAs may originate from separately designated breeding colony SPAs. In many cases colony SPAs are adjacent to the marine SPA (e.g. Arctic terns breeding at the Pentland Firth Islands SPA and foraging within the Pentland Firth pSPA) but the seabirds from the colony may also be located tens or even hundreds of kilometres away (e.g. Manx shearwater breeding at the Copeland Islands SPA and foraging at the Irish Sea Front SPA, ~100km distant). Consequently, the marine SPA site documentation and additional tagging data (where available) have been examined to identify their known 'source' colony SPAs (see

Table 4.1); where Blocks have been screened in for these marine SPAs based on the screening criteria, these Blocks have also been screened in for their linked 'source' SPAs. While it is acknowledged that the mean maximum foraging ranges of many seabird species are large, and that there is the theoretical potential for marine SPAs to be used by birds from a large number of colony SPAs, the focus here is on source SPAs from which the majority of birds within the marine SPA are likely to originate, as discussed in the relevant site documentation, or have been shown to be linked through tagging data.

Table 4.1: Marine SPAs designated for foraging aggregations of seabirds during the breeding season and their 'source' breeding colony SPAs

Marine SPA/pSPA	'Source' breeding colony SPAs (relevant species; distance)
Central and Northern North Sea	
Bluemull and Colgrave Sounds pSPA	• Hermaness, Saxa Vord and Valla Field SPA (breeding red-throated diver, 2km) • Otterswick and Graveland SPA (breeding red-throated diver, 6km)
East Mainland Coast pSPA	• Otterswick and Graveland SPA (breeding red-throated diver, 6km)
North Orkney pSPA	• Orkney Mainland Moors SPA (breeding red-throated diver; <1km)
Scapa Flow pSPA	• Hoy (breeding red-throated diver; partial overlap) • Orkney Mainland Moors (breeding red-throated diver; 1km)
Pentland Firth pSPA	• Pentland Firth Islands SPA (breeding Arctic tern; contiguous) • Hoy SPA (breeding Arctic skua & guillemot; partial overlap) • North Caithness Cliffs (breeding guillemot; partial overlap) • Copinsay SPA (breeding guillemot; 5km)
Moray Firth pSPA	• East Caithness Cliffs SPA (breeding shag; partial overlap)
Outer Firth of Forth and St Andrews Bay Complex pSPA	• Firth of Forth Islands SPA (multiple breeding seabirds; partial overlap) • St Abb's Head to Fast Castle SPA (multiple breeding seabirds; partial overlap) • Firth of Tay and Eden Estuary SPA (breeding little tern; partial overlap) [1] • Firth of Forth SPA (breeding sandwich tern; contiguous)[1]
Northumberland Marine SPA	• Lindisfarne SPA (breeding little tern; contiguous) • Northumbria Coast SPA (breeding little tern; contiguous) • Farne Islands SPA (multiple breeding seabirds; contiguous) • Coquet Island SPA (multiple breeding seabirds; contiguous)
Teesmouth and Cleveland Coast pSPA (extension)	• Teesmouth and Cleveland SPA (breeding little & common tern; contiguous)
West of Shetland and Rockall	
Seas off Foula pSPA	• Foula SPA (multiple breeding seabirds; contiguous)
Seas off St Kilda pSPA	• St Kilda SPA (multiple breeding seabirds; contiguous) • Flannan Isles SPA (multiple breeding seabirds; 16km)
West Coast of the Outer Hebrides pSPA	• Lewis Peatlands SPA (breeding red-throated diver, 8km) • Mointeach Scadabhaigh SPA (breeding red-throated diver, 3km)
Irish Sea and North Channel	
East Coast (Northern Ireland) Marine pSPA	• Larne Lough SPA (breeding common, roseate and Sandwich tern; contiguous) • Belfast Lough SPA (breeding common and Arctic tern; contiguous)[1] • Outer Ards SPA (breeding Sandwich and Arctic tern; contiguous) • Strangford Lough SPA (breeding Sandwich, common and Arctic tern; contiguous) • Copeland Islands SPA (breeding Arctic tern and Manx shearwater; contiguous)

Marine SPA/pSPA	'Source' breeding colony SPAs (relevant species; distance)
Irish Sea Front SPA	• Copeland Islands SPA (breeding Manx shearwater, 102km) • Skomer, Skokholm and the Seas off Pembrokeshire SPA (breeding Manx shearwater, 203km) • Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island SPA (breeding Manx shearwater, 85km)[2] • Rum SPA (breeding Manx shearwater, 355km)[3]
Liverpool Bay SPA	• Mersey Narrows & North Wirral Foreshore SPA (breeding common tern, contiguous) • The Dee Estuary SPA (breeding little tern, contiguous)
English Channel	
Solent and Dorset Coast pSPA	• Poole Harbour SPA (breeding common and Sandwich tern, contiguous) • Solent and Southampton Water SPA (breeding common, Sandwich and little tern, contiguous) • Chichester & Langstone Harbours SPA (breeding common, Sandwich and little tern, contiguous)

Notes: 1. Sites also designated for wintering waterbird features which are common with the overlapping/adjoining marine SPA/pSPA. 2. Site not acknowledged as linked to marine SPA in site documentation and no birds have been tagged at this site, but it is reasonable to assume the features of this site use the Irish Sea Front SPA given its proximity and the movement of birds tagged at neighbouring colonies. 3. Site not acknowledged as linked to marine SPA in site documentation but more recently reported tagging data (Dean et al. 2015) shows connectivity with the Irish Sea Front SPA.

Data on movements and foraging ranges

Information on the foraging movements of a number of seabird species has increased in recent years, mainly due to advances in satellite and other tracking technologies (e.g. Langston *et al*. 2013, Wakefield *et al*. 2015, 2017, Thaxter *et al*. 2014, Cleasby *et al*. 2015, Bogdanova *et al*. 2017, Carter *et al*. 2016, Edwards *et al*. 2016, Votier *et al*. 2017). There is generally limited information on foraging areas used by species from particular colonies and to help address this, Thaxter *et al*. (2012) reported on representative breeding season foraging ranges for a range of species.

Table 4.2 provides indicative foraging ranges (mean maximum and mean) travelled for a range of seabird species from a breeding colony to a foraging area. The mean maximum foraging range value has been used here to show possible connectivity to breeding colony SPAs, but bird density will not be continuous throughout this range. Other ways of representing foraging ranges (e.g. the mean, or percentage foraging area derived from kernel analyses) may therefore provide more useful information, where available. Whilst applying mean maximum foraging radius would encompass the majority of a population's home-range area, the overall size of the predicted foraging areas around the colony would potentially make it too large to be a useful management tool, without further refinement using habitat and bathymetric data (Soanes *et al.* 2016). Similarly, the assumption that seabirds are uniformly distributed out to some threshold distance from their colonies, such as their putative maximum foraging range, is unrealistic. Seabird density declines with distance from the colony with density-dependent competition, coastal morphology and habitat preferences (Wakefield *et al*. 2017), for example oceanographic features at which seabirds preferentially forage including shelf-edge fronts,

upwelling and tidal-mixing fronts, offshore banks and internal waves, regions of stratification, and topographically complex coastal areas subject to strong tidal flow (Cox *et al.* 2018), resulting in highly non-uniform distributions. While Critchley *et al*. (2018) used a distance-weighted foraging radius approach to project distributions at sea for a wide range of seabird species during the breeding season, the authors recognised the limitations of not considering environmental variables that contribute to such non-uniform distributions noted above.

Table 4.2: Indicative breeding season foraging ranges

Species	Mean maximum[1] (km)	Mean[2] (km)	Confidence level[3]
Eider	80	2.4	Poor
Red-throated diver	9	4.5	Low
Fulmar	400 ± 245.8	47.5 ± 1	Moderate
Manx shearwater	18.3 ± 12.5 & >330	2.3 ±0.8	Moderate
Leach's storm petrel	91.7 ± 27.5	-	Poor
Gannet	229.4 ± 124.3	92.5 ± 59.9	Highest
Cormorant	25 ± 10	5.2 ± 1.5	Moderate
Shag	14.5 ± 3.5	5.9 ± 4.7	Moderate
Arctic skua	62.5 ± 17.2	6.4 ± 5.9	Uncertain
Great skua	10.9 ± 3.0 & 86.4	-	Moderate, Poor
Black-headed gull	25.5 ± 20.5	11.4 ± 6.7	Uncertain
Common gull	50	25	Poor
Mediterranean gull	20	11.5	Uncertain
Herring gull	61.1 ± 44	10.5	Moderate
Lesser black-backed gull	141.0 ± 50.8	71.9 ± 10.2	Moderate
Kittiwake	60.0 ± 23.3	24.8 ±12.1	Highest
Sandwich tern	49.0 ± 7.1	11.5 ± 4.7	Moderate
Roseate tern	16.6 ± 11.6	12.2 ± 12.1	Low
Common tern	15.2 ± 11.2	4.5 ± 3.2	Moderate
Arctic tern	24.2 ± 6.3	7.1 ± 2.2	Moderate
Little tern	6.3 ± 2.4	2.1	Low
Guillemot	84.2 ± 50.1	37.8 ± 32.2	Highest
Razorbill	48.5 ± 35.0	23.7 ± 7.5	Moderate
Puffin	105.4 ± 46.0	4	Low

Notes:

1. The maximum range reported in each study averaged across studies.

2. The mean foraging range reported for each colony averaged across all colonies. For tracking studies, this was typically the mean foraging range from all central place foraging trips assessed at the colony.

3. Confidence levels were assigned as follows: highest (based on >5 direct studies); moderate (between 2-5 direct studies); low (indirect measures or only one direct tracking study); uncertain (survey-based estimates); poor (few survey estimates or speculative data available).

Source: Thaxter et al. (2012)

The distribution at sea throughout the year of many of the species in Table 4.2 is summarised in Appendix A1a.6 of the OESEA3 Environmental Report (DECC 2016); in general, they are

widely distributed at low densities with areas of moderate or higher density. Within the North Sea, these areas include: the shelf edge for gannet and lesser black-backed gulls; the Dogger Bank for guillemot; the Dutch Bank for herring gull; Fladen Ground for kittiwake; and, the Moray Firth and Aberdeen bank for razorbill (Stone *et al*. 1995). To the north west of the UK, seabird distribution is closely correlated to water depth with more birds found over shallower continental shelves than the deeper oceanic waters. Birds present in the deeper slope and oceanic waters will comprise mainly pelagic species (e.g. fulmar, gannet and kittiwake). Some high density areas are also likely to be transitory, associated with short-lived natural feeding aggregations or attraction to fishing vessels. Wakefield *et al.* (2017) used extensive tracking data and environmental covariates to model the predicted at-sea distribution of four seabird species during the breeding season (shag, guillemot, razorbill and kittiwake), including extrapolations for Seabird 2000 census counts at some 5,500 breeding sites in Britain and Ireland. Seabird density was shown to decline with distance from the colony, with kittiwake distribution being the most diffuse (albeit with discrete high-density areas) and shag the most confined to near-shore waters. While density-dependent competition, coastal morphology and habitat preferences resulted in highly non-uniform distributions, the core areas of use of all four study species overlapped within most of the coastal waters in Scotland, highlighting the importance of this area to these species (Wakefield *et al*. 2017). A BEIS-funded three-year telemetry study of gannets from Bempton Cliffs indicated a marked decline in the density of foraging locations with distance from colony, which was the over-riding influence on gannet distribution at-sea during the breeding season (Langston *et al*. 2013). Similarly, Votier *et al*. (2010, 2011) reported that breeding gannets, constrained by the need to regularly return to the nest, foraged less widely than immature birds. Other studies using GPS tracking of breeding gannets have indicated some consistency in the use of foraging areas by individual adults (e.g. Hamer *et al*. 2007, Patrick *et al*. 2015, Wakefield *et al*. 2015). Votier *et al*. (2017) showed that breeding gannets (aged 5+) displayed strong site fidelity, followed similar routes and were faithful to distal points during successive trips. Conversely, immature gannets (aged 2–3) were far more exploratory and lacked route or foraging site fidelity, and failed breeders showed intermediate behaviours. The authors proposed that foraging sites may be learned during exploratory behaviours early in life, which become established with age and experience (see also Grecian *et al*. 2018, Phillips *et al.* 2017).

As part of the process of identifying potential Marine Protected Areas, seabird aggregations have been delineated through analysis of the European Seabirds at Sea (ESAS) database (Kober *et al.* 2010, 2012). Forty-two areas were identified for eleven seabird species, covering many of the species highlighted in Table 4.2 (fulmar, Manx shearwater, gannet, shag, great skua, kittiwake, common gull, herring gull, Arctic tern, guillemot and puffin) in both the breeding and the non-breeding seasons. A review of 25 of these areas in light of other independent information was carried out to provide a more robust and complete evidence-base on which to base any future decisions about these areas (note that a number are currently proposed SPAs) (Cook *et al.* 2015). The review also considered whether there was a sound ecological rationale behind each aggregation such as the presence of suitable habitat, proximity to known breeding colonies, or high abundance of prey species in the area. In addition to offshore seabird aggregations, work on inshore wintering waterbird aggregations (e.g. Lawson *et al.* 2015a, b, c, Lawson *et al.* 2018, O'Brien *et al.* 2015), foraging areas for terns (Wilson *et al.*

2014, Parsons *et al.* 2015), foraging areas for red-throated divers (Black *et al.* 2015) and aggregations of shags (Daunt *et al.* 2015) has also contributed to the identification of SPAs[39].

Based on these processes, a number of proposed marine SPAs have recently undergone consultation covering foraging areas during breeding periods as well as wintering areas for most of the species identified above. These proposed SPAs have been screened in where appropriate. BEIS will ensure that the HRA process considers the ongoing marine SPAs identification process.

Physical, visual or acoustic disturbance from exploration drilling and seismic survey is not regarded to result in significant effects for bird species in relation to Blocks beyond those already screened in, as outlined in Sections 4.4 and 4.5. This is due to: the relatively small seabed footprint and transitory nature of rig placement/installation and drilling discharges coupled with the relatively low densities of seabirds in offshore waters; that none of the species that are likely to be present offshore (outside Blocks screened in by the 10km physical disturbance criterion) are particularly vulnerable to disturbance by shipping (Garthe & Hüppop 2004) and are therefore unlikely to be significantly disturbed by the presence and movement of vessels associated with exploration activities. The likely low density of diving birds in offshore areas, and their limited exposure time and likely low sensitivity to underwater noise (see Section 4.5) would indicate that significant disturbance from seismic surveys in Blocks beyond those already screened in by the 15km noise criterion is unlikely.

4.6.2 Marine mammals

Applicable Annex II species include the two species of seal which breed in the UK and Republic of Ireland: the harbour (*Phoca vitulina*) and grey seal (*Halichoerus grypus*); and two cetaceans: the harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*). These species are highly mobile and wide-ranging and will spend time up to considerable distances beyond the boundaries of designated sites. Therefore, there is a need to consider the potential for activities which may follow Block licensing to have effects on site features outside of site boundaries. Such effects are considered for these four marine mammals species in the sections below, distinguishing between short-term disturbance (which is managed under EPS disturbance licences) and likely significant effects in the context of the site conservation objectives.

Seals

The seal management units (MU) currently in use around the UK (indicated on Figures 5.5 and 5.6) were originally formulated in response to requirements of legislative drivers and do not define discrete populations. Given the movement of animals between MUs (Russell *et al*. 2013), especially in the case of grey seals, impacts on animals may have effects at the population level outside the particular MU with which the 'population' is associated (SCOS 2014). For harbour seals, these are broadly similar to OSPAR EcoQO units (OSPAR Ecological Quality Objectives) and supported by ICES advice on assessment units for the

[39] See: http://jncc.defra.gov.uk/page-4184

Marine Strategy Framework Directive (MSFD) (ICES 2014). For grey seals, ICES has advised for only two assessment units, one for the North Sea and one to combine western Britain, Ireland and Western France. An Inter-Agency Marine Mammal Working Group (IAMMWG 2015) paper on management units for cetaceans in UK waters indicated that an as yet unpublished paper outlining seal MUs was in preparation. Genetic studies suggest differentiation of harbour seals into four main clusters of: southern UK-mainland Europe; northern Ireland-west coast Scotland; east Scotland, Orkney and Shetland; and, Norway (Olsen *et al*. 2017).

Major breeding colonies of grey and harbour seals are protected around the UK as a series of coastal SACs, several of which extend, to varying degrees, into adjacent waters. As central-place foragers, seal colonies and haul-out sites are important not only in the breeding season, but throughout the year through provision of habitat for resting and during moulting periods. Nonetheless, grey and harbour seals are highly mobile marine species which spend extensive periods of time foraging beyond the boundaries of colony SACs (Matthiopoulos *et al*. 2004, Sharples *et al*. 2012, Jones *et al*. 2015). One study estimated that between 21-58% of female grey seals predominately foraged in a different region[40] to that within which they bred (Russell *et al*. 2013), while telemetry and individual recognition (photo-identification) data have revealed the movement of seals, particularly grey seals, between the UK and the waters of adjacent Member States (Jones *et al*. 2015, Brasseur *et al*. 2015).

Models of the at-sea distribution of grey and harbour seals which breed and haul-out around the UK and Ireland have been developed from extensive tagging data combined with population estimates derived from aerial and land-based counts (e.g. Jones *et al*. 2015). The most recent model iterations incorporate data from approximately 300 grey and 300 harbour seal individuals tagged between 1991-2016, are scaled to the estimated population size in 2015, and include updates to analytical approaches to improve the accuracy of estimated distributions (Russell *et al*. 2017). Figures 5.5 and 5.6 show the UK-wide at-sea density of harbour and grey seals respectively in relation to the relevant seal management units; the 31st Round Blocks offered; and, those Blocks screened in according to criteria for potential underwater noise and physical and drilling effects on sites with qualifying seal species. The usage maps represent the estimated number of seals in each 5x5km grid square at any point in time (Jones *et al*. 2017).

Results show that grey seals use offshore areas (up to 100km from the coast) connected to their haul-out sites by prominent corridors, while harbour seals primarily stay within 50 km of the coastline (Jones *et al*. 2015). For both species, density is greatest in coastal waters adjacent to colonies. The majority of Blocks offered in the 31st Round do not overlap territorial waters of Scotland, including Orkney and Shetland, or northeast England – areas which comprise some of the most important marine areas for grey and harbour seals in UK and Irish waters. Similarly, there are no offered Blocks overlapping offshore areas of relatively high seal

[40] The regions investigated included: Hebrides; northern Scotland (*ca*. Cape Wrath to Rattray Head); east coast (*ca*. Rattray Head to River Tees); and, south-east coast (*ca*. River Tees to Deal) (Russell *et al*. 2013).

usage in the southern North Sea which extend from the Humber Estuary SAC and The Wash and North Norfolk Coast SAC.

The highest at-sea densities of grey and harbour seals are generally within 15km of SAC boundaries for which seals are a qualifying feature and offered Blocks within this distance are consequently screened-in (e.g. West of Shetland - North Rona SAC; Central and Northern North Sea - Berwickshire and North Northumberland Coast SAC). An area of estimated high density (relative to the majority of the UKCS) of grey seals radiates out from Berwickshire & North Northumberland Coast SAC, with predicted densities of ≥100 seals per grid cell extending up to 20km from the SAC boundary. The periphery of this area of higher density overlaps or is adjacent to offered Blocks 34/3, 34/4, 34/5, 34/10, 34/15 and 34/20. Block 34/3 is already screened-in for potential underwater noise effects on grey seals as it lies 13km away from the site, whereas the remaining of these Blocks all lie >15km from the SAC boundary and have not been screened in under the 10 or 15km screening criteria. However, considering their proximity to this area of high density extending from the SAC, it is considered that likely significant physical and drilling and underwater noise effects on the seal feature of Berwickshire and North Northumberland Coast SAC cannot be excluded at this screening stage for Blocks 34/3, 34/4, 34/5, 34/10 and 34/15, and underwater noise effects on Block 34/20, and they are thus screened in (Figure 5.6).

An area of high use by grey seals extends south-east of Orkney, overlapping several screened-in Blocks, most notably Block 12/12 where modelled density varies between 500 seals per 5x5km grid cell in the north-west of the Block and 34 seals per 5x5km grid cell in the south-east corner. Adjacent Blocks also overlap some areas of >50 seals per 5x5km grid cell, but are generally in the 10-30 seals per grid cell range. While these Blocks are screened-in for potential effects on several SPAs, the closest SAC for grey seal is Faray and Holm of Faray, some 60km to the north, and therefore Block 12/12 and adjacent Blocks are not screened-in for potential effects on this SAC. Grey seals move widely and individuals regularly travel long distances between breeding colonies, haul-outs and foraging areas; however, there are numerous large colonies elsewhere in Orkney and on the shores of the Pentland Firth, colonies which are closer to the Blocks and which are not designated as SACs. Consequently, it is likely that the majority of seals in this area south-east of Orkney are not associated with a particular designated site and therefore it is not considered necessary to screen in additional offshore Blocks for likely significant effects on the integrity of a specific site(s).

At-sea usage modelling of grey seals suggests an area of high density in Liverpool Bay, focussed on the mouth of the Dee Estuary, where estimates of up to 235 seals per 5x5km grid cell occur in waters adjacent to haul-out sites of Hilbre Island and West Hoyle sandbank (maximum count of 518 seals reported in May 2002; Westcott & Stringell 2004). Models predict densities of > 10 seals per 5x5km grid cell to extend along the coast of north Wales and out to approximately 20km offshore in Liverpool Bay, overlapping several offered Blocks (110/14f, 110/17, 110/18). These animals do not breed in Liverpool Bay, and there are no colony SACs for which they are qualifying features within many tens of kilometres of this area of high use. Telemetry and photo-identification data indicate grey seals occurring in Liverpool Bay move widely throughout the Irish Sea (SCOS 2013, Stone *et al*. 2013, Hammond *et al*.

2005) and it is not possible to assign a majority of individuals to a particular colony SAC. Breeding is likely at various small colonies on the North Wales coast and Isle of Man (none of which are designated as an SAC for breeding seals), with others travelling further to breed at SACs where they are qualifying features on the Welsh coast[41], Irish east coast[42] and within the Hebrides[43]. In view of the available information, significant effects to specific SACs are not considered likely, and no further Blocks have been screened in.

Cetaceans

Bottlenose dolphins

Analyses of photo-identification data and some genetic studies have shown that within European waters there are coastal/inshore groups of bottlenose dolphins which are mobile and range over large areas but still show strong site fidelity along defined stretches of coast (see ICES 2013, Quick *et al*. 2014). Some dolphins appear to make long-distance movements from the east coast of Scotland to the west coast of Scotland and to Irish waters, although the population identity of these apparently wide-ranging individuals is unknown (Robinson *et al*. 2012). Whilst ICES (2013) recognised that in some areas information is incomplete, that distribution may be ephemeral and the animals present likely comprise sympatric populations, they proposed a series of bottlenose dolphin MUs for UK waters; the boundaries of which were finalised by IAMMWG (2015) (Figure 5.7). Within UK waters, the only SACs where bottlenose dolphin is a qualifying feature lie within the Irish Sea and coastal east Scotland MUs.

With regard to the MU for bottlenose dolphin in the coastal regions of east of Scotland (Figure 5.7) and the Moray Firth SAC (the only Natura 2000 site designated for this population), the range of this population extends well beyond the boundaries of the SAC as animals utilise waters off the southern Moray Firth, Grampian and Fife coasts (Cheney *et al*. 2013). Quick *et al*. (2014) showed that individual dolphins range up and down the coast, with much spatial and temporal variability in individual movements. Outside of the SAC, dolphins were most frequently encountered in waters less than 20m deep and within 2km of the coast in and around the Tay Estuary as well as along the coast between Montrose and Aberdeen. While there are Blocks offered in the 31st Round off the east coast of Scotland, the majority of these are in offshore waters (> 12nm from the coast) and distant to areas identified as important for bottlenose dolphins.

Three 31st Round Blocks (18/9, 18/10, 19/6) are adjacent to the coast along the southern shore of the outer Moray Firth. Surveys conducted between Lossiemouth and Fraserburgh during summer and autumn months since 2001 show inshore waters of this area to be frequented by bottlenose dolphins, with most sightings between the mouth of the River Spey and Rosehearty (Robinson *et al*. 2007). Population estimates suggest that approximately 60 to 130 individuals use these waters each year over the period May-September/October (Culloch & Robinson

[41] Lleyn Peninsula & the Sarnau SAC; Cardigan Bay SAC; Pembrokeshire Marine SAC
[42] Lambay Island SAC; The Maidens SCI
[43] Treshnish Isles SAC

2008, Filan 2015), representing up to two thirds of the *ca*. 200 individuals of the total Scottish east coast population (Cheney *et al.* 2013, 2018). The southern outer Moray Firth is used by bottlenose dolphins transiting between the SAC and other areas of preferred habitat further south off the east coast. Based on the regular sighting of animals in these nearshore waters, including a high proportion of females with calves, Blocks 18/9, 18/10, 19/6 are screened in for potential underwater noise and physical and drilling effects on the bottlenose dolphin feature of the Moray Firth SAC, despite being > 50km distant from the site. It is noted that these three Blocks are already screened-in due to their proximity to the Troup, Pennan and Lion's Heads SPA.

Relevant SACs for the Irish Sea MU for bottlenose dolphins include the Lleyn Peninsula and Sarnau SAC and Cardigan Bay SAC, which are to the south of the 31st Round Blocks (Figure 5.7). The wider movements of dolphins associated with these two sites are not well known, and occasional sightings throughout much of the Irish Sea coast suggest that some animals may range widely throughout the region (Baines & Evans 2012). However, regular sightings at rates comparable to those from land- and vessel-based surveys in Cardigan Bay, combined with extensive matches of individuals with those observed in Cardigan Bay indicate that coastal waters around the north and east coast of Anglesey are important for animals associated with these two SACs (Pesante *et al*. 2008, Baines & Evans 2012, Evans *et al*. 2015). It is apparent that a large proportion of this population spend the winter in waters off north Wales, whilst smaller numbers can be seen in this area throughout the year (Pesante *et al*. 2008). Blocks 109/15 and 110/16 both lie within 15km of Anglesey, and 11km and 4km, respectively, from the coast of north-east Anglesey where the highest sighting rates of bottlenose dolphins north of Cardigan Bay occur. Block 109/15 is screened-in for potential underwater noise effects on bottlenose dolphin features of the Lleyn Peninsula and Sarnau SAC and Cardigan Bay SAC, while Block 110/16 is screened-in for both potential underwater noise and physical and drilling effects on these two sites. It is noted that these two Blocks are already screened-in under the criterion for potential acoustic effects due to their proximity to the North Anglesey Marine SCI (harbour porpoise).

Harbour porpoise

The harbour porpoise is the most common cetacean in UK waters; it is wide-ranging and abundant throughout the UK shelf seas, both coastally and offshore (Reid *et al*. 2003). This species is sighted throughout the year, although peak numbers are generally recorded in summer months from June to October. Since the early 1990s it appears to have become much less common around the Northern Isles, while increasing in numbers in the English Channel, southern North Sea and in the Celtic Sea, where few individuals had been previously observed (i.e. SCANS-I 1994) (Hammond *et al*. 2013, 2017; also see Evans *et al.* 2015). In coastal waters they are often encountered close to islands and headlands with strong tidal currents (e.g. Pierpoint 2008); sightings becoming increasingly rare close to the continental shelf edge, with relatively few records in deeper waters beyond the shelf edge (Reid *et al*. 2003). Individuals across the UKCS are part of the north east Atlantic population which is mainly considered to be a single 'continuous' population, even though some degree of genetic differentiation has been observed (Andersen *et al.* 1997, 2001, Tolley *et al.* 2001, Fontaine *et*

al. 2007). However, for management and conservation purposes, three distinct UK Management Units have been proposed (IAMMWG 2015); the North Sea, West Scotland and the Celtic & Irish Seas.

Heinänen & Skov (2015) identified discrete and persistent areas of relatively high porpoise density, which were mainly within the Irish Sea and Welsh coastal waters, shelf waters of the North Sea and along the north-west Scottish coast. Six candidate Special Areas of Conservation (cSACs) (in both inshore and offshore waters) for harbour porpoise were identified, all of which were submitted to the European Commission by January 2017 and have now been adopted as Sites of Community Importance (SCIs). For five of the six harbour porpoise SCIs, multiple relevant Blocks have been screened-in through the criteria for potential physical and drilling or acoustic effects, as have Blocks relevant to the Doggersbank SAC and Klaverbank SAC in neighbouring Dutch waters. All offered Blocks are >15km distant to the Inner Hebrides and the Minches SCI (the closest being 22km), and therefore none have been screened in for potential effects on this site.

While harbour porpoise are a wide-ranging species and are likely to frequently occur beyond site boundaries, these sites encompass large areas of favourable habitat supporting higher densities of the species than other areas of the UKCS. Considering this, in addition to the buffer provided by the screening criteria, and maintaining a distinction between the potential for interaction between activities following the licensing of Blocks and site features outside of site boundaries (e.g. short-term disturbance, which is managed under EPS disturbance licences) and likely significant effects in the context of the site conservation objectives, it is not considered necessary to screen in any additional Block-site combinations for harbour porpoise.

4.6.3 Fish

Of those fish listed under Annex II of the EC Habitats Directive, only Atlantic salmon, Allis and Twaite shad, sea lamprey and river lamprey are qualifying species of sites relevant to the 31st Round Blocks.

Given their widespread and transient presence offshore, particularly in the majority of Blocks to the west of the UK in deeper waters, where diadromous species for example will only be present on migration and unlikely to be encountered, potential exploration activity in the 31st Round Blocks away from the coast is unlikely to have a significant effect on relevant sites. Consequently, no additional Blocks to those already screened in on the basis of physical disturbance or noise effects have been identified for further assessment.

4.6.4 Conclusion

Whilst individuals of the mobile species discussed above could potentially interact with work programme activities associated with the Initial Term (see Section 2.2) for Blocks other than those already screened in using the criteria set out in Sections 4.4 and 4.5, and those additional Blocks identified in the Moray Firth and Irish Sea above, significant effects on the populations of sites relating to such species, and therefore the conservation status of such sites, are not considered likely. This is due to the combination of:

- The small physical footprint of activities and their transitory nature.

- The likely scale of potential activity (i.e. number of licences applied for and awarded, and actual activity which follows, see Section 2.3.1), and the duration of the initial term (up to 9 years) within which activity could take place.
- The likely relative density of relevant features in relation to activities which could take place.

4.7 In-combination effects

This screening assessment includes the potential for in-combination effects resulting from the interaction of exploration/appraisal activities in 31st Round Blocks with activities resulting from other marine plans, programmes and activities to lead to likely significant effects on European sites.

Marine planning has a key role in informing strategic and project level spatial considerations, with the Marine Policy Statement indicating, *"Marine Plans should reflect and address, so far as possible, the range of activities occurring in, and placing demands on, the plan area. The Marine Plan should identify areas of constraint and locations where a range of activities may be accommodated. This will reduce real and potential conflict, maximise compatibility between marine activities and encourage co-existence of multiple uses."*

Currently, there are 11 marine plan areas within English inshore and offshore regions and marine plans have been adopted for four of these, the East Inshore and Offshore and South Inshore and Offshore plans. Marine plans are presently in development for the other seven areas, all of which are due to be complete by 2021. The Scottish National Marine Plan was adopted in March 2015 and subsequent regional planning has been proposed for a further 11 inshore areas. Devolved plans for Welsh and Northern Irish waters are still in development, with consultation having taken place on both plans in early 2018[44]. To date, whilst the marine plans acknowledge the potential interactions between activities and map these, indicate key resource areas and provide policy context in relation to potential activity interactions, they are not spatially prescriptive and therefore provide a limited indication of the location of possible future development.

The uncertainty over the scale and timing of activities which could follow licensing of 31st Round Blocks and the activities resulting from other plans and programmes is recognised. Using a GIS, the 31st Round Blocks (distinguishing those screened in and screened out following the application of the criteria given in Section 4.3-4.5) are considered in the context of areas of activity and proposals for a range of marine activities/potential activities including:

- Existing oil and gas licences (Figures 5.8 and 5.9)

[44] See: https://www.daera-ni.gov.uk/articles/marine-plan-northern-ireland and https://beta.gov.wales/welsh-national-marine-plan

- Leases/licences or Agreement for Leases for hydrocarbon gas storage (Figures 5.8 and 5.9)
- Existing oil and gas infrastructure (Figures 5.8 and 5.9)
- Marine renewable energy developments, zones and related cables/cable agreement areas (Figures 5.10 and 5.11)
- Marine aggregate extraction (Figure 5.10 and 5.11)
- Shipping density (Figures 5.12 and 5.13)
- Fisheries

GIS outputs are included for each of the above showing the spatial relationship to SPAs and SACs and a text based consideration is made of the potential for in-combination effects leading to likely significant effects on European sites (see Section 5).

5 Screening

5.1 Screening of potential effects of 31st Round Block activities

The screening of the various sources of impact from exploration and appraisal activities which could follow licensing of the 31st Round Blocks (as described in Section 4) were applied to the relevant European sites and considered in the context of mobile species when not within site boundaries. This led to the identification of a number of Blocks for which likely significant effects on European sites could not be discounted at the screening stage. Figures 5.1-5.7 illustrate these initial screening results as paired maps showing the Blocks and sites which have been screened in.

The Blocks screened in at this stage are listed in Table 5.1.

Table 5.1: List of Blocks initially screened in

Central and Northern North Sea									
2/2	1/4	1/5	1/9	1/10	1/14	1/15	1/19	1/20	1/23
1/24	1/25	1/28	2/1	2/6	2/7	2/11	2/12	2/16	5/30
6/19	7/6	11/23	11/24c	11/25b	11/27	11/28	11/29	11/30	12/9
12/10	12/12	12/13	12/14	12/15	12/16	12/17	12/18	12/19	12/20
12/21b	17/4	17/5	18/1	18/2	18/3	18/4	18/5	18/9	18/10
19/6	19/23	25/25	26/6	26/16	26/17	26/21	26/22	26/23	26/26
26/27	26/28	34/3	34/4	34/5	34/10	34/15	34/20	34/25	36/13
36/14	36/15b	36/18	36/19	36/23	37/11b	37/12	37/13	37/14	37/15
37/20	37/25	37/28a	37/29a	37/30	38/13	38/14	38/15	38/16	38/17
38/18	38/19	38/20	38/21	38/22	38/23	38/24	38/25	38/26	38/29
38/30	39/7	39/11	39/12	39/16	39/17	39/21	39/26	40/5	43/3
43/4	43/5	44/1	44/4	44/5	44/3b	45/1	209/26	209/27	
West of Shetland and Rockall									
5/2	5/1	5/3	5/4	5/5	5/7	5/8	5/9	5/10	6/1
6/6	128/1	128/2	128/3	128/4	128/5	128/6	128/7	128/8	128/9
128/10	129/1	133/14	133/15	133/18	133/19	133/20	133/23	133/24	133/25
133/29	133/30	138/1	138/2	138/3	138/4	138/5	138/6	138/7	138/8
138/9	138/10	138/13	138/14	138/15	138/19	138/20	138/23	138/24	138/25
138/27	138/28	138/29	138/30	139/1	139/2	139/6	139/7	139/11	139/12
139/13	139/16	139/17	139/18	139/21	139/22	139/26	139/27	140/7	140/8
140/9	140/10	140/12	140/13	140/14	140/15	140/17	140/18	140/19	140/20
140/22	140/23	140/24	140/25	140/28	140/29	140/30	141/13	141/6	141/7
141/8	141/11	141/12	141/16	141/17	141/18	141/19	141/21	141/22	141/23
141/26	141/27	148/11	148/6	148/16	148/17	148/18	148/19	148/21	148/22
148/23	148/24	148/25	148/26	148/27	148/28	148/29	148/30	149/21	149/26
149/27	152/15	152/19	152/20	153/11	153/12	153/13	153/14	153/15	153/16
153/17	153/18	153/19	153/20	153/21	153/22	153/23	153/24	153/25	153/29

Table 5.1: List of Blocks initially screened in

153/30	154/26	155/3	155/4	155/5	156/1	156/2	156/3	156/4	156/5
156/8	156/9	156/14	164/2	164/3	164/4	164/5	164/6	164/7	164/8
164/9	164/10	164/11	164/12	164/13	164/14	164/15	165/1	165/2	165/3
165/4	165/6	165/7	165/8	165/9	165/10	165/11	165/12	165/23	165/24
165/25	165/28	165/29	165/30	166/6	166/21	166/22	166/23	166/24	166/25
166/26	166/27	166/28	166/29	166/30	174/27	174/28	174/29	174/30	175/21
175/22	175/26	175/27	175/28	202/21	202/22	202/23	202/24	202/25	202/26
202/27	202/28	202/29	202/30	203/4	203/5	203/22	205/28	205/29	205/30
206/18	206/19	206/22	206/23	206/26	206/27	206/28			
Irish Sea and North Channel									
107/1	106/5	106/9	106/10	106/25	107/6	108/10	108/2	108/3	108/4
108/5	108/8	108/9	108/14	108/15	108/19	108/20	108/24	108/25	108/30
109/1	109/2	109/3	109/4	109/6	109/7	109/8	109/9	109/10	109/11
109/15	109/26	110/1	110/2d	110/4	110/6	110/10	110/11	110/12c	110/14e
110/14f	110/16	110/17	110/18	110/21a	110/21b	110/23	110/7b	110/8b	110/9c
111/25	111/3	111/4	111/9	111/10	111/15	111/29	111/30	112/11	112/12
112/13	112/14	112/16	112/17	113/26c	113/22	113/27f	125/18	125/19	125/20
125/23	125/24	125/25	125/30	126/26					
South West Approaches and Celtic Sea									
73/19	72/19	72/20	72/22	72/23	72/24	72/25	73/10	73/12	73/13
73/14	73/15	73/16	73/17	73/18	73/21	74/3	74/4	74/5	74/6
74/7	74/8	74/9	74/10	74/11	74/12	75/1	75/2	75/3	85/24
85/25	85/26	85/27	85/28	85/29	85/30	86/8	86/9	86/10	86/21
86/26	91/25	91/29	91/30	92/16	92/17	92/18	92/19	92/21	92/22
92/23	92/24	92/26	92/27	92/28	93/20	93/25	93/27	94/3	94/4
94/5	94/8	94/9	94/12	94/13	94/16	94/17	102/10	102/14	102/15
102/19	102/20	102/24	102/25	102/29	102/30	103/1	103/6	103/7	103/11
103/12	103/16	103/17	103/18	103/21	103/22	103/23	103/24	103/25	103/26
103/27	103/28	103/29	103/30						
English Channel									
97/25	98/11b	98/12	98/13	98/16	98/17	98/18	98/21	98/26	99/12

5.2 Screening for potential in-combination effects

All blocks offered as part of the 31st Round, including those screened in (Table 5.1), were considered further in terms of the potential for likely significant effects to arise from activities following licensing, in-combination with those from other marine activities. Relevant marine activities were identified based on those referred to in Appendix 1h of OESEA3 (DECC 2016)[45] and where it was considered that a relevant pathway of in-combination effect was present. The sources of in-combination effect are regarded to be largely related to physical disturbance

[45] Relevant marine planning portals for England, Scotland and Wales were also referred to, in addition to other sources of the latest spatial data on marine activities including data.gov.uk.

and underwater noise, and in the context of those areas being offered for licensing, any such effects are expected to be primarily from other offshore energy activity, specifically offshore wind in the central North Sea and Irish Sea. The area to the west of Shetland, Rockall and the South West Approaches have a comparatively low density of activity.

