Department of Energy & Climate Change

Offshore Oil & Gas Licensing 27th Seaward Round Northern Ireland

Blocks 111/01, 111/02, 111/07, 125/30 and 126/26

Habitats Regulations Assessment
Appropriate Assessment

November 2013

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Contents

1 Introduction

1.1 Background and purpose

On 1st February 2012, the Secretary of State for the Department of Energy and Climate Change (DECC) invited applications for licences in the 27th Seaward Licensing Round. The licensing Round forms part of a plan/programme adopted by the Secretary of State following completion of the offshore energy Strategic Environmental Assessment (DECC 2011). Applications for Traditional Seaward, Frontier Seaward and Promote Licences covering over 400 Blocks/part Blocks were received.

To comply with obligations under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended), in summer 2012, the Secretary of State undertook a screening assessment to determine whether the award of any of the Blocks applied for would be likely to have a significant effect on a relevant site, either individually or in combination with other plans or projects (DECC 2012a).

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

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

A screening assessment (including consultation with the statutory agencies/bodies) forming the first stage of the Habitats Regulations Assessment (HRA) process, identified 61 whole or part Blocks as requiring further assessment prior to decisions on whether to grant licences (DECC 2012a). Because of the wide distribution of these Blocks around the UKCS, the Appropriate Assessments (AA) in respect of each potential licence award, are contained in seven regional reports as follows:

- Southern North Sea
- Outer Moray Firth

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

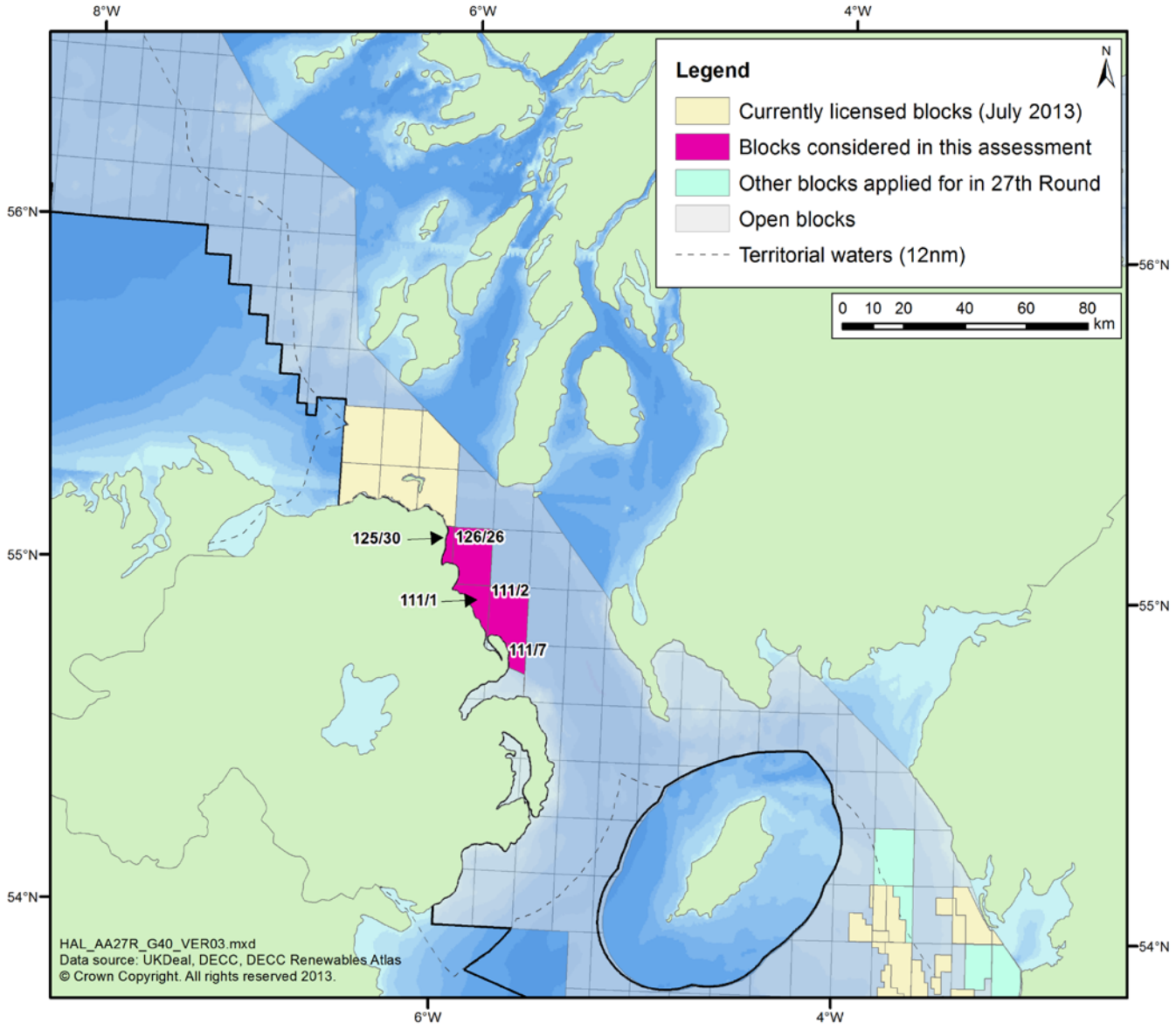
This report documents the further assessment in relation to 5 Blocks off Northern Ireland (see Section 1.2).

1.2 Northern Ireland Blocks

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

111/1 111/2 111/7 125/30 126/26

Figure 1.1: Location of Northern Ireland Blocks



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

2 Licensing and activity

2.1 Licensing

The exclusive rights to search and bore for and get petroleum in Great Britain, the territorial sea adjacent to the United Kingdom and on the UK Continental Shelf (UKCS) are vested in the Crown and the *Petroleum Act 1998* (as amended) gives the Secretary of State the power to grant licences to explore for and exploit these resources. The main type of offshore Licence is the Seaward Production Licence. Offshore licensing for oil and gas exploration and production commenced in 1964 and has progressed through a series of Seaward Licensing Rounds. A Seaward Production Licence may cover the whole or part of a specified Block or a group of Blocks. A Licence grants exclusive rights to the holders "to search and bore for, and get, petroleum" in the area covered by the Licence but does not constitute any form of approval for activities to take place in the Blocks, nor does it confer any exemption from other legal or regulatory requirements (see Figure 2.1).

There are three types of Seaward Production Licences

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

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

- In the 21st Round (2002) the Department introduced Promote Licences. The general concept of the Promote Licence is that the licensee is given two years after award to

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

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

It is noted that the environmental management capacity and track record of applicants is considered by DECC, through written submissions and interviews, before licences are awarded.

2.2 Activity

As part of the licence application process, applicant companies provide DECC with details of work programmes they propose in the first term to further the understanding or exploration of the Blocks(s) in question. These work programmes are considered with a range of other factors in DECC's decision on whether to license the Blocks and to whom. There are three levels of drilling commitment:

- A **Firm Drilling Commitment** is a commitment to the Secretary of State to drill a well. Applicants are required to make firm drilling commitments on the basis that, if there were no such commitment, the Secretary of State could not be certain that potential licensees would make full use of their licences. However, the fact that a licensee has been awarded a licence on the basis of a "firm commitment" to undertake a specific activity should not be taken as meaning that the licensee will actually be able to carry out that activity. This will depend upon the outcome of all relevant environmental assessments.

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

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

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

It is made clear in the application guidance that a Production Licence does not allow a licensee to carry out all petroleum-related activities from then on (this includes those activities outlined in initial work programmes). Field activities (see Table 2.1), such as seismic survey or drilling, are subject to further individual controls by DECC (see Figures 2.2-2.3), and a licensee also remains subject to controls by other bodies such as the Health and Safety Executive. It is the licensee's responsibility to be aware of, and comply with, all regulatory controls and legal requirements.

The proposed work programmes for the first four-year period (six years in the case of Frontier licences) are detailed in the licence applications. For some activities, such as seismic survey noise and accidental events such as oil spills, the impacts can occur some distance from the

licensed Blocks and the degree of activity is not necessarily proportional to the size or number of Blocks in an area. In the case of direct physical disturbance, the licence Blocks being applied for are relevant, although there may still be pipelines that cross unlicensed Blocks should any significant development ensue after the initial four-year exploratory period.

On past experience, less activity actually takes place than is bid at the licence application stage. A proportion of Blocks awarded may be relinquished without any field activities occurring. The approach used here has been to take the proposed activity for a given Block as being the maximum of any application for that Block, and to assume that all activity takes place as a result of the structuring of licences. The Blocks comprise a single licence and an estimate of work commitments for the Blocks derived by DECC from the application received are as follows:

Block(s)	Initial term work programme	Licence type
111/1, 111/2, 111/7, 125/30, 126/26	Drill or drop well, shoot 2D seismic	**Traditional**: work programme must be carried out and 50% of block acreage relinquished within 4 years, otherwise licence will not continue to second term.

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

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

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

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

Potential activity	Description
Geophysical survey	
Deep geological seismic (2D and 3D) survey	2-D seismic involves a survey vessel with a single source and a towed hydrophone streamer. The reflections from the subsurface strata provide an image in two dimensions (horizontal and vertical). Repeated parallel lines are typically run at intervals of several kilometres (minimum ca. 0.5km) and a second set of lines at right angles to the first to form a grid pattern. This allows imaging and interpretation of geological structures and identification of potential hydrocarbon reservoirs. 3D seismic survey is similar but uses more than one source and several hydrophone streamers towed by the survey vessel. Thus closely spaced 2D lines (typically between 25 and 50m apart) can be achieved by a single sail line. 3D survey airgun arrays are normally larger[3] with typical broadband source levels of 248-259db re 1µPa.
Rig site survey	Rig site surveys utilise a range of techniques, including 2-D seismic survey, although for rig site surveys a much smaller energy source and shorter hydrophone streamer is used (with source size of 40-400 cubic inches[1]). The survey typically covers a relatively small area of seabed, in the order of 2km or 3km square. The rig site survey vessel may also be used to gather baseline information on the seabed sediment, fauna, presence of protected habitats and species, and background contamination.
Well evaluation (e.g. Vertical Seismic Profiling)	Sometimes conducted to assist with well evaluation subsequent to drilling. A seismic source (airgun array, typically with a source size of up to ~500 cubic inches[1]) is deployed from onboard the rig, and measurements are made within the wellbore using a series of geophones deployed inside it. VSP produces a relatively high intensity impulse noise, but over a short duration (usually a few hours).
Drilling	
Rig tow out & de-mobilisation	Mobile rigs are towed to and from the well site typically by 2-3 anchor handling vessels.
Rig placement/ anchoring	Semi-submersible rigs use either anchors (deployed and recovered by anchor handler vessels) or dynamic positioning (DP) to manoeuvre into and stay in position over the well location. Eight to 12 anchors attached to the rig by cable or chain are deployed radially at 1 to 1.5km from the rig; part of the anchoring hold is provided by a proportion of the cables or chains lying on the seabed (catenary). A jack up rig is assisted into position by anchor handling vessels, and then the rig's legs are lowered to the seafloor to maintain position. Semi-submersible rigs can either use anchors combined with the assistance from anchor handling vessels, or dynamic positioning (DP) to manoeuvre into and stay in position over the drill site.

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

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

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

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

Block	Period of concern for seismic surveys	Special Conditions†
111/1	February-June	✓
111/2	February-June	✓
111/7	February-June	✓
125/30	-	✓
126/26	February-June (Marine Scotland)	✓

Note: † Activity is of concern to the MoD because the Block lies within training ranges. For further information see: Other regulatory issues (DECC 27th Seaward licensing Round website).

Activity after the initial term is much harder to predict, as this depends on the results of the initial phase, which is, by definition, exploratory. Typically less than half the wells drilled reveal hydrocarbons, and of that half less than half again will yield an amount significant enough to warrant development. Depending on the expected size of finds, there may be further drilling to appraise the hydrocarbons (appraisal wells). Discoveries that are developed may require further drilling, wellhead infrastructure, pipelines and possibly production facilities such as platforms, although most recent developments are tiebacks to existing production facilities rather than stand alone developments.

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

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

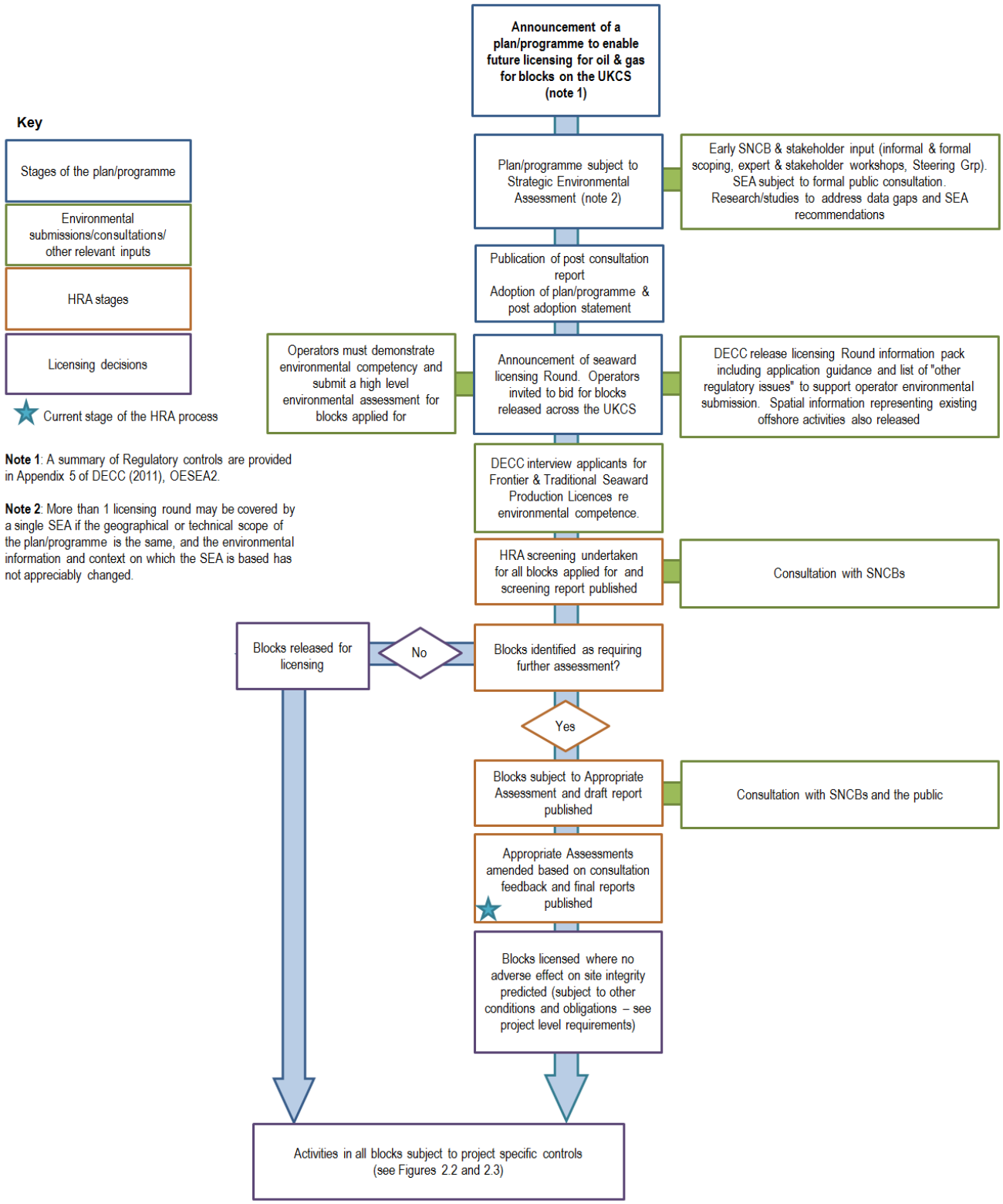


Figure 2.2: High level overview of exploration drilling environmental requirements[4]