Figures 5.8 and 5.9 illustrate the spatial relationship between existing oil and gas licences, agreements for lease (AfL) for gas storage, the relevant European sites, as well as the 31st Round Blocks. Existing controls on exploration and appraisal operations, and their likely intensity as outlined in Section 2, suggest that significant in-combination effects of existing licensed areas and those proposed for licensing in the 31st Seaward Licensing Round on European sites are not likely. Additionally, based on the lack of or limited spatial overlap of other licences and infrastructure, the documented scale of effects from production operations together with existing controls on exploration and appraisal operations (see Section 4.3), significant in-combination effects on European sites are not likely to occur.

Operators are planning for the decommissioning of a number of fields in 31st Round areas, or are implementing decommissioning plans which involve offshore activities (e.g. for well plug and abandonment and facility removal)[46]. This includes plans for fields and related infrastructure in quadrants 3, 9, 11, 12, 14, 20, 30, 44, 110 and 211, some of which are adjacent to or coincide with Natura 2000 sites, including Liverpool Bay SPA (Bains Field, 110/3c), Dogger Bank SAC and Southern North Sea SCI (Tyne South, 44/18a). 31st Round Blocks adjacent to these sites have already been screened in to the second stage of HRA where the potential for significant cumulative and in-combination effects on European sites would be assessed.

The only relevant gas storage AfL is that for the Gateway development in the Irish Sea, which is adjacent to a number of 31st Round Blocks (110/4, 110/8b and 110/9c) and relevant sites (Liverpool Bay SPA, Shell Flat and Lune Deep SAC). At present, the timescale for development of the Gateway project or any other offshore gas storage project in UK waters is uncertain. No CCS agreements for lease or licence areas are located close to any of the 31st Round Blocks on offer (the closest is National Grid's AfL in the southern North Sea at ~60km from Block 43/3). In view of the likely scale of exploration activity that could result from 31st Round licensing and the lack of firm project plans or timescales for new offshore storage projects, significant in-combination effects are not considered likely.

Figures 5.10 and 5.11 show marine renewable energy development areas, relevant European sites and the 31st Round Blocks. A number of Blocks overlap with renewable energy developments (either planned or operational), and with European sites. For example Blocks overlap with the Dogger Bank (Creyke Beck A and B and Teesside Lackenby A and B), which also overlap the Southern North Sea SCI and/or Dogger Bank SAC, and with a number of wind farms in the Irish Sea (Gwynt y Môr, Rhyl Flats, North Hoyle, Barrow, Burbo Bank, West of

[46] See: https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines and https://itportal.ogauthority.co.uk/eng/fox/path/PATH_REPORTS/pdf

Duddon Sands and Walney) which either coincide or are close to Liverpool Bay SPA, Morecambe Bay SPA/SAC, and Shell Flat and Lune Deep SAC. A draft HRA has been published for consultation as part of a review of consents for offshore wind farms identified to have a likely significant effect on the Southern North Sea SCI, the conclusions of which are that, with agreed mitigation measures, the construction of the wind farms assessed will not result in an adverse effect on site integrity of the site[47]. This draft report, and any final version following consultation, will be considered as part of the in-combination effects assessment of the second stage of HRA where appropriate. In Scottish waters, 31st Round Blocks overlap Inch Cape offshore wind farm which partly overlaps the Outer Firth of Forth and St Andrews Bay Complex pSPA. In all cases these Blocks have been screened in to the second stage of HRA when the potential for significant in-combination effects on European sites will be assessed.

Leasing rounds for further offshore wind are presently in planning for Scottish[48] and English, Welsh and Northern Irish[49] waters. The Scottish Government are in the process of identifying plan option areas which will be part of consultation exercises related to separate SEA and HRA processes[50]. Draft areas of search for offshore wind in Scottish waters have been identified as part of the 2018 scoping exercise for the Scottish sectoral offshore wind plan. In keeping with the Scottish National Marine Plan policy RENEWABLES 1, on adoption, proposals for future offshore wind are likely to be made in these areas. A number of the draft areas of search overlap 31st Round Blocks in the central and northern North Sea, and West of Shetland and Rockall areas, and include proposed deep-water areas for potential floating offshore wind development. For the purposes of this HRA, it is noted that these areas are yet to be finalised, the draft sectoral plan is yet to complete its formal SEA process, and the timing and nature of any subsequent development is unknown and are unlikely to take place within the timing of 31st Round activities. Therefore likely significant in-combination effects have not been identified.

Potential extensions to eight existing offshore wind farm projects were announced by The Crown Estate in October 2018, covering an additional 3.4GW of new capacity[51]. Two of these proposed extensions are partly within Blocks offered in the 31st Round including the Rampion (Blocks 99/12, 99/13 and 99/14) and Gwynt y Môr extensions (Blocks 110/16 and 110/17), with proposed installed capacities of 400MW and 576MW respectively (see Figures 5.10 and 5.11). Agreements for Lease could be granted in summer 2019, subject to the outcome of a plan level HRA being undertaken separately by The Crown Estate. Any subsequent proposal would be subject to project-specific permitting, which may also include further HRA as appropriate. This screening has already identified a number of sites which should be subject to Appropriate

[47] https://www.gov.uk/government/consultations/southern-north-sea-review-of-consents-draft-habitats-regulations-assessment-hra
[48] http://www.crownestatescotland.com/media-and-notices/news-media-releases-opinion/preparation-starts-for-new-offshore-wind-leasing-in-scotland
[49] https://www.thecrownestate.co.uk/en-gb/what-we-do/on-the-seabed/energy/offshore-wind-potential-new-leasing/
[50] https://consult.gov.scot/marine-scotland/offshore-wind-scoping/
[51] https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2018-the-crown-estate-completes-initial-assessment-of-offshore-wind-extension-applications/

Assessment in relation to those Blocks offered which overlap the proposed wind farm extensions, including Anglesey Terns SPA, Liverpool Bay SPA, Conway Bay SPA, Puffin Island SPA, Pagham Harbour SPA, Solent and Dorset Coast pSPA, Chichester and Langstone Harbours SPA, North Anglesey Marine SCI and Dee Estuary SAC. Any further information relating to the proposed windfarm extensions will be considered as part of the in-combination effects assessment of the second stage of HRA where appropriate. Plans for further leasing by The Crown Estate for England, Wales and Northern Ireland are currently being progressed, and it is expected that further offshore wind leasing will be launched in early 2019[52]. As with the above extensions, any further information on this will be considered as part of the in-combination effects assessment of the second stage of HRA.

A range of cables traverse blocks offered in the 31st Round, both electricity grid interconnectors and telecommunications cables. The surface area of these is extremely small, and they are well-charted features which are avoided by oil and gas operators, including during exploration. A range of interconnector projects are either in planning, or at an early stage of development, which are of relevance to the 31st Round Blocks[53]. These include: Greenlink (Blocks to the north of Quads 102 and 103), IFA2 (Block 99/12), North Sea Link (Blocks within Quads 28, 34 and 35), NorthConnect (Blocks in Quad 19), Aquind (Blocks 9/12 and 9/13), the Celtic Interconnector (Blocks in Quads 85, 92 and 93) and Shetland HVDC Link (Blocks in Quads 6 and 12). The Havfrue telecommunications cable, proposed to connect Denmark with the United States and Ireland, would traverse a number of quadrants to the north and west of Scotland. To date only a scoping report has been prepared for the UK section of this proposal[54].

While all of these project have proposed installation and commissioning dates within the timeframe in which offshore activities associated with the initial term of 31st Round licences could take place (2020-2022), some remain at a pre-planning or feasibility stage (e.g. Aquind, Celtic Interconnector, Shetland HVDC Link). Others are yet to be spatially defined (e.g. Neuconnect, Ice Link) and so cannot be considered at this stage. It is not considered that any additional Blocks or sites should be screened in due to the potential for interaction with these proposals. Where appropriate these proposals will be considered in more detail in relation to those Blocks already screened into the second stage of HRA.

A number of tidal lease areas are located in the North Channel including Fair Head and Torr Head (within Block 125/15) and Mull of Galloway (within Block 112/11), which are close to relevant sites including Rathlin Island SAC and Red Bay SAC, and Luce Bay and Sands SAC respectively. The Argyll tidal demonstration site is located relatively close (~6km) to Block 125/25. None of these zones have been developed to date. In addition to the above areas the Wave Hub demonstration zone is located partly within Block 94/17, which overlaps with Lands

[52] https://www.thecrownestate.co.uk/en-gb/media-and-insights/news/2018-the-crown-estate-launches-a-second-phase-of-engagement-on-new-offshore-wind-leasing-following-positive-market-response/
[53] Note that the majority of these are Projects of Common Interest, see: http://ec.europa.eu/energy/sites/ener/files/technical_document_3rd_list_with_subheadings.pdf
[54] http://marine.gov.scot/node/15979

End and Cape Bank SAC and is close proximity to the Bristol Channel Approaches SCI. All Blocks coinciding with these zones have been screened in to the second stage of HRA where the potential for significant cumulative and in-combination effects will be assessed. The Scottish Government have identified a number of option areas for wave and tidal energy, reflected in regional location guidance[55], and the Scottish National Marine Plan. Those leases for wave and tidal already mentioned in relation to 31st Round Blocks are located in these areas, though the timing for these or any further areas to be developed is not known.

Marine aggregate extraction areas relevant European sites and the 31st Round Blocks are shown in Figures 5.10 and 5.11. A limited number of Blocks overlap licensed aggregate extraction areas, limited to production areas in the Irish Sea; Blocks 100/8b, 110/12c and 110/18, and production, exploration and option areas in the English Channel; Blocks 98/12, 98/13, 98/17 and 98/18. All of these Blocks have been screened in to the second stage of HRA when the potential for significant cumulative and in-combination effects on European sites would be assessed.

Figures 5.12 and 5.13 illustrate the spatial relationship between the density of navigation in UK waters, relevant European sites and the 31st Round Blocks. The 31st Round Blocks coincident with areas of elevated navigation density in or in proximity to European sites (where potential significant in-combination effects could occur) have already been screened in to the second stage of HRA where this consideration will be made.

Commercial fishing occurs throughout UK waters and effort data provides a strategic level proxy of fisheries activity across the UKCS. However, it is noted that activity is seasonally and annually variable, and collated data includes most but not all fishing activity. Fishing and particularly bottom trawling has historically contributed to seabed disturbance over extensive areas, and was identified as an ongoing problem in the UK initial assessment for MSFD[56]. It was also noted that depending on the nature of future measures (e.g. in relation to MPA management in the wider environment and within MPAs[57]), such effects are likely to be reduced and therefore some improvement in benthic habitats could be expected[58]. The management of fisheries in relation to Article 6 of the Habitats Directive is fundamentally different to other activities such as offshore energy development, and a revised approach to the management of commercial fisheries in European sites[59] has sought to implement steps to ensure that they are managed in accordance with Article 6. Similarly, NRW has been working

[55] https://www.gov.scot/Topics/marine/marineenergy/Planning
[56] https://www.gov.uk/government/publications/marine-strategy-part-one-uk-initial-assessment-and-good-environmental-status
[57] For example, see the MMO strategic management table for MPAs: https://www.gov.uk/government/publications/marine-protected-areas-strategic-management-table and measures proposed by the Scottish Government: https://www.gov.scot/Topics/marine/marine-environment/mpanetwork/SACmanagement
[58] https://www.gov.uk/government/publications/marine-strategy-part-three-uk-programme-of-measures
[59] https://www.gov.uk/government/publications/revised-approach-to-the-management-of-commercial-fisheries-in-european-marine-sites-overarching-policy-and-delivery

with the Welsh Government to evaluate the impacts of fishing on features of Marine Protected Areas, including Natura 2000 sites, to inform their future management[60].

In England management is presently coordinated between the Inshore Fisheries and Conservation Authorities and the Marine Management Organisation for sites within 12nm (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 by Scottish Ministers in Scottish waters. For offshore sites, measures are required to be proposed by the European Commission in accordance with the Common Fisheries Policy[61]. In relation to specific sites of relevance to this HRA, management proposals for the Dogger Bank have been drawn up by the Dogger Bank Steering Group which includes a number of zones which would be closed for beam trawl, bottom/otter trawl, dredges and semi-pelagic trawl fisheries. A fisheries joint management proposal was agreed in early 2017 and was followed by a Joint Recommendation process submission to the European Commission. Similarly, a number of management measures incorporating the prohibition of demersal towed or static gears in areas of Annex I habitat have been proposed for other relevant sites including Pobie Bank SAC, Solan Bank SAC, Wyville Thomson Ridge SAC, Anton Dohrn Seamount SAC, East Rockall Bank SAC and Stanton Banks SAC, or have been implemented as in the Darwin Mounds SAC and North West Rockall Bank SAC.

Whilst fishing may be linked to historical disturbance to site features, and presents an ongoing risk to these, future management measures should limit the potential for in-combination effects with other activities, particularly when considered in the context of existing controls which are available to avoid effects on sites from exploration activity (see Section 4.3), and other activities including offshore renewables which are subject to statutory environmental impact assessment and where appropriate, an HRA. All Blocks in, or within 10km of sites designated for Annex I habitats have been screened in to the second stage of HRA, when the potential for significant cumulative and in-combination effects on European sites would be assessed.

For activity-specific assessments, it is the licensee's responsibility to identify potential in-combination effects and undertake early engagement with other stakeholders.

[60] https://naturalresources.wales/about-us/our-projects/marine-projects/assessing-welsh-fishing-activities/?lang=en

[61] Also refer to Regulation (EU) No. 1380/2013 on the Common Fisheries Policy.

Figure 5.1: Physical and drilling effects – Blocks and SPAs screened in

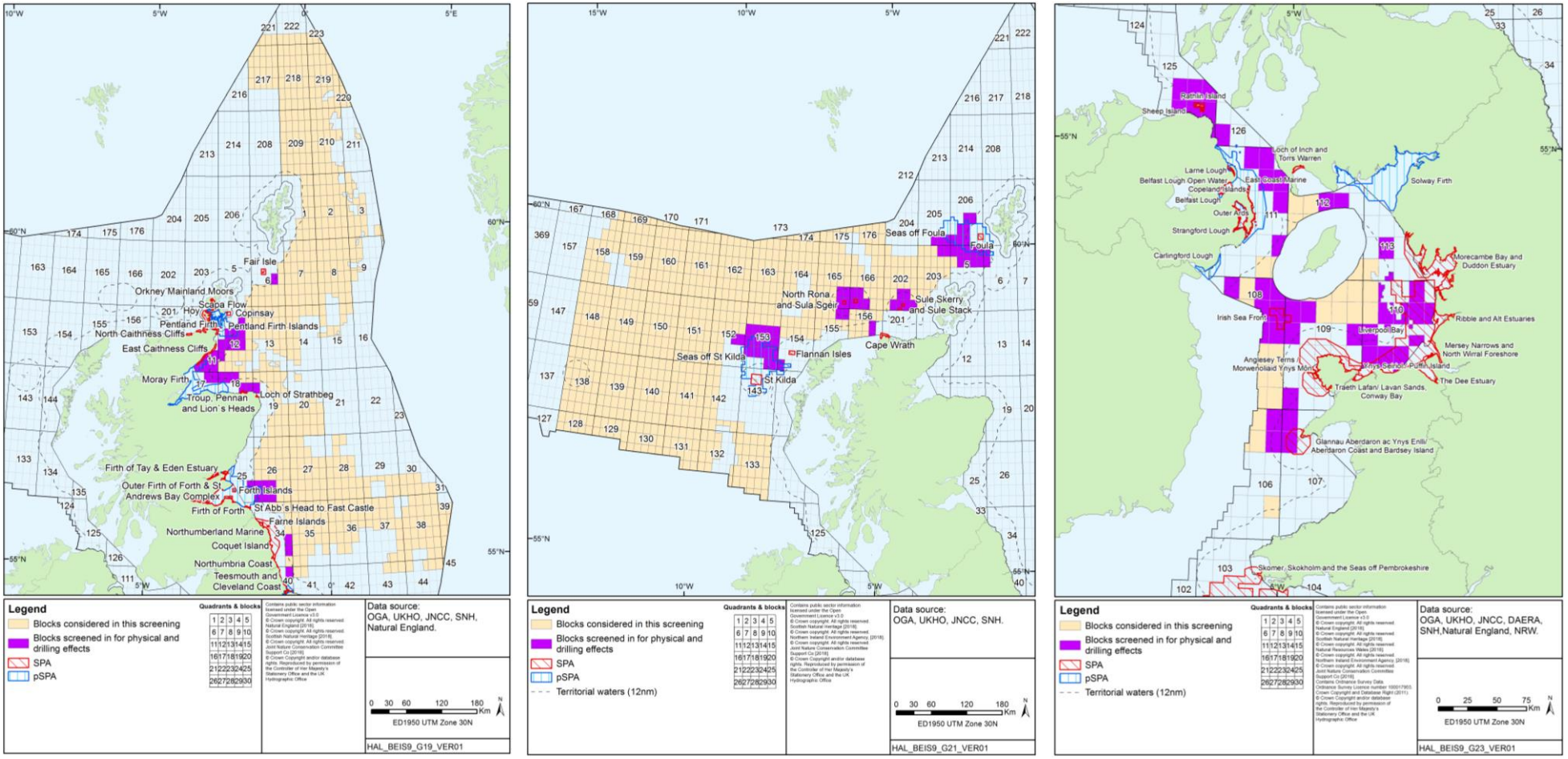
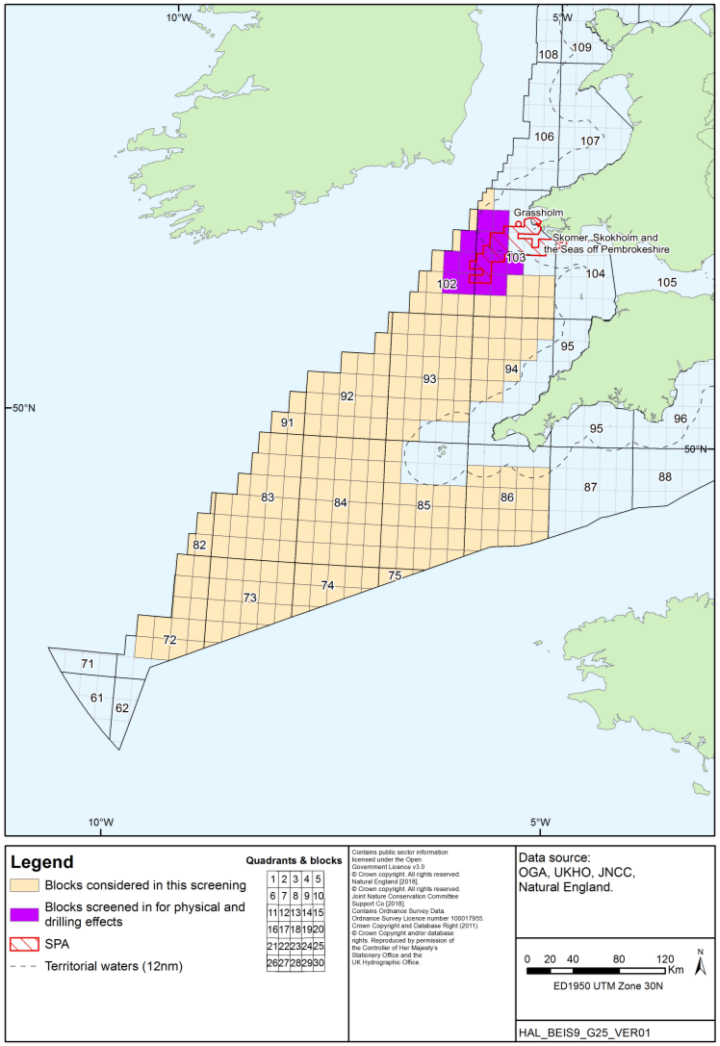


Figure 5.1: Physical and drilling effects – Blocks and SPAs screened in – continued



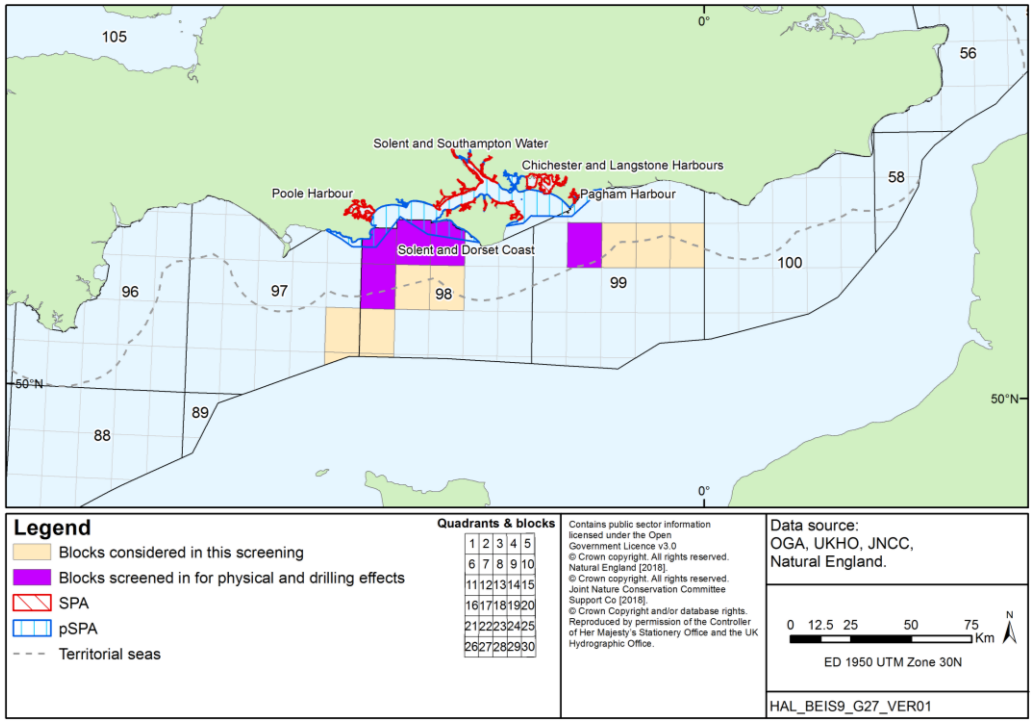


Figure 5.2: Physical and drilling effects – Blocks and SACs screened in

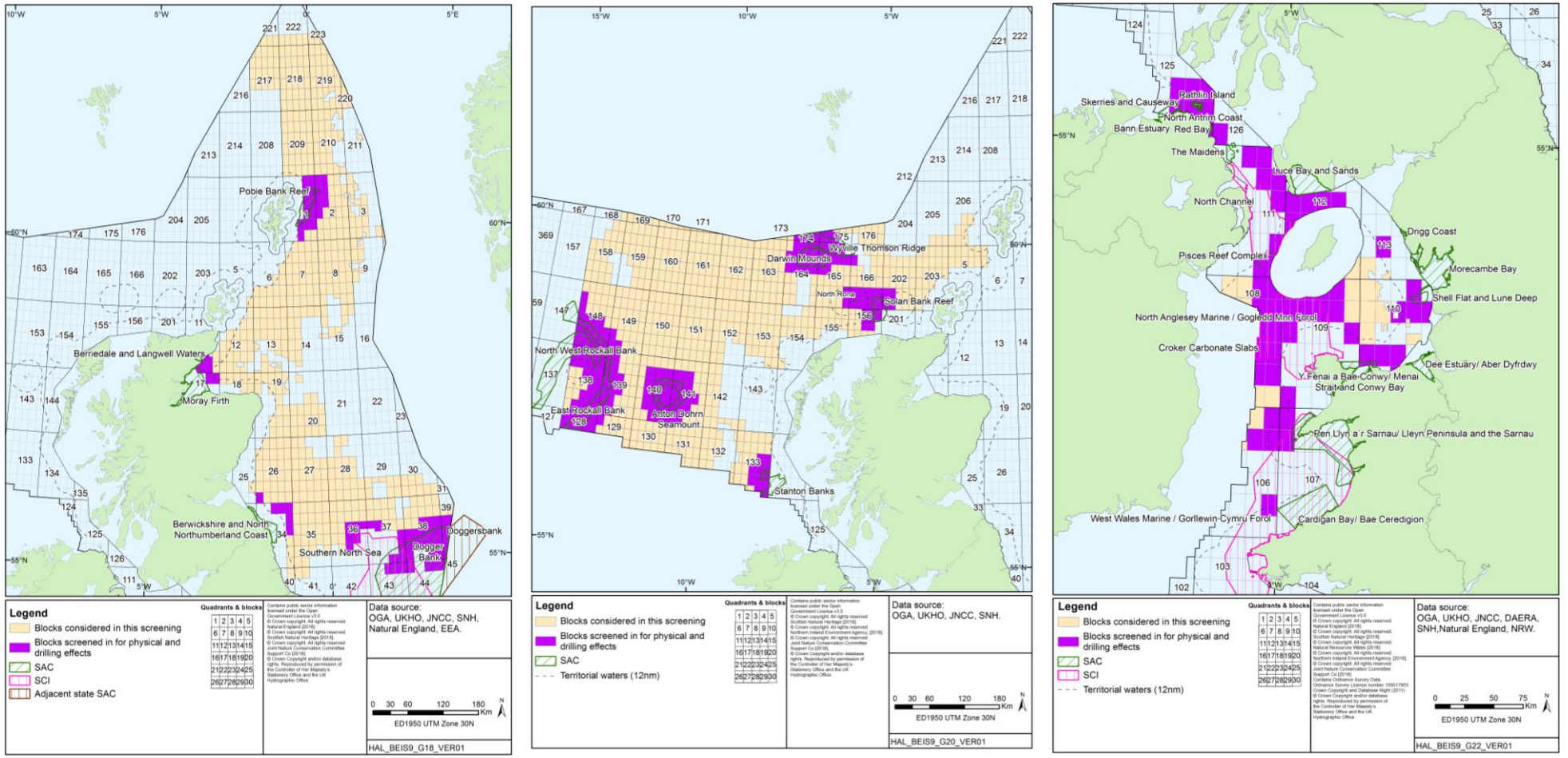
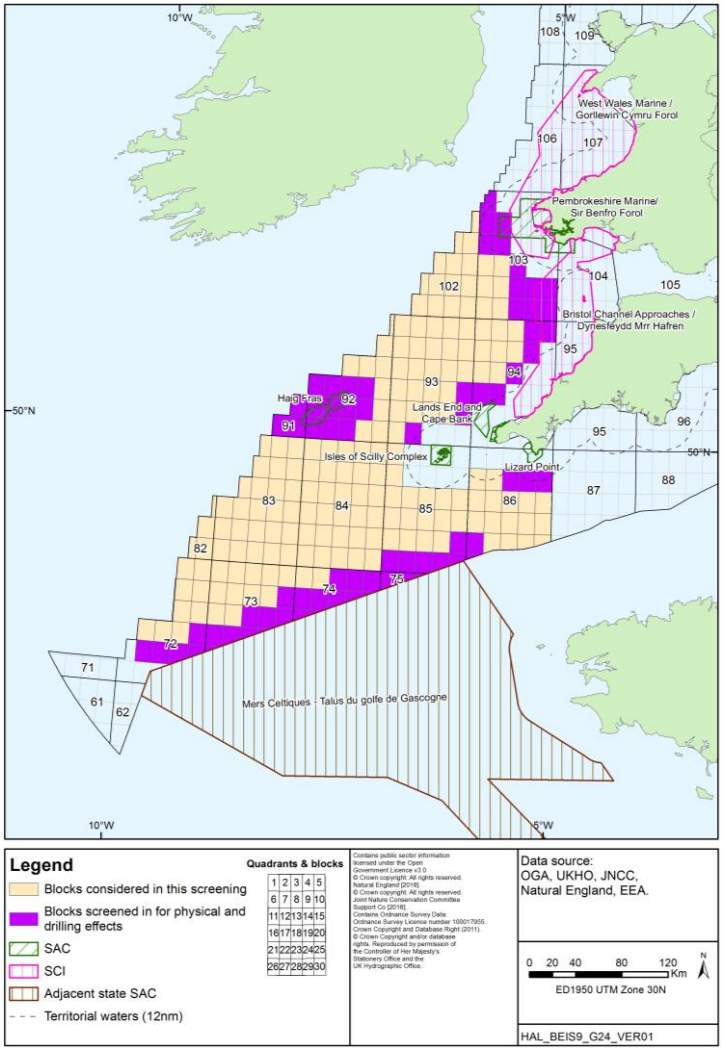


Figure 5.2: Physical and drilling effects – Blocks and SACs screened in – continued



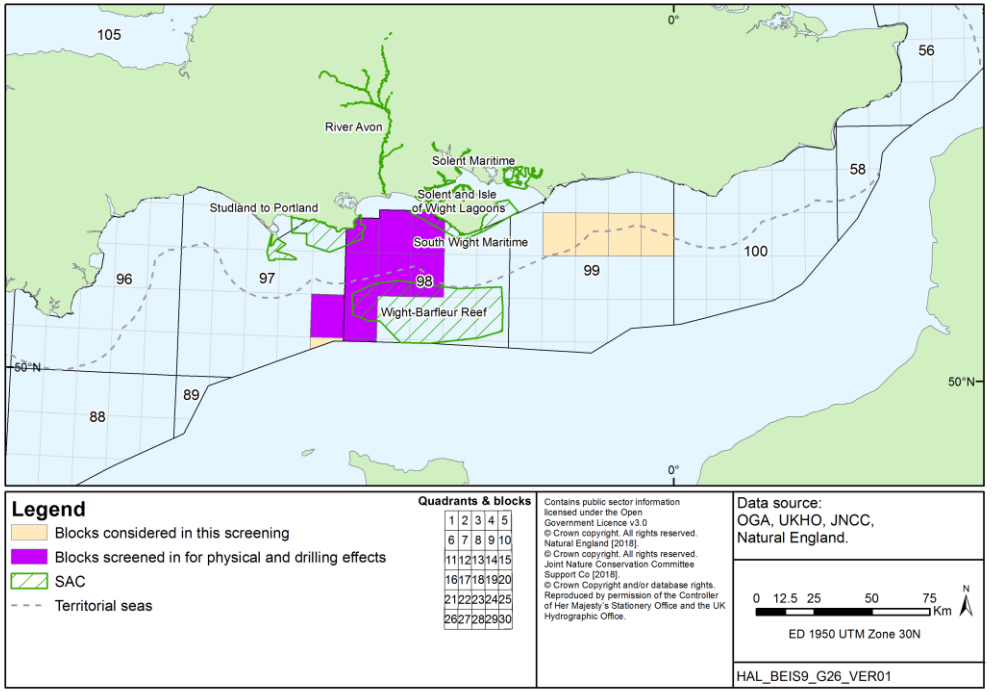


Figure 5.3: Underwater noise effects – Blocks and SPAs screened in

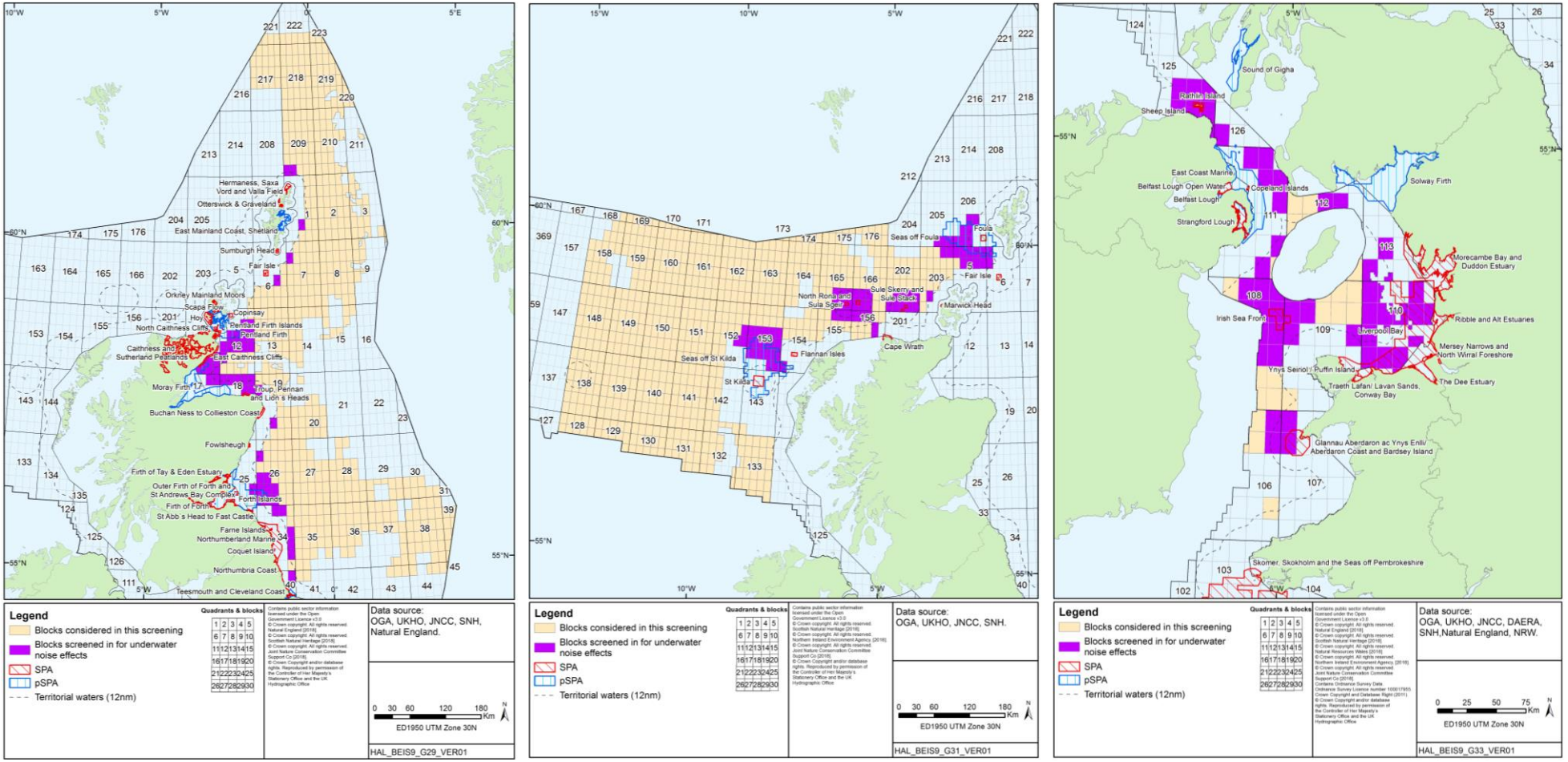
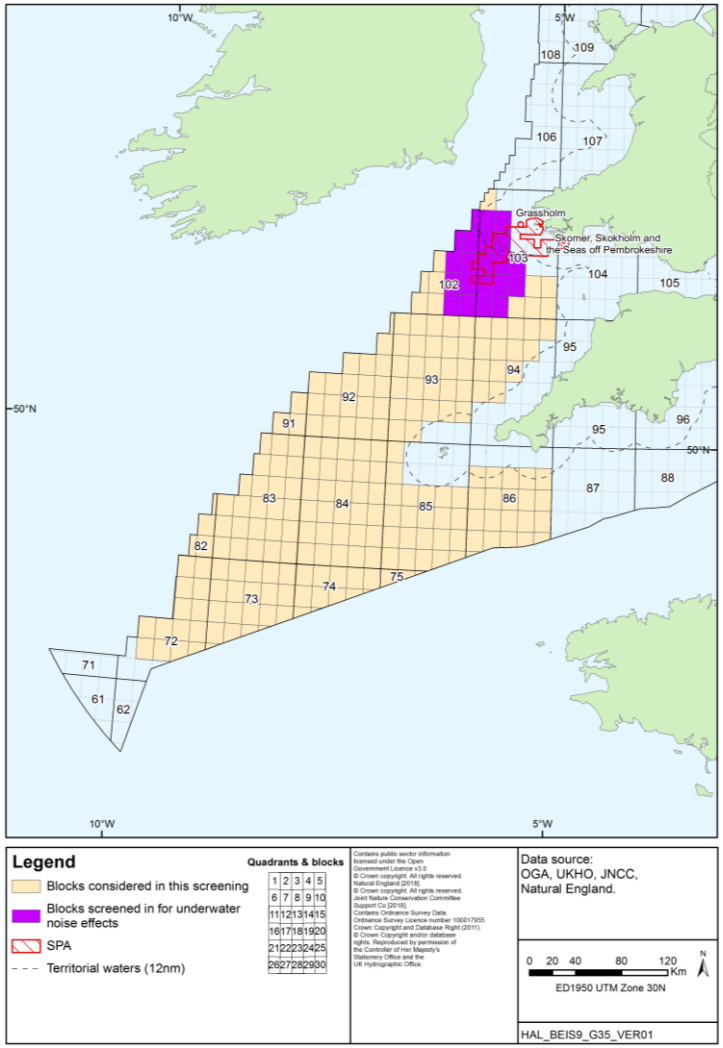