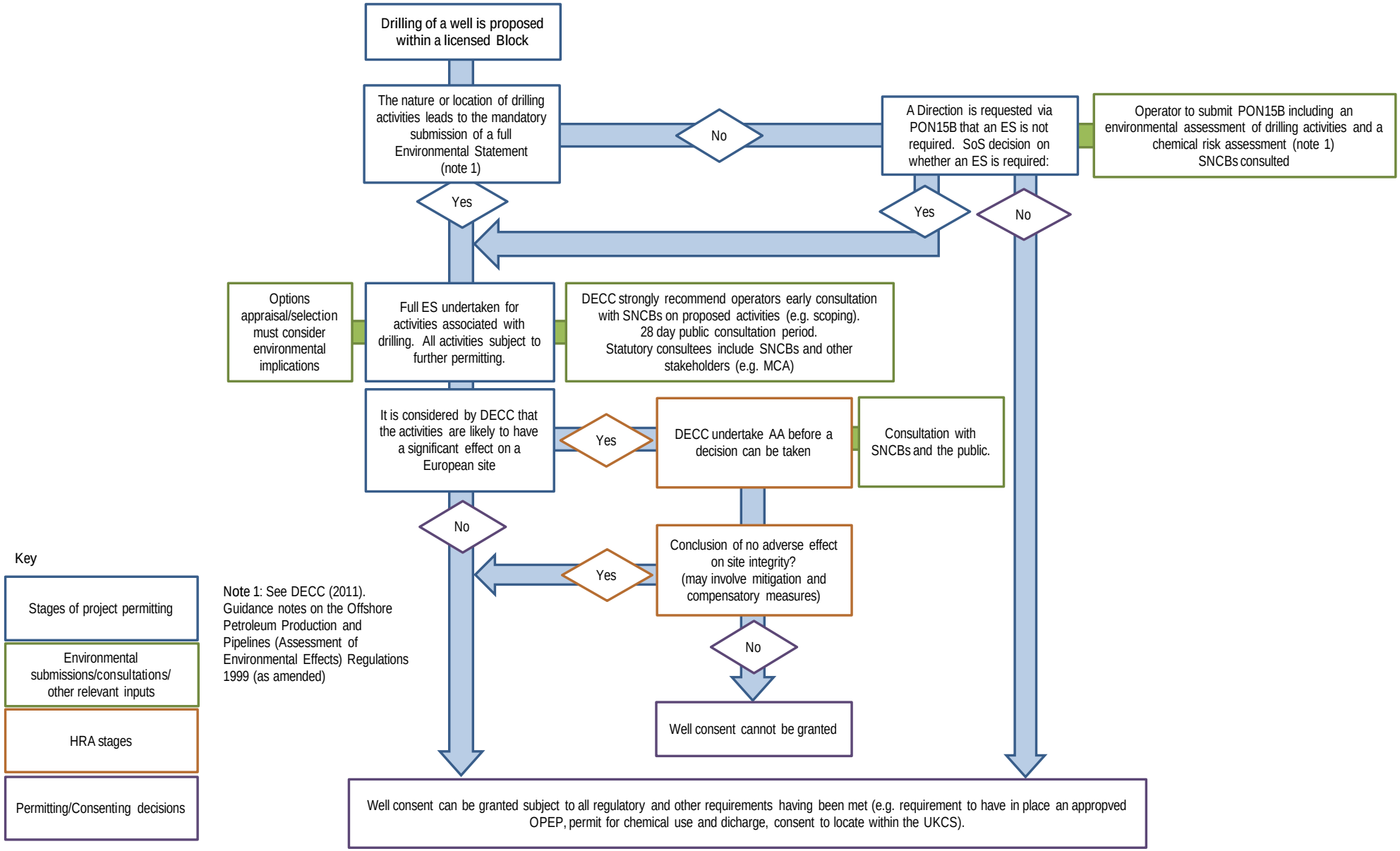
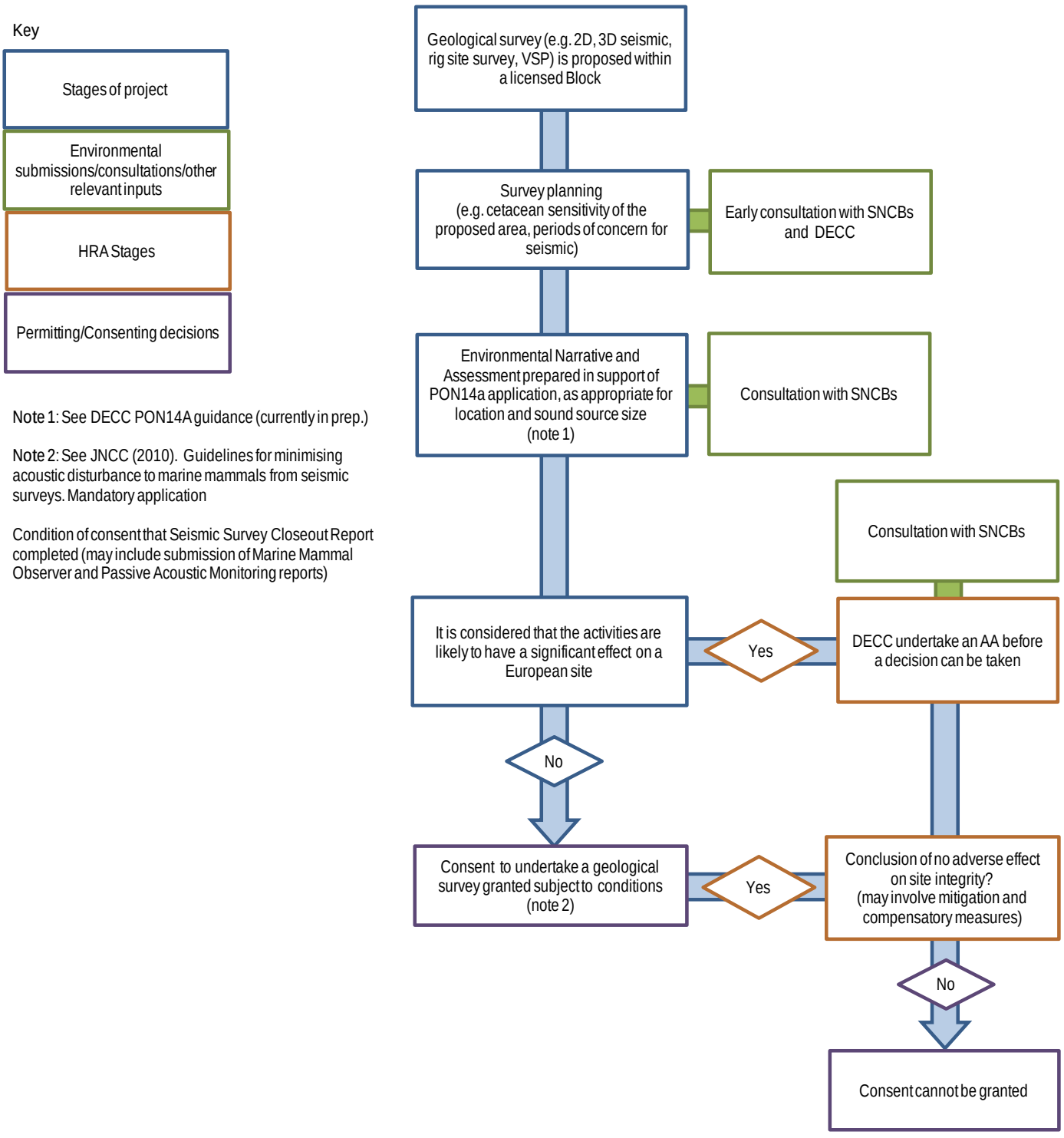


Figure 2.3: High level overview of seismic survey environmental requirements[4]



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

3 Relevant Natura 2000 Sites

The Natura 2000 sites to be considered in this assessment were identified based on their location in relation to the 5 Blocks (see Section 1.2 above) which are the subject of a licence application and in terms of the foreseeable possibility of interactions. Sites considered include designated Natura 2000 sites (also referred to as 'European Sites' and including Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) and potential sites for which there is adequate information on which to base an assessment.

The sites considered are listed and mapped in Appendix A and include:

- Coastal and marine Natura 2000 sites along the coast of Northern Ireland, the west coast of Scotland and England from the island of Tiree to Morecambe Bay, and along the Republic of Ireland's north Donegal coast (there will most likely be a requirement to consult with relevant Irish authorities during the project-level consenting process).

- Riverine SACs within the area for migratory fish.

- Offshore SACs (i.e. sites located in the UK's offshore marine area[5]) situated to the north west and south east of the Blocks.

Guidance in relation to sites which have not yet been submitted to the European Commission is given by Circular 06/2005 (ODPM 2005) which states that: "*Prior to its submission to the European Commission as a cSAC, a proposed SAC (pSAC) is subject to wide consultation. At that stage it is not a European site and the Habitats Regulations do not apply as a matter of law or as a matter of policy. Nevertheless, planning authorities should take note of this potential designation in their consideration of any planning applications that may affect the site."* Despite reference to the Habitats Regulations not applying as a matter of policy to such sites, in accordance with Government policy (as set out in the National Planning Policy Framework (DCLG 2012[6]) and Marine Policy Statement (HM Government 2011)), the relevant sites considered include classified and potential SPAs, designated and candidate SACs and Sites of

[5] Defined (in the *Offshore Marine Conservation (Natural Habitats, & c.) Regulations, 2007 (as amended)*) as: (a) any part of the seabed and subsoil situated within the UK's Continental Shelf (the area designated under section 1(7) of the Continental Shelf Act 1964); and (b) any part of the waters within British fishery limits (except the internal waters of, and the territorial sea adjacent to, the United Kingdom, the Channel Islands and the Isle of Man).

[6] Which states that "listed or proposed Ramsar sites...should be given the same protection as European sites." UK coastal Ramsar sites are typically coincident with SACs and/or SPAs.

Community Importance[7] (SCIs). This is also reflected in Scottish Planning Policy (SPP)[8] and the Northern Ireland Draft Planning Policy Statement 2 (Revised) 2011.

Information gathering is in progress to inform the potential designation of further Natura 2000 sites, for instance the work of Kober *et al.* (2010, 2012) – see Section 7.3.3.1 for information. Should further sites be established in the future, these would be considered as necessary in subsequent project specific assessments. Northern Ireland Environment Agency (NIEA) have advised[9] that work has been undertaken to define an extension of Belfast Lough Open Water SPA relating to non-breeding red-throated diver and a marine extension to the Copeland Islands SPA relating to the utilisation of sea areas by the Manx shearwater. NIEA plan to progress these amendments in 2013/14. Additionally, NIEA has indicated that various colony extensions are proposed for sites designated for breeding terns to cover foraging areas. Relevant sites in Northern Ireland include Carlingford Lough, Strangford Lough, Outer Ards, Copeland Islands and Larne Lough SPA. These boundary extensions will require public consultation and have not been included on Figure 3.1 but DECC will treat such areas as fully designated once they are put forward for consultation. Summaries of sites, together with their features of interest, and location maps are given in Appendix A (Maps A.1 to A.3 and Tables A.1 to A.7).

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

The sites listed in Tables 3.1 to 3.3 and shown in Figures 3.1-3.2 are those taken forward from the block screening assessment (DECC 2012a) and have been re-screened in Appendix B in relation to the final Blocks proposed to be taken forward for licensing in the 27th Round and their related work programmes (Section 2.2). Those for which a likely significant effect was identified in the re-screening are highlighted in Tables 3.1 to 3.3 and subject to further assessment in Sections 5-8. Appendix C provides additional site details such as the status of qualifying features and related conservation objectives.

[7] Sites of Community Importance (SCIs) are more advanced in designation than cSACs in that they have been adopted by the European Commission but not yet formally designated by the government of the relevant country.
[8] Paragraph 135 of Scottish Planning Policy – http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf. Note that a review of the SPP was announced in the Scottish Parliament on September 18, running concurrently with a review of the Scottish National Planning Framework 3.
[9] NIEA response dated 4th September 2012 to draft 27th Round HRA screening document.

Figure 3.1: SPAs in the Northern Ireland area, and those relevant to this Appropriate Assessment

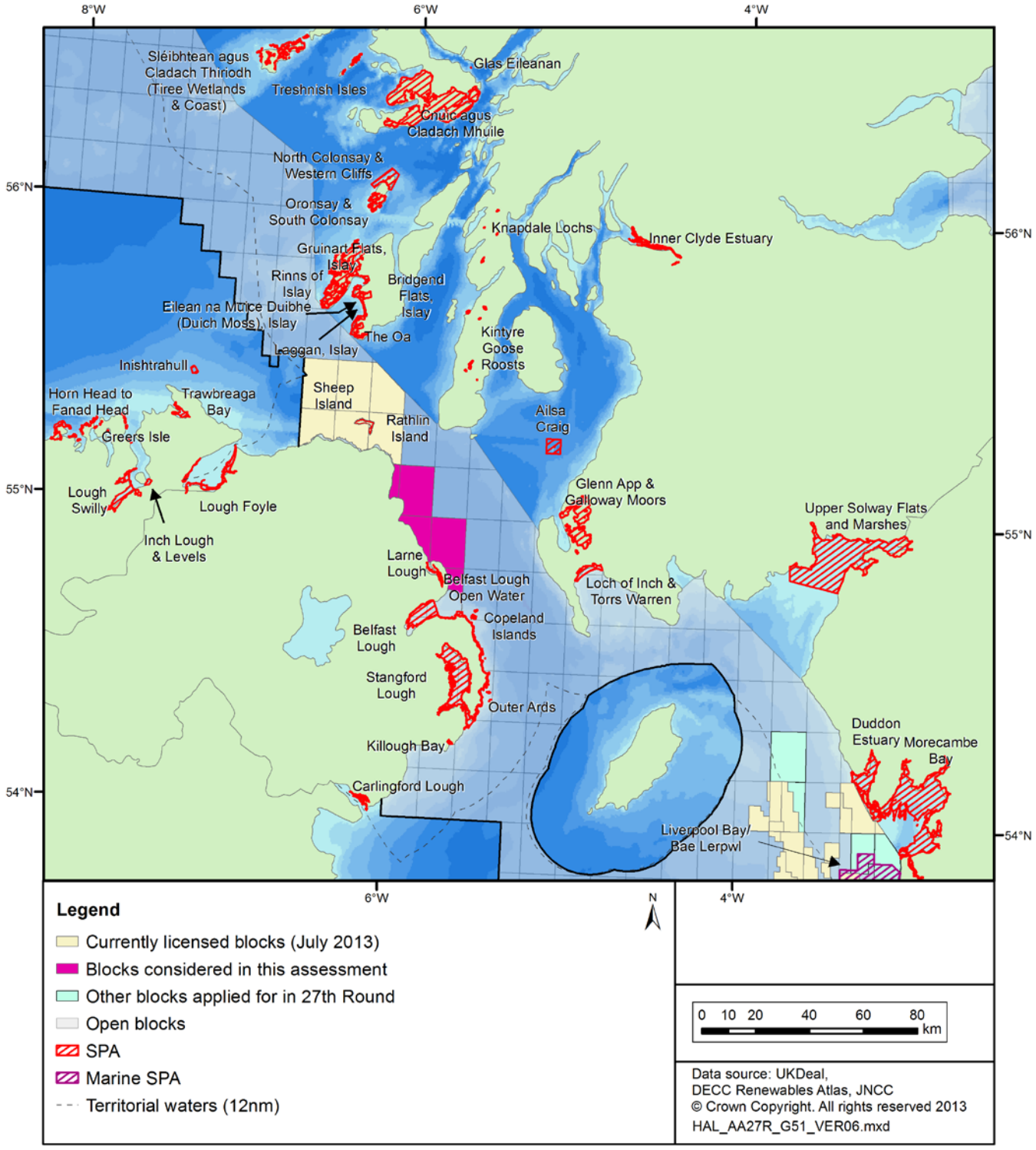


Figure 3.2: SACs in the Northern Ireland area, and those relevant to the Northern Ireland Appropriate Assessment