Figure 5.3: Underwater noise effects – Blocks and SPAs screened in – continued



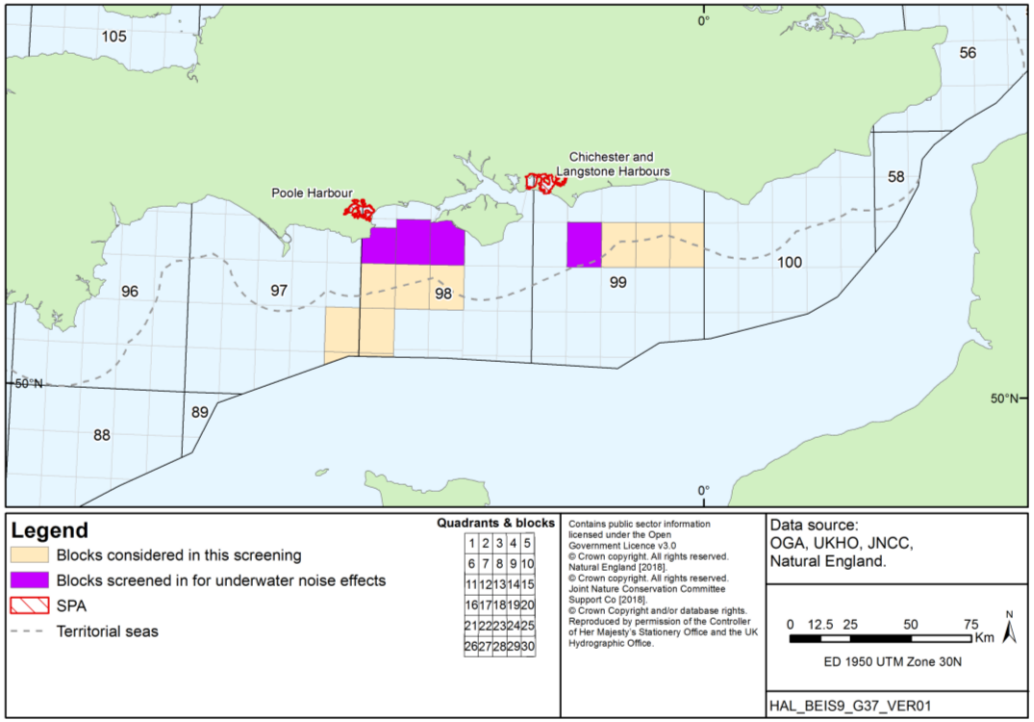


Figure 5.4: Underwater noise effects – Blocks and SACs screened in

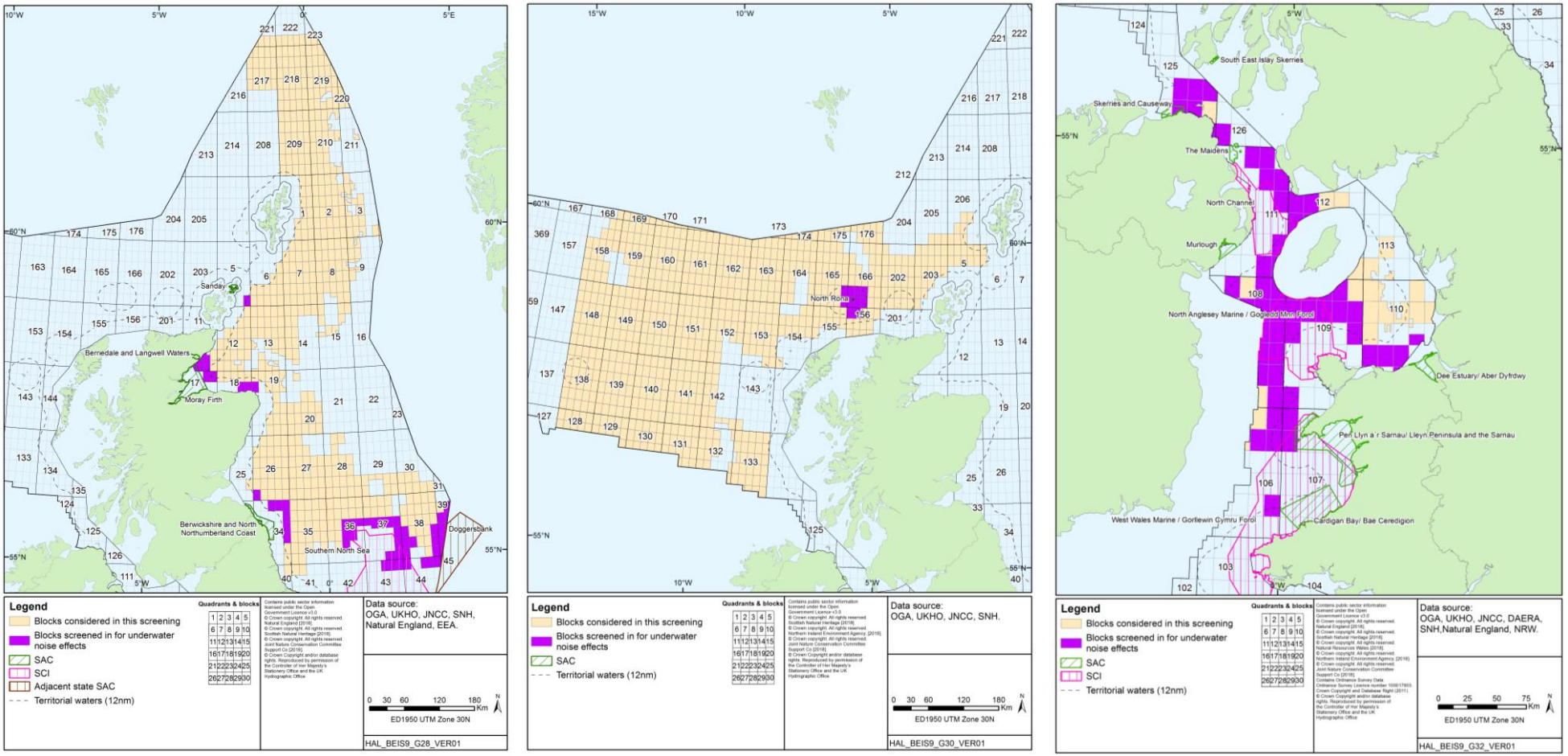
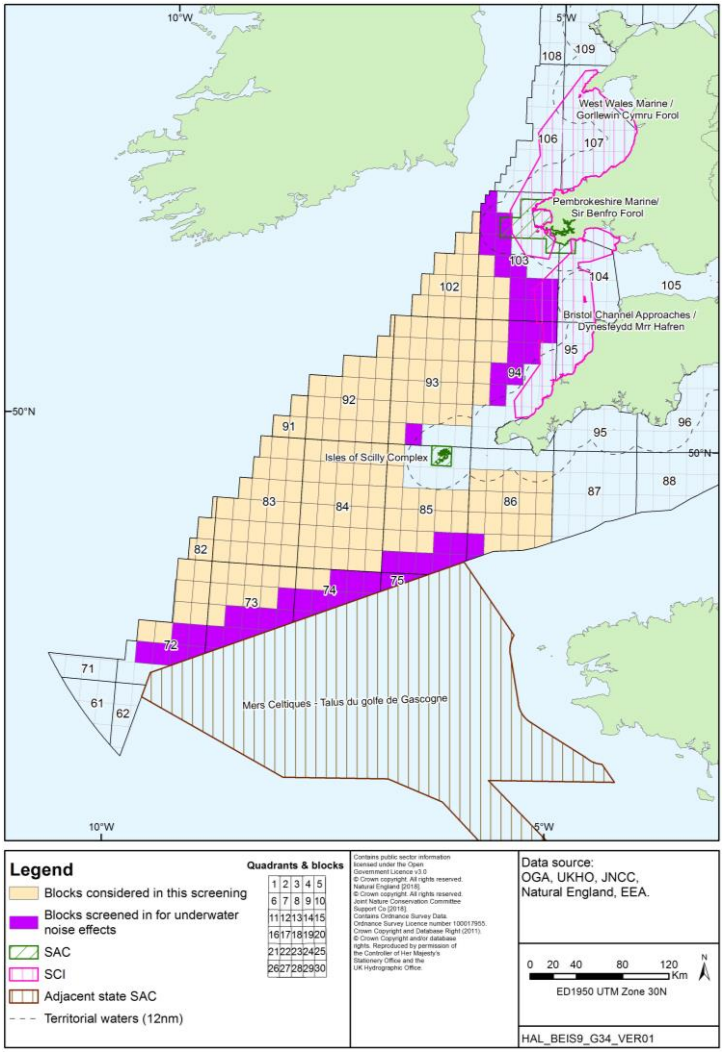


Figure 5.4: Underwater noise effects – Blocks and SACs screened in – continued



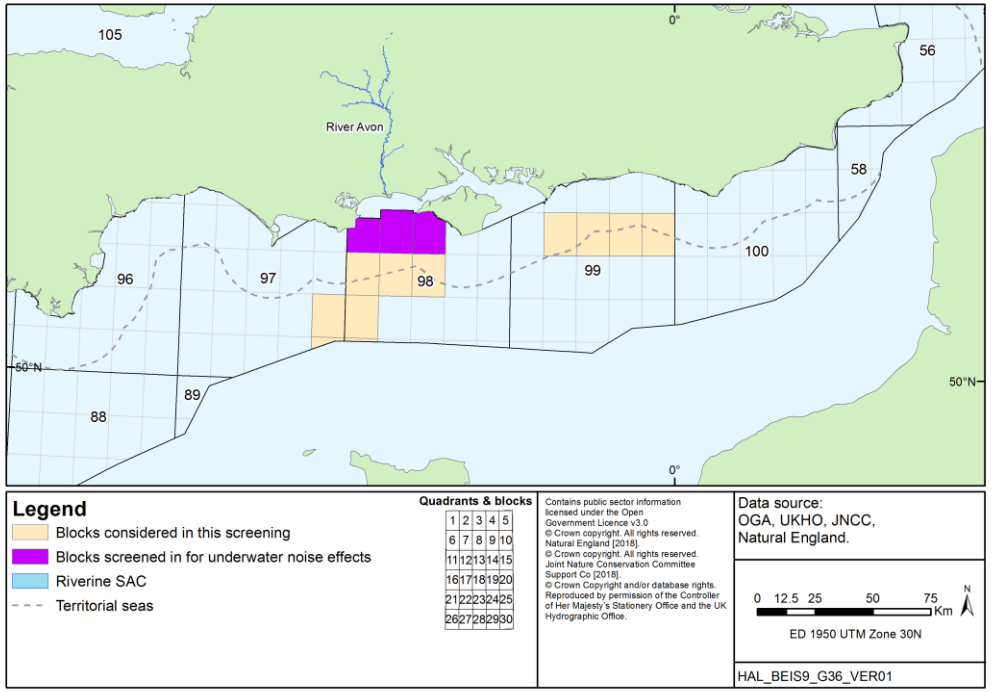


Figure 5.5: Estimated total density of harbour seals in UK waters

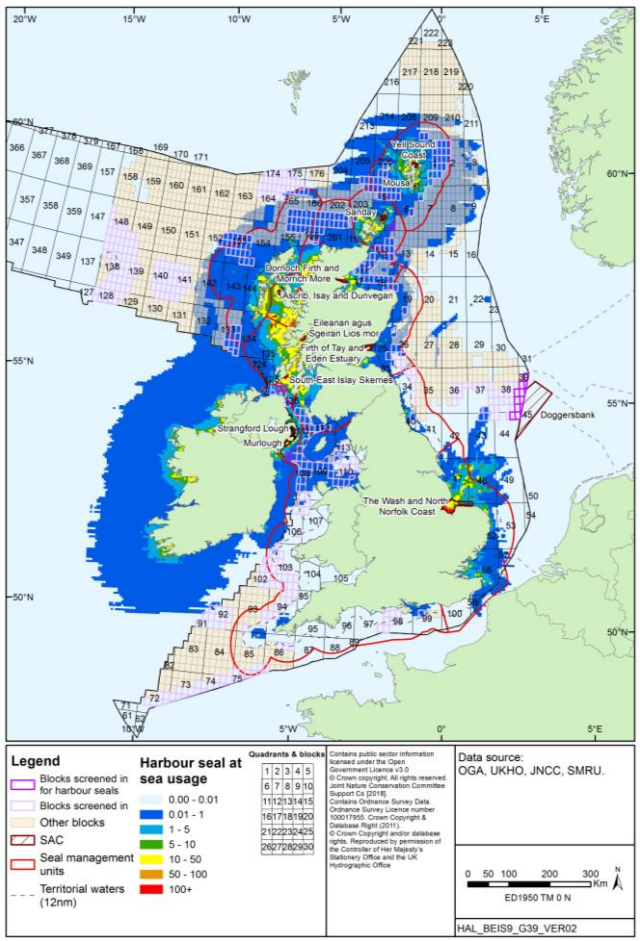


Figure 5.6: Estimated total density of grey seals in UK waters

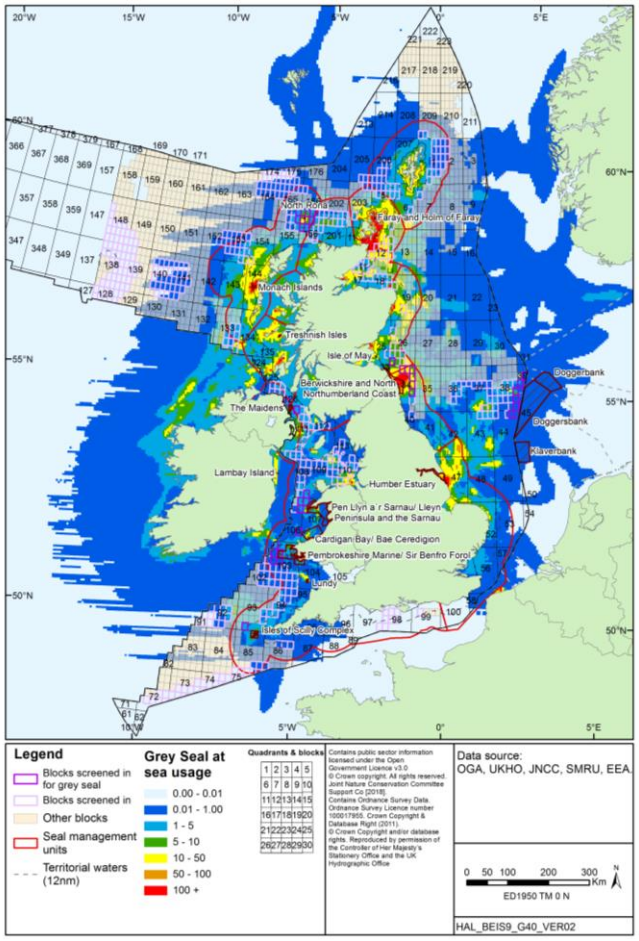


Figure 5.7: Bottlenose dolphin management units in the UK

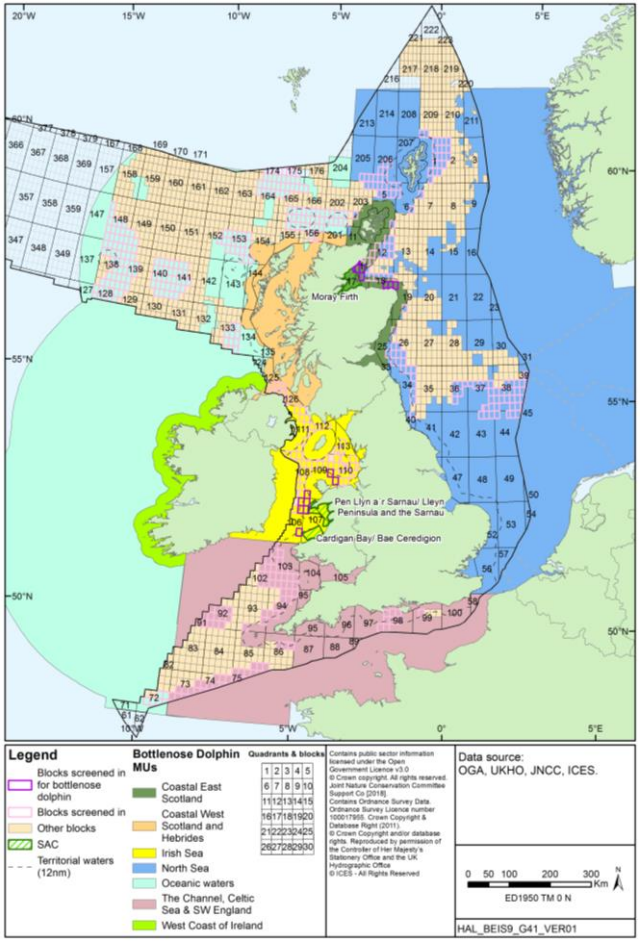


Figure 5.8: Existing oil and gas licences and infrastructure, Agreements for Lease, SPAs and 31st Round Blocks

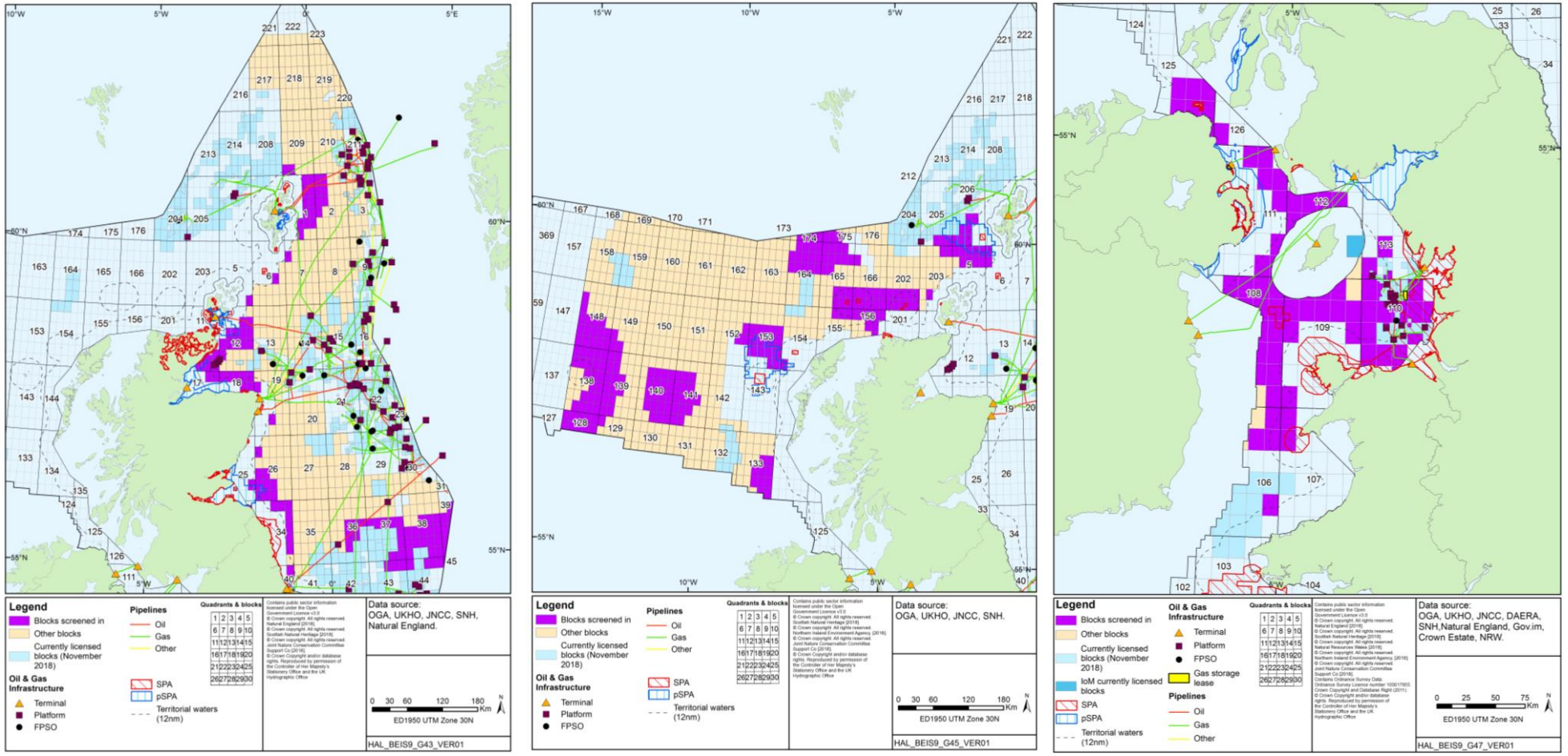


Figure 5.8: Existing oil and gas licences and infrastructure, Agreements for Lease, SPAs and 31st Round Blocks - continued

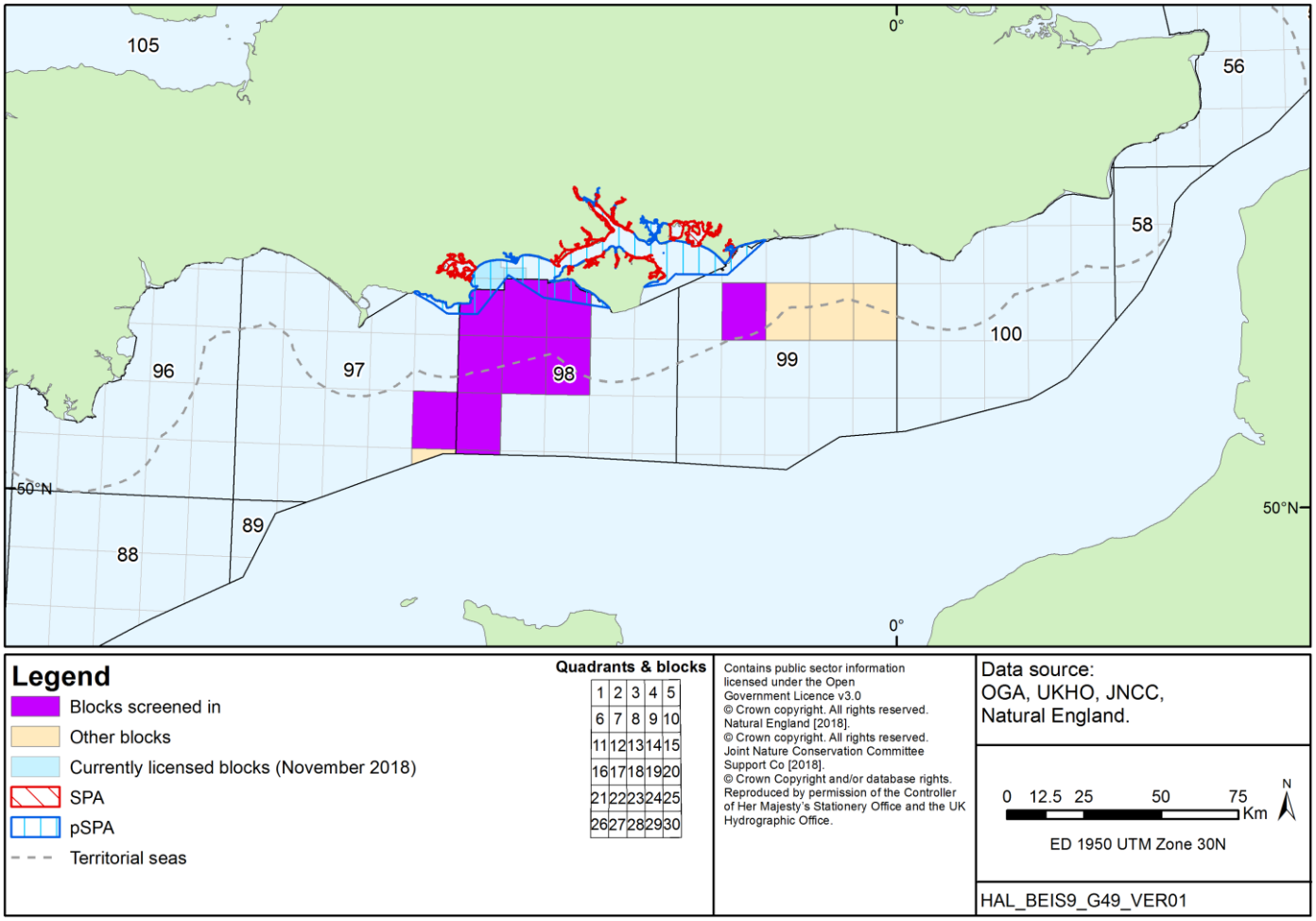


Figure 5.9: Existing oil and gas licences and infrastructure, Agreements for Lease, SACs and 31st Round Blocks

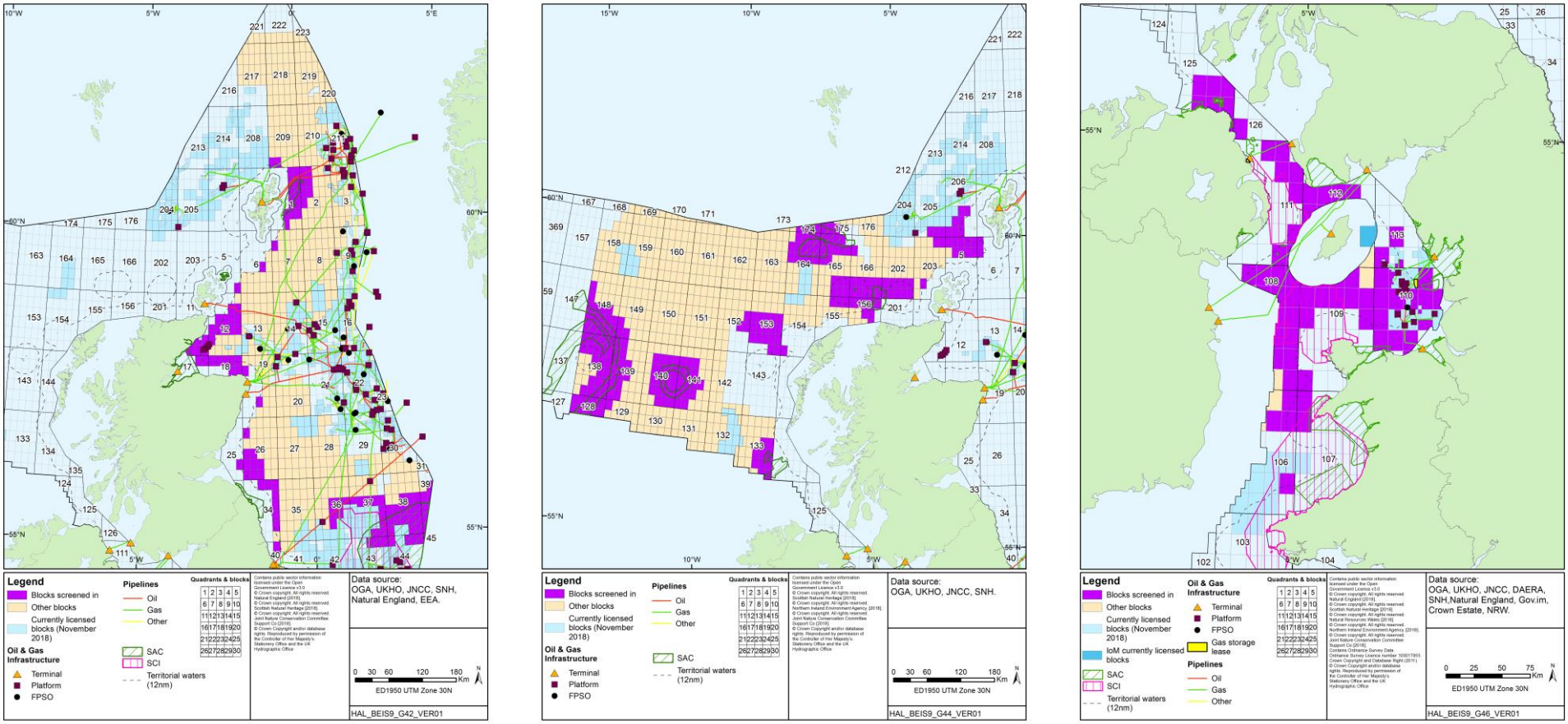


Figure 5.9: Existing oil and gas licences and infrastructure, Agreements for Lease, SACs and 31st Round Blocks - continued

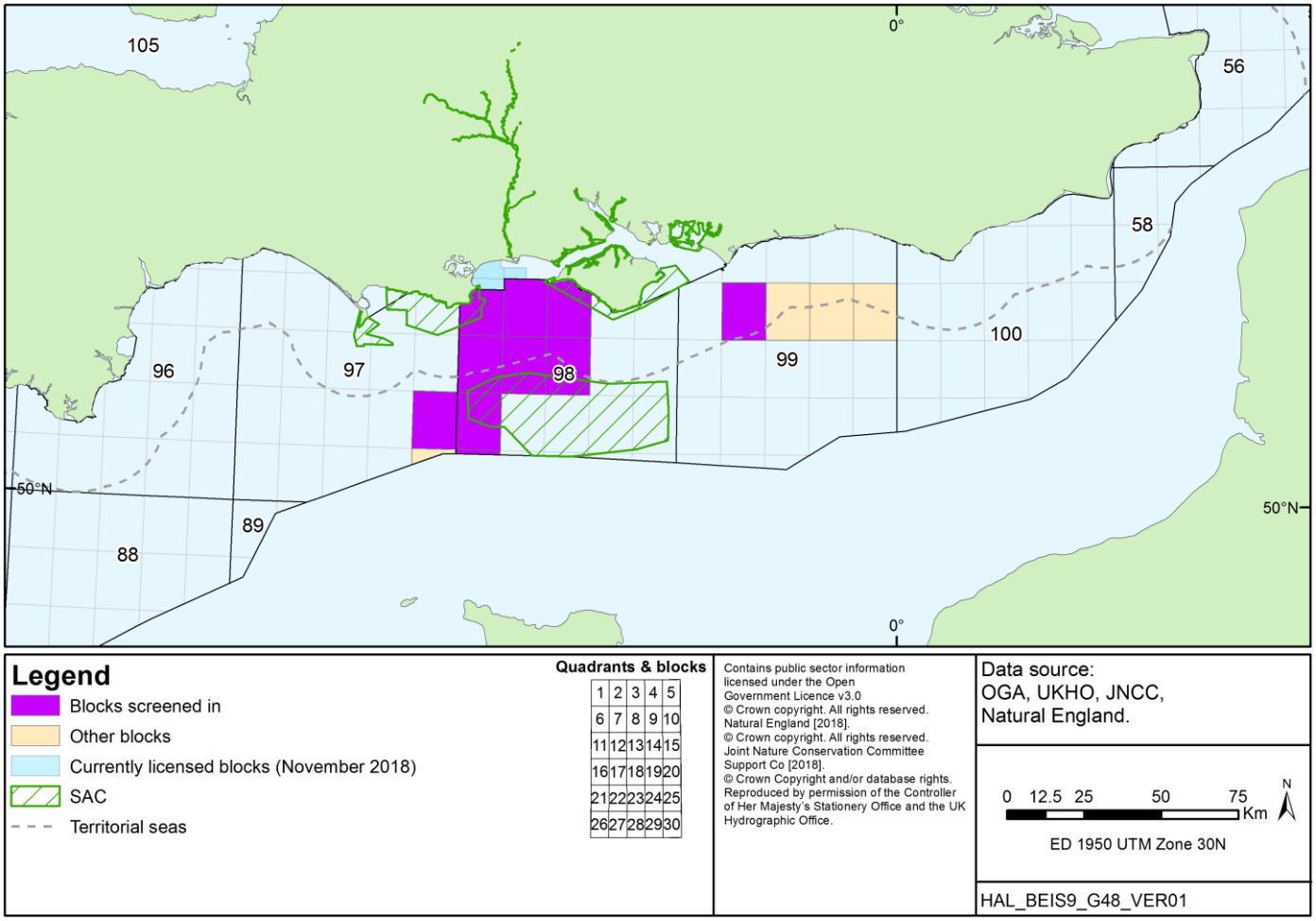


Figure 5.10: Marine renewable energy, aggregate extraction, SPAs and 31st Round Blocks

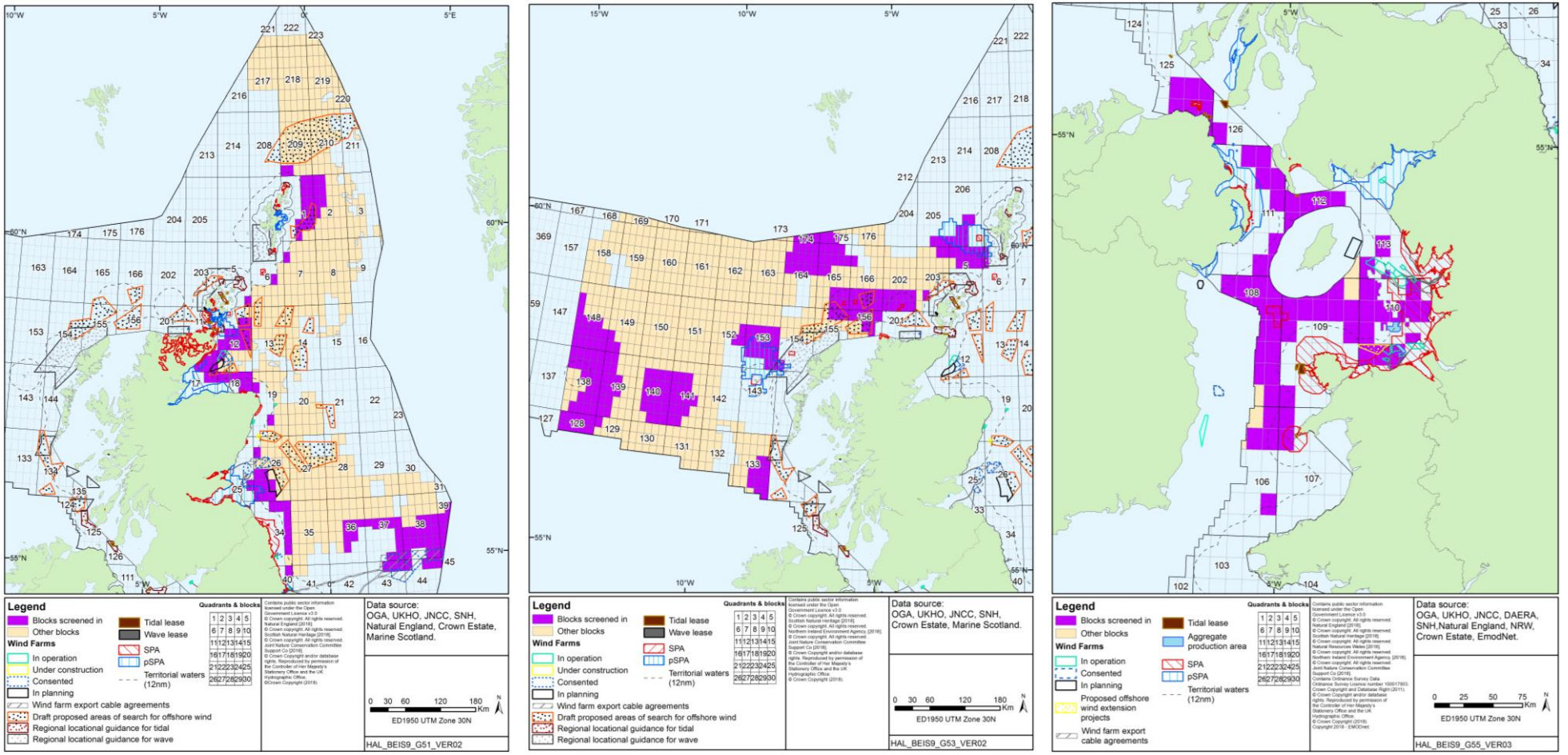
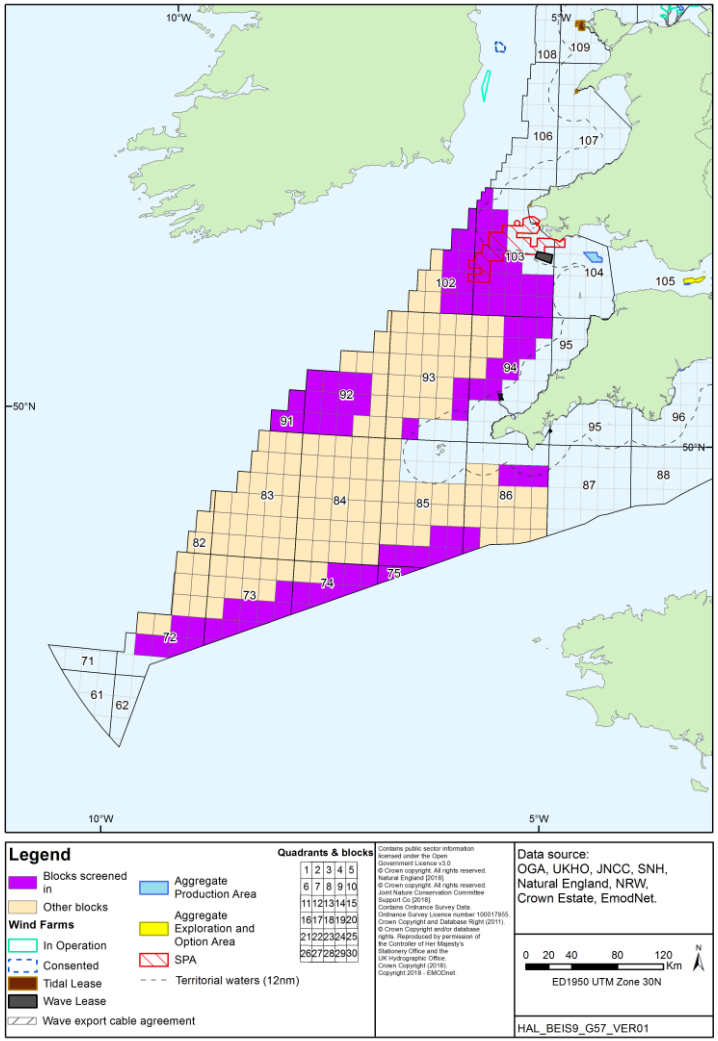