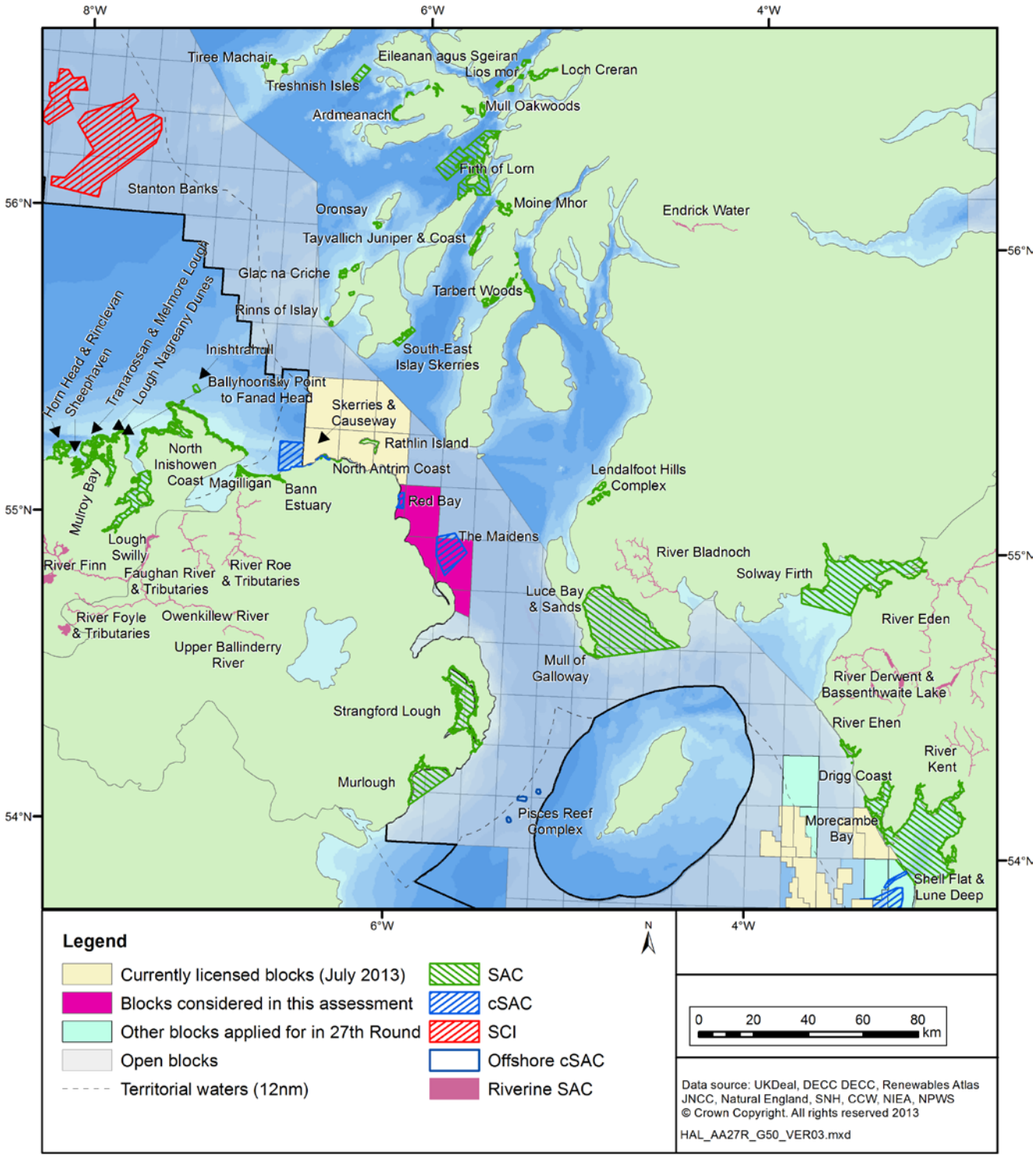


Table 3.1: SPA sites and qualifying features under Article 4.1 and 4.2 in the Northern Ireland area, and those relevant to this Appropriate Assessment (see Appendix A for full site details)

*Note: B = Breeding, W = Over Wintering, P = On Passage, see Appendix C for more details. *see Appendices B and C.*

	Northern Ireland												England		Adjacent Member States				
	Lough Foyle	Sheep Island	Rathlin Island	Larne Lough	Belfast Lough Open Water	Belfast Lough	Copeland Islands	Outer Ards	Strangford Lough	Killough Bay	Carlingford Lough	Duddon Estuary	Morecambe Bay	Liverpool Bay / Bae Lerpwl	Horn Head to Fanad Head	Lough Swilly	Greers Isle	Trawbreaga Bay	Inishtrahull	Lough Foyle
Red-throated diver														W						
Great crested grebe					W											W				W
Fulmar															B				B	
Manx shearwater							B													
Cormorant		B													B	W				W
Shag															B				B	
Guillemot			B												B					
Razorbill			B												B					
Puffin															B					
Black-headed gull																W	B			W
Common gull																W	B	W	B	W
Lesser black-backed gull													B						B	
Herring gull													B		B				B	W
Great black-backed gull																				
Kittiwake			B												B				B	
Little tern													B							
Sandwich tern				B					B		B	B	B			B	B			
Roseate tern				B																
Common tern				B					B		B					B	B			
Arctic tern							B	B	B								B			
Coot															W	W				

	Northern Ireland												England			Adjacent Member States				
	Lough Foyle	Sheep Island	Rathlin Island	Larne Lough	Belfast Lough Open Water	Belfast Lough	Copeland Islands	Outer Ards	Strangford Lough	Killough Bay	Carlingford Lough	Duddon Estuary	Morecambe Bay	Liverpool Bay / Bae Lerpwl	Horn Head to Fanad Head	Lough Swilly	Greers Isle	Trawbreaga Bay	Inishtrahull	Lough Foyle
Peregrine			B												R					
Chough															R			B		
Oystercatcher													W			W		W		W
Ringed plover								W				P	P			W		W		
Golden plover	W							W	W				W			W				W
Grey plover													W							
Lapwing															B	W		W		W
Knot									W			W	W			W				W
Sanderling												P	P							
Dunlin													W		B	W		W		W
Snipe															B					
Bar-tailed godwit	W					W			W				W			W		W		W
Curlew													W			W		W		W
Redshank						W			W			W	W			W		W		W
Greenshank																W				W
Turnstone						W		W					W			W				W
Bewick's swan	W																			W
Whooper swan	W														W	W		W		W
Pink-footed goose													W							
Greenland white-fronted goose															W	W				
Icelandic greylag goose																W				W
Greenland barnacle goose															W			W		
Barnacle goose																		W	W	W
Canadian light-bellied brent goose	W			W				W	W	W	W							W		
Brent goose																W				W

	Northern Ireland											England			Adjacent Member States					
	Lough Foyle	Sheep Island	Rathlin Island	Larne Lough	Belfast Lough Open Water	Belfast Lough	Copeland Islands	Outer Ards	Strangford Lough	Killough Bay	Carlingford Lough	Duddon Estuary	Morecambe Bay	Liverpool Bay / Bae Lerpwl	Horn Head to Fanad Head	Lough Swilly	Greers Isle	Trawbreaga Bay	Inishtrahull	Lough Foyle
Shelduck									W				W			W				W
Wigeon																W		W		W
Teal															W	W				W
Mallard															W	W		W		W
Pintail												W	W							
Shoveler																W				
Pochard															W					
Tufted duck															W	W				
Scaup																W				
Eider																				W
Common scoter														W						
Goldeneye																W				
Red-breasted merganser																W		W		W
Common sandpiper															B					
Assemblage	W		B			W			W			W	B,W	W		W				W
Site subject to AA*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*Note: B = Breeding, W = Over Wintering, P = On Passage, see Appendix C for more details. *see Appendices B and C.*

Table 3.1: SPA sites and qualifying features under Article 4.1 and 4.2 in the Northern Ireland area, and those relevant to this Appropriate Assessment (Contd.)