Figure 5.10: Marine renewable energy, aggregate extraction, SPAs and 31st Round Blocks – continued



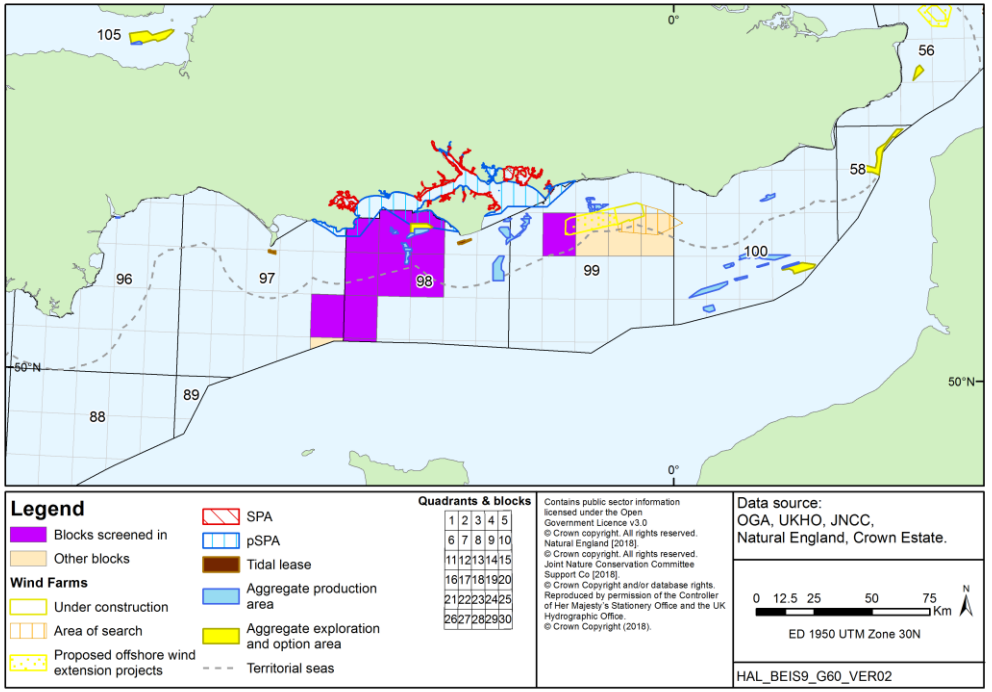


Figure 5.11: Marine renewable energy, aggregate extraction, SACs and 31st Round Blocks

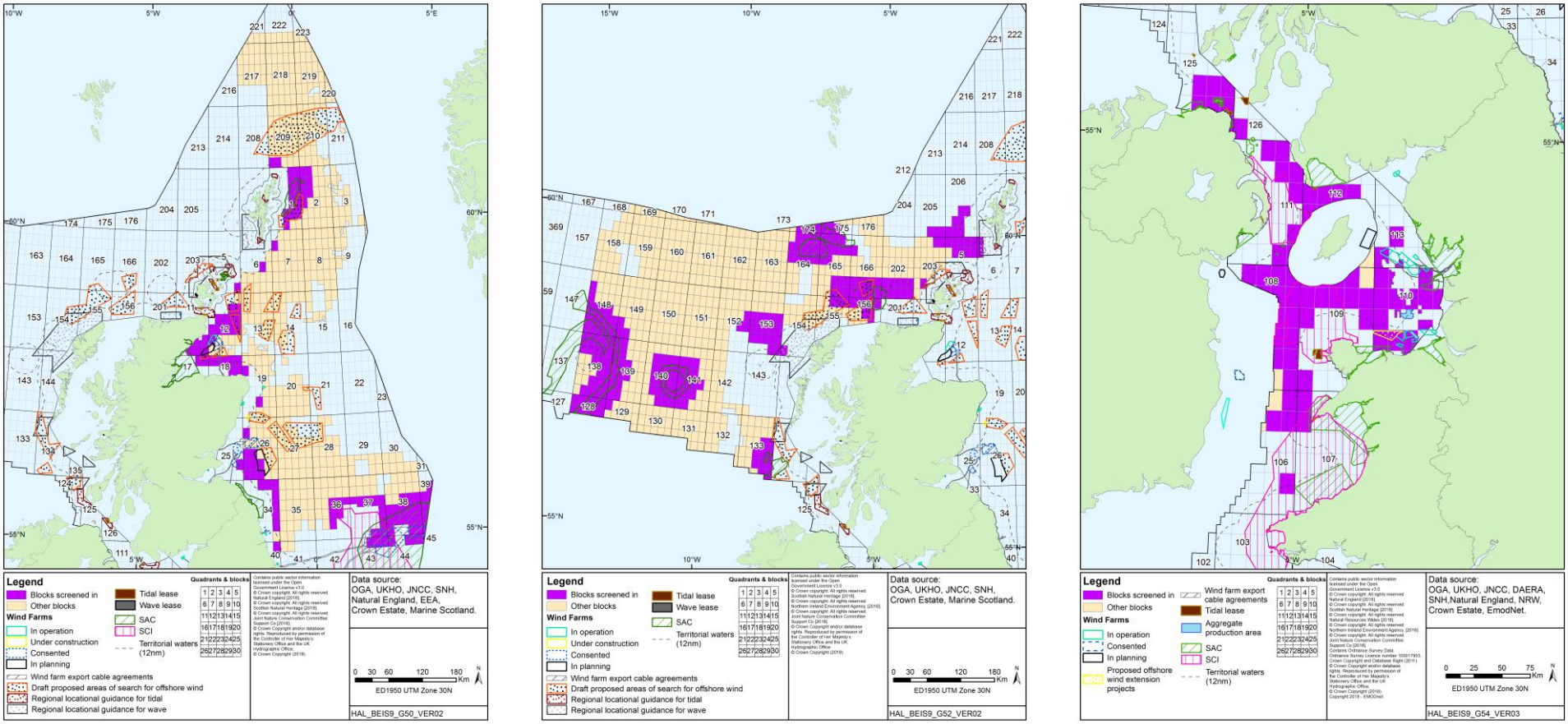
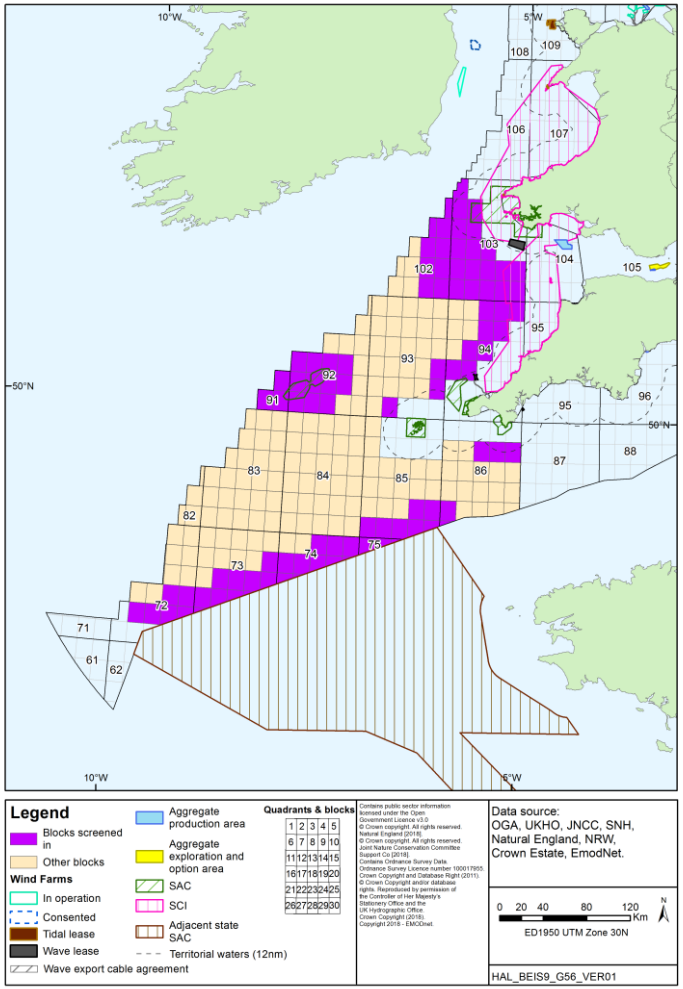


Figure 5.11: Marine renewable energy, aggregate extraction, SACs and 31st Round Blocks



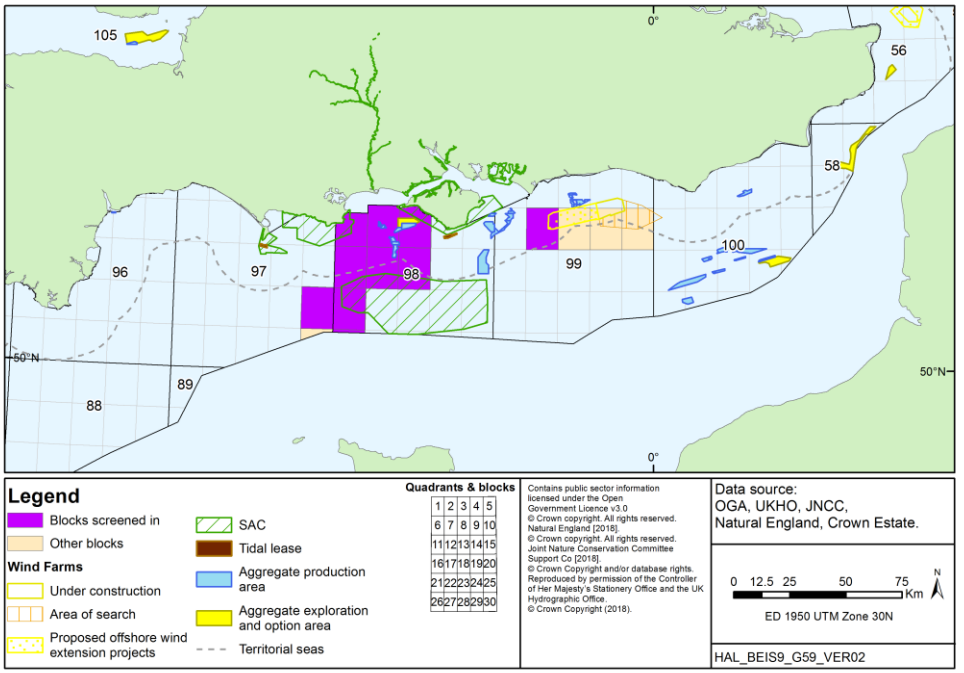


Figure 5.12: Navigation density, SPAs and 31st Round Blocks

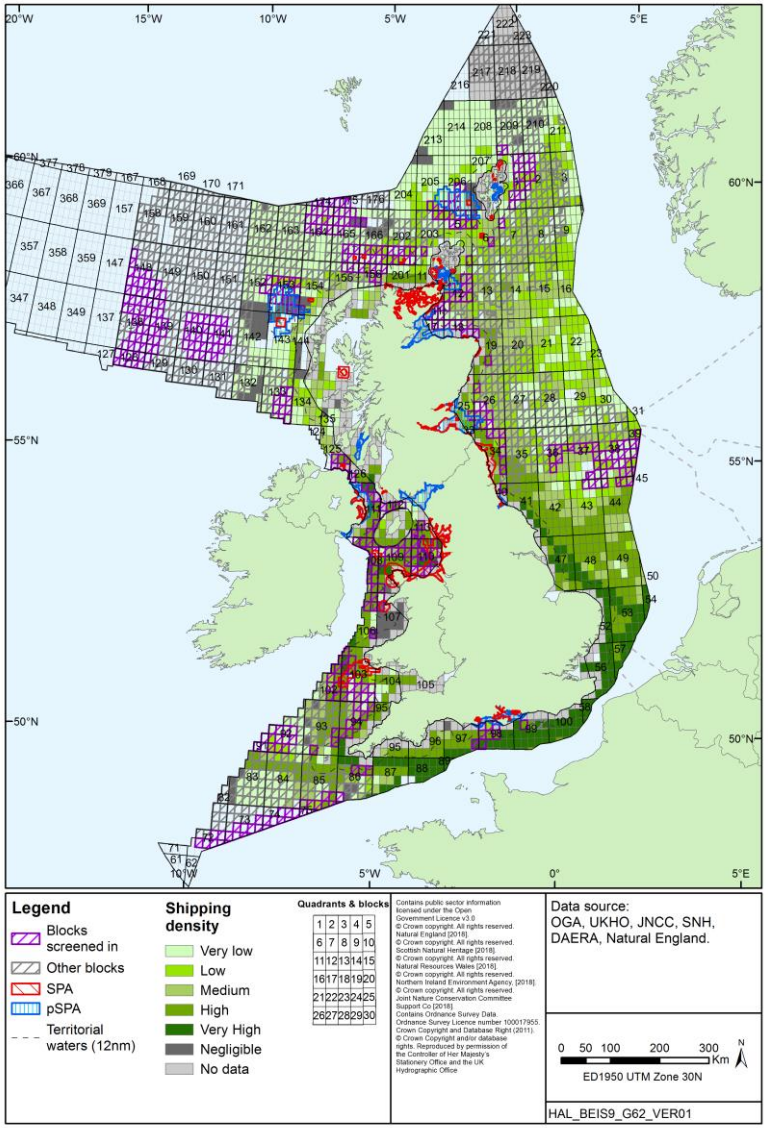
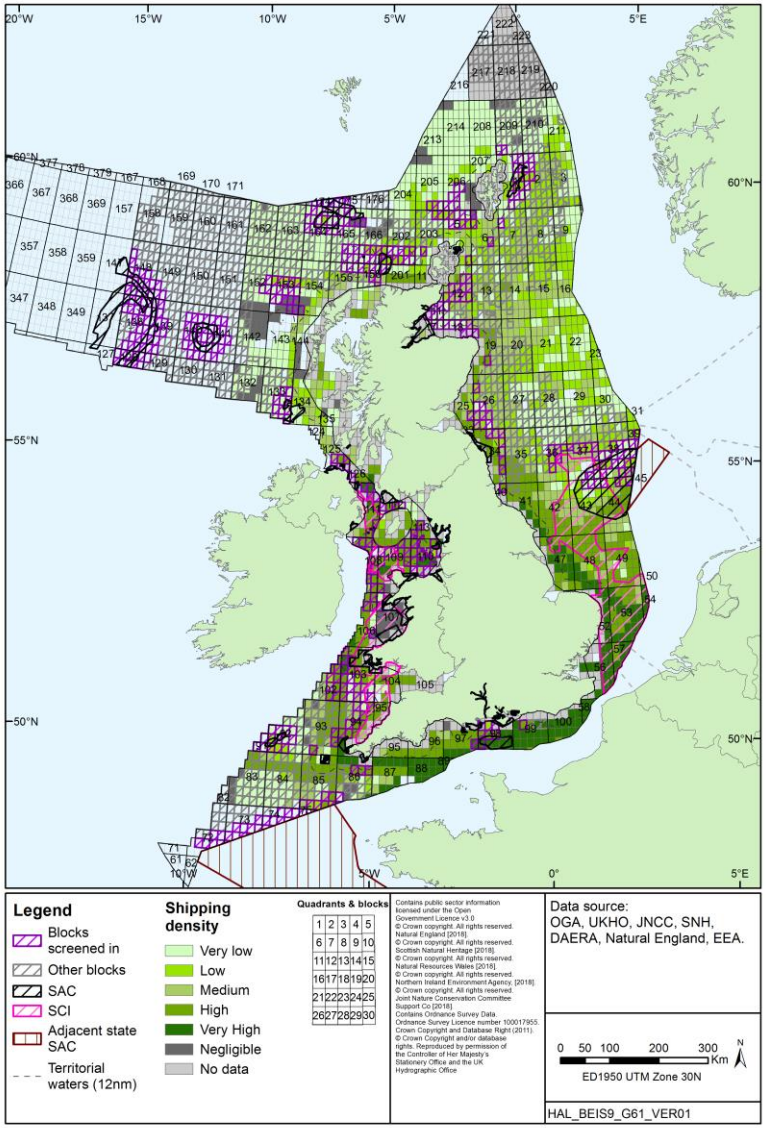


Figure 5.13: Navigation density, SACs and 31st Round Blocks

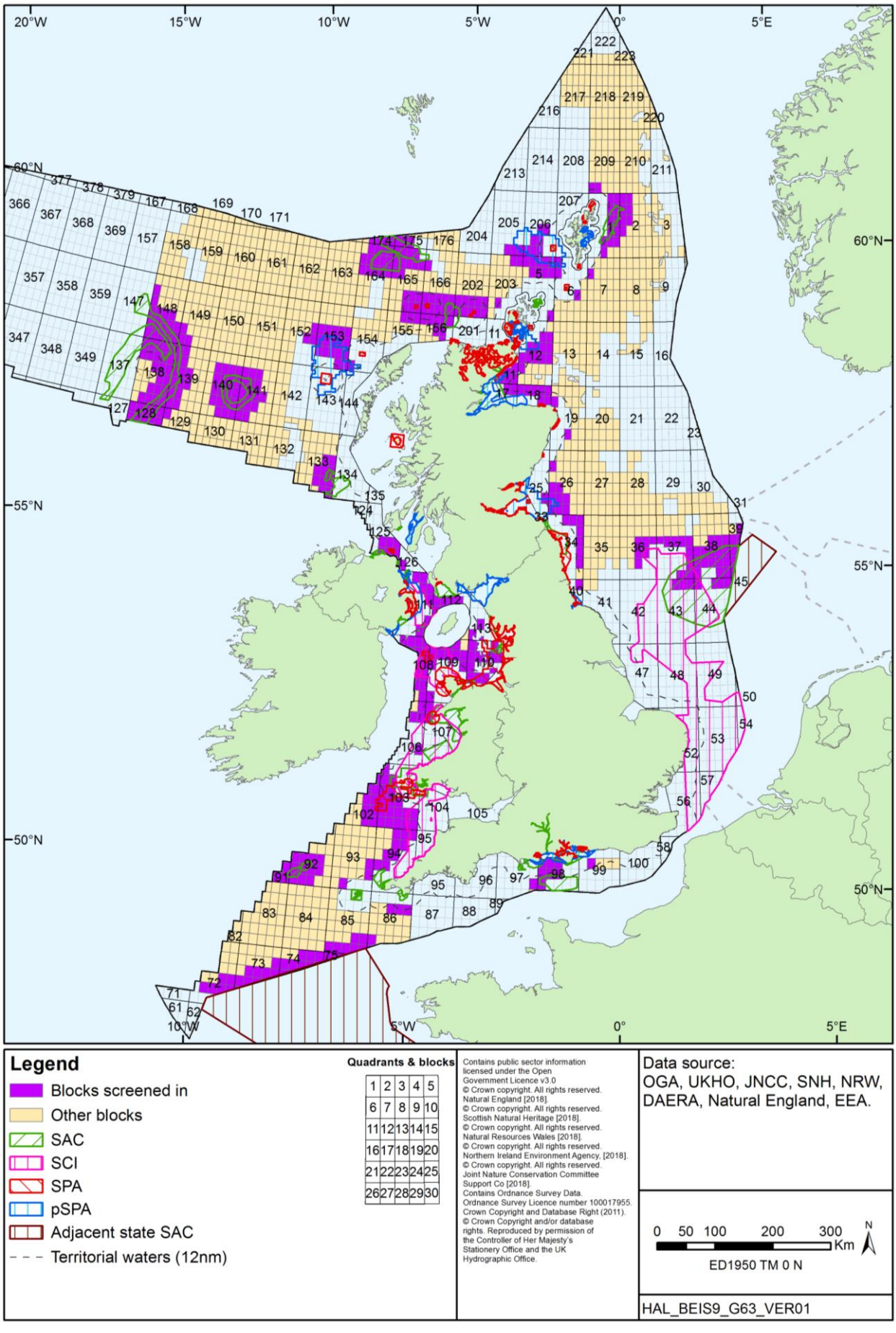


6 Conclusion

This screening assessment is based on the Blocks offered in the 31st Round and has considered the likelihood for significant effects on Natura 2000 sites from exploration/appraisal activities that could follow licensing of Blocks. The screening, which does not take account of mitigation, concluded that for the majority of the Blocks, licensing would not have the potential to cause significant effects on Natura 2000 site(s). However, based on the screening results a number of Blocks on offer and relevant sites may be subject to a second stage of HRA, Appropriate Assessment, if licences are applied for and prior to decisions on the grant of such licences. These Blocks are listed in Table 5.1 and Appendix B (which lists the Blocks and relevant sites according to the criteria by which they were screened in), and are shown in Figure 6.1 with the relevant sites.

As described in Section 1.1, the award of a licence does not constitute any form of approval for activities to take place in the Blocks, nor does it confer any exemption from other legal or regulatory requirements. Offshore activities are subject to a range of statutory permitting and consenting requirements, including, where relevant, activity-specific Appropriate Assessment (AA) under Article 6(3) of the Habitats Directive (Directive 92/43/EC).

Figure 6.1: 31st Round Blocks and sites for which a 2nd Stage of HRA may be undertaken



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Appendix A – The Designated Sites

A1 Introduction

The following maps and tables show the locations of potentially relevant European sites and their qualifying features with respect to the Blocks offered as part of the 31st Seaward Licensing Round.

The primary sources of site data were the latest JNCC SAC[62] and SPA summary data[63] and interest features and site characteristics were filtered for their coastal and marine relevance. The websites of the relevant Statutory Nature Conservation Bodies (SNCBs) were also reviewed to verify and augment site information including Scottish Natural Heritage (SNH)[64], Natural England[65,66], Natural Resources Wales (NRW)[67], and the Department of Agriculture, Environment and Rural Affairs (DAERA) [68].

The sites in this Appendix are ordered thus:

A2 Coastal and marine Special Protection Areas

A3 Coastal and marine Special Areas of Conservation

A4 Sites in the adjacent waters of other member states

A5 Ramsar sites

[62] Version as of 1st June 2018 - http://jncc.defra.gov.uk/page-1461

[63] Version as of 1st June 2018 - http://jncc.defra.gov.uk/page-1409

[64] http://gateway.snh.gov.uk/sitelink/index.jsp

[65] http://publications.naturalengland.org.uk/category/6490068894089216

[66] https://www.gov.uk/government/collections/conservation-advice-packages-for-marine-protected-areas

[67] https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/find-protected-areas-of-land-and-seas/?lang=en

[68] https://www.daera-ni.gov.uk/articles/marine-protected-areas

A2 Coastal and Marine Special Protection Areas

Special Protection Areas (SPAs) are protected sites classified in accordance with Article 4 of the EC Birds Directive (2009/147/EC). Sites are classified for rare and vulnerable birds and for regularly occurring migratory birds. The SPAs included in this section are coastal sites selected for the presence of one or more of the bird species listed in Box A.1 (below).

A number of marine SPAs, some of which provide marine extensions to existing sites, are presently at the proposed stage in Scottish inshore and offshore waters having undergone public consultation in 2016 and early 2017[69]. Additionally the Teesmouth and Cleveland Coast extension pSPA is presently subject to consultation[70] and the draft Isles of Scilly extension SPA, are tabulated and shown in relevant maps below. Relevant SPAs in the adjacent waters of another Member State (Republic of Ireland, France), see Maps A.3-A.5) are listed and described separately in Section A4. All relevant SPAs are included on Maps A.1 to A.5.

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

Divers and grebes

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

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

Gulls, terns and skuas

Arctic skua *Stercorarius parasiticus*
Great skua *Stercorarius skua*
Mediterranean gull *Larus melanocephalus*
Black-headed gull *Chroicocephalus ridibundus*

Waders

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

[69] http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/proposed-marine-spas/
[70] https://consult.defra.gov.uk/natural-england-marine/teesmouth-and-cleveland-coast-potential-sp/

Common gull *Larus canus*
Lesser black-backed gull *Larus fuscus*
Herring gull *Larus argentatus*
Great black-backed gull *Larus marinus*
Kittiwake *Rissa tridactyla*
Sandwich tern *Thalasseus sandvicensis*
Roseate tern *Sterna dougallii*
Common tern *Sterna hirundo*
Arctic tern *Sterna paradisaea*
Little tern *Sternula albifrons*

Crakes and rails

Corncrake *Crex crex*

Birds of prey and owls

Marsh harrier *Circus aeruginosus*
Hen harrier *Circus cyaneus*
Golden eagle *Aquila chrysaetos*
Osprey *Pandion haliaetus*
Merlin *Falco columbarius*
Peregrine *Falco peregrinus*
Short-eared owl *Asio flammeus*

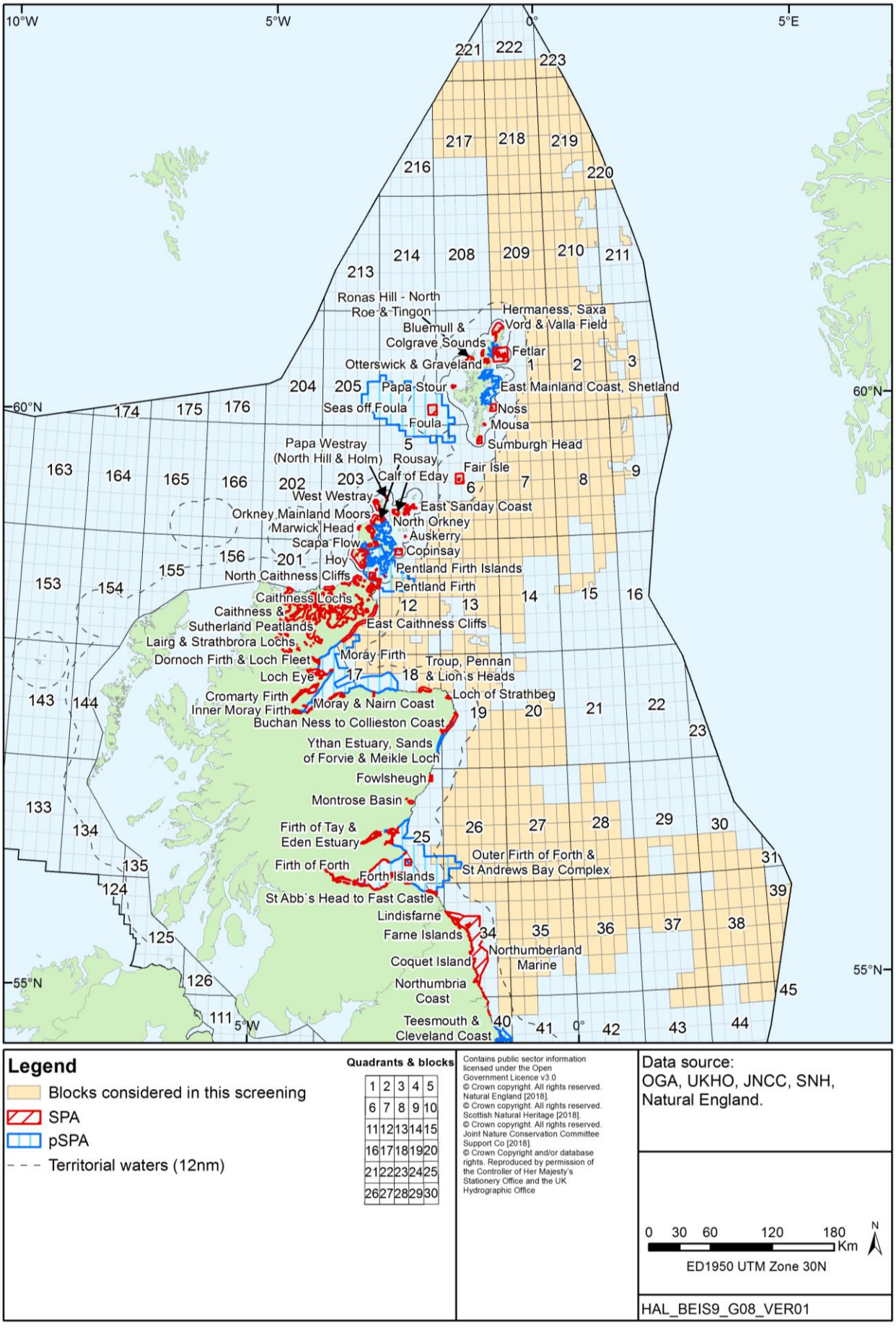
Other bird species

Fair Isle wren *Troglodytes troglodytes fridariensis*
Chough *Pyrrhocorax pyrrhocorax*

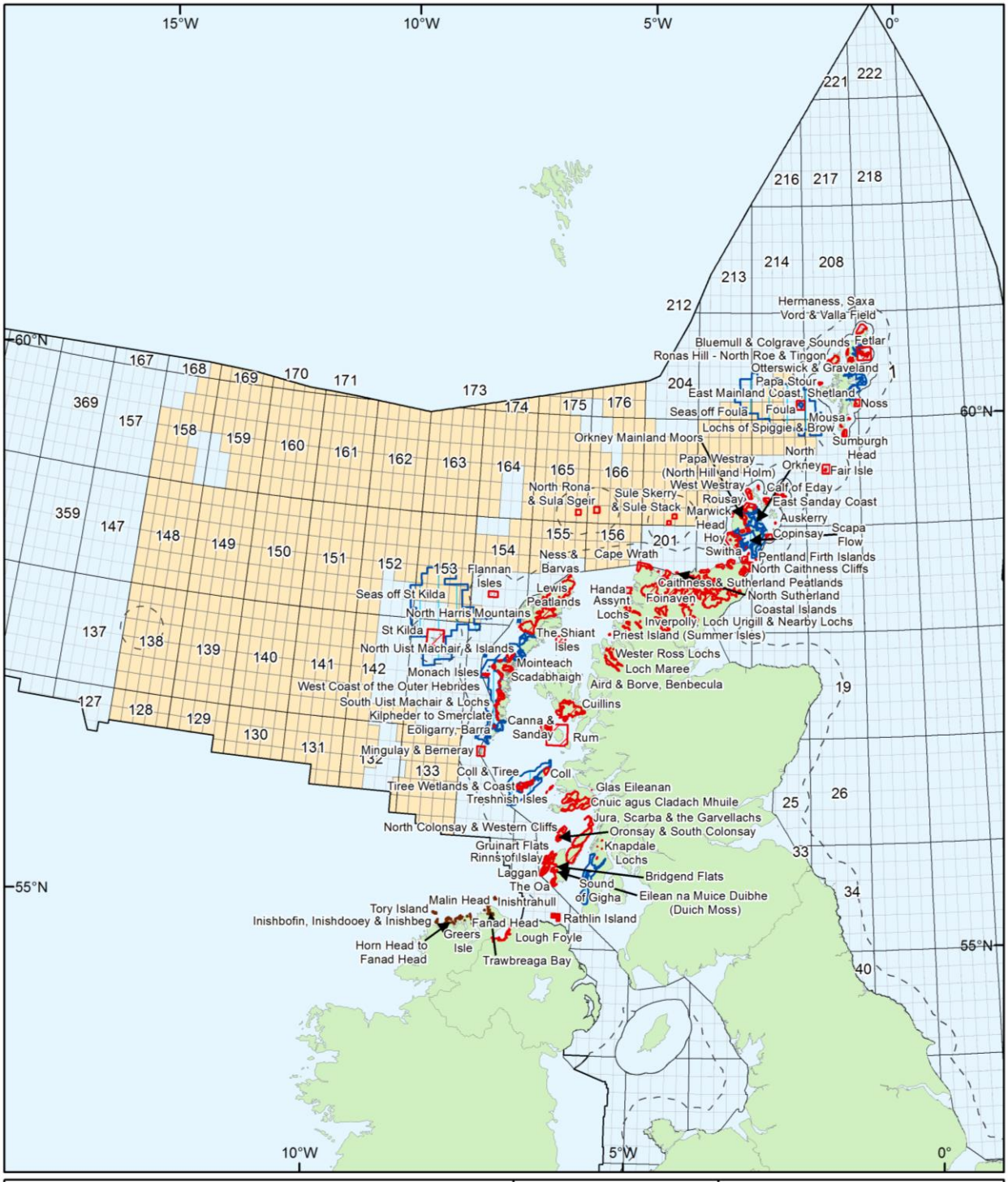
Waterfowl

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

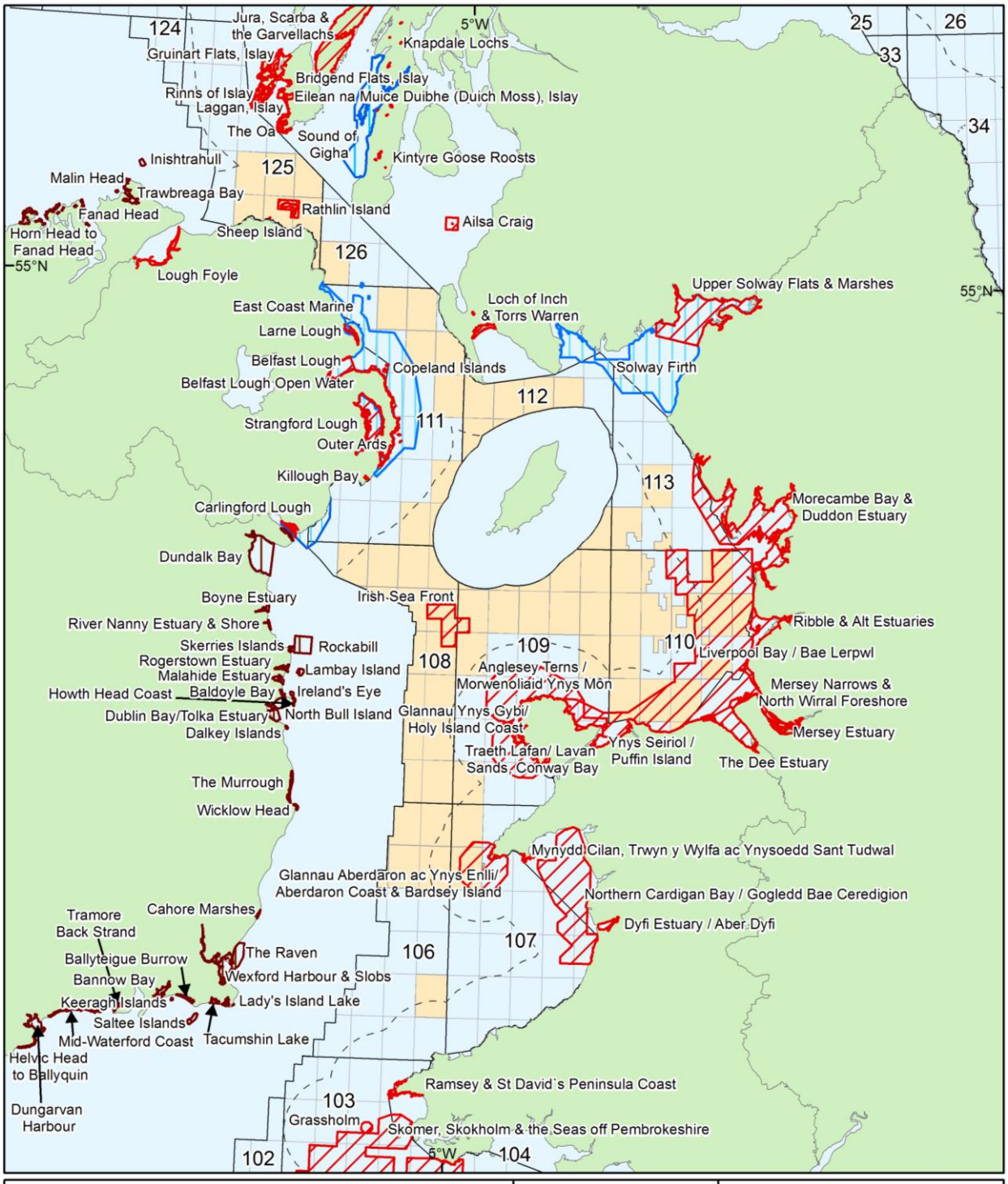
Map A.1: Location of SPAs – central and northern North Sea