*Note: B = Breeding, W = Over Wintering, P = On Passage, see Appendix C for more details. *see Appendices B and C.*

	Scotland																		
	Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	Treshnish Isles	Glas Eileanan	Cnuic agus Cladach Mhuile (Mull Coast and Hills)	North Colonsay and Western Cliffs	Oronsay and South Colonsay	Gruinart Flats, Islay	Rinns of Islay	Eilean na Muice Duibhe (Duich Moss), Islay	Laggan, Islay	The Oa	Bridgend Flats, Islay	Knapdale Lochs	Kintyre Goose Roosts	Inner Clyde Estuary	Ailsa Craig	Glen App-Galloway Moors	Loch of Inch & Torrs Warren	Upper Solway Flats and Marshes
Black-throated diver													B						
Storm petrel		B																	
Gannet																B			
Guillemot					B														
Lesser black-backed gull																B			
Kittiwake					B														
Common tern			B																
Corncrake						B		B											
Hen harrier								B									B	W	
Chough					B,W	B,W	B,W	B,W			B								
Oystercatcher	B																		W
Ringed plover	B,W																		P
Golden plover																			W
Grey plover																			W
Knot																			W
Sanderling																			W
Dunlin	B																		W
Bar-tailed godwit																			W
Curlew																			W
Redshank	B														W				W

	Scotland																		
	Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	Treshnish Isles	Glas Eileanan	Cnuic agus Cladach Mhuile (Mull Coast and Hills)	North Colonsay and Western Cliffs	Oronsay and South Colonsay	Gruinart Flats, Islay	Rinns of Islay	Eilean na Muice Duibhe (Duich Moss), Islay	Laggan, Islay	The Oa	Bridgend Flats, Islay	Knapdale Lochs	Kintyre Goose Roosts	Inner Clyde Estuary	Ailsa Craig	Glen App-Galloway Moors	Loch of Inch & Torrs Warren	Upper Solway Flats and Marshes
Turnstone	W																		W
Whooper swan								P											W
Pink-footed goose																			W
Greenland white-fronted goose	W						W	W	W	W				W				W	
Greenland barnacle goose		W																	
Svalbard barnacle goose																			
Barnacle goose	W						W			W		W							W
Canadian light-bellied brent goose							W												
Shelduck																			W
Teal																			W
Pintail																			W
Shoveler																			W
Scaup																			W
Common scoter								B											
Goldeneye																			W
Golden eagle				R															
Assemblage																W			W
Site subject to AA*		✓			✓		✓	✓		✓		✓		✓		✓		✓	✓

*Note: B = Breeding, W = Over Wintering, P = On Passage, see Appendix C for more details. *see Appendices B and C*

Table 3.2: SAC sites and qualifying features under Annex 1 and Annex 2 in the Northern Ireland area, and those relevant to this Appropriate Assessment

	Northern Ireland						England					Offshore							Adjacent Member States					
Annex 1 Habitats	Magilligan	Skerries and Causeway	Bann Estuary	North Antrim Coast	Rathlin Island	Red Bay SCI	The Maidens cSAC	Strangford Lough	Murlough	Drigg Coast	Morecambe Bay	Shell Flat and Lune Deep SCI	Stanton Bank SCI	Pisces Reef Complex cSAC	Horn Head and Rinclevan	Sheephaven	Tranarossan and Melmore Lough	Mulroy Bay	Ballyhoorisky Point to Fanad Head	Lough Nagreany dunes	North Inishowen Coast	Lough Swilly	Inishtrahull
Sea cliffs				P	P												P		P		P		P
Sea caves		P			P																		
Heaths																	Q						
Bog																							
Standing freshwater																	P		Q				
Fens																							
Rocky Slopes																							
Coastal lagoons								P			Q											P	
Inlets and bays								P			P							P					
Reefs		P			P		P	P			Q	P	P	P				P					
Sandbanks		P			Q	P	P		Q		Q	P											
Mudflats and sandflats								P	Q	Q	P					P,Q	Q						
Grasslands				Q																	Q		
Scree																							
Coastal dunes	P,Q	P,Q	P,Q	Q					P,Q	P,Q	P,Q				P	Q	P			P	Q		
Machair															P								
Forests																Q						P	
Estuaries										P	P											P	
Saltmarsh and saltmeadow			Q	Q				Q	Q	Q	P					Q					Q	P	
Vegetation of drift lines				Q	Q			Q									Q				Q		
Vegetation of stony banks								Q			P						Q		Q				
Site subject to AA*		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓			✓	✓	

*Note: P = Primary feature, Q = Qualifying feature, see Appendix C for more details – note that primary and qualifying (secondary) features are treated equally within this assessment. Annex 1 habitats follow nomenclature shown in Box A.2 (AppendixA2). *see Appendices B and C.*

Table 3.2: SAC sites and qualifying features under Annex 1 and Annex 2 in the Northern Ireland area, and those relevant to this Appropriate Assessment (Contd.)

	Scotland														
Annex 1 Habitats	Tiree Machair SAC	Loch Creran SAC	Treshnish Isles SAC	Ardmeanach SAC	Mull Oakwoods SAC	Firth of Lorn SAC	Moine Mhor SAC	Tarbert Woods SAC	Oronsay SAC	Tayvallich Juniper and Coast SAC	Glac na Criche SAC	Lendalfoot Hills Complex SAC	Luce Bay and Sands SAC	Mull of Galloway SAC	Solway Firth SAC
Sea cliffs				Q							Q			P	
Sea caves															
Heaths											Q	Q			
Bog							P				P				
Standing freshwater	P														
Fens												P			
Rocky Slopes															
Coastal lagoons															
Inlets and bays													P		
Reefs		P	Q			P							Q		Q
Sandbanks													Q		P
Mudflats and sandflats							Q						Q		P
Grasslands				P								P,Q			
Scree															
Coastal dunes	P,Q	P,Q											P		P
Machair	P								P						
Forests					P		Q	P							
Estuaries															P
Saltmarsh and saltmeadow							Q								P
Vegetation of drift lines															
Vegetation of stony banks															Q
Scrub (matorral)										P					
Site subject to AA*							✓						✓		✓

*Note: P = Primary feature, Q = Qualifying feature, see Appendix C for more details – note that primary and qualifying (secondary) features are treated equally within this assessment. Annex 1 habitats follow nomenclature shown in Box A.2 (AppendixA2). *see Appendices B and C.*

Table 3.2: SAC sites and qualifying features under Annex 1 and Annex 2 in the Northern Ireland area, and those relevant to this Appropriate Assessment (Contd.)

	Northern Ireland					*Eng		Adjacent Member States										Scotland				
Annex 2 Species	Magilligan	Skerries and Causeway	North Antrim Coast	The Maidens	Strangford Lough	Murlough	Morecambe Bay	Horn Head and Rinclevan	Sheephaven	Tranarossan and Melmore Lough	Mulroy Bay	Ballyhoorisky Point to Fanad Head	Lough Nagreany dunes	North Inishowen Coast	Lough Swilly	Eileanan agus Sgeiran Lios mór	Treshnish Isles	Moine Mhor	Tayvallich Juniper and Coast	South-east Islay Skerries	Luce Bay and Sands	Solway Firth
Narrow mouthed whorl snail			P					Q				Q		Q								
Marsh fritillary butterfly	Q					P												Q	P			
Great crested newt							P														Q	
Petalwort	Q							Q	Q	Q												
Slender naiad								Q				Q	Q									
Harbour porpoise		Q																				
Harbour seal					Q	Q										P				P		
Grey seal				Q				Q									P					
Otter											Q			Q	Q			Q	Q			
Sea lamprey																						P
River lamprey																						P
Site subject to AA*		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓

*Note: P = Primary feature, Q = Qualifying feature, see Appendix C for more details – note that primary and qualifying (secondary) features are treated equally within this assessment. Annex 1 habitats follow nomenclature shown in Box A.2 (AppendixA2). *see Appendices B and C.*
**Eng = England*

Table 3.3: Riverine SACs designated for migratory fish and/or the freshwater pearl mussel in the Northern Ireland area, and those relevant to this Appropriate Assessment

	Northern Ireland					Scotland		England				AMS*
	River Faughan and Tributaries	River Foyle and Tributaries	Upper Ballinderry River	Owenkillew River	River Roe and Tributaries	River Bladnoch	Endrick Water	River Eden	River Derwent & Bassenthwaite Lake	River Ehen	River Kent	River Finn
Bullhead								P				
Freshwater pearl mussel			P	P						P	Q	
Otter	Q	Q	Q	Q	Q			P	P			P
Atlantic salmon	P	P		Q	P	P	Q	P	P	Q		P
Sea lamprey								P	P			
River lamprey							P	P	P			
Brook lamprey							P	P	P			
Site subject to AA*	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓

*Note: P = Primary feature, Q = Qualifying feature, see Appendix C for more details – note that primary and qualifying (secondary) features are treated equally within this assessment. *see Appendices B and C.*
**AMS = Adjacent Member States*

4 Assessment of the effects of the plan on site integrity

4.1 Process

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

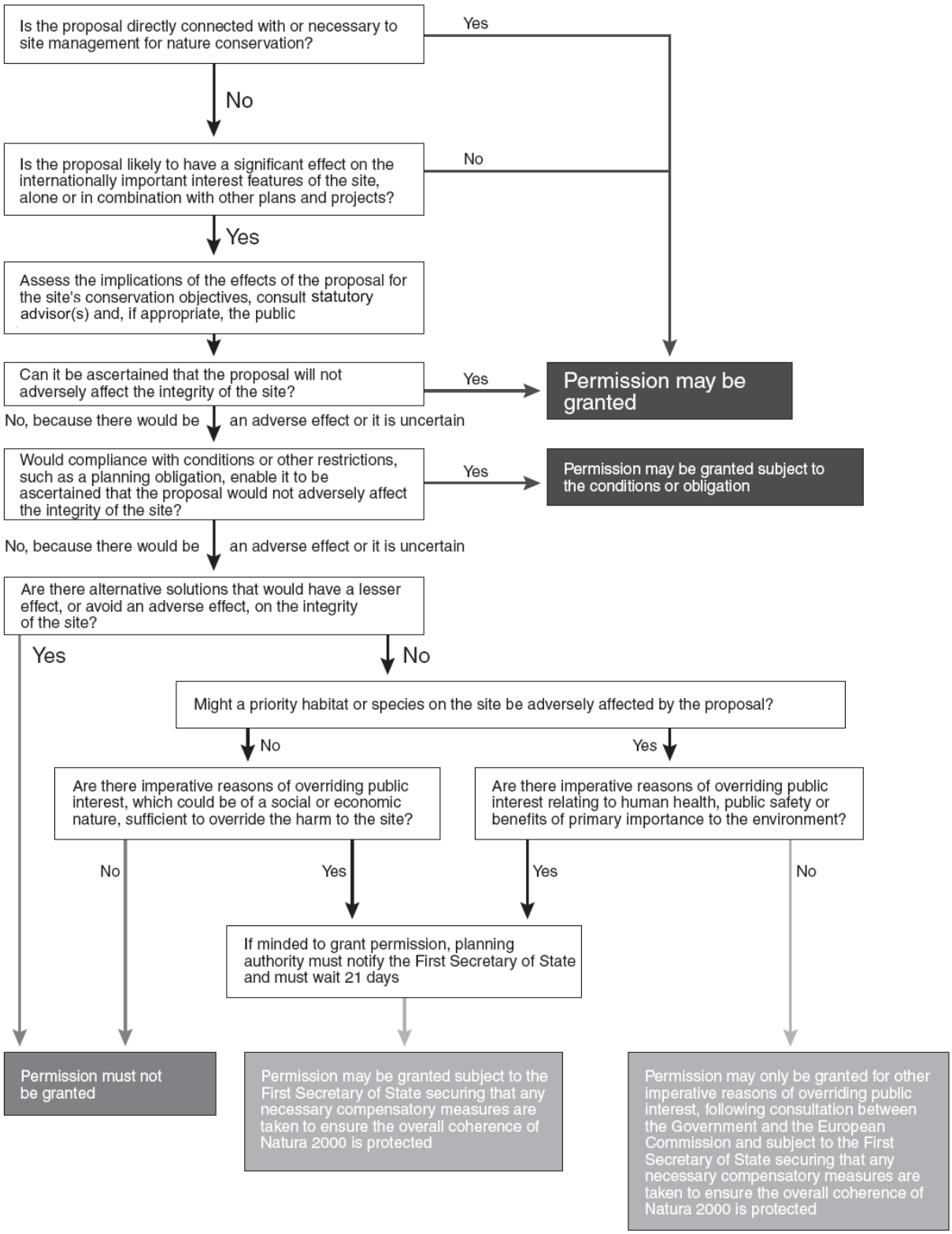
- Considered, on the basis of the precautionary principle, whether it could be concluded that the integrity of relevant sites would not be affected. This impact prediction involved a consideration of the cumulative and in-combination effects.
- Examined, in relation to elements of the plan where it was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

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

- Prior to the grant of any licence all activities which may be carried out following the grant of such a licence, and which by themselves or in combination with other activities can affect the site's conservation objectives, are identified in the light of the best scientific knowledge in the field.
- A licence can only be granted if DECC has made certain that the activities to be carried out under such a licence will not adversely affect the integrity of that site (i.e. cause deterioration to a qualifying habitat or habitat of qualifying species, and/or undermine the conservation objectives of any given site). That is the case where no reasonable scientific doubt remains as to the absence of such effects.

A flowchart summarising the process is shown in Figure 4.1.

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



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

4.2 Site integrity

Site integrity is defined by the Draft Supplementary Planning Guidance (DoE 2011) to accompany the Draft Planning Policy Statement 2 (Revised): Natural Heritage for Northern Ireland as follows: *"The coherence of the site's ecological structure and function, across its whole area or the habitats, complex of habitats and/or populations of species for which the site is or will be classified* (EC 2000)." The guidance indicates that "When looking at the 'integrity of the site', it is important to take into account a range of factors, including the possibility of effects, both direct and indirect, which could manifest in the short, medium and long-term." As clarified by Section 4.6.3 of the EC Guidance (2000), the integrity of a site relates to the site's conservation objectives. These objectives are assigned at the time of designation to ensure that the site continues, in the long-term, to make an appropriate contribution to achieving favourable conservation status (see Table 4.1) for the qualifying interest features. For example, it is possible that a plan or project will adversely affect the integrity of a site only in a visual sense or only habitat types or species other than those listed in Annex I or Annex II. In such cases, the effects do not amount to an adverse effect for purposes of Article 6(3), provided that the coherence of the network is not affected. The AA must therefore conclude whether the proposed activity adversely affects the integrity of the site, in the light of its conservation objectives.

4.3 Assessment

The approach to ascertaining the absence or otherwise of adverse effects on the integrity of a relevant site is set out in Section 4.1 above. This assessment has been undertaken in accordance with the European Commission Guidance (EC 2000), and with reference to various other guidance and reports including the Habitats Regulations guidance notes (e.g. SEERAD 2000), Draft Planning Policy Statement 2 (Revised) (DOENI 2011), Circular 06/2005 (ODPM 2005), the English Nature Research Reports, No 704 (Hoskin & Tyldesley 2006) and the Scottish Natural Heritage Habitats Regulations Appraisal of Plans, No 1739 (Tyldesley & Associates 2012).