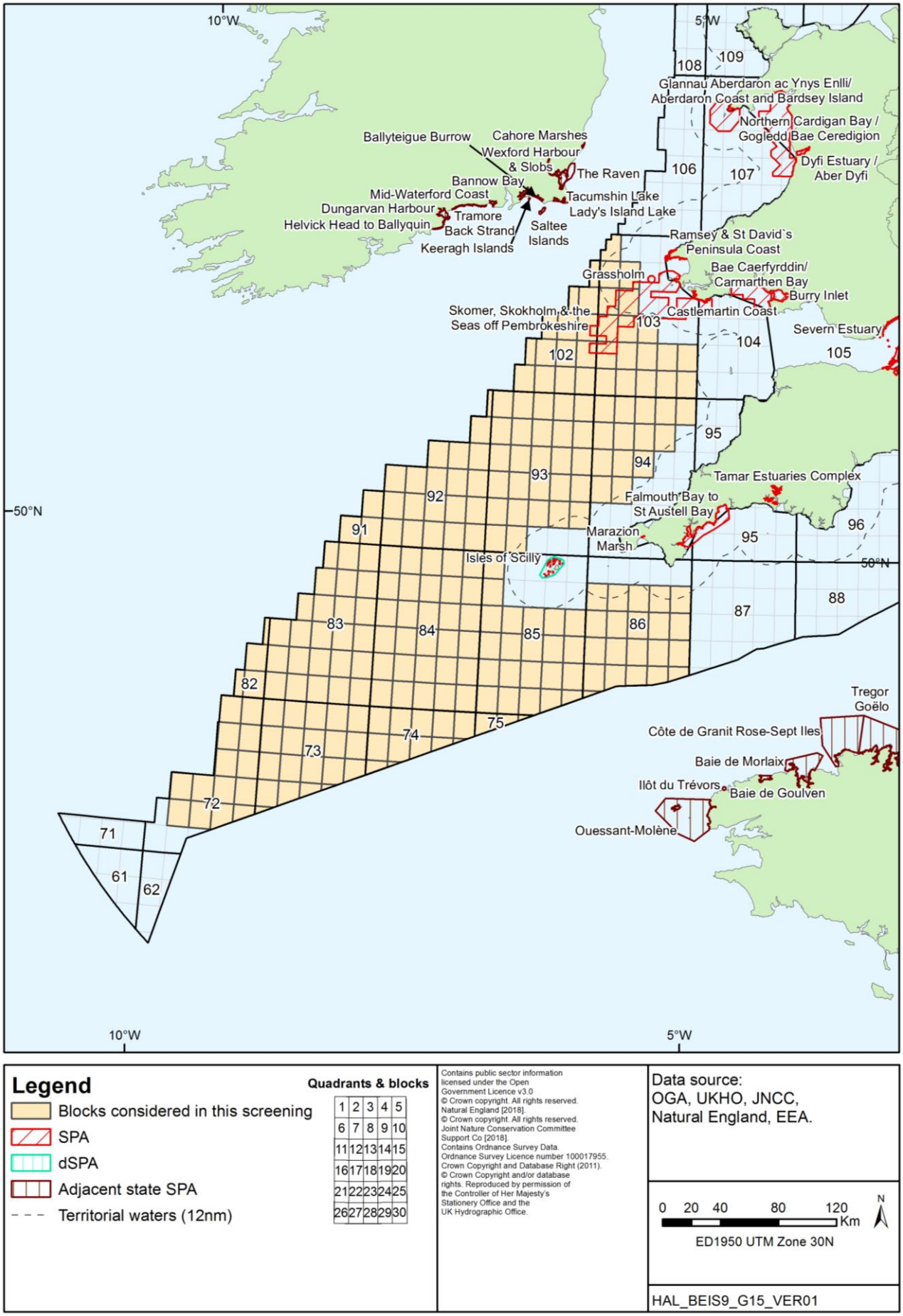
Map A.2: Location of SPAs – West of Shetland and Rockall



Map A.3: Location of SPAs – Irish Sea and North Channel



Map A.4: Location of SPAs – South West Approaches and Celtic Sea



Map A.5: Location of SPAs – English Channel

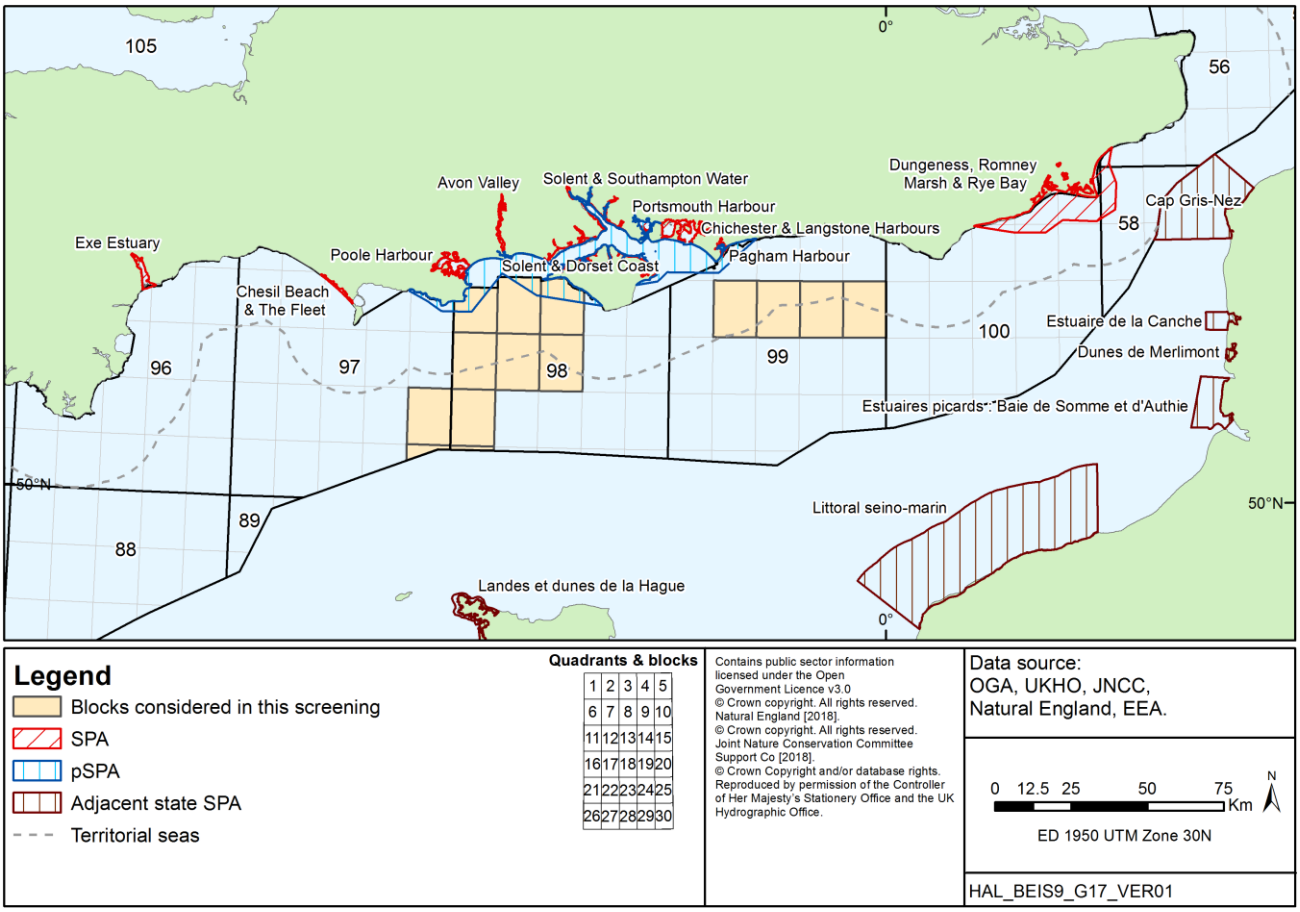


Table A.1: SPAs and their Qualifying Features

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
CENTRAL AND NORTHERN NORTH SEA				
Hermaness, Saxa Vord and Valla Field SPA	6832.36	Breeding: Red-throated diver	Breeding: Gannet Great skua Puffin	Breeding: Seabirds
Fetlar SPA	16964.69	Breeding: Arctic tern Red-necked phalarope	Breeding: Dunlin Great skua Whimbrel	Breeding: Seabirds
Otterswick and Graveland SPA	2239.59	Breeding: Red-throated diver	N/A	N/A
East Mainland Coast, Shetland pSPA	25646.67	Breeding: Red-throated diver Over winter: Great northern diver Slavonian grebe	Over winter: Eider Long-tailed duck Red-breasted merganser	N/A

[71] A seabird assemblage of international importance: the area regularly supports at least 20,000 seabirds. Or, a wetland of international importance: the area regularly supports at least 20,000 waterfowl.

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
Noss SPA	3338.38	N/A	Breeding: Gannet Great skua Guillemot	Breeding: Seabirds
Mousa SPA	196.85	Breeding: Arctic tern Storm petrel	N/A	N/A
Lochs of Spiggie and Brow SPA	140.66	Over winter: Whooper swan	N/A	N/A
Sumburgh Head SPA	2478.91	Breeding: Arctic tern	N/A	Breeding: Seabirds
Fair Isle SPA	6825.1	Breeding: Arctic tern Fair Isle wren	Breeding: Guillemot	Breeding: Seabirds
Papa Westray (North Hill and Holm) SPA	245.94	Breeding: Arctic tern	N/A	N/A
West Westray SPA	3780.16	Breeding: Arctic tern	Breeding: Guillemot	Breeding: Seabirds
East Sanday Coast SPA	1508.2	N/A	Over winter: Purple sandpiper Turnstone	N/A
Calf of Eday SPA	2671.77	N/A	N/A	Breeding: Seabirds
Rousay SPA	5480.84	Breeding: Arctic tern	N/A	Breeding: Seabirds
North Orkney pSPA	22695.17	Breeding: Red-throated diver Over winter: Great northern diver Slavonian grebe	Over winter: Eider Long-tailed duck Velvet scoter Red-breasted merganser Shag	N/A
Marwick Head SPA	475.54	N/A	Breeding: Guillemot	Breeding: Seabirds
Orkney Mainland Moors SPA	5342.44	Breeding: Hen harrier Red-throated diver Short-eared owl Over winter: Hen harrier	N/A	N/A
Auskerry SPA	103.11	Breeding: Arctic tern Storm petrel	N/A	N/A
Copinsay SPA	3607.7	N/A	N/A	Breeding: Seabirds
Sule Skerry & Sule Stack SPA	3909.45	Breeding: Leach's storm petrel Storm petrel	Breeding: Gannet Puffin	Breeding: Seabird
Hoy SPA	18123.91	Breeding: Peregrine Red-throated diver	Breeding: Great skua	Breeding: Seabirds
Switha SPA	57.0	Over winter: Barnacle goose	N/A	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
Scapa Flow pSPA	37065.53	Breeding: Red-throated diver Over winter: Great northern diver Black-throated diver Slavonian grebe	Over winter: Shag Eider Long-tailed duck Goldeneye Red-breasted merganser	N/A
Pentland Firth Islands SPA	170.0	Breeding: Arctic tern	N/A	N/A
Pentland Firth pSPA	97325	Breeding: Arctic tern	N/A	Breeding: Seabirds
Caithness & Sutherland Peatlands SPA	145312.97	Breeding: Black-throated diver Golden eagle Golden plover Hen harrier Merlin Red-throated diver Short-eared owl Wood sandpiper	Breeding: Dunlin	N/A
North Caithness Cliffs SPA	14628.77	Breeding: Peregrine	Breeding: Guillemot	Breeding: Seabird
East Caithness Cliffs SPA	11696.37	Breeding: Peregrine	Breeding: Razorbill Herring gull Shag Kittiwake Guillemot	Breeding: Seabird
Caithness Lochs SPA	1381.65	Over winter: Greenland white-fronted goose Whooper swan	Over winter: Greylag goose	N/A
Lairg and Strathbrora Lochs SPA	286.14	Breeding: Black-throated diver	N/A	N/A
Moray Firth pSPA	176235.95	Over winter: Great northern diver Red-throated diver Slavonian grebe	Breeding: Shag Over winter: Scaup Eider Long-tailed duck Common scoter Velvet scoter Common goldeneye Red-breasted merganser Shag	N/A
Dornoch Firth and Loch Fleet SPA	7856.54	Breeding: Osprey Over winter: Bar-tailed godwit	Over winter: Greylag goose Wigeon	Over winter: Waterfowl
Loch Eye SPA	204.88	Over winter: Whooper swan	Over winter: Greylag goose	N/A
Cromarty Firth SPA	3247.95	Breeding: Common tern Osprey Over winter: Bar-tailed godwit Whooper swan	Over winter: Greylag goose	Over winter: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
Inner Moray Firth SPA	2290.25	Breeding: Common tern Osprey Over winter: Bar-tailed godwit	Over winter: Greylag goose Red-breasted merganser Redshank	N/A
Moray and Nairn Coast SPA	2325.67	Breeding: Osprey Over winter: Bar-tailed godwit	Over winter: Greylag goose Pink-footed goose Redshank	Over winter: Waterfowl
Troup, Pennan and Lion's Heads SPA	3365.2	N/A	Breeding: Guillemot	Breeding: Seabirds
Loch of Strathbeg SPA	616.26	Breeding: Sandwich tern Over winter: Whooper swan	Over winter: Teal Greylag goose Pink-footed goose Goldeneye	Over winter: Waterfowl
Buchan Ness to Collieston Coast SPA	5400.76	N/A	N/A	Breeding: Seabirds
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	1014.62	Breeding: Common tern Little tern Sandwich tern	Over winter: Pink-footed goose	Over winter: Waterfowl
Ythan Estuary, Sands of Forvie and Meikle Loch pSPA (extension)	6051.39	Breeding: Sandwich tern Little tern	N/A	N/A
Fowlsheugh SPA	1303.23	N/A	Breeding: Guillemot Kittiwake	Breeding: Seabirds
Montrose Basin SPA	981.19	N/A	Over winter: Greylag goose Knot Pink-footed goose Oystercatcher Redshank	Over winter: Waterfowl
Firth of Tay and Eden Estuary SPA	6947.62	Breeding: Little tern Marsh harrier Over winter: Bar-tailed godwit	Over winter: Greylag goose Pink-footed goose Redshank	Over winter: Waterfowl
Outer Firth of Forth and St Andrews Bay Complex pSPA	272068.09	Breeding: Common tern Arctic tern Over-winter: Red-throated diver Little gull Slavonian grebe	Breeding: Shag Gannet Over-winter: Eider	Breeding: Seabirds Over winter: Seabirds Waterfowl
Firth of Forth Islands SPA	9795	Breeding: Roseate tern Common tern Sandwich tern Arctic tern	Breeding: Puffin Lesser black-backed gull Gannet Shag	Breeding: Seabirds

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
Firth of Forth SPA	6317.69	Over winter: Red-throated diver Bar-tailed godwit Golden plover Slavonian grebe Oystercatcher On passage: Sandwich tern	Over winter: Pink-footed goose Turnstone Knot Shelduck Redshank	Over winter: Waterfowl
St Abb's Head to Fast Castle SPA	1736.75	N/A	N/A	Breeding: Seabirds
Lindisfarne SPA	3671.03	Breeding: Little tern Roseate tern Over winter: Bar-tailed godwit Golden plover Whooper swan	On passage: Ringed plover Over winter: Grey plover Greylag goose Light-bellied brent goose Sanderling Wigeon Dunlin Ringed plover Long-tailed duck Red-breasted merganser Eider Shelduck	N/A
Farne Islands SPA	101.23	Breeding: Arctic tern Common tern Sandwich tern	Breeding: Guillemot	Breeding: Seabirds
Northumberland Marine SPA	88687	Breeding: Sandwich tern Common tern Arctic tern Roseate tern Little tern	Breeding: Puffin Guillemot	Breeding: Seabirds
Northumbria Coast SPA	1097.44	Breeding: Little tern Arctic tern	Over winter: Purple sandpiper Turnstone	N/A
Coquet Island SPA	19.78	Breeding: Arctic tern Common tern Roseate tern Sandwich tern	N/A	Breeding: Seabirds
Teesmouth and Cleveland Coast SPA	1251.51	Breeding: Little tern On passage: Sandwich tern	On passage: Redshank Over winter: Knot	Over winter: Waterfowl
Teesmouth and Cleveland Coast pSPA (extension)	12226.28	Breeding: Avocet Sandwich tern Common tern On passage: Ruff	On passage: Knot Redshank	Over winter: Waterfowl
WEST OF SHETLAND AND ROCKALL				
Handa SPA	3205.61	N/A	Breeding: Guillemot Razorbill	Breeding: Seabirds
Cape Wrath SPA	6734.48	N/A	N/A	Breeding: Seabirds

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
North Sutherland Coastal Islands SPA	223.46	Over winter: Barnacle goose	N/A	N/A
Bluemull and Colgrave Sounds pSPA	3823.27	Breeding: Red-throated diver	N/A	N/A
Ronas Hill-North Roe and Tingon SPA	5474.35	Breeding: Red-throated diver	Breeding: Great skua	N/A
Papa Stour SPA	569.6	Breeding: Arctic tern	N/A	N/A
Seas off Foula pSPA	341215	N/A	Breeding: Great skua	Breeding: Seabirds Over winter: Seabirds
Foula SPA	7985.49	Breeding: Arctic tern Leach's petrel Red-throated diver	Breeding: Great skua Guillemot Puffin Shag	Breeding: Seabirds
Foinaven SPA	21082.64	Breeding: Golden eagle	N/A	N/A
Inverpolly, Loch Urigill and Nearby Lochs SPA	1937.05	Breeding: Black-throated diver	N/A	N/A
North Rona and Sula Sgeir SPA	6850.58	Breeding: Storm petrel Leach's petrel	Breeding: Gannet Guillemot	Breeding: Seabirds
Flannan Isles SPA	5832.82	Breeding: Leach's petrel	N/A	Breeding: Seabirds
Lewis Peatlands SPA	58959.88	Breeding: Black-throated diver Golden eagle Golden plover Merlin Red-throated diver	Breeding: Dunlin Greenshank	N/A
Ness & Barvas, Lewis SPA	647.54	Breeding: Corncrake	N/A	N/A
North Harris Mountains SPA	13128.46	Breeding: Golden eagle	N/A	N/A
Mointeach Scadabhaigh SPA	4182.75	Breeding: Black-throated diver Red-throated diver	N/A	N/A
North Uist Machair and Islands SPA	4860.13	Breeding: Corncrake Over winter: Barnacle goose	Breeding: Dunlin Ringed plover Oystercatcher Redshank Over winter: Ringed plover Turnstone Purple sandpiper	N/A
Aird & Borve, Benbecula SPA	359.03	Breeding: Corncrake	N/A	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
South Uist Machair and Lochs SPA	5027.31	Breeding: Corncrake Little tern	Breeding: Dunlin Oystercatcher Redshank Ringed plover Over winter: Ringed plover Sanderling	N/A
Kilpheder to Smerclate, South Uist SPA	379.64	Breeding: Corncrake	N/A	N/A
Eoligarry, Barra SPA	143.59	Breeding: Corncrake	N/A	N/A
West Coast of the Outer Hebrides pSPA	132170.04	Breeding: Red-throated diver Over winter: Great northern diver Black-throated diver Slavonian grebe	Over winter: Eider Long-tailed duck Red-breasted merganser	N/A
Monach Islands SPA	600.07	Breeding: Little tern Common tern Over winter: Barnacle goose	Breeding: Black guillemot	N/A
The Shiant Isles SPA	6935.65	Over winter: Barnacle goose	Breeding: Razorbill Puffin Shag	Breeding: Seabirds
Mingulay and Berneray SPA	7801.71	N/A	Breeding: Razorbill	Breeding: Seabirds
Canna & Sanday SPA	6567.58	N/A	N/A	Breeding: Seabirds
Assynt Lochs SPA	1158.19	Breeding: Black-throated diver	N/A	N/A
Priest Island (Summer Isles) SPA	132.02	Breeding: Storm petrel	N/A	N/A
Wester Ross Lochs SPA	1989.82	Breeding: Black-throated diver	N/A	N/A
Cuillins SPA	29503.25	Breeding: Golden Eagle	N/A	N/A
Rum SPA	46724.16	Breeding: Golden eagle Red throated-diver *(proposed as a new feature of marine extension)*	Breeding: Manx shearwater	Breeding: Seabirds
Coll SPA	2324.37	Over winter: Greenland white-fronted goose Barnacle goose	N/A	N/A
Coll & Tiree pSPA	79475.15	Over winter: Great northern diver	Over winter: Eider	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast) SPA	1939.72	Over winter: Greenland white-fronted goose Barnacle goose	Breeding: Dunlin Oystercatcher Redshank Ringed plover Over winter: Turnstone Ringed plover	N/A
Glas Eileanan SPA	1.57	Breeding: Common tern	N/A	N/A
Treshnish Isles SPA	241.77	Breeding: Storm petrel Over winter: Barnacle goose	N/A	N/A
North Colonsay and Western Cliffs SPA	3297.3	Breeding: Chough Over winter: Chough	N/A	Breeding: Seabirds
Oronsay and South Colonsay SPA	2016.85	Breeding: Corncrake Chough Over winter: Chough	N/A	N/A
Cnuic agus Cladach Mhuile SPA	29242.12	Resident: Golden eagle	N/A	N/A
St Kilda SPA	29014.62	Breeding: Leach's petrel Storm petrel	Migrating: Gannet Great skua Puffin	Breeding: Seabirds
Seas off St Kilda pSPA	399500	N/A	Breeding: Gannet	Breeding: Seabirds
IRISH SEA AND NORTH CHANNEL				
Rinns of Islay SPA	9434.09	Breeding: Chough Corncrake Hen harrier On passage: Whooper swan Over winter: Greenland white-fronted goose	Breeding: Common scoter	N/A
Laggan, Islay SPA	1225.62	Over winter: Barnacle goose Greenland white-fronted goose	N/A	N/A
Gruinart Flats, Islay SPA	3256.32	Breeding: Chough Over winter: Barnacle goose Greenland white-fronted goose Chough	Over winter: Canadian light-bellied brent goose	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
Eilean na Muice Duibhe (Duich Moss), Islay SPA	577.27	Over winter: Greenland white-fronted goose	N/A	N/A
Bridgend Flats, Islay SPA	332.08	Over winter: Barnacle goose	N/A	N/A
Jura, Scarba and the Garvellachs SPA	34585.96	Resident: Golden eagle	N/A	N/A
Sound of Gigha pSPA	36326.83	Great northern diver	Eider Red-breasted merganser	N/A
Knapdale Lochs SPA	113.86	Breeding: Black-throated diver	N/A	N/A
The Oa SPA	1930.84	Breeding: Chough	N/A	N/A
Kintyre Goose Roosts SPA	409.2	Over winter: Greenland white-fronted goose	N/A	N/A
Ailsa Craig SPA	2759.57	N/A	Breeding: Gannet Lesser black-backed gull	Breeding: Seabirds
Loch of Inch and Torrs Warren SPA	2110.5	Over winter: Greenland white-fronted goose Hen harrier	N/A	N/A
Solway Firth pSPA	135749.35	Over winter: Red-throated diver Whooper swan Barnacle goose Golden plover Bar-tailed godwit	On passage: Ringed plover Over winter: Pink-footed goose Pintail Scaup Oystercatcher Knot Curlew Redshank	Over winter: Waterfowl
Upper Solway Flats and Marshes SPA	43678.26	Over winter: Bar-tailed godwit Barnacle goose Golden plover Whooper swan	Over winter: Pintail Shoveler Teal Pink-footed goose Turnstone Scaup Goldeneye Sanderling Dunlin Knot Oystercatcher Curlew Grey plover Shelduck Redshank	Over winter: Waterfowl
Carlingford Lough SPA (including proposed extension)	826.91	Breeding: Common tern Sandwich tern	Over winter: Canadian light-bellied brent goose	N/A
Killough Bay SPA	132.71	N/A	Over winter: Canadian light-bellied brent goose	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
East Coast Marine pSPA	96668.34	Breeding: Sandwich tern Common tern Arctic tern Over winter: Red-throated diver	Breeding: Manx shearwater Over winter: Great crested grebe Eider	N/A
Strangford Lough SPA	15564.4	Breeding: Arctic tern Common tern Sandwich tern	Over winter: Canadian light-bellied brent goose Knot Redshank	Over winter: Waterfowl
Outer Ards SPA	1394.8	Breeding: Arctic tern Over winter: Golden plover	Over winter: Turnstone Canadian light-bellied brent goose Ringed plover	N/A
Copeland Islands SPA	200.19	Breeding: Arctic tern	Breeding: Manx shearwater	N/A
Belfast Lough Open Water SPA	5591.73	N/A	Over winter: Great crested grebe	N/A
Belfast Lough SPA	428.64	N/A	Over winter: Redshank	N/A
Larne Lough SPA	391.48	Breeding: Common tern Roseate tern Sandwich tern	Over winter: Canadian light-bellied brent goose	N/A
Rathlin Island SPA	3342.8	Breeding: Peregrine	Breeding: Guillemot Razorbill Kittiwake	N/A
Sheep Island SAC	3.39	N/A	Breeding: Cormorant	N/A
Lough Foyle SPA	2204.36	Over winter: Bar-tailed godwit Berwick's swan Golden plover Whooper swan	Over winter: Light-bellied brent goose	Over winter: Waterfowl
Morecambe Bay & Duddon Estuary SPA	66899	Breeding: Common tern Sandwich tern Little tern Over winter: Whooper swan Little egret Golden plover Ruff Bar-tailed godwit Mediterranean gull	Breeding: Lesser black-backed gull Herring gull On passage: Pink-footed goose Shelduck Oystercatcher Ringed plover Grey plover Knot Sanderling Dunlin Black-tailed godwit Curlew Pintail Turnstone Redshank Lesser black-backed gull	Any season: Seabird Any season: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
Ribble and Alt Estuaries SPA	12449.92	Breeding: Common tern Ruff Over winter: Bar-tailed godwit Bewick's swan Golden plover Whooper swan	Breeding: Lesser black-backed gull Black-headed gull On passage: Ringed plover Sanderling Redshank Whimbrel Over winter: Pintail Teal Wigeon Pink-footed goose Scaup Sanderling Dunlin Knot Oystercatcher Black-tailed godwit Common scoter Curlew Cormorant Grey plover Shelduck Redshank Lapwing	Breeding: Seabirds Over winter: Waterfowl
Mersey Narrows and North Wirral Foreshore SPA	2078.36	Breeding: Common tern On passage: Little gull Common tern Over winter: Bar-tailed godwit	Over winter: Knot	Over winter: Waterfowl
Mersey Estuary SPA	5023.35	Over winter: Golden plover	On passage: Redshank Ringed plover Over winter: Dunlin Pintail Redshank Shelduck Teal Lapwing Great crested grebe Grey plover Curlew Black-tailed godwit Wigeon	N/A
Liverpool Bay SPA	252773	Breeding: Little tern Common tern Over winter: Red-throated diver Little gull	Over winter: Common scoter	Over winter: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
The Dee Estuary SPA	14294.95	Breeding: Common tern Little tern On passage: Sandwich tern Over winter: Bar-tailed godwit	On passage: Redshank Over winter: Pintail Teal Dunlin Knot Oystercatcher Black-tailed godwit Curlew Grey plover Shelduck Redshank	Over winter: Waterfowl
Traeth Lafan/ Lavan Sands, Conway Bay SPA	2703.13	N/A	Over winter: Oystercatcher Curlew On passage: Great crested grebe	N/A
Ynys Seiriol / Puffin Island SPA	31.32	N/A	Breeding: Cormorant	N/A
Anglesey Terns / Morwenoliaid Ynys Môn SPA	101931.08	Breeding: Roseate tern Common tern Arctic tern Sandwich tern	N/A	N/A
Irish Sea Front SPA	18000	N/A	Breeding: Manx shearwater	N/A
Glannau Ynys Gybi/Holy Island Coast SPA	604.39	Over winter: Chough	N/A	N/A
Glannau Aberdaron and Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA	33942.42	Breeding: Chough Over winter: Chough	Breeding: Manx shearwater	N/A
Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal / Mynydd Cilan, Trwyn y Wylfa and the St Tudwal Islands SPA	372.94	Breeding: Chough Over winter: Chough	N/A	N/A
Northern Cardigan Bay / Gogledd Bae Ceredigion SPA	82312.9	Over winter: Red-throated diver	N/A	N/A
Dyfi Estuary / Aber Dyfi SPA	2056.5	Over winter: Greater white-fronted goose	N/A	N/A
SOUTH WEST APPROACHES AND CELTIC SEA				
Ramsey and St David`s Peninsula Coast SPA	845.63	Breeding: Chough Over winter: Chough	N/A	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
Burry Inlet SPA	6627.99	N/A	Over winter: Oystercatcher Pintail	Over winter: Waterfowl
Castlemartin Coast SPA	1122.32	Breeding: Chough Over winter: Chough	N/A	N/A
Grassholm SPA	1774.42	N/A	Breeding: Gannet	N/A
Bae Caerfyrddin/ Carmarthen Bay SPA	33411.27	N/A	Over winter: Common scoter	N/A
Skomer, Skokholm and the Seas off Pembrokeshire SPA	166800.74	Breeding: Short-eared owl Storm petrel Chough	Breeding: Puffin Lesser black-backed gull Manx shearwater	Breeding: Seabird
Severn Estuary SPA	24662.98	Over winter: Bewick's swan	On passage: Ringed plover Over winter: Curlew Dunlin Pintail Redshank Shelduck	Over winter: Waterfowl
Falmouth Bay to St Austell Bay SPA	258.68	Over winter: Black-throated diver Great northern diver Slavonian grebe	N/A	N/A
Marazion Marsh SPA	54.58	On passage: Aquatic warbler Over winter: Bittern	N/A	N/A
Tamar Estuaries Complex SPA	1955	On passage: Little egret Over winter: Avocet Little egret	N/A	N/A
Isles of Scilly SPA	401.64	Breeding: Storm petrel	Breeding: Lesser black-backed gull	Breeding: Seabird
Isles of Scilly dSPA	-	Draft proposals to add a seaward extension to the Isles of Scilly SPA and add European shag and great black-backed gull as features.		
ENGLISH CHANNEL				
Exe Estuary SPA	2345.71	Over winter: Slavonian grebe	N/A	Over winter: Waterfowl
Chesil Beach and The Fleet SPA	748.11	Breeding: Little tern	Over winter: Dark-bellied brent goose	N/A
Poole Harbour SPA	4157.52	Breeding: Mediterranean gull Sandwich tern Common tern Over winter: Little egret Avocet Spoonbill	Over winter: Black-tailed godwit Shelduck	Over winter: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[71]
Avon Valley SPA	1385.08	Over winter: Bewick's swan	Over winter: Gadwall	N/A
Portsmouth Harbour SPA	1248.77	N/A	Over winter: Dark-bellied brent goose	N/A
Chichester and Langstone Harbours SPA	5810.03	Breeding: Little tern Sandwich tern Common tern Over winter: Bar-tailed godwit	Over winter: Dark-bellied Brent goose Dunlin Grey plover Redshank Ringed plover Curlew Pintail Red-breasted merganser Sanderling Shelduck Shoveler Teal Turnstone Wigeon	Over winter: Waterfowl
Pagham Harbour SPA	636.68	Breeding: Little tern Over winter: Ruff	Over winter: Pintail	N/A
Solent and Southampton Water SPA	5505.86	Breeding: Common tern Little tern Mediterranean gull Roseate tern Sandwich tern	Over winter: Black-tailed godwit Dark-bellied brent goose Ringed plover Teal	Over winter: Waterfowl
Solent and Dorset Coast pSPA	87531.75	Breeding: Sandwich tern Common tern Little tern	N/A	N/A
Dungeness, Romney Marsh and Rye Bay SPA	42417.53	Breeding: Mediterranean gull Sandwich tern Common tern Little tern Marsh harrier Avocet On passage: Aquatic warbler Over winter: Hen harrier Ruff Bewick's swan Bittern Golden plover Shoveler	Over winter: Shoveler	Over winter: Waterfowl

A3 Coastal and Marine Special Areas of Conservation

This section includes coastal and marine Special Areas of Conservation (SAC) which contain one or more of the Annex I habitats listed in Box A.2 (below) or Annex II qualifying marine species. Relevant SACs in the waters of adjacent Member States (the Netherlands, France, Germany and the Republic of Ireland) are listed in Section A4. All relevant SACs are included on Maps A.6 to A.10.

Abbreviations for the Annex I habitats used in SAC site summaries (Tables A.2 to A.4) are listed in Box A.2. Common names of Annex II species are used in SAC site summaries with corresponding scientific names listed in Box A.3.