Appendix A lists and summarises the relevant sites as defined in Section 3. Appendix B then presents the results of a re-screening exercise of these sites to identify the potential for activities that could follow the licensing of the 5 Blocks in question (see work programme in Section 2.2) to result in a likely significant effect. Where potential effects are identified in Appendix B, more detailed information on the relevant sites including their conservation objectives is provided in Appendix C.

Detailed assessments are made in Sections 5-8 of the implications for the integrity of the relevant sites (in terms of their qualifying features and species, and the site's conservation objectives) were a licence (or licences) to be granted for the 5 Northern Ireland Blocks. The assessment is based on an indication of the proposed work programme for the Blocks and likely hydrocarbon resources if present (unknown but assumed to be oil as worse case in terms of potential spill impacts), along with the characteristics and specific environmental conditions of the relevant sites as described in the Appendices. As noted in Section 2.2, the proposed work programme is taken as the maximum of any application for that Block; however, on past experience, less activity actually takes place than is bid at the licence application stage. Activities which may be carried out following the grant of a licence, and which by themselves or in combination with other activities can affect the conservation objectives of relevant sites, are discussed under the following broad headings:

- Physical disturbance and other effects (e.g. rig siting, marine discharges)

- Underwater noise (in particular, deep geological seismic surveys, though also rig site survey and VSP)
- Oil spills (including all liquid phase hydrocarbons)
- In-combination effects (e.g. cumulative and synergistic and secondary/indirect effects)

Use has been made of advice prepared by the conservation agencies under the various Habitats Regulations, since this typically includes advice on operations that may cause deterioration or disturbance to relevant features or species. Advice given under Regulation 35[10] (formerly Regulation 33) includes an activities/factors matrix derived from MarLIN (www.marlin.ac.uk) where applicable. Several of the "probable" effects highlighted in the MarLIN matrices are not inevitable consequences of oil and gas exploration and production, since through the regulatory Environmental Impact Assessment (EIA) and permitting processes they are mitigated by timing, siting (e.g. of rigs) or technology requirements (or a combination of one or more of these). There is a requirement that these options would also be evaluated in the environmental assessments necessary as part of activity consenting.

The Marine Evidence Group is attempting to address difficulties in assessing the impacts of marine development on European sites and species, in particular gaps in evidence which create uncertainties when undertaking HRA. A report by the group (Defra 2013) provides an overview of the key evidence gaps identified in the Habitats and Wild Birds Directives Implementation Review and progress in addressing them, as well as a set of initial recommendations covering how the evidence base can be improved and how this might be built into the decision making process, which includes improving access to marine data. The areas identified in the review as having information gaps/requiring further research include:

- Modelling of effects on population of seabirds and validating critical input parameters, e.g. population framework, collision and displacement risk
- Modelling of effects on populations of marine mammals and validating critical input parameters, e.g. population framework, displacement risk
- Impacts of marine activity (e.g. offshore wind, cabling) on the seabed and priority species
- Cumulative impacts of marine activities
- Understanding better the specific impacts of different marine sectors and how they can be avoided and the solutions more widely applied
- Understanding better the populations of mobile species at appropriate scales and the population implications of any impacts from significant infrastructure projects in English waters

Many of these gaps (e.g. collision risk) are chiefly of relevance to marine renewable energy developments, although some have applicability to oil and gas activities.

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

A Natural England review of risks from ongoing activities within existing European Marine Sites (EMS) in England was undertaken to identify and prioritise action required to ensure site features were maintained or restored to favourable condition (Coyle & Wiggins 2010). The review did not directly cover oil or chemical spills at sea, but indicated they were a continued risk to EMS, with a number of incidents taking place each year.

The conservation objectives identified for SAC and SPA features for sites where a likely significant effect has been identified are listed in Appendix C and referred to where relevant throughout the document. These objectives, in relation to the specific qualifying features of each site, and the conservation status of these features, have been considered during this AA, including a site-specific consideration of conservation objectives in relation to activities outlined in the work programmes which may arise from licensing the blocks subject to assessment. The basis and primary concern of the conservation objectives are to maintain or achieve favourable conservation status. Table 4.1 provides a definition of conservation status based on Articles 1(e) and (i) of the Habitats Directive.

Table 4.1: Definition of favourable conservation status for sites defined in the Habitats Directive

For habitats	Conservation status of a natural habitat means the sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species. The conservation status of a natural habitat will be taken as 'favourable' when: • its natural range and areas it covers within that range are stable or increasing • the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future • the conservation status of its typical species is favourable (see below)
For species	Conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations. The *conservation status* will be taken as 'favourable' when: • population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and • the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and • there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis

High level controls and mitigation measures are in place for each of the broad sources of effect listed above (see Table 4.2, Figures 2.2 and 2.3). These mitigation measures, which are discussed in more detail in Sections 5-8, should *inter alia* help to avoid the deterioration of any qualifying habitats, and habitats supporting species, and seek to prevent undermining any of the conservation objectives for a given site in relation to the features for which it is designated. These high-level mitigation measures can be partly interpreted as "...conditions or other restrictions such as a planning obligation, [compliance with which would] enable it to be ascertained that the proposal would not adversely affect the integrity of the site" (see Figure 4.1, above), though also represent other non-statutory guidance etc. with regards to the avoidance of significant effects on sites. Where it is considered conservation objectives would not be

undermined by any of the given sources of effect for a particular species or habitat (e.g. due to animal behaviour and/or the location/characteristics of a particular habitat), certain sites may be screened out of the assessment, and these are listed in Appendix B.

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

High level Mitigation	
Physical disturbance	Some Blocks are partly or wholly within, or abut boundaries of Natura 2000 sites. There is the potential for physical disturbance associated with rig installation and drilling discharges. However, there are well proven methods to prevent significant impacts – such mitigation would be defined at the project level (e.g. following rig site survey), and be subject to project specific EIA and HRA, where necessary.
Marine Discharges	Discharges from offshore oil and gas facilities have been subject to increasingly stringent regulatory controls over recent decades, and oil and other contaminant concentrations in the major streams (drilling wastes and produced water) have been substantially reduced or eliminated. Discharges would be considered in detail in project-specific EIA, HRAs (where necessary) and chemical risk assessments under existing permitting procedures.
Other effects	The IMO International Convention for the Control of Ballast Water and Sediment , serves to mitigate against the possible introduction of invasive alien species through shipping ballast, which may degrade sensitive local habitats and communities. Measures include the mid-ocean exchange of ballast water (with ultra-violet irradiation of ballast a proposed alternative). The potential for collision of birds with offshore infrastructure, increased by attraction of birds to lights may be mitigated by limiting well testing to the minimum time required to satisfy test objectives and limit any flaring required to that which meets the technical requirements of processing. Rescheduling of activities, for instance by avoiding or limiting activities during months when large numbers of birds aggregate in the area, could help to reduce the risk of bird collision
Underwater noise	Application for consent to conduct seismic and other geophysical surveys – PON14. Seismic operators are required, as part of the application process, to justify that their proposed activity is not likely to cause a disturbance etc. under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended) and *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007* (as amended). It is a condition of consents issued under Regulation 4 of the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (& 2007 amendments) for oil and gas related seismic surveys that the JNCC, *Guidelines for minimising the risk of disturbance and injury to marine mammals from seismic surveys,* are followed. European Protected Species (EPS) disturbance licences can also be issued under the *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007*. Passive acoustic monitoring (PAM) may be required as a mitigation tool. DECC will take account of the advice provided by the relevant statutory nature conservation body in determining any consent conditions.

High level Mitigation	
	Potential disturbance of certain species may be avoided by the seasonal timing of noisy activities, and periods of seasonal concern for individual Blocks on offer have been highlighted (See Section 2.2) for which licensees should expect to affect DECC's decision whether or not to approve particular activities.
Oil Spills	Oil Pollution Emergency Plans (OPEPs): regulatory requirements on operators to prepare spill prevention and containment measures, risk