Box A.2: Annex I habitat abbreviations used in site summaries

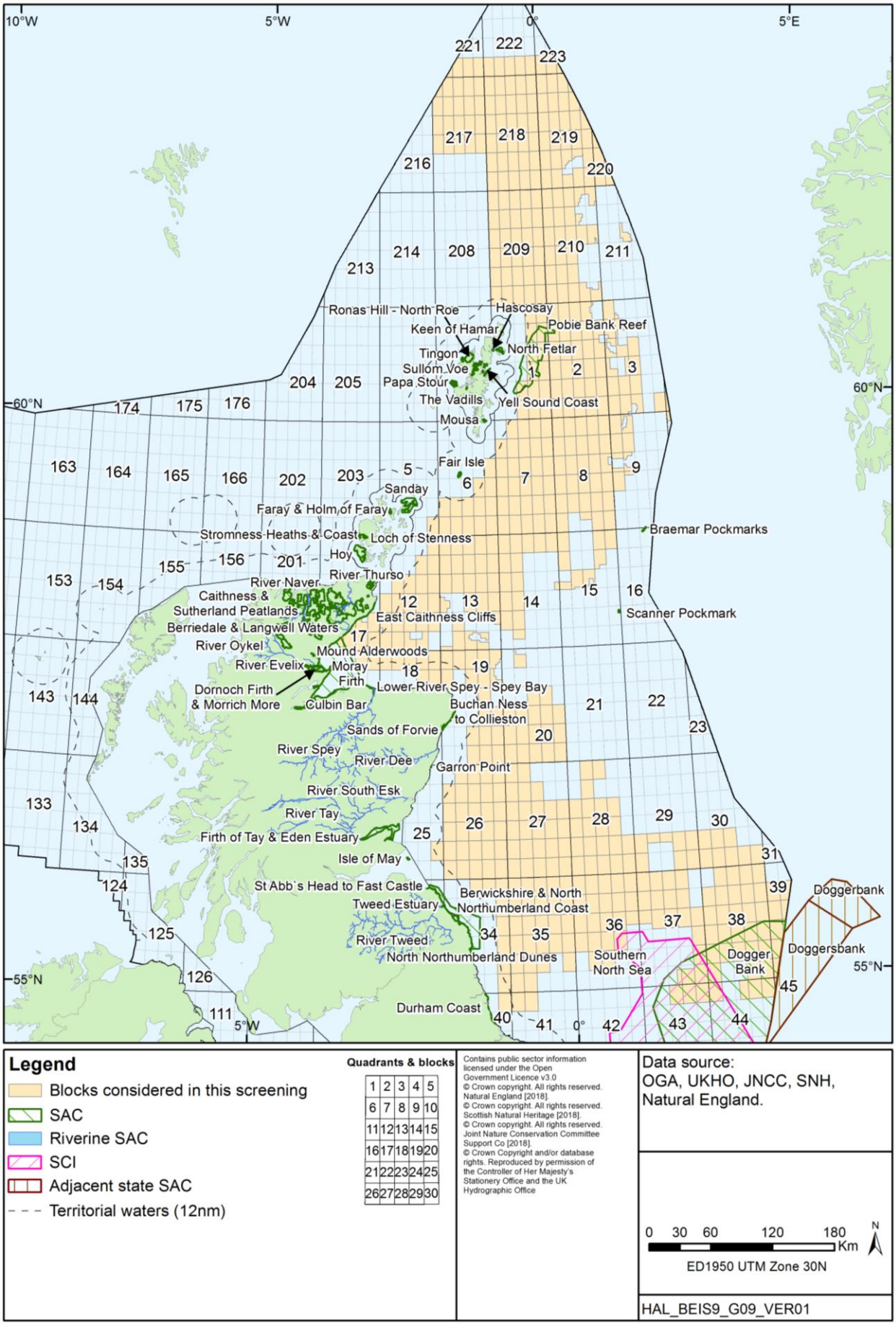
Annex I habitat (abbreviated)	Annex I habitat(s) (full description)
Bogs	Blanket bogs * Priority feature Transition mires and quaking bogs Depressions on peat substrates of the *Rhynchosporion* Active raised bogs * Priority feature Degraded raised bogs still capable of natural regeneration Bog Woodland * Priority feature
Coastal dunes	Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") Fixed coastal dunes with herbaceous vegetation ("grey dunes") * Priority feature Humid dune slacks Embryonic shifting dunes Decalcified fixed dunes with *Empetrum nigrum* * Priority feature Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) * Priority feature Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) Coastal dunes with *Juniperus* spp. Dunes with *Hippophae rhamnoides* Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature
Coastal lagoons	Coastal lagoons * Priority feature
Estuaries	Estuaries
Fens	Alkaline fens Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* * Priority feature Petrifying springs with tufa formation (*Cratoneurion*) * Priority feature
Forest	Western acidic oak woodland Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) * Priority feature *Taxus baccata* woods of the British Isles *Priority feature *Tilio-Acerion* forests of slopes, screes and ravines * Priority feature Old sessile oak woods and *Ilex* and *Blechnum* in the British Isles Old sessile oak woods with *Quercus robur* on sandy plains

Annex I habitat (abbreviated)	Annex I habitat(s) (full description)
Grasslands	Alpine and subalpine calcareous grasslands Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels Siliceous alpine and boreal grasslands Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) * Priority feature Alpine pioneer formations of the *Caricion bicoloris-atrofuscae* * Priority feature Calaminarian grasslands of the *Violetalia calaminariae* *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) * Priority feature
Heaths	Northern Atlantic wet heaths with *Erica tetralix* European dry heaths Alpine and Boreal heaths Dry Atlantic coastal heaths with *Erica vagans*
Inlets and bays	Large shallow inlets and bays
Limestone pavements	Limestone pavements * Priority feature
Machairs	Machairs
Mudflats and sandflats	Mudflats and sandflats not covered by seawater at low tide
Reefs	Reefs
Rocky slopes	Calcareous rocky slopes with chasmophytic vegetation Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*) Siliceous rocky slopes with chasmophytic vegetation
Running freshwater	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
Saltmarsh and salt meadows	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) *Salicornia* and other annuals colonising mud and sand *Spartina* swards (*Spartinion maritimae*)
Sandbanks	Sandbanks which are slightly covered by sea water all the time
Scree	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)
Scrub	*Juniperus communis* formations on heaths or calcareous grasslands Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)
Sea caves	Submerged or partially submerged sea caves
Sea cliffs	Vegetated sea cliffs of the Atlantic and Baltic Coasts
Standing freshwater	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* Natural dystrophic lakes and ponds Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)
Vegetation of drift line	Annual vegetation of drift lines
Vegetation of stony banks	Perennial vegetation of stony banks

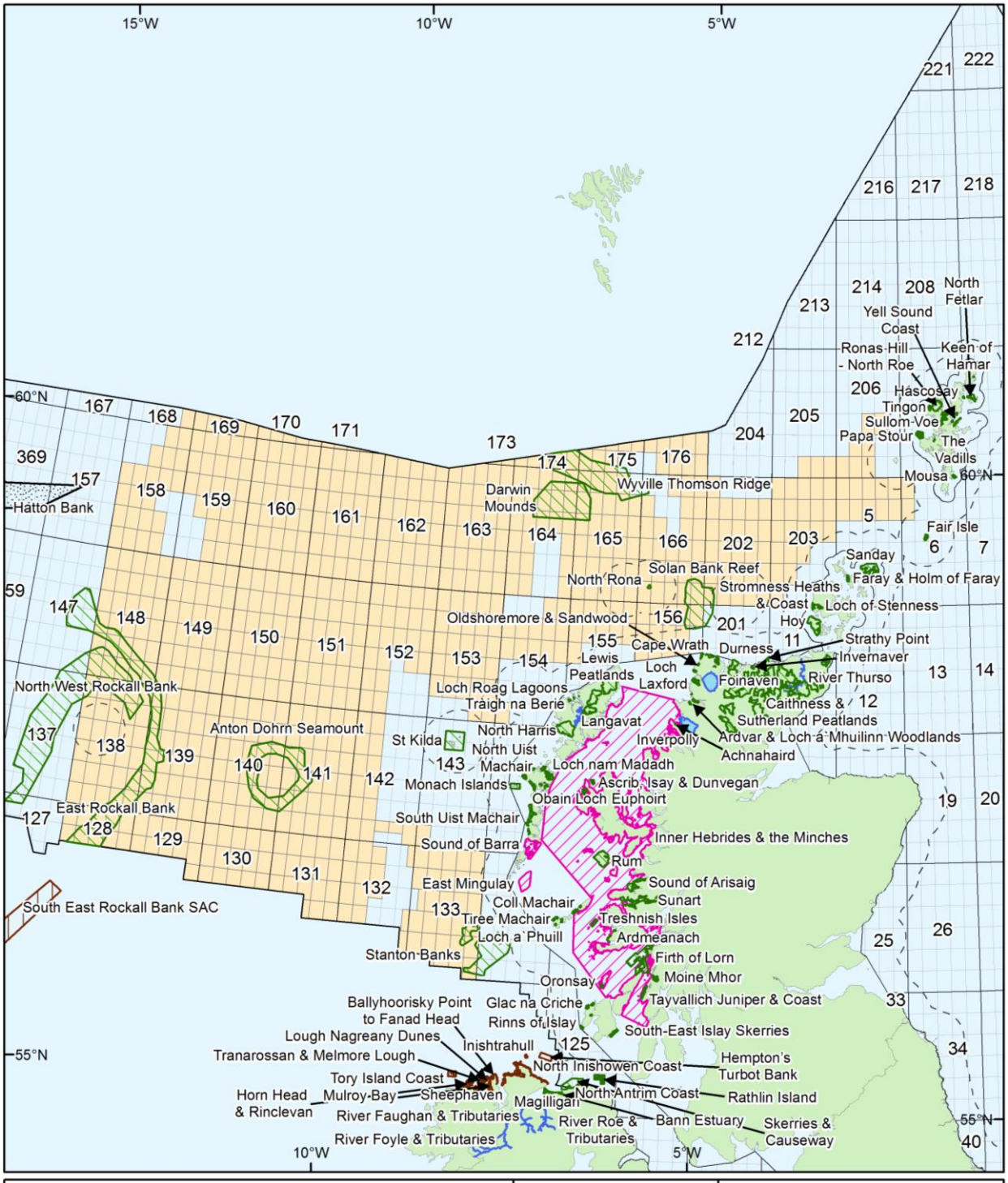
Box A.3: Annex II species common names used in site summaries and scientific names

Group	Annex II species common name (scientific name)
Plants	marsh saxifrage (*Saxifraga hirculus*) petalwort (*Petalophyllum ralfsii*) floating water-plantain (*Luronium natans)* shore dock (*Rumex rupestris)*
Invertebrates	marsh fritillary butterfly (*Euphydryas (Eurodryas, Hypodryas) aurinia*) freshwater pearl mussel (*Margaritifera margaritifera*) slender naiad (*Najas flexilis*) narrow-mouthed whorl snail (*Vertigo angustior*) white-clawed (or Atlantic stream) crayfish (*Austropotamobius pallipes*) Fisher's estuarine moth (*Gortyna borelii lunata)*
Amphibians	great crested newt (*Triturus cristatus)*
Fish	sea lamprey (*Petromyzon marinus)* brook lamprey (*Lampetra planeri)* river lamprey (*Lampetra fluviatilis)* Atlantic salmon (*Salmo salar)* bullhead (*Cottus gobio)*
Mammals	grey seal (*Halichoerus grypus*) harbour seal (*Phoca vitulina*) otter (*Lutra lutra*) harbour porpoise (*Phocoena phocoena*) bottlenose dolphin (*Tursiops truncatus*)

Map A.6: Location of SACs – central and northern North Sea



Map A.7: Location of SACs – West of Shetland and Rockall



Legend

- Blocks considered in this screening
- SAC
- Riverine SAC
- SCI
- cSAC
- Adjacent state SAC
- Territorial waters (12nm)

Quadrants & blocks

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30

Data source: OGA, UKHO, JNCC, SNH, DAERA.

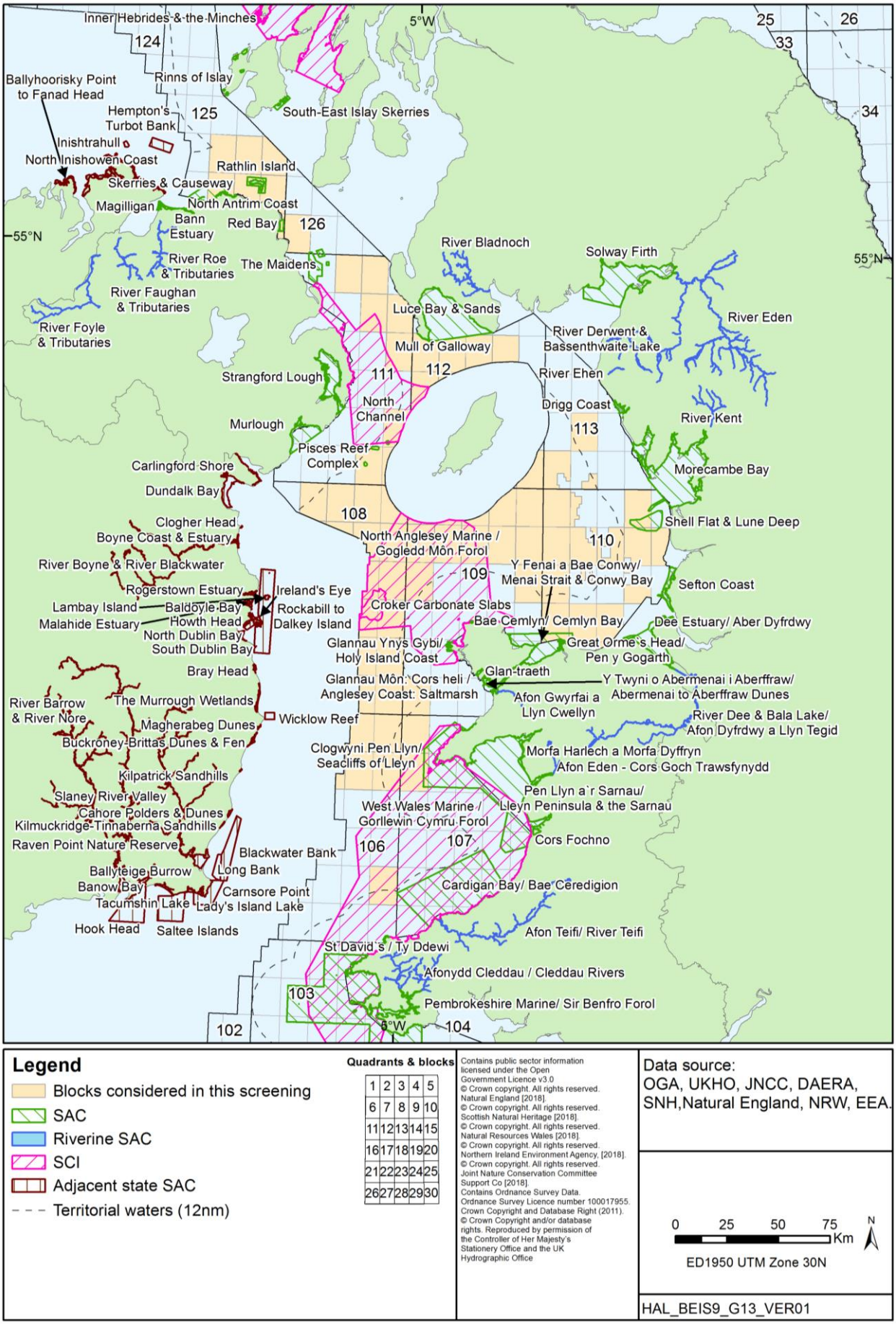
0 30 60 120 180 Km

N

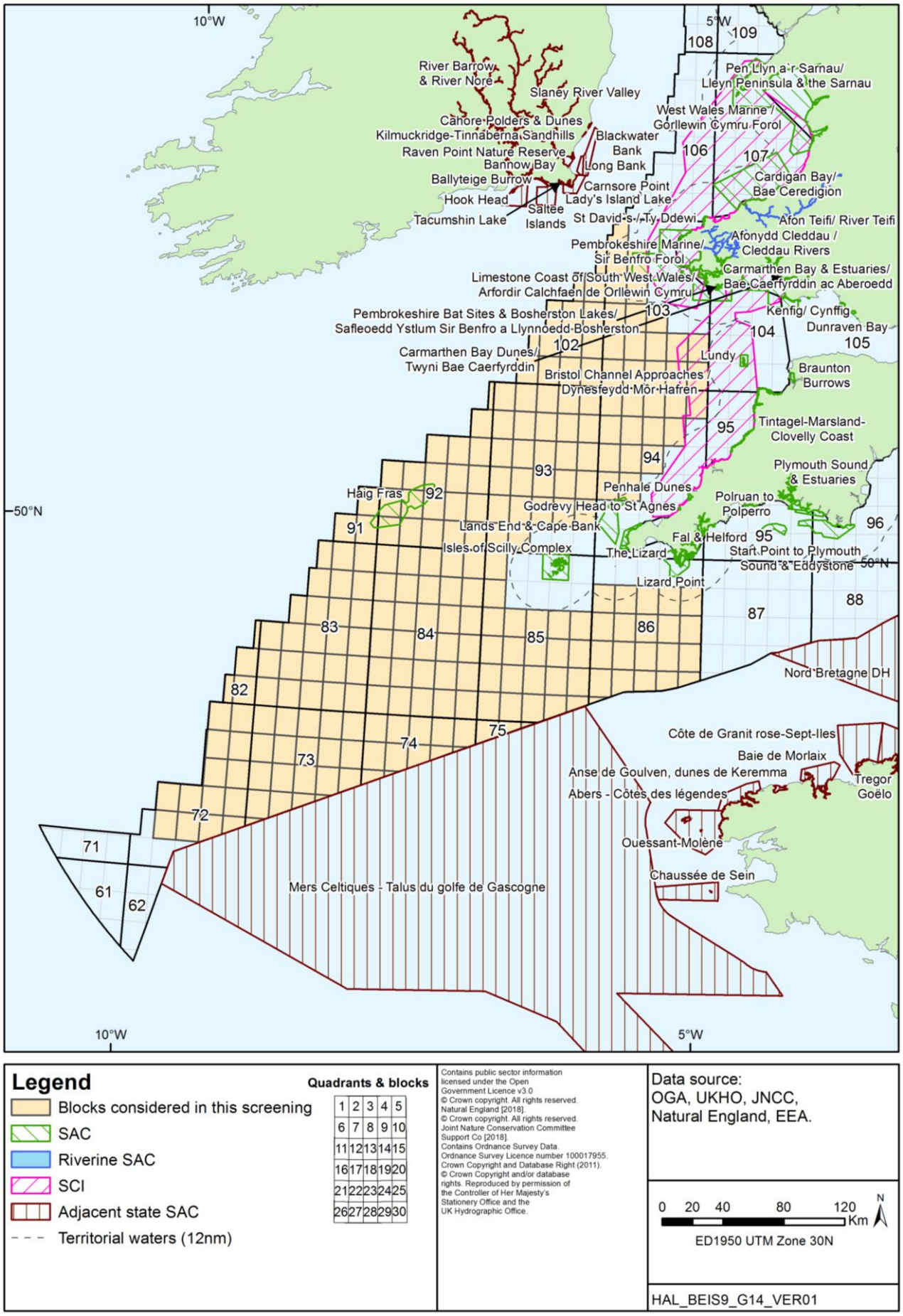
ED1950 UTM Zone 30N

HAL_BEIS9_G10_VER01

Map A.8: Location of SACs – Irish Sea and North Channel



Map A.9: Location of SACs – South West Approaches and Celtic Sea



Map A.10: Location of SACs – English Channel

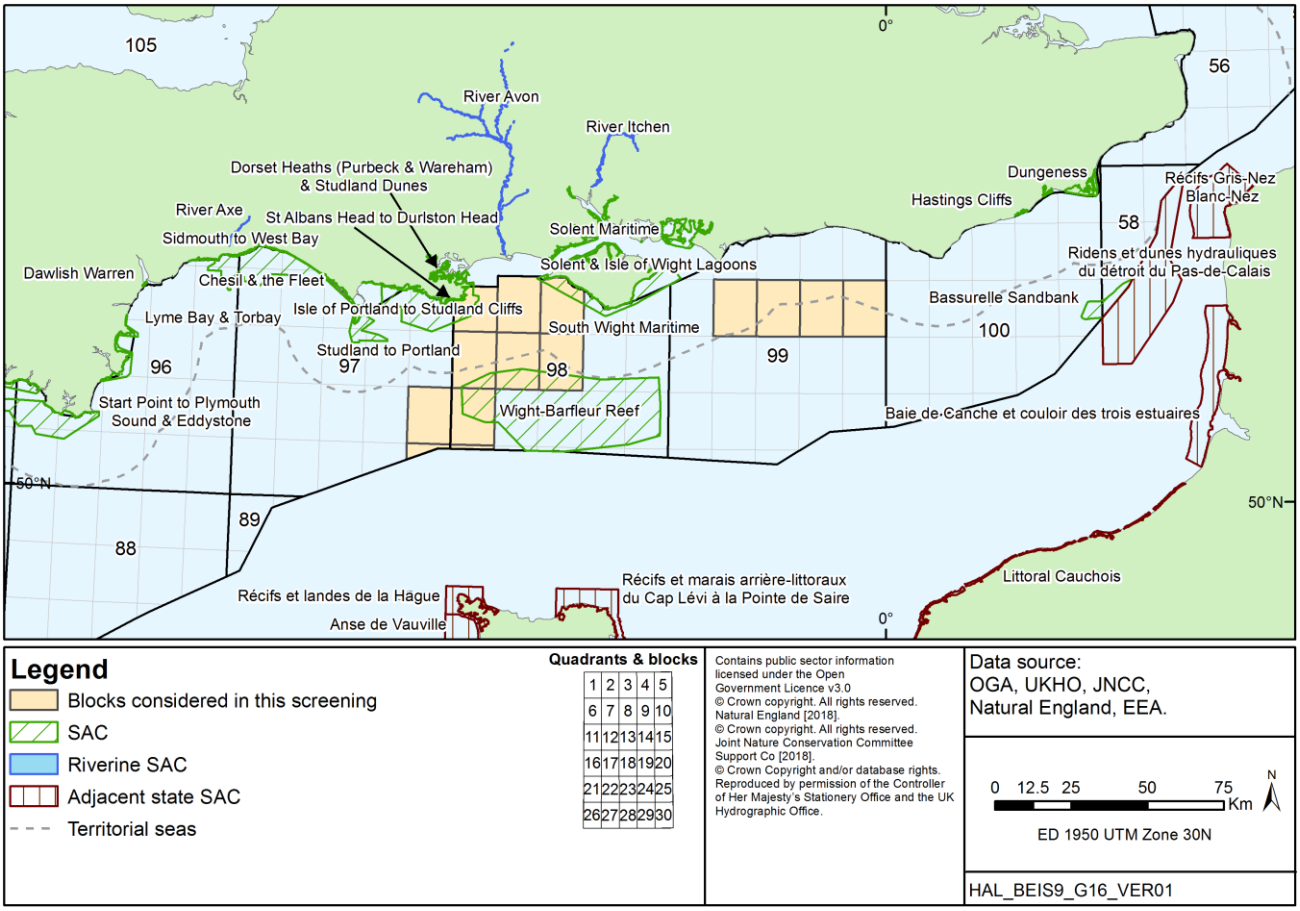


Table A.2: SACs and their Qualifying Features

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
CENTRAL AND NORTHERN NORTH SEA					
Braemar Pockmarks SAC	1143 (includes proposed extension)	Submarine structures made by leaking gases	N/A	N/A	N/A
Scanner Pockmark SAC	674 (includes proposed extension)	Submarine structures made by leaking gases	N/A	N/A	N/A
Pobie Bank Reef SAC	96575	Reefs	N/A	N/A	N/A
Cape Wrath SAC	1009.75	Sea cliffs	N/A	N/A	N/A
Durness SAC	1213.8	Coastal dunes Standing freshwater Grasslands Limestone pavements	Coastal dunes Heaths Grasslands Fens	N/A	Otter
Foinaven SAC	14853.66	Standing freshwater Heaths Grasslands Scree Rocky slopes	Grasslands Bogs Rocky slopes	N/A	Freshwater pearl mussel Otter

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Invernaver SAC	287.67	Coastal dunes Heaths Grasslands	Coastal dunes Fens	N/A	N/A
River Naver SAC	1044.15	N/A	N/A	Freshwater pearl mussel Atlantic salmon	N/A
Strathy Point SAC	207	Sea cliffs	N/A	N/A	N/A
River Thurso SAC	348.25	N/A	N/A	Atlantic salmon	N/A
Caithness and Sutherland Peatlands SAC	143561.47	Standing freshwater Bogs	Heaths Bogs	Otter Marsh saxifrage	N/A
East Caithness Cliffs SAC	457.48	Sea cliffs	N/A	N/A	N/A
Berriedale and Langwell Waters SAC	58.25	N/A	N/A	Atlantic salmon	N/A
Moray Firth SAC	151273.99	N/A	Sandbanks	Bottlenose dolphin	N/A
River Oykel	921.46	N/A	N/A	Freshwater pearl mussel	Atlantic salmon
River Evelix	23.6	N/A	N/A	Freshwater pearl mussel	N/A
Dornoch Firth and Morrich More SAC	8701.22	Estuaries Mudflats and sandflats Saltmarsh and salt meadows Coastal dunes	Sandbanks Reefs	Otter Harbour seal	N/A
Culbin Bar SAC	580.99	Vegetation of stony banks	Saltmarsh and salt meadows Coastal dunes	N/A	N/A
Lower River Spey - Spey Bay SAC	654.26	Vegetation of stony banks Forests	N/A	N/A	N/A
River Spey SAC	5759.72	N/A	N/A	Freshwater pearl mussel Sea lamprey Atlantic salmon Otter	N/A
Buchan Ness to Collieston SAC	206.03	Sea cliffs	N/A	N/A	N/A
Sands of Forvie SAC	735.48	Coastal dunes	N/A	N/A	N/A
River Dee SAC	2334.48	N/A	N/A	Freshwater pearl mussel Atlantic salmon Otter	N/A
Garron Point SAC	15.01	N/A	N/A	Narrow-mouthed whorl snail	N/A
River South Esk SAC	471.85	N/A	N/A	Freshwater pearl mussel Atlantic salmon	N/A
River Tay SAC	9461.63	N/A	Standing freshwater	Atlantic salmon	Sea lamprey Brook lamprey River lamprey Otter
Firth of Tay and Eden Estuary SAC	15441.63	Estuaries	Sandbanks Mudflats and sandflats	Harbour seal	N/A
Isle of May SAC	356.64	N/A	Reefs	Grey seal	N/A
St Abb's Head to Fast Castle SAC	122.63	Sea cliffs	N/A	N/A	N/A

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
River Tweed SAC	3742.65	Running freshwater	N/A	Atlantic salmon Otter	Sea lamprey Brook lamprey River lamprey
Tweed Estuary SAC	156.24	Estuaries Mudflats and sandflats	N/A	N/A	Sea lamprey River lamprey
Berwickshire and North Northumberland Coast SAC	65226.12	Mudflats and sandflats Inlets and Bays Reefs Sea caves	N/A	Grey seal	N/A
North Northumberland Dunes SAC	1127.27	Coastal dunes	N/A	Petalwort	N/A
Southern North Sea cSAC	3695054	N/A	N/A	Harbour porpoise	N/A
Dogger Bank SAC	1233115	Sandbanks	N/A	N/A	N/A
Durham Coast SAC	389.61	Sea cliffs	N/A	N/A	N/A
WEST OF SHETLAND AND ROCKALL					
Hascosay SAC	164.19	Bogs	N/A	N/A	Otter
North Fetlar SAC	1585.18	Heaths Fens	N/A	N/A	N/A
Mousa SAC	529.74	N/A	Reefs Sea caves	Harbour seal	N/A
Fair Isle SAC	561.05	Sea cliffs	Heaths	N/A	N/A
Sanday SAC	10976.97	Reefs	Sandbanks Mudflats and sandflats	Harbour seal	N/A
Faray and Holm of Faray SAC	781.33	N/A	N/A	Grey seal	N/A
Keen of Hamar SAC	39.87	Grasslands Scree	Heaths	N/A	N/A
Ronas Hill – North Roe SAC	4903.57	Standing freshwater Heaths Bogs	Heaths Scree	N/A	N/A
Yell Sound Coast SAC	1544.44	N/A	N/A	Otter Harbour seal	N/A
Sullom Voe SAC	2691.43	Inlets and bays	Coastal lagoons Reefs	N/A	N/A
Papa Stour SAC	2072.9	Reefs Sea caves	N/A	N/A	N/A
The Vadills SAC	62.42	Coastal lagoons	N/A	N/A	N/A
Stromness Heaths and Coast SAC	638.26	Sea cliffs Heaths	Fens	N/A	N/A
Loch of Stenness SAC	792.59	Coastal lagoons	N/A	N/A	N/A
Hoy SAC	9501.27	Sea cliffs Standing freshwater Heaths Bog	Heaths Fens Rocky slopes	N/A	N/A
Wyville Thomson Ridge SAC	173995	Reefs	N/A	N/A	N/A
Darwin Mounds SAC	137726	Reefs	N/A	N/A	N/A
Anton Dohrn Seamount SAC	1428611	Reefs	N/A	N/A	N/A
East Rockall Bank SAC	369489	Reefs	N/A	N/A	N/A
North West Rockall Bank SAC	436526	Reefs	N/A	N/A	N/A

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Hatton Bank cSAC	1569433	Reefs	N/A	N/A	N/A
Solan Bank Reef SAC	85593	Reefs	N/A	N/A	N/A
North Rona SAC	628.53	N/A	Reefs Sea cliffs Sea caves	Grey seal	N/A
Oldshoremore and Sandwood SAC	446.2	Coastal dunes Machairs	Coastal dunes	N/A	N/A
Achnahaird SAC	21.55	N/A	N/A	Petalwort	N/A
Ardvar and Loch a`Mhuilinn Woodlands SAC	808.1	Forest	N/A	N/A	Freshwater pearl mussel Otter
St Kilda SAC	25467.57	Reefs Sea cliffs Sea caves	N/A	N/A	N/A
Tràigh na Berie SAC	153.54	Machairs	N/A	N/A	N/A
Lewis Peatlands SAC	27955.02	Standing freshwater Bogs	Heaths Bogs	N/A	Otter
Langavat SAC	1471.42	N/A	N/A	Atlantic salmon	N/A
Loch nam Madadh SAC	2320.9	Coastal lagoons Inlets and bays	Sandbanks Mudflats and sandflats Reefs	Otter	N/A
Loch Roag Lagoons SAC	43.14	Coastal lagoons	N/A	N/A	N/A
Monach Islands SAC	3646.56	Machairs	Coastal dunes	Grey seal	N/A
Obain Loch Euphoirt SAC	348.28	Coastal lagoons	N/A	N/A	N/A
North Harris SAC	13119.9	Standing freshwater Heaths Grasslands	Standing freshwater Heaths Bogs Rocky slopes Scree	Freshwater pearl mussel	Atlantic salmon Otter
North Uist Machair SAC	3039.34	Salt meadows Machairs Standing freshwater	Vegetation of drift lines Coastal dunes	N/A	Slender naiad
South Uist Machair SAC	3437.71	Machairs Standing freshwater	Coastal lagoons Vegetation of drift lines Coastal dunes	Slender naiad *Najas flexilis*	Otter *Lutra lutra*
East Mingulay SAC	11510.87	Reefs	N/A	N/A	N/A
Sound of Barra SAC	12507.39	Sandbanks Reefs	N/A	N/A	Harbour seal
Stanton Banks SAC	81727	Reefs	N/A	N/A	N/A
Inverpolly SAC	11881.94	Standing freshwater Heaths Bogs	Heaths Grassland Scree Rocky slopes Forest	Otter	Freshwater pearl mussel
Loch Laxford SAC	1214.54	Inlets and bays	Reefs	N/A	N/A
Ascrib, Isay and Dunvegan SAC	2577.99	N/A	N/A	Harbour seal	N/A
Sunart SAC	10230.22	Forest	Reefs Heaths Forest	Otter	N/A

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC	4544.27	Sandbanks	N/A	N/A	N/A
Coll Machair SAC	854.24	Coastal dunes Machairs	Coastal dunes Standing freshwater	Slender naiad	N/A
Tiree Machair SAC	789.37	Coastal dunes Machairs Standing freshwater	Coastal dunes	N/A	N/A
Loch a`Phuill SAC	152.44	Standing freshwater	N/A	N/A	N/A
Rum SAC	10839.74	Standing freshwater Heaths Grasslands Scree	Sea cliffs Heaths Grasslands Bogs Fens Scree Rocky slopes	Otter	N/A
Oronsay SAC	340.02	Machairs	N/A	N/A	N/A
Treshnish Isles SAC	1962.66	N/A	Reefs	Grey seal	N/A
Tayvallich Juniper and Coast SAC	1213.13	Scrub	N/A	Marsh fritillary butterfly	Otter
Firth of Lorn SAC	20999.35	Reefs	N/A	N/A	N/A
Ardmeanach SAC	378.33	Grassland	Sea cliffs	N/A	N/A
Glac na Criche SAC	263.36	Bogs	Sea cliffs Heaths	N/A	Marsh fritillary butterfly
Moine Mhor SAC	1149.02	Bogs	Mudflats and sandflats Salt marshes and salt meadows Forests	N/A	Marsh fritillary butterfly Otter
IRISH SEA AND NORTH CHANNEL					
Murlough SAC	11902.03	Coastal dunes	Sandbanks Mudflats and sandflats Saltmarsh and salt meadows Coastal dunes	Marsh fritillary butterfly	Harbour seal
River Faughan and Tributaries SAC	293.79	N/A	Forests	Atlantic salmon	Otter
River Foyle and Tributaries SAC	771.8	Running freshwater	N/A	Atlantic salmon	Otter
River Roe and Tributaries SAC	408.19	N/A	Running freshwater Forests	Atlantic salmon	Otter
Pisces Reef Complex SAC	873	Reefs	N/A	N/A	N/A
North Channel SCI	160367	N/A	N/A	Harbour porpoise	N/A
Strangford Lough SAC	15398.54	Mudflats and sandflats Coastal lagoons Inlets and bays Reefs	Vegetation of drift lines Vegetation of stony banks Saltmarsh and salt meadows	N/A	Harbour seal
The Maidens SAC	7461.36	Reefs Sandbanks	N/A	N/A	Grey seal
Red Bay SAC	965.54	Sandbanks	N/A	N/A	N/A

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
North Antrim Coast SAC	314.59	Sea cliffs	Vegetation of drift lines Saltmarsh and salt meadows Coastal dunes Grasslands	Narrow-mouthed whorl snail	N/A
Rathlin Island SAC	3344.62	Reefs Sea cliffs Sea caves	Sandbanks Vegetation of drift lines	N/A	N/A
Skerries and Causeway SAC	10862	Reefs Sandbanks Sea caves	N/A	N/A	Harbour porpoise
Bann Estuary SAC	347.94	Coastal dunes	Saltmarsh and salt meadows Coastal dunes	N/A	N/A
Magilligan SAC	1058.22	Coastal dunes	Coastal dunes	N/A	Marsh fritillary butterfly Petalwort
Rinns of Islay SAC	1149.7	N/A	N/A	Marsh fritillary butterfly	N/A
South East Islay Skerries SAC	1498.3	N/A	N/A	Harbour seal	N/A
Inner Hebrides and the Minches cSAC	1380199	N/A	N/A	Harbour porpoise	N/A
Mull of Galloway SAC	136.39	Sea cliffs	N/A	N/A	N/A
Luce Bay and Sands SAC	48759.28	Inlets and bays Coastal dunes	Sandbanks Mudflats and sandflats Reefs	N/A	Great crested newt
River Bladnoch SAC	272.6	N/A	N/A	Atlantic salmon	N/A
Solway Firth SAC	43636.72	Sandbanks Estuaries Mudflats and sandflats Saltmarsh and salt meadows	Reefs Vegetation of stony banks Coastal dunes	Sea lamprey River lamprey	N/A
River Eden SAC	2430.39	Standing freshwater Running freshwater Forests	N/A	White-clawed (or Atlantic stream) crayfish Sea lamprey Brook lamprey River lamprey Atlantic salmon Bullhead Otter	N/A
River Derwent and Bassenthwaite Lake SAC	1793.8	Standing freshwater	Running freshwater	Marsh fritillary butterfly Sea lamprey Brook lamprey River lamprey Atlantic salmon Otter Floating water-plantain	N/A
River Ehen SAC	23.33	N/A	N/A	Freshwater pearl mussel	Atlantic salmon
Drigg Coast SAC	1397.44	Estuaries Coastal dunes	Mudflats and sandflats Saltmarsh and salt meadows Coastal dunes	N/A	N/A

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Morecambe Bay SAC	61506.22	Estuaries Mudflats and sandflats Inlets and bays Vegetation of stony banks Saltmarsh and salt meadows Coastal dunes	Sandbanks Coastal lagoons Reefs Coastal dunes	Great crested newt	N/A
River Kent	88.9	N/A	Running freshwater	White-clawed (or Atlantic stream) crayfish	Freshwater pearl mussel Bullhead
Shell Flat and Lune Deep SAC	10565	Sandbanks Reefs	N/A	N/A	N/A
Sefton Coast SAC	4563.97	Coastal dunes	Coastal dunes	Petalwort	Great crested newt
Dee Estuary/ Aber Dyfrdwy SAC	15805.89	Mudflats and sandflats Saltmarsh and salt meadows	Estuaries Sea cliffs Vegetation of drift lines Coastal dunes	N/A	River lamprey Sea lamprey Petalwort
River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	1308.93	Running freshwater	N/A	Atlantic salmon Floating water-plantain	Sea lamprey Brook lamprey River lamprey Bullhead Otter
Great Orme`s Head/ Pen y Gogarth SAC	302.63	Heaths Grasslands	Sea cliffs	N/A	N/A
Afon Gwyrfai a Llyn Cwellyn SAC	111.6	Standing freshwater Running freshwater	N/A	Atlantic salmon Floating water-plantain	Otter
Glan-traeth SAC	13.98	N/A	N/A	Great crested newt	N/A
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC	26482.67	Sandbanks Mudflats and sandflats Reefs	Inlets and bays Sea caves	N/A	N/A
North Anglesey Marine / Gogledd Môn Forol cSAC	324949	N/A	N/A	Harbour porpoise	N/A
Croker Carbonate Slabs SCI	6,591	Submarine structures made by leaking gases	N/A	N/A	N/A
Bae Cemlyn/ Cemlyn Bay SAC	43.43	Coastal lagoons	Vegetation of stony banks	N/A	N/A
Glannau Ynys Gybi/ Holy Island Coast SAC	464.27	Sea cliffs Heaths	Heaths	N/A	N/A
Glannau Môn: Cors heli / Anglesey Coast: Saltmarsh SAC	1058	Saltmarsh and salt meadows	Estuaries Mudflats and sandflats	N/A	N/A
Y Twyni o Abermenai i Aberffraw/ Abermenai to Aberffraw Dunes SAC	1871.03	Coastal dunes	Standing freshwater	Petalwort Shore dock	N/A
Clogwyni Pen Llyn/ Seacliffs of Lleyn SAC	1048.4	Sea cliffs	N/A	N/A	N/A

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC	146023.48	Sandbanks Estuaries Coastal lagoons Inlets and bays Reefs	Mudflats and sandflats Saltmarsh and salt meadows Sea caves	N/A	Bottlenose dolphin Otter Grey seal
Cardigan Bay / Bae Ceredigion SAC	95857.06	N/A	Sandbanks Reefs Sea caves	Bottlenose dolphin	Sea lamprey River lamprey Grey seal
Morfa Harlech a Morfa Dyffryn SAC	1062.57	Coastal dunes	N/A	Petalwort	N/A
West Wales Marine / Gorllewin Cymru Forol cSAC	737614	N/A	N/A	Harbour porpoise	N/A
Afon Eden - Cors Goch Trawsfynydd SAC	280.65	N/A	Bogs	Freshwater pearl mussel Floating water-plantain	Atlantic salmon Otter
Afon Teifi/ River Teifi SAC	691.07	Running freshwater	Standing freshwater	Brook lamprey River lamprey Atlantic salmon Bullhead Otter Floating water-plantain	Sea lamprey
SOUTH WEST APPROACHES AND CELTIC SEA					
Afonydd Cleddau / Cleddau Rivers SAC	751.706	N/A	Running freshwater Bogs Forests	Brook lamprey River lamprey Atlantic salmon Bullhead Otter	Sea lamprey
St David`s / Ty Ddewi SAC	934.3	Sea cliffs Heaths	N/A	Floating water plantain	N/A
Pembrokeshire Bat Sites and Bosherston Lakes/ Safleoedd Ystlum Sir Benfro a Llynnoedd Bosherston SAC	121.26	Standing freshwater	N/A	Greater horseshoe bat	Lesser horseshoe bat Otter
Pembrokeshire Marine/ Sir Benfro Forol SAC	138069.45	Estuaries Inlets and bays Reefs	Sandbanks Lagoons Sea caves Salt meadows	Grey seal Shore dock	Sea lamprey River lamprey Allis shad Twaite shad Otter
Limestone Coast of South West Wales/ Arfordir Calchfaen de Orllewin Cymru SAC	1594.53	Sea cliffs Dunes	Heaths Grasslands Sea caves	Greater horseshoe bat Early gentian	Petalwort
Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC	66101.16	Sandbanks Estuaries Mudflats and sandflats Inlets and bays Salt meadows	N/A	Twaite shad	Sea lamprey River lamprey Allis shad Otter
Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	1206.32	Dunes	N/A	Narrow-mouthed whorl snail Petalwort Fen orchid	N/A
Severn Estuary/ Môr Hafren SAC	73715.4	Estuaries Mudflats and sandflats Salt meadows	Sandbanks Reefs	River lamprey Sea lamprey Twaite shad	N/A

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Bristol Channel Approaches / Dynesfeydd Môr Hafren cSAC	584994	Harbour porpoise	N/A	N/A	N/A
Lundy SAC	3064.53	Reefs	Sandbanks Sea caves	N/A	Grey seal
Kenfig/ Cynffig SAC	1191.67	Coastal dunes Standing freshwater	Salt meadows	Petalwort Fen orchid	N/A
Penhale Dunes SAC	621.34	Coastal dunes	Coastal dunes	Petalwort Shore dock Early gentian	N/A
Tintagel-Marsland-Clovelly Coast SAC	2429.84	Sea cliffs Forests	Heaths	N/A	N/A
Braunton Burrows SAC	1346.64	Coastal dunes	Mudflats and sandflats	Petalwort	N/A
Lands End and Cape Bank SAC	30203.63	Reefs	N/A	N/A	N/A
Lizard Point SAC	13995.24	Reefs	N/A	N/A	N/A
The Lizard SAC	3257.11	Sea cliffs Standing freshwater Heaths	N/A	N/A	N/A
Polruan to Polperro SAC	213.39	Sea cliffs	Heaths	Shore dock	N/A
Plymouth Sound and Estuaries SAC	6402.03	Sandbanks Estuaries Inlets and bays Salt meadows	Mudflats and sandflats	Shore dock	Allis shad
Godrevy Head to St Agnes SAC	128.07	Heaths	N/A	Early gentian	N/A
Dunraven Bay SAC	6.47	N/A	N/A	Shore dock	N/A
Fal and Helford SAC	6387.8	Sandbanks Mudflats and sandflats Inlets and bays Salt meadows	Estuaries Reefs	Shore dock	N/A
Haig Fras SAC	47569.38	Reefs	N/A	N/A	N/A
ENGLISH CHANNEL					
Start Point to Plymouth Sound & Eddystone SAC	34089.58	Reefs	N/A	N/A	N/A
Lyme Bay and Torbay SAC	31246.73	Reefs Sea caves	N/A	N/A	N/A
Dawlish Warren SAC	58.69	Coastal dunes	Coastal dunes	Petalwort	N/A
Isles of Scilly Complex SAC	26848.62	Sandbanks Mudflats and sandflats Reefs	N/A	Shore dock	Grey seal
River Axe SAC	25.78	Running freshwater	N/A	N/A	Sea lamprey Brook lamprey Bullhead
Sidmouth to West Bay SAC	897.3	Sea cliffs Forests	Vegetation of drift lines	N/A	N/A
Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC	2230.53	Coastal dunes Standing freshwater Heaths Bogs	Grasslands Fens Forests	Southern damselfly	Great crested newt

Site Name	Area (ha)	Annex I Habitat Primary	Annex I Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Chesil and the Fleet SAC	1634.91	Coastal lagoons Vegetation of drift lines Vegetation of stony banks Scrub	Salt meadows	N/A	N/A
Isle of Portland to Studland Cliffs SAC	1441.75	Sea cliffs Grasslands	Vegetation of drift lines	Early gentian	N/A
Studland to Portland SAC	33184.28	Reefs	N/A	N/A	N/A
St Albans Head to Durlston Head SAC	283.4	Sea cliffs Grasslands	N/A	Early gentian	Greater horseshoe bat
River Avon SAC	498.24	Running freshwater	N/A	Desmoulin's whorl snail Sea lamprey Brook lamprey Atlantic salmon Bullhead	N/A
Solent and Isle of Wight Lagoons SAC	37.93	Coastal lagoons	N/A	N/A	N/A
River Itchen SAC	309.26	Running freshwater	N/A	Southern damselfly Bullhead	White-clawed (or Atlantic stream) crayfish Brook lamprey Atlantic salmon Otter
Solent Maritime SAC	11243.12	Estuaries Salt meadows	Sandbanks Mudlflats and sandflats Coastal lagoons Vegetation of drift lines Vegetation of stony banks Salt meadows Coastal dunes	N/A	Desmoulin's whorl snail
South Wight Maritime SAC	19866.12	Reefs Sea cliffs Sea caves	N/A	N/A	N/A
Wight-Barfleur Reef SAC	137344	Reefs	N/A	N/A	N/A
Dungeness SAC	3241.43	Vegetation of drift lines Vegetation of stony banks	N/A	Great crested newt	N/A
Hastings Cliffs SAC	183.72	Sea cliffs	N/A	N/A	N/A
Bassurelle Sandbank SAC	6709	Sandbanks	N/A	N/A	N/A

A4 Sites in waters of other member states

Relevant sites in adjacent states are highlighted in the previous Tables A.1 and A.2 as well as listed separately in Tables A.3 and A.4 below. Coastal sites in the Republic of Ireland (RoI; shown on Maps A.3 and A.6) and offshore sites in the Netherlands and Germany (shown on Maps A.4 and A.5) were considered in this screening assessment.

Table A.3: SPA sites in the adjacent waters of other Member States

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
IRISH SEA AND NORTH CHANNEL				
Cahore Marshes SPA (RoI)	191.61	Over winter: Golden plover Greenland white-fronted goose Bewick's swan Whooper swan	Over winter: Shoveler Wigeon Lapwing Teal Mallard Black-headed gull Curlew Shelduck	N/A
Wicklow Head SPA (RoI)	195.13	Breeding: Peregrine	Breeding: Kittiwake Razorbill Fulmar Guillemot Whitethroat	N/A

[72] A seabird assemblage of international importance: the area regularly supports at least 20,000 seabirds. Or, a wetland of international importance: the area regularly supports at least 20,000 waterfowl.

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
The Murrough SPA (RoI)	941.19	Breeding: Little tern Over winter: Red-throated diver Greenland white-fronted goose Whooper swan Little egret Golden plover Sandwich tern	Breeding: Reed warbler Over winter: Greylag goose Light-bellied brent goose Wigeon Teal Black-headed gull Herring gull Shoveler Mallard Gadwall Greylag goose Grey heron Turnstone Curlew sandpiper Little stint Ringed plover Curlew Cormorant Little grebe Shelduck Greenshank Green sandpiper Redshank Lapwing Dunlin	N/A
Dalkey Islands SPA (RoI)	83.08	Breeding: Roseate tern Common tern Arctic tern	N/A	N/A
South Dublin Bay/Tolka Estuary SPA (RoI)	2194.11	On passage: Common tern Roseate tern Arctic tern Over winter: Bar-tailed godwit Mediterranean gull	Over winter: Light-bellied brent goose Oystercatcher Ringed plover Grey plover Knot Sanderling Redshank Common gull Black-headed gull Turnstone Red-breasted merganser Curlew Cormorant Great crested grebe Dunlin	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
North Bull Island SPA (RoI)	1944.3	Over winter: Bar-tailed godwit Golden plover Short-eared owl On passage: Ruff	Over winter: Light-bellied brent goose Black-tailed godwit Shelduck Teal Pintail Shoveler Oystercatcher Grey plover Knot Sanderling Curlew Redshank Turnstone Black-headed gull Wigeon Mallard Sanderling Little stint Ringed plover Common gull Red-breasted merganser Curlew Greenshank Dunlin On passage: Curlew sandpiper Spotted redshank	Over winter: Waterfowl
Howth Head Coast SPA (RoI)	207.82	Breeding: Peregrine	Breeding: Kittiwake Razorbill Fulmar Guillemot	N/A
Ireland's Eye SPA (RoI)	214.52	Breeding: Peregrine	Breeding: Cormorant Herring gull Kittiwake Guillemot Razorbill Fulmar Gannet Over winter: Razorbill Kittiwake Guillemot	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Baldoyle Bay SPA (RoI)	262.77	Over winter: Golden plover Bar-tailed godwit	Over winter: Light-bellied brent goose Shelduck Ringed plover Grey plover Pintail Teal Mallard Turnstone Sanderling Knot Oystercatcher Black-tailed godwit Red-breasted merganser Curlew Great crested grebe Greenshank Redshank Lapwing Dunlin	N/A
Malahide Estuary SPA (RoI)	764.96	Over winter: Golden plover Bar-tailed godwit On passage: Ruff	Over winter: Great crested grebe Light-bellied brent goose Shelduck Pintail Goldeneye Red-breasted merganser Oystercatcher Grey plover Knot Black-tailed godwit Redshank Teal Mallard Turnstone Pochard Sanderling Ringed plover Common gill Black-headed gull Curlew Cormorant Great crested grebe Greenshank Redshank Lapwing Dunlin On passage: Curlew sandpiper Green sandpiper Little stint	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Rogerstown Estuary SPA (RoI)	645.62	Over winter: Golden plover On passage: Ruff	Over winter: Light-bellied brent goose Greylag goose Shelduck Shoveler Oystercatcher Ringed plover Grey plover Knot Black-tailed godwit Redshank Teal Mallard Turnstone Sanderling Knot Snipe Red-breasted merganser Curlew Cormorant Greenshank Redshank Lapwing Dunlin On passage: Curlew sandpiper Little stint Green sandpiper	N/A
Lambay Island SPA (RoI)	599.56	Breeding: Peregrine	Breeding: Fulmar Cormorant Shag Kittiwake Guillemot Razorbill Puffin Lesser black-backed gull Herring Gull Oystercatcher Manx shearwater Shelduck Over winter: Greylag goose Turnstone Light-bellied brent goose Purple sandpiper Oystercatcher Curlew Cormorant	Breeding: Seabird

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Skerries Islands SPA (RoI)	217.21	Over winter: Golden plover Short-eared owl	Breeding: Cormorant Shag Herring gull Fulmar Over winter: Light-bellied brent goose Purple sandpiper Turnstone Wigeon Mallard Ringed plover Snipe Oystercatcher Curlew Cormorant Grey plover Lapwing	N/A
Rockabill SPA (RoI)	5229.32	Breeding: Roseate tern Common tern Arctic tern	Breeding: Kittiwake Over winter: Purple sandpiper	N/A
River Nanny Estuary and Shore SPA (RoI)	229.78	Over winter: Golden plover	Over winter: Oystercatcher Ringed plover Knot Sanderling Herring gull	N/A
Boyne Estuary SPA (RoI)	593.68	Breeding: Little tern Over winter: Golden plover Bar-tailed godwit	Over winter: Shelduck Oystercatcher Grey plover Lapwing Knot Sanderling Black-tailed godwit Redshank Turnstone Teal Wigeon Mallard Light-bellied brent goose Ringed plover Common gull Black-headed gull Red-breasted merganser Curlew Cormorant Dunlin	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Dundalk Bay SPA (RoI)	13243.53	Over winter: Golden plover Bar-tailed godwit Greenland white-fronted Goose Great northern diver Red-throated diver Ruff On passage: Ruff	Over winter: Great crested grebe Greylag goose Light-bellied brent goose Shelduck Teal Mallard Pintail Common scoter Red-breasted merganser Oystercatcher Ringed plover Grey plover Lapwing Knot Black-tailed godwit Curlew Redshank Black-headed gull Common gull Herring gull Wigeon Turnstone Goldeneye Cormorant Greenshank Dunlin On passage: Curlew sandpiper Spotted redshank	Over winter: Waterfowl
Carlingford Lough SPA (RoI)	595.37	Over winter: Bar-tailed godwit	Over winter: Light-bellied brent goose Turnstone Oystercatcher Red-breasted merganser Cormorant Redshank Dunlin	Over winter: Waterfowl
Fanad Head SPA (RoI)	136.07	Breeding: Corncrake	N/A	N/A
Greers Isle SPA (RoI)	19.13	Breeding: Black-headed gull Common gull Sandwich tern Arctic tern	N/A	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Horn Head to Fanad Head SPA (RoI)	2385.34	Breeding: Chough Peregrine Over winter: Greenland white-fronted Goose Barnacle goose Whopper swan	Breeding: Common sandpiper Razorbill Puffin Fulmar Herring gull Shag Cormorant Guillemot Kittiwake Snipe Lapwing Dunlin Over winter: Teal Mallard Pochard Tufted duck Coot	Breeding: Seabird
Inishbofin, Inishdooey and Inishbeg SPA (RoI)	601.17	Breeding: Corncrake Arctic tern Over winter: Barnacle goose	Breeding: Common gull Lesser black-backed gull	N/A
Inishtrahull SPA (RoI)	474.25	Over winter: Barnacle goose	Breeding: Shag Fulmar Herring gull Common gull Lesser black-backed gull Kittiwake	N/A
Keeragh Islands SPA (RoI)	80.00	N/A	Breeding: Cormorant	N/A
Lady's Island Lake SPA (RoI)	478.60	Breeding: Sandwich tern Arctic tern Common tern Roseate tern Marsh harrier Hen harrier Over winter: Ruff Golden plover Whooper swan	Breeding: Shoveler Garganey Black-headed gull Over winter: Northern pintail Teal Wigeon Gadwall Pochard Tufted duck Greater scaup Coot Oystercatcher Black-headed gull Black-tailed godwit Red-breasted merganser Curlew Greenshank Redshank Lapwing Green sandpiper On passage: Spotted redshank Wood sandpiper Little stint Curlew sandpiper	Over winter: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Malin Head SPA (RoI)	281.07	Breeding: Corncrake	N/A	N/A
Saltee Islands SPA (RoI)	870.62	Breeding: Chough	Breeding: Razorbill Puffin Fulmar Lesser black-backed gull Cormorant Manx shearwater Chough Kittiwake Guillemot Herring gull Shag Great black-backed gull	N/A
Tacumshin Lake SPA (RoI)	476.17	Over winter: Golden plover Greenland white-fronted Goose Whooper swan Bewick's swan On passage: Ruff	Breeding: Reed warbler Marsh harrier Over winter: Northern pintail Shoveler Teal Wigeon Mallard Gadwall Pochard Tufted duck Brent goose Sanderling Coot Lesser black-backed gull Black-headed gull Black-tailed godwit Curlew Grey plover Shelduck Greenshank Redshank Lapwing Mute swan Little grebe Dunlin On passage: Little stint Curlew sandpiper Ruff	Over winter: Waterfowl
The Raven SPA (RoI)	4204.63	Breeding: Little tern Over winter: Golden plover Bar-tailed godwit Greenland white-fronted Goose Great northern diver Red-throated diver Slavonian grebe	Over winter: Wigeon Mallard Sanderling Knot Ringed plover Oystercatcher Common gull Common scoter Red-breasted merganser Curlew Cormorant Grey plover Great crested grebe Shelduck Lapwing Dunlin	Over winter: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Tory Island SPA (RoI)	570.77	Breeding: Corncrake Chough Little tern Over winter: Chough	Breeding: Razorbill Puffin Fulmar Herring gull Common gull Black-headed gull Shag Kittiwake Little tern Guillemot	N/A
Trawbreaga Bay SPA (RoI)	1549.16	Breeding: Chough Over winter: Chough Bar-tailed godwit Whooper swan	Over winter: Wigeon Mallard Brent goose Barnacle goose Ringed plover Oystercatcher Common gull Black-headed gull Red-breasted merganser Curlew Redshank Lapwing Dunlin	Over winter: Waterfowl
Wexford Harbour and Slobs SPA (RoI)	5979.34	Breeding: Little tern Over winter: Golden plover Bar-tailed godwit Greenland white-fronted Goose Short-eared owl Hen harrier Bewick's swan Whooper swan Ruff Little egret On passage: Ruff Wood sandpiper	Over winter: Pintail Shoveler Teal Wigeon Mallard Gadwall Turnstone Pochard Tufted duck Scaup Brent goose Goldeneye Sanderling Knot Ringed plover Coot Oystercatcher Common gull Black-headed gull Black-tailed godwit Red-breasted merganser Curlew Cormorant Grey plover Great crested grebe Shelduck Redshank Lapwing Greenshank Dunlin On passage: Spotted redshank Green sandpiper	Over winter: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Bannow Bay SPA (RoI)	1363.32	Over winter: Golden plover Bar-tailed godwit	Over winter: Pintail Shoveler Wigeon Mallard Turnstone Light-bellied brent goose Knot Ringed plover Oystercatcher Black-headed gull Black-tailed godwit Red-breasted merganser Curlew Cormorant Shelduck Greenshank Redshank Lapwing Dunlin	Over winter: Waterfowl
Ballyteigue Burrow SPA (RoI)	660.24	Breeding: Little tern Over winter: Golden plover Bar-tailed godwit	Over winter: Pintail Shoveler Wigeon Mallard Light-bellied brent goose Ringed plover Oystercatcher Black-headed gull Black-tailed godwit Red-breasted merganser Curlew Shelduck Redshank Lapwing Dunlin	Over winter: Waterfowl
SOUTH WEST APPROACHES AND CELTIC SEA				
Tramore Back Strand SPA (RoI)	675.68	Over winter: Golden plover Bar-tailed godwit	Over winter: Light-bellied brent goose Grey plover Lapwing Dunlin Black-tailed godwit Curlew	N/A
Tregor Goëlo SPA (FR)	91438	Breeding: Common tern Little tern	Breeding: Oystercatcher Ringed plover Over winter: Red-breasted merganser Oystercatcher Ringed plover Grey plover Sanderling Dunlin Redshank Greenshank Turnstone	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Côte de Granit rose-Sept-Iles SPA (FR)	69602	Breeding: Storm petrel Over winter: Mediterranean gull	Breeding: Fulmar Oystercatcher Ringed plover Lesser black-backed gull Herring gull Great black-backed gull Kittiwake Guillemot Razorbill Puffin Shag Gannet Manx shearwater Over winter: Red-breasted merganser Oystercatcher Purple sandpiper	N/A
Baie de Morlaix SPA (FR)	27389	Breeding: Sandwich tern Roseate tern Common tern On passage: Black-throated diver Bar-tailed godwit Sandwich tern Roseate tern Common tern Over winter: Black-throated diver Bar-tailed godwit	Breeding: Cormorant Shag Oystercatcher Herring gull Great black-backed gull Razorbill Puffin On passage: Cormorant Shag Oystercatcher Ringed plover Grey plover Sanderling Dunlin Curlew Spotted redshank Redshank Greenshank Turnstone Herring gull Great black-backed gull Razorbill Over winter: Oystercatcher Ringed plover Grey plover Sanderling Dunlin Curlew Spotted redshank Redshank Greenshank Turnstone Herring gull Great black-backed gull	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Baie de Goulven SPA (FR)	2234	Breeding: Kentish plover On passage: Spoonbill Kentish plover Aquatic warbler Over winter: Spoonbill Whooper swan Kentish plover Golden plover Bar-tailed godwit	Over winter: Brent goose Shelduck Wigeon Teal Mallard Oystercatcher Ringed plover Grey plover Lapwing Knot Sanderling Dunlin Ruff Black-tailed godwit Curlew Spotted redshank Redshank Greenshank Turnstone Common gull	N/A
Ilôt du Trévors SPA (FR)	402	Breeding: Sandwich tern Roseate tern Common tern	Breeding: Cormorant Shag Oystercatcher Lesser black-backed gull Herring gull Great black-backed gull	N/A
Ouessant-Molène SPA (FR)	77288	Breeding: Chough Storm petrel Common tern Little tern On passage: Storm petrel	Breeding: Fulmar Cormorant Shag Oystercatcher Ringed plover Lesser black-backed gull Herring gull Great black-backed gull Puffin Manx shearwater On passage: Fulmar Cormorant Shag Oystercatcher Ringed plover Grey plover Purple sandpiper Curlew Turnstone Lesser black-backed gull Herring gull Great black-backed gull Puffin Manx shearwater Over winter: Oystercatcher Ringed plover Grey plover Purple sandpiper Curlew Turnstone Lesser black-backed gull Herring gull Great black-backed gull	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
ENGLISH CHANNEL				
Cap Gris-Nez SPA (FR)	56224	On passage: Red-throated diver Black-throated diver Great northern diver Slavonian grebe Spoonbill Barnacle goose Smew Sandwich tern Over winter: Red-throated diver Black-throated diver Great northern diver Slavonian grebe Spoonbill Barnacle goose Smew Sandwich tern	On passage: Great crested grebe Red-necked grebe Black-necked grebe Fulmar Greater white-fronted goose Greylag goose Brent goose Scaup Eider Common scoter Velvet scoter Red-breasted merganser Purple sandpiper Kittiwake Guillemot Razorbill Over winter: Great crested grebe Red-necked grebe Black-necked grebe Fulmar Brent goose Scaup Eider Common scoter Velvet scoter Red-breasted merganser Purple sandpiper Kittiwake Guillemot Razorbill	N/A
Estuaire de la Canche SPA (FR)	5032	On passage: Bittern Smew White-tailed eagle Over winter: Bittern Smew White-tailed eagle	Breeding: Sanderling Over winter: Sanderling Curlew	N/A
Dunes de Merlimont SPA (FR)	1033	Breeding: Honey buzzard Nightjar Black woodpecker On passage: Little egret Black stork Spoonbill Marsh harrier Osprey Short-eared owl Kingfisher Bluethroat Aquatic warbler Over winter: Bittern Great egret Hen harrier	On passage: Teal Pintail Garganey Snipe Common gull	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Estuaires picards : Baie de Somme et d'Authie SPA (FR)	15214	Breeding: Little egret Avocet Mediterranean gull On passage: Barnacle goose Over winter: Little egret Great egret Smew Avocet Short-eared owl	Breeding: Oystercatcher On passage: Greylag goose Grey plover Over winter: Greylag goose Shelduck Wigeon Teal Mallard Pintail Shoveler Oystercatcher Grey plover Dunlin Curlew	N/A
Littoral seino-marin SPA (FR)	180050	Breeding: Peregrine On passage: Red-throated diver Black-throated diver Mediterranean gull Little gull Sandwich tern Common tern Over winter: Red-throated diver Black-throated diver	Breeding: Fulmar Cormorant Herring gull Kittiwake On passage: Gannet Kittiwake Guillemot Razorbill Over winter: Great crested grebe Fulmar Gannet Cormorant Herring gull Great black-backed gull Guillemot Razorbill	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory Species	Article 4.2 Assemblages[72]
Landes et dunes de la Hague SPA (FR)	4950	Breeding: Marsh harrier Hen harrier Peregrine Kentish plover Nightjar Dartford warbler On passage: Bar-tailed godwit Sandwich tern Common tern Little tern Black tern Aquatic warbler Over winter: Red-throated diver Black-throated diver Great northern diver Bittern Marsh harrier Hen harrier Merlin Peregrine Kentish plover Mediterranean gull Short-eared owl Kingfisher	Breeding: Little grebe Shag Teal Garganey Shoveler Pochard Tufted duck Ringed plover Curlew Over winter: Teal	N/A

Table A.4: SAC sites in the adjacent waters of other Member States

Site Name	Area (ha)	Annex 1 Habitat	Annex II Species
CENTRAL AND NORTHERN NORTH SEA			
Doggerbank SAC (Germany)	169895	Sandbanks	Harbour porpoise Harbour seal
Doggersbank SAC (Netherlands)	473500	Sandbanks	Grey seal Harbour seal Harbour porpoise
WEST OF SHETLAND AND ROCKALL			
South East Rockall Bank SAC (RoI)	149318	Reefs	N/A
Ballyhoorisky Point to Fanad Head SAC (RoI)	1292.49	Vegetation of stony banks Sea cliffs Standing freshwater	Narrow-mouthed whorl snail Slender naiad
Horn Head and Rinclevan SAC (RoI)	2343.32	Dunes Standing freshwater Machairs	Slender naiad Geyer's whorl snail Petalwort Grey seal
Inishtrahull SAC (RoI)	471.02	Sea cliffs	N/A
Lough Nagreany Dunes SAC (RoI)	221.06	Dunes Standing freshwater	Slender naiad
Mulroy Bay SAC (RoI)	3207.76	Inlets and bays Reefs	Otter
North Inishowen Coast SAC (RoI)	7066.04	Mudflats and sandflats Vegetation of stony banks Dunes Heaths Machairs Sea cliffs	Otter Narrow-mouthed whorl snail
Sheephaven SAC (RoI)	1841.19	Mudflats and sandflats Salt meadows Dunes Machairs Forests	Petalwort Marsh fritillary
Tory Island Coast SAC (RoI)	3044.43	Coastal lagoons Reefs Vegetation of stony banks Sea caves	N/A
Tranarossan and Melmore Lough SAC (RoI)	653.35	Mudflats and sandflats Vegetation of drift lines Vegetation of stony banks Sea cliffs Dunes Standing freshwater Heaths Machairs	Petalwort
IRISH SEA AND NORTH CHANNEL			
Hempton's Turbot Bank SAC (RoI)	4492.68	Sandbanks	N/A
Kilpatrick Sandhills SAC (RoI)	39.71	Vegetation of drift line Coastal dunes	N/A
Buckroney-Brittas Dunes and Fen SAC (RoI)	320.79	Vegetation of drift line Vegetation of stony banks Saltmarsh and salt meadows Coastal dunes Fens	N/A
Wicklow Reef SAC (RoI)	1533.23	Reefs	N/A
The Murrough Wetlands SAC (RoI)	606.12	Vegetation of drift line Vegetation of stony banks Saltmarsh and salt meadows Fens	N/A

Site Name	Area (ha)	Annex 1 Habitat	Annex II Species
Bray Head SAC (RoI)	264.3	Sea cliffs Heaths	N/A
South Dublin Bay SAC (RoI)	742.12	Mudflats and sandflats Vegetation of drift line Saltmarsh and salt meadows Coastal dunes	N/A
North Dublin Bay SAC (RoI)	1474.99	Mudflats and sandflats Vegetation of drift line Saltmarsh and salt meadows Coastal dunes	Petalwort
Howth Head SAC (RoI)	374.88	Sea cliffs Heaths	N/A
Ireland's Eye SAC (RoI)	41.83	Vegetation of stony banks Sea cliffs	N/A
Baldoyle Bay SAC (RoI)	538.93	Mudflats and sandflats Saltmarsh and salt meadows	N/A
Malahide Estuary SAC (RoI)	809.69	Mudflats and sandflats Saltmarsh and salt meadows Coastal dunes	N/A
Lambay Island SAC (RoI)	405.3	Reefs Sea cliffs	Grey seal Harbour seal
Rockabill to Dalkey Island SAC (RoI)	27325.56	Reefs	Harbour porpoise
Rogerstown Estuary SAC (RoI)	586.47	Estuaries Mudflats and sandflats Saltmarsh and salt meadows Coastal dunes	N/A
River Boyne and River Blackwater SAC (RoI)	2320.86	Fens Forests	River lamprey Atlantic salmon Otter
Boyne Coast and Estuary SAC (RoI)	629.51	Estuaries Mudflats and sandflats Vegetation of drift line Saltmarsh and salt meadows Coastal dunes	N/A
Clogher Head SAC (RoI)	23.75	Sea cliffs Heaths	N/A
Dundalk Bay SAC (RoI)	5236.27	Estuaries Mudflats and sandflats Vegetation of stony banks Saltmarsh and salt meadows	N/A
Carlingford Shore SAC (RoI)	526.28	Vegetation of drift line Vegetation of stony banks	N/A
Ballyteige Burrow SAC (RoI)	703.09	Estuaries Mudflats and sandflats Coastal lagoons Vegetation of drift lines Vegetation of stony banks Salt meadows Scrub Coastal dunes	N/A
Blackwater Bank SAC (RoI)	12401.45	Sandbanks	N/A
Cahore Polders and Dunes SAC (RoI)	264.76	Vegetation of drift lines Coastal dunes	N/A
Carnsore Point SAC (RoI)	8736.19	Mudflats and sandflats Reefs	N/A
Lady's Island Lake SAC (RoI)	540.07	Vegetation of stony banks Coastal lagoons Reefs	N/A
Kilmuckridge-Tinnaberna Sandhills SAC (RoI)	85.71	Coastal dunes	N/A

Site Name	Area (ha)	Annex 1 Habitat	Annex II Species
Long Bank SAC (RoI)	3370.87	Sandbanks	N/A
Magherabeg Dunes SAC (RoI)	47.61	Vegetation of drift lines Coastal dunes Fens	N/A
Raven Point Nature Reserve SAC (RoI)	594.26	Mudflats and sandflats Vegetation of drift lines Salt meadows Coastal dunes	N/A
Saltee Islands SAC (RoI)	15802.14	Mudflats and sandflats Inlets and bays Reefs Sea cliffs Sea caves	Grey seal
Bannow Bay SAC (RoI)	1325.12	Estuaries Mudflats and sandflats Vegetation of drift lines Vegetation of stony banks Salt meadows Scrub Dunes	N/A
Slaney River Valley SAC (RoI)	6017.81	Forests Estuaries Mudflats and sandflats Salt meadows Running freshwater	Freshwater pearl mussel Sea lamprey Brook lamprey River lamprey Twaite shad Atlantic salmon Otter Harbour seal
Tacumshin Lake SAC (RoI)	558.57	Coastal lagoons Vegetation of drift lines Vegetation of stony banks Coastal dunes	N/A
SOUTH WEST APPROACHES AND CELTIC SEA			
Hook Head SAC (RoI)	16932.71	Reefs Sea cliffs Inlets and bays	N/A
River Barrow and River Nore SAC (RoI)	12367.76	Forests Estuaries Mudflats and sandflats Reefs Salt meadows Running freshwater Heaths Grasslands Fens	Desmoulin's whorl snail Freshwater pearl mussel White-clawed crayfish Sea lamprey Brook lamprey River lamprey Twaite shad Atlantic salmon Otter Killarney fern Nore pearl mussel
Buckroney-Brittas Dunes and Fen SAC (RoI)	320.79	Vegetation of drift line Vegetation of stony banks Saltmarsh and salt meadows Coastal dunes Fens	N/A
Wicklow Reef SAC (RoI)	1533.23	Reefs	N/A
The Murrough Wetlands SAC (RoI)	606.12	Vegetation of drift line Vegetation of stony banks Saltmarsh and salt meadows Fens	N/A
Bray Head SAC (RoI)	264.3	Sea cliffs Heaths	N/A
South Dublin Bay SAC (RoI)	742.12	Mudflats and sandflats Vegetation of drift line Saltmarsh and salt meadows Coastal dunes	N/A

Site Name	Area (ha)	Annex 1 Habitat	Annex II Species
North Dublin Bay SAC (RoI)	1474.99	Mudflats and sandflats Vegetation of drift line Saltmarsh and salt meadows Coastal dunes	Petalwort
Howth Head SAC (RoI)	374.88	Sea cliffs Heaths	N/A
Ireland's Eye SAC (RoI)	41.83	Vegetation of stony banks Sea cliffs	N/A
Baldoyle Bay SAC (RoI)	538.93	Mudflats and sandflats Saltmarsh and salt meadows	N/A
Malahide Estuary SAC (RoI)	809.69	Mudflats and sandflats Saltmarsh and salt meadows Coastal dunes	N/A
Lambay Island SAC (RoI)	405.3	Reefs Sea cliffs	Grey seal Harbour seal
Rockabill to Dalkey Island SAC (RoI)	27325.56	Reefs	Harbour porpoise
Rogerstown Estuary SAC (RoI)	586.47	Estuaries Mudflats and sandflats Saltmarsh and salt meadows Coastal dunes	N/A
River Boyne and River Blackwater SAC (RoI)	2320.86	Fens Forests	River lamprey Atlantic salmon Otter
Boyne Coast and Estuary SAC (RoI)	629.51	Estuaries Mudflats and sandflats Vegetation of drift line Saltmarsh and salt meadows Coastal dunes	N/A
Clogher Head SAC (RoI)	23.75	Sea cliffs Heaths	N/A
Dundalk Bay SAC (RoI)	5236.27	Estuaries Mudflats and sandflats Vegetation of stony banks Saltmarsh and salt meadows	N/A
Carlingford Shore SAC (RoI)	526.28	Vegetation of drift line Vegetation of stony banks	N/A
Mers Celtiques - Talus du golfe de Gascogne SAC (FR)	6240756.17	Reefs	Harbour porpoise Bottlenose dolphin
Chaussée de Sein SAC (FR)	41498.94	Sandbanks Reefs	Harbour porpoise Bottlenose dolphin Grey seal Shore dock
Abers - Côtes des légendes SAC (FR)	77113.60	Sandbanks Coastal lagoons Reefs Vegetation of drift lines Sea cliffs	Grey seal Otter Harbour porpoise Shore dock Bottlenose dolphin Killarney fern
Anse de Goulven, dunes de Keremma SAC (FR)	2064.63	Mudflats and sandflats Reefs Vegetation of drift lines Sea cliffs Saltmarsh and salt meadows Coastal dunes	Grey seal Harbour porpoise Southern damselfly Fen orchid Jersey tiger

Site Name	Area (ha)	Annex 1 Habitat	Annex II Species
Baie de Morlaix SAC (FR)	26617.00	Sandbanks Estuaries Mudflats and sandflats Inlets and Bays Reefs Vegetation of drift lines Vegetation of stony banks Sea cliffs Scrub Heath Forests	Otter Grey seal Barbastelle Harbour porpoise Atlantic salmon
Côte de Granit Rose-Sept Iles SAC (FR)	72140.36	Sandbanks Mudflats and sandflats Inlets and Bays Coastal lagoons Reefs Vegetation of stony banks Sea cliffs Saltmarsh and salt meadows Dunes Heath	Allis shad Twaite shad Grey seal Sea lamprey Harbour porpoise Greater horseshoe bat Shore dock Atlantic salmon Killarney fern Bottlenose dolphin *Elona quimperiana*
Nord Bretagne DH SAC (FR)	283200.00	N/A	Bottlenose dolphin Harbour porpoise
Tregor Goëlo SAC (FR)	91228.00	Sandbanks Estuaries Mudflats and sandflats Coastal lagoons Inlets and Bays Reefs Vegetation of stony banks Sea cliffs Saltmarsh and salt meadows Dunes Standing freshwater Heaths Grasslands Rocky slopes Forests	Allis shad Grey seal Brook lamprey Otter Harbour porpoise Atlantic salmon Killarney fern Bottlenose dolphin *Elona quimperiana*
ENGLISH CHANNEL			
Récifs et landes de la Hague SAC (FR)	9178.00	Sandbanks Mudflats and sandflats Reefs Vegetation of drift lines Vegetation of stony banks Sea cliffs Saltmarsh and salt meadows Dunes Heaths Grasslands Bogs Forests	Bechstein's bat Shore dock Killarney fern Bottlenose dolphin
Anse de Vauville SAC (FR)	13058.00	Sandbanks Reefs	Bottlenose dolphin

Site Name	Area (ha)	Annex 1 Habitat	Annex II Species
Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire SAC (FR)	15385.00	Heaths Reefs Forests Salt meadows Vegetation of stony banks Fens Dunes Grasslands Mudflats and sandflats Standing freshwater Sandbanks Vegetation of drift lines Sea cliffs	Grey seal Harbour seal Bottlenose dolphin Great crested newt
Littoral Cauchois SAC (FR)	6303	Reefs Heaths Forest Standing freshwater Vegetation of stony banks Caves Grasslands Fens Sea cliffs Fens	Stag beetle Greater horseshoe bat Lesser horseshoe bat Great crested newt Jersey tiger
Baie de Canche et couloir des trois estuaires SAC (FR)	33306.00	Sandbanks Estuaries Sandflats and mudflats Salt meadows	Grey seal Harbour seal Harbour porpoise
Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC (FR)	68245.00	Sandbanks Reefs	Grey seal Harbour seal Harbour porpoise
Récifs Gris-Nez Blanc-Nez SAC (FR)	29156.00	Sandbanks Reefs	Grey seal Harbour seal Harbour porpoise

A5 Ramsar sites

The coastal Ramsar sites listed in Table A.5 and shown on Map A.11 are also SPAs and/or SACs (although site boundaries are not always strictly coincident and a Ramsar site may comprise one or more Natura 2000 sites), see tabulation below.

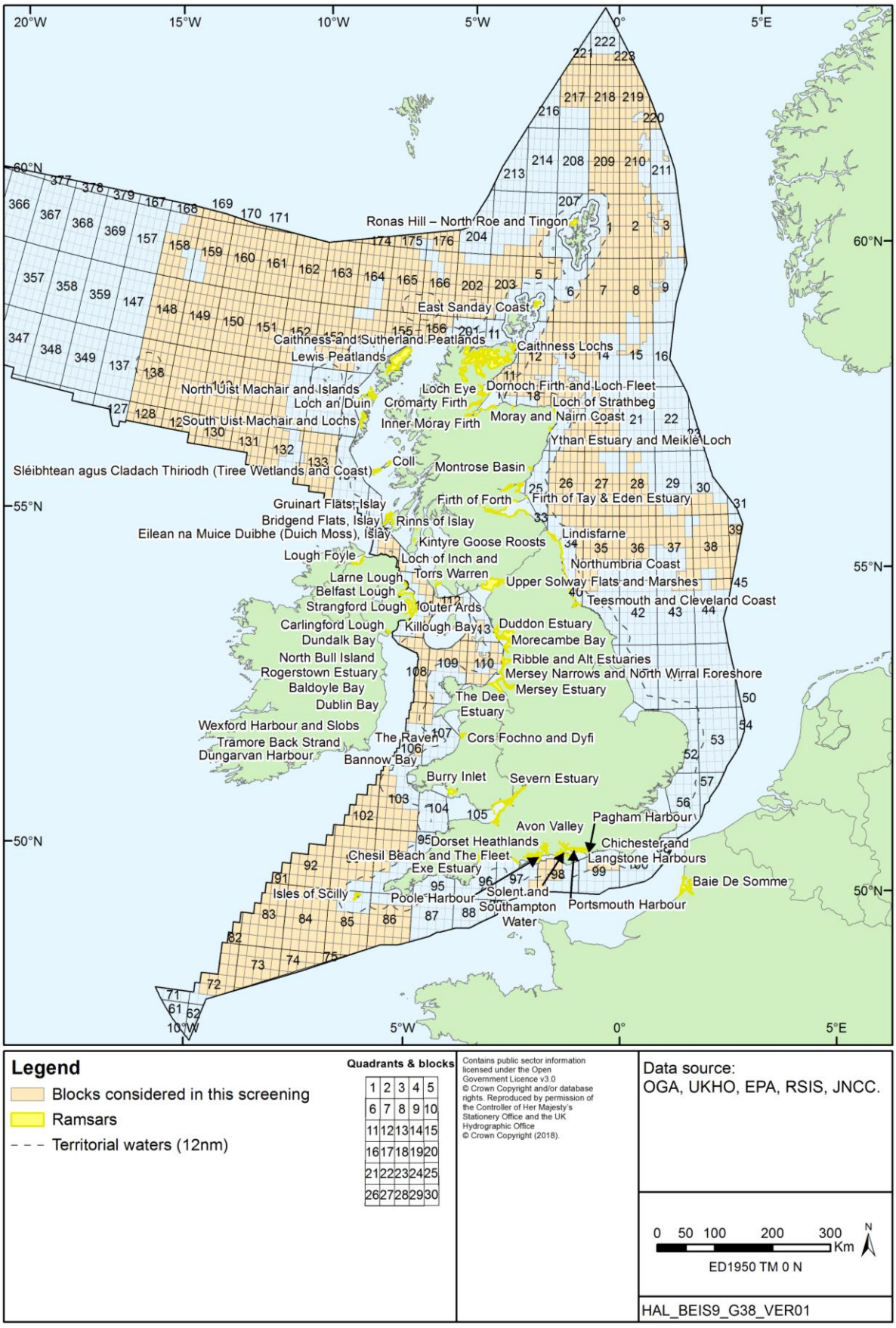
Table A.5: Coastal Ramsar sites and corresponding Natura 2000 sites

Ramsar Name	SPA Name	SAC Name
CENTRAL AND NORTHERN NORTH SEA		
Lindisfarne	Northumbria Coast Lindisfarne Northumberland Marine	North Northumberland Dunes Berwickshire and North Northumberland Coast
Northumbria Coast	Northumbria Coast Teesmouth and Cleveland Coast Northumberland Marine Teesmouth and Cleveland Coast pSPA	Durham Coast North Northumberland Dunes Berwickshire and North Northumberland Coast
Teesmouth and Cleveland Coast	Teesmouth and Cleveland Coast Teesmouth and Cleveland Coast pSPA	-
Caithness and Sutherland Peatlands	Caithness and Sutherland Peatlands	Caithness and Sutherland Peatlands
Caithness Lochs	Caithness Lochs	-
Coll	Coll	Inner Hebrides and the Minches
Cromarty Firth	Cromarty Firth	Moray Firth
Dornoch Firth and Loch Fleet	Moray Firth pSPA Dornoch Firth and Loch Fleet	Dornoch Firth and Morrich More Moray Firth
East Sanday Coast	East Sanday Coast	Sanday
Firth of Forth	Outer Firth of Forth and St Andrews Bay Complex pSPA Firth of Forth Forth Islands	-
Firth of Tay & Eden Estuary	Outer Firth of Forth and St Andrews Bay Complex pSPA Firth of Tay & Eden Estuary	Firth of Tay and Eden Estuary
Inner Moray Firth	Moray Firth pSPA Inner Moray Firth	Moray Firth
Loch of Strathbeg	Loch of Strathbeg	-
Montrose Basin	Montrose Basin	River South Esk
Moray and Nairn Coast	Moray Firth pSPA Moray and Nairn Coast	Culbin Bar Moray Firth Lower River Spey - Spey Bay River Spey
Ythan Estuary and Meikle Loch	Ythan Estuary, Sands of Forvie and Meikle Loch SPA Ythan Estuary, Sands of Forvie and Meikle Loch (extension) pSPA	Sands of Forvie
WEST OF SHETLAND AND ROCKALL		
Eilean na Muice Duibhe (Duich Moss), Islay	Eilean na Muice Duibhe (Duich Moss), Islay	-
Gruinart Flats, Islay	Rinns of Islay Gruinart Flats, Islay	Rinns of Islay
Lewis Peatlands	Lewis Peatlands	Lewis Peatlands Langavat
Loch an Duin	West Coast of the Outer Hebrides pSPA	Loch nam Madadh
Loch Eye	Loch Eye	-

Ramsar Name	SPA Name	SAC Name
Loch of Inch and Torrs Warren	Loch of Inch and Torrs Warren	Luce Bay and Sands
North Uist Machair and Islands	North Uist Machair and Islands West Coast of the Outer Hebrides pSPA	North Uist Machair
Rinns of Islay	Rinns of Islay	Glac na Criche Rinns of Islay
Ronas Hill – North Roe and Tingon	Ronas Hill - North Roe and Tingon	Tingon Ronas Hill - North Roe
Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast) Coll and Tiree pSPA	Tiree Machair Loch a`Phuill
South Uist Machair and Lochs	South Uist Machair and Lochs West Coast of the Outer Hebrides pSPA	South Uist Machair
IRISH SEA AND NORTH CHANNEL		
Duddon Estuary	Morecambe Bay and Duddon Estuary	Morecambe Bay
Mersey Estuary	Liverpool Bay / Bae Lerpwl Mersey Estuary	-
Morecambe Bay	Morecambe Bay and Duddon Estuary	Morecambe Bay
Ribble and Alt Estuaries	Ribble and Alt Estuaries Liverpool Bay / Bae Lerpwl	Sefton Coast
Upper Solway Flats and Marshes	Upper Solway Flats and Marshes Solway Firth pSPA	Solway Firth
Belfast Lough	Belfast Lough Belfast Lough Open Water East Coast Marine pSPA	-
Carlingford Lough	Carlingford Lough	-
Killough Bay	Killough Bay	-
Larne Lough	Larne Lough East Coast Marine pSPA	-
Lough Foyle	Lough Foyle	Magilligan River Faughan and Tributaries River Roe and Tributaries
Outer Ards	Outer Ards Belfast Lough Open Water East Coast Marine pSPA	Strangford Lough North Channel SCI
Strangford Lough	Strangford Lough Outer Ards East Coast Marine pSPA	Strangford Lough
Bridgend Flats, Islay	Bridgend Flats, Islay	-
Kintyre Goose Roosts	Kintyre Goose Roosts	-
Burry Inlet	Bae Caerfyrddin/ Carmarthen Bay Burry Inlet	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin Bristol Channel Approaches / Dynesfeydd Môr Hafren SCI
Cors Fochno and Dyfi	Dyfi Estuary / Aber Dyfi	Cors Fochno Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau West Wales Marine / Gorllewin Cymru Forol SCI
The Dee Estuary	The Dee Estuary Mersey Narrows and North Wirral Foreshore Liverpool Bay / Bae Lerpwl	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid Dee Estuary/ Aber Dyfrdwy
Mersey Narrows and North Wirral Foreshore	The Dee Estuary Mersey Narrows and North Wirral Foreshore Liverpool Bay / Bae Lerpwl	Dee Estuary/ Aber Dyfrdwy
Malahide Estuary (RoI)	Malahide Estuary	Malahide Estuary

Ramsar Name	SPA Name	SAC Name
Dundalk Bay (RoI)	Dundalk Bay	Dundalk Bay
North Bull Island (RoI)	North Bull Island Dublin Bay/Tolka Estuary	Rockabill to Dalkey Island North Dublin Bay
Rogerstown Estuary	Rogerstown Estuary	Rogerstown Estuary
Baldoyle Bay	Baldoyle Bay	Baldoyle Bay
Dublin Bay/Tolka Estuary (RoI)	North Bull Island Dublin Bay/Tolka Estuary	South Dublin Bay
Bannow Bay (RoI)	Hook Head	Bannow Bay
The Raven (RoI)	The Raven Wexford Harbour and Slobs	Slaney River Valley Raven Point Nature Reserve
Tramore Back Strand (RoI)	Tramore Back Strand	-
Dungarvan Harbour (RoI)	Dungarvan Harbour	-
Bannow Bay (RoI)	Bannow Bay	Bannow Bay Hook Head
Wexford Harbour and Slobs (RoI)	Wexford Harbour and Slobs The Raven	Slaney River Valley Raven Point Nature Reserve
SOUTH WEST APPROACHES AND CELTIC SEA		
Severn Estuary	Severn Estuary	Severn Estuary/ Môr Hafren
Isles of Scilly	Isles of Scilly dSPA	Isles of Scilly
ENGLISH CHANNEL		
Avon Valley	Avon Valley Solent and Dorset Coast pSPA	River Avon
Chesil Beach and The Fleet	Chesil Beach and The Fleet	Chesil and the Fleet Lyme Bay and Torbay
Chichester and Langstone Harbours	Chichester and Langstone Harbours Solent and Dorset Coast pSPA	Solent and Isle of Wight Lagoons Solent Maritime
Dorset Heathlands	Poole Harbour Avon Valley Solent and Dorset Coast pSPA	Dorset Heaths (Purbeck and Wareham) and Studland Dunes
Exe Estuary	Exe Estuary	Exe Estuary
Pagham Harbour	Pagham Harbour	Solent and Dorset Coast
Poole Harbour	Poole Harbour Solent and Dorset Coast pSPA	Dorset Heaths (Purbeck and Wareham) and Studland Dunes
Portsmouth Harbour	Portsmouth Harbour Solent and Dorset Coast	-
Solent and Southampton Water	Solent and Southampton Water Solent and Dorset Coast pSPA	South Wight Maritime Solent and Isle of Wight Lagoons Solent Maritime
Baie de Somme (France)	Estuaires picards : Baie de Somme et d'Authie	Baie de Canche et couloir des trois estuaires

Map A.11: Location of coastal Ramsar sites



Appendix B – Blocks and sites screened in

B1 Introduction

The following tables list those 31st Round Blocks and sites which have been screened in following application of the screening process described in Section 4. The Blocks and sites are listed according to the criteria by which they were screened in:

- Physical disturbance and drilling (Section 4.4, also see Figures 5.1 and 5.2)
- Underwater noise (Section 4.5, also see Figures 5.3 and 5.4)

These Blocks and sites will be subject to a second stage of HRA, Appropriate Assessment, if Blocks are applied for and before licensing decisions are taken.

B2 Physical disturbance and drilling

Central and northern North Sea								
SPAs								
Caithness and Sutherland Peatlands SPA	11/23	11/24c	11/25b	12/16				
East Caithness Cliffs SPA	11/23	11/24c	11/25b	11/27	11/28	11/29	11/30	17/4
	12/16	12/21b	17/5	18/1	18/2	18/3		
Fair Isle SPA	6/19							
Loch of Strathbeg SPA	18/10	19/6						
Moray Firth pSPA	11/23	11/24c	11/25b	11/27	11/28	11/29	11/30	17/4
	17/5	18/1	18/2	18/3				
North Caithness Cliffs SPA	12/9	12/12	12/13	12/14	12/16	12/17	12/18	12/19
Northumberland Marine SPA	34/20	34/25						
Lindisfarne SPA	34/20	34/25						
Coquet Island SPA	34/20	34/25						
Farne Islands SPA	34/20	34/25						
Northumbria Coast SPA	40/5	34/20	34/25					
Outer Firth of Forth and St Andrews Bay Complex pSPA	25/25	26/21	26/22	26/23	26/26	26/27	26/28	
Firth of Forth Islands SPA	25/25	26/21	26/22	26/23	26/26	26/27	26/28	
St Abb's Head to Fast Castle SPA	25/25	26/21	26/22	26/23	26/26	26/27	26/28	
Firth of Tay and Eden Estuary SPA	25/25	26/21	26/22	26/23	26/26	26/27	26/28	
Firth of Forth SPA	25/25	26/21	26/22	26/23	26/26	26/27	26/28	
Pentland Firth pSPA	12/9	12/12	12/13	12/14	12/16	12/17	12/18	12/19
Pentland Firth Islands SPA	12/9	12/12	12/13	12/14	12/16	12/17	12/18	12/19
Scapa Flow pSPA	12/12							
Orkney Mainland Moors SPA	12/12							
Hoy SPA	12/9	12/12	12/13	12/14	12/16	12/17	12/18	12/19
Copinsay	12/9	12/12	12/13	12/14	12/16	12/17	12/18	12/19
Teesmouth and Cleveland Coast pSPA	40/5							
Teesmouth and Cleveland Coast SPA	40/5							
Troup, Pennan and Lion`s Heads SPA	18/9	18/10	19/6					

SACs								
Berriedale and Langwell Waters SAC	11/23	11/24c	11/27	11/28	11/29			
Berwickshire and North Northumberland Coast SAC	26/26	34/3	34/4	34/5	34/15			
Dogger Bank SAC	37/20	37/25	37/28a	37/29a	37/30	38/13	38/14	38/15
	38/16	38/17	38/18	38/19	38/20	38/21	38/22	38/23
	38/24	38/25	38/26	38/29	38/30	39/11	39/12	39/16
	39/17	39/21	39/26	43/3	43/4	43/5	44/1	44/3b
	44/4	44/5	45/1					
Doggersbank SAC (Netherlands)	38/25	38/30	39/11	39/12	39/16	39/17	39/21	39/26
	44/5	45/1						
Moray Firth SAC	11/23	11/27	11/28	11/29	17/4	17/5	18/9	18/10
	19/6							
Pobie Bank Reef SAC	1/4	1/5	1/9	1/10	1/14	1/15	1/19	1/20
	1/23	1/24	1/25	1/28	2/1	2/2	2/6	2/7
	2/11	2/12	2/16					
Southern North Sea SCI	36/13	36/14	36/15b	36/18	36/19	36/23	37/11b	37/12
	37/20	37/25	37/28a	37/29a	37/30	38/21	38/26	43/3
	43/4	43/5	44/1					
West of Shetland and Rockall								
SPAs								
Cape Wrath SPA	156/9	156/14						
North Rona and Sula Sgeir SPA	155/4	155/5	165/24	165/25	165/29	165/30	166/21	166/22
	166/26	166/27	166/28					
Seas off Foula pSPA	5/1	5/2	5/3	5/4	5/5	5/7	5/8	5/9
	5/10	6/1	6/6	203/4	203/5	205/28	205/29	205/30
	206/18	206/19	206/22	206/23	206/26	206/27	206/28	
Foula SPA	5/1	5/2	5/3	5/4	5/5	5/7	5/8	5/9
	5/10	6/1	6/6	203/4	203/5	205/28	205/29	205/30
	206/18	206/19	206/22	206/23	206/26	206/27	206/28	
Seas off St Kilda pSPA	152/19	152/20	153/11	153/12	153/13	153/14	153/15	153/16
	153/17	153/18	153/19	153/20	153/21	153/22	153/23	153/24
	153/25	153/29	153/30	154/26				
St Kilda SPA	152/19	152/20	153/11	153/12	153/13	153/14	153/15	153/16
	153/17	153/18	153/19	153/20	153/21	153/22	153/23	153/24
	153/25	153/29	153/30	154/26				
Flannan Isles SPA	152/19	152/20	153/11	153/12	153/13	153/14	153/15	153/16
	153/17	153/18	153/19	153/20	153/21	153/22	153/23	153/24
	153/25	153/29	153/30	154/26				
Sule Skerry and Sule Stack SPA	202/23	202/24	202/27	202/28	202/29	202/30		
SACs								
Anton Dohrn Seamount SAC	140/7	140/8	140/9	140/10	140/12	140/13	140/14	140/15
	140/17	140/18	140/19	140/20	140/22	140/23	140/24	140/25
	140/28	140/29	140/30	141/6	141/7	141/8	141/11	141/12
	141/13	141/16	141/17	141/18	141/19	141/21	141/22	141/23

	141/26	141/27						
Darwin Mounds SAC	164/2	164/3	164/4	164/5	164/6	164/7	164/8	164/9
	164/10	164/11	164/12	164/13	164/14	164/15	165/1	165/2
	165/6	165/7	165/11	165/12				
East Rockall Bank SAC	128/1	128/2	128/3	128/4	128/5	128/6	128/7	128/8
	128/9	128/10	129/1	138/4	138/5	138/10	138/15	138/19
	138/20	138/23	138/24	138/25	138/27	138/28	138/29	138/30
	139/1	139/2	139/6	139/7	139/11	139/12	139/13	139/16
	139/17	139/18	139/21	139/22	139/26	139/27	148/6	148/11
	148/16	148/17	148/18	148/19	148/21	148/22	148/23	148/24
	148/25	148/27	148/28	148/29	148/30	149/21	149/26	149/27
North Rona SAC	165/25	165/30	166/21	166/22	166/26	166/27		
North West Rockall Bank SAC	138/1	138/2	138/3	138/4	138/5	138/6	138/7	138/8
	138/9	138/10	138/13	138/14	138/15	139/1	139/6	148/21
	148/22	148/23	148/26	148/27	148/28	148/29	148/30	
Solan Bank Reef SAC	156/3	156/4	156/5	156/8	156/9	166/23	166/24	166/25
	166/28	166/29	166/30	202/21	202/22	202/26	202/27	
Stanton Banks SAC	133/14	133/15	133/18	133/19	133/20	133/23	133/24	133/25
	133/29	133/30						
Wyville Thomson Ridge SAC	164/2	164/3	164/4	164/5	164/10	165/1	165/2	165/3
	165/4	165/6	165/7	165/8	165/9	165/10	166/6	174/27
	174/28	174/29	174/30	175/21	175/22	175/26	175/27	175/28
Irish Sea and North Channel								
SPAs								
Anglesey Terns / Morwenoliaid Ynys Môn SPA	109/11	109/15	109/26	110/16	110/21b			
Copeland Islands SPA	108/4	108/5	108/9	108/10	108/14	108/15	109/1	109/6
	109/7	109/11	111/9	111/4	111/9	111/10	111/15	111/25
	125/30	126/26						
Skomer, Skokholm and the Seas off Pembrokeshire SPA	108/4	108/5	108/9	108/10	108/14	108/15	109/1	109/6
	109/7	109/11						
East Coast Marine pSPA	111/3	111/4	111/9	111/10	111/15	111/25	125/30	126/26
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA	106/5	106/10	107/1	107/6	108/4	108/5	108/9	108/10
	108/14	108/15	109/1	109/6	109/7	109/11		
Irish Sea Front SPA	108/4	108/5	108/9	108/10	108/14	108/15	109/1	109/6
	109/7	109/11						
Larne Lough SPA	111/3	111/4	111/9	111/10	111/15	111/25	125/30	126/26
Belfast Lough SPA	111/4	111/9	111/10	111/15	111/25	125/30	126/26	
Strangford Lough SPA	111/4	111/9	111/10	111/15	111/25	125/30	126/26	
Rum SPA	108/4	108/5	108/9	108/10	108/14	108/15	109/1	109/6
	109/7	109/11						
Liverpool Bay SPA	109/15	110/2d	110/4	110/7b	110/8b	110/9c	110/10	110/11
	110/12c	110/14e	110/14f	110/16	110/17	110/18	110/21a	110/21b

	110/23	113/27f						
Loch of Inch and Torrs Warren SPA	111/10							
Mersey Narrows and North Wiral Foreshore SPA	109/15	110/2d	110/4	110/7b	110/8b	110/9c	110/10	110/11
	110/12c	110/14e	110/14f	110/16	110/17	110/18	110/21a	110/21b
	110/23	113/27f						
Morecambe Bay and Duddon Estuary SPA	110/4	110/10	113/22					
Outer Ards SPA	111/9	111/4	111/9	111/10	111/15	111/25	125/30	126/26
Rathlin Island SPA	125/18	125/19	125/20	125/23	125/24	125/25		
Ribble and Alt Estuaries SPA	110/9c	110/10	110/14f					
Sheep Island SPA	125/18	125/19	125/23	125/24	125/25			
Solway Firth pSPA	112/13	112/14						
The Dee Estuary SPA	109/15	110/2d	110/4	110/7b	110/8b	110/9c	110/10	110/11
	110/12c	110/14e	110/14f	110/16	110/17	110/18	110/21a	110/21b
	110/23	113/27f						
Traeth Lafan/ Lavan Sands, Conway Bay SPA	110/16	110/21b						
Ynys Seiriol / Puffin Island SPA	110/16	110/21b						
Carlingford Lough SPA	108/2							
SACs								
Bann Estuary SAC	125/23							
Cardigan Bay/ Bae Ceredigion SAC	106/25	110/16						
Croker Carbonate Slabs SCI	108/14	108/15	108/19	108/20	108/24	108/25	109/11	
Dee Estuary/ Aber Dyfrdwy SAC	110/18	110/23						
Drigg Coast SAC	113/22							
Luce Bay and Sands SAC	111/10	111/15	112/11	112/12	112/13	112/14		
Morecambe Bay SAC	110/4	110/10						
North Anglesey Marine / Gogledd Mn Forol SCI	108/4	108/5	108/9	108/10	108/14	108/15	108/19	108/20
	108/24	108/25	109/1	109/2	109/3	109/4	109/6	109/7
	109/8	109/9	109/11	109/15	109/26			
North Antrim Coast SAC	125/18	125/23	125/24					
North Channel SCI	111/3	111/4	111/9	111/10	111/15	111/25	111/29	111/30
	112/11	112/12	112/16	112/17				
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC	107/1	107/6	110/16					
Pisces Reef Complex SAC	108/4	111/25	111/29	111/30				
Rathlin Island SAC	125/18	125/19	125/20	125/23	125/24	125/25		

Red Bay SAC	125/25	125/30	126/26					
Shell Flat and Lune Deep SAC	110/4	110/8b	110/9c	110/10				
Skerries and Causeway SAC	125/18	125/19	125/23	125/24				
The Maidens SAC	111/3	126/26						
West Wales Marine / Gorllewin Cymru Forol SCI	106/5	106/9	106/10	106/25	107/1	107/6	109/26	
Y Fenai a Bae Conwy/ Menai Strait and Conwy Bay SAC	110/16	110/17	110/21a	110/21b				
South West Approaches and Celtic Sea								
SPAs								
Grassholm SPA	103/7	103/12						
Skomer, Skokholm and the Seas off Pembrokeshire SPA	102/15	102/19	102/20	102/24	102/25	103/6	103/7	103/11
	103/12	103/16	103/17	103/18	103/21	103/22		
SACs								
Bristol Channel Approaches / Dynesfeydd Mrr Hafren SCI	94/4	94/5	94/9	94/13	94/17	103/23	103/24	103/25
	103/28	103/29	103/30					
Haig Fras SAC	91/25	91/29	91/30	92/16	92/17	92/18	92/19	92/21
	92/22	92/23	92/24	92/26	92/27	92/28		
Isles of Scilly Complex SAC	93/27							
Lands End and Cape Bank SAC	93/20	93/25	94/16	94/17				
Lizard Point SAC	86/8	86/9	86/10					
Mers Celtiques - Talus du golfe de Gascogne SAC (FR)	72/20	72/22	72/23	72/24	72/25	73/10	73/13	73/14
	73/15	73/16	73/17	73/18	73/19	73/21	74/3	74/4
	74/5	74/6	74/7	74/8	74/9	74/10	74/11	74/12
	75/1	75/2	75/3	85/25	85/26	85/27	85/28	85/29
	85/30	86/21	86/26					
Pembrokeshire Marine/ Sir Benfro Forol SAC	103/1	103/6	103/7	103/11	103/12			
West Wales Marine / Gorllewin Cymru Forol SCI	103/7	103/12	103/18					
English Channel								
SPAs								
Pagham Harbour SPA	99/12							
Poole Harbour SPA	98/11b	98/12	98/13	98/16	99/12			
Solent and Dorset Coast pSPA	98/11b	98/12	98/13	98/16	99/12			
Solent and Southampton Water SPA	98/11b	98/12	98/13	98/16	99/12			

Chichester & Langstone Harbours SPA	98/11b	98/12	98/13	98/16	99/12			
SACs								
River Avon SAC	98/12							
Solent and Isle of Wight Lagoons SAC	98/12	98/13						
Solent Maritime SAC	98/12	98/13						
South Wight Maritime SAC	98/12	98/13	98/18					
Studland to Portland SAC	98/11b	98/12	98/16	98/17				
Wight-Barfleur Reef SAC	97/25	98/16	98/17	98/18	98/21	98/26		

B3 Underwater noise

Central and northern North Sea								
SPAs								
Buchan Ness to Collieston Coast SPA	19/23							
Caithness and Sutherland Peatlands SPA	11/23	11/24c	11/25b	11/27	11/28	12/16	12/21b	
Copinsay SPA	12/9							
East Caithness Cliffs SPA	11/23	11/24c	11/25b	11/27	11/28	11/29	11/30	12/16
	12/17	12/21b	17/4	17/5	18/1	18/2	18/3	
East Mainland Coast, Shetland pSPA	1/23							
Fowlsheugh SPA	26/6							
Hermaness, Saxa Vord and Valla Field SPA	209/26	209/27						
Otterswick and Graveland SPA	1/23							
Moray Firth pSPA	11/23	11/24c	11/25b	11/27	11/28	11/29	11/30	17/4
	17/5	18/1	18/2	18/3				
North Caithness Cliffs SPA	12/9	12/10	12/12	12/13	12/14	12/15	12/16	12/17
	12/18	12/19	12/20					
Northumberland Marine SPA	34/3	34/4	34/15	34/20	34/25			
Lindisfarne SPA	34/3	34/4	34/15	34/20	34/25			
Northumbria Coast SPA	34/3	34/4	34/15	34/20	34/25			
Farne Islands SPA	34/3	34/4	34/15	34/20	34/25			
Coquet Island SPA	34/3	34/4	34/15	34/20	34/25			
Outer Firth of Forth and St Andrews Bay Complex pSPA	25/25	26/16	26/17	26/21	26/22	26/23	26/26	26/27
	26/28							
Firth of Forth SPA	25/25	26/16	26/17	26/21	26/22	26/23	26/26	26/27
	26/28							
Firth of Forth Islands SPA	25/25	26/16	26/17	26/21	26/22	26/23	26/26	26/27
	26/28							
Firth of Tay and Eden Estuary SPA	25/25	26/16	26/17	26/21	26/22	26/23	26/26	26/27
	26/28							
Pentland Firth pSPA	12/9	12/10	12/12	12/13	12/14	12/15	12/16	12/17
	12/18	12/19	12/20					
Pentland Firth Islands SPA	12/9	12/10	12/12	12/13	12/14	12/15	12/16	12/17
	12/18	12/19	12/20					

Scapa Flow pSPA	12/12							
Hoy SPA	12/9	12/10	12/12	12/13	12/14	12/15	12/16	12/17
	12/18	12/19	12/20					
Copinsay SPA	12/9	12/10	12/12	12/13	12/14	12/15	12/16	12/17
	12/18	12/19	12/20					
Orkney Mainland Moors SPA	12/12							
St Abb`s Head to Fast Castle SPA	25/25	26/16	26/17	26/21	26/22	26/23	26/26	26/27
	26/28							
Sumburgh Head SPA	7/6							
Teesmouth and Cleveland Coast SPA	40/5							
Teesmouth and Cleveland Coast pSPA	40/5							
Troup, Pennan and Lion`s Heads SPA	18/3	18/4	18/5	18/9	18/10	19/6		
SACs								
Berriedale and Langwell Waters SAC	11/23	11/24c	11/27	11/28	11/29			
Berwickshire and North Northumberland Coast SAC	26/26	34/3	34/4	34/5	34/10	34/15	34/20	
Doggersbank SAC (Netherlands)	38/20	38/25	38/30	39/7	39/11	39/12	39/16	39/17
	39/21	39/26	44/4	44/5	45/1			
Moray Firth SAC	11/23	11/27	11/28	11/29	17/4	17/5	18/9	18/10
	19/6							
Sanday SAC	5/30							
Southern North Sea SCI	36/13	36/14	36/15b	36/18	36/19	36/23	37/11b	37/12
	37/13	37/14	37/15	37/20	37/25	37/28a	37/29a	37/30
	38/16	38/21	38/22	38/26	43/3	43/4	43/5	44/1
	44/3b							
West of Shetland and Rockall								
SPAs								
Cape Wrath SPA	156/9	156/14						
Fair Isle SPA	6/6	6/19						
Flannan Isles SPA	154/26							
Foula SPA	5/4	5/5	6/1	206/23	206/28			
Marwick Head SPA	203/22							
North Rona and Sula Sgeir SPA	155/3	155/4	155/5	156/1	156/2	156/3	165/23	165/24
	165/25	165/28	165/29	165/30	166/21	166/22	166/23	166/26
	166/27	166/28						
Seas off Foula pSPA	5/1	5/2	5/3	5/4	5/5	5/7	5/8	5/9
	5/10	6/1	6/6	203/4	203/5	205/28	205/29	205/30

	206/18	206/19	206/22	206/23	206/26	206/27	206/28	
Foula SPA	5/1	5/2	5/3	5/4	5/5	5/7	5/8	5/9
	5/10	6/1	6/6	203/4	203/5	205/28	205/29	205/30
	206/18	206/19	206/22	206/23	206/26	206/27	206/28	
Seas off St Kilda pSPA	152/15	152/19	152/20	153/11	153/12	153/13	153/14	153/15
	153/16	153/17	153/18	153/19	153/20	153/21	153/22	153/23
	153/24	153/25	153/29	153/30	154/26			
St Kilda SPA	152/15	152/19	152/20	153/11	153/12	153/13	153/14	153/15
	153/16	153/17	153/18	153/19	153/20	153/21	153/22	153/23
	153/24	153/25	153/29	153/30	154/26			
Flannan Isles SPA	152/15	152/19	152/20	153/11	153/12	153/13	153/14	153/15
	153/16	153/17	153/18	153/19	153/20	153/21	153/22	153/23
	153/24	153/25	153/29	153/30	154/26			
Sule Skerry and Sule Stack SPA	202/22	202/23	202/24	202/25	202/26	202/27	202/28	202/29
	202/30							
SACs								
North Rona SAC	156/1	156/2	165/25	165/30	166/21	166/22	166/23	166/26
	166/27	166/28						
Irish Sea and North Channel								
SPAs								
Copeland Islands SPA	108/3	108/4	108/5	108/8	108/9	108/10	108/14	108/15
	108/19	108/20	109/1	109/2	109/6	109/7	109/11	111/3
	111/4	111/9	111/10	111/15	111/25	111/29	125/30	126/26
East Coast Marine pSPA	111/3	111/4	111/9	111/10	111/15	111/25	111/29	125/30
	126/26							
Larne Lough SPA	111/3	111/4	111/9	111/10	111/15	111/25	111/29	125/30
	126/26							
Belfast Lough SPA	111/3	111/4	111/9	111/10	111/15	111/25	111/29	125/30
	126/26							
Outer Ards SPA	111/3	111/4	111/9	111/10	111/15	111/25	111/29	125/30
	126/26							
Strangford Lough SPA	111/3	111/4	111/9	111/10	111/15	111/25	111/29	125/30
	126/26							
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA	106/5	106/10	107/1	107/6	108/3	108/4	108/5	108/8
	108/9	108/10	108/14	108/15	108/19	108/20	109/1	109/2
	109/6	109/7	109/11					
Irish Sea Front SPA	108/3	108/4	108/5	108/8	108/9	108/10	108/14	108/15
	108/19	108/20	109/1	109/2	109/6	109/7	109/11	
Skokholm, Skomer and the Seas of Pembrokeshire SPA	108/3	108/4	108/5	108/8	108/9	108/10	108/14	108/15
	108/19	108/20	109/1	109/2	109/6	109/7	109/11	
Rum SPA	108/3	108/4	108/5	108/8	108/9	108/10	108/14	108/15
	108/19	108/20	109/1	109/2	109/6	109/7	109/11	
Liverpool Bay SPA	109/15	110/1	110/2d	110/4	110/6	110/7b	110/8b	110/9c
	110/10	110/11	110/12c	110/14e	110/14f	110/16	110/17	110/18

	110/21a	110/21b	110/23	113/26c	113/27f			
Mersey Narrows and North Wirral Foreshore SPA	110/14f	110/18						
Morecambe Bay and Duddon Estuary SPA	110/4	110/9c	110/10	113/22				
Rathlin Island SPA	125/18	125/19	125/20	125/23	125/24	125/25	125/30	126/26
Ribble and Alt Estuaries SPA	110/4	110/9c	110/10	110/14f				
Sheep Island SPA	125/18	125/19	125/20	125/23	125/24	125/25		
Solway Firth pSPA	112/13	112/14						
Sound of Gigha pSPA	125/20							
The Dee Estuary SPA	110/14f	110/17	110/18	110/23				
Traeth Lafan/ Lavan Sands, Conway Bay SPA	110/16	110/17	110/21a	110/21b				
Ynys Seiriol / Puffin Island SPA	110/16	110/17	110/21a	110/21b				
SACs								
Cardigan Bay/ Bae Ceredigion SAC	106/25	109/15	110/16					
Dee Estuary/ Aber Dyfrdwy SAC	110/14f	110/17	110/18	110/23				
Murlough SAC	108/2							
North Anglesey Marine / Gogledd Mn Forol SCI	108/4	108/5	108/8	108/9	108/10	108/14	108/15	108/19
	108/20	108/24	108/25	108/30	109/1	109/2	109/3	109/4
	109/6	109/7	109/8	109/9	109/10	109/11	109/15	109/26
	110/16							
North Channel SCI	111/3	111/4	111/9	111/10	111/15	111/25	111/29	111/30
	112/11	112/12	112/16	112/17	126/26			
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC	106/5	106/10	107/1	107/6	109/15	109/26	110/16	
Skerries and Causeway SAC	125/18	125/19	125/23	125/24				
South-East Islay Skerries SAC	125/19	125/20						
The Maidens SAC	111/3	125/30	126/26					
West Wales Marine / Gorllewin Cymru Forol SCI	106/5	106/9	106/10	106/25	107/1	107/6	109/26	
South West Approaches and Celtic Sea								
SPAs								
Grassholm SPA	103/7	103/12						
Skomer, Skokholm and the	102/10	102/14	102/15	102/19	102/20	102/24	102/25	102/29
	102/30	103/6	103/7	103/11	103/12	103/16	103/17	103/18

Seas off Pembrokeshire SPA	103/21	103/22	103/23	103/26	103/27			
SACs								
Bristol Channel Approaches / Dynesfeydd Mrr Hafren SCI	94/3	94/4	94/5	94/8	94/9	94/12	94/13	94/17
	103/18	103/23	103/24	103/25	103/28	103/29	103/30	
Isles of Scilly Complex SAC	93/27							
Mers Celtiques - Talus du golfe de Gascogne SAC (FR)	72/19	72/20	72/22	72/23	72/24	72/25	73/10	73/12
	73/13	73/14	73/15	73/16	73/17	73/18	73/19	73/21
	74/3	74/4	74/5	74/6	74/7	74/8	74/9	74/10
	74/11	74/12	75/1	75/2	75/3	85/24	85/25	85/26
	85/27	85/28	85/29	85/30	86/21	86/26		
Pembrokeshire Marine/ Sir Benfro Forol SAC	103/1	103/6	103/7	103/11	103/12			
West Wales Marine / Gorllewin Cymru Forol SCI	103/1	103/6	103/7	103/11	103/12	103/17	103/18	
English Channel								
SPAs								
Chichester and Langstone Harbours SPA	99/12							
Poole Harbour SPA	98/11b	98/12						
SACs								
River Avon SAC	98/11b	98/12	98/13					

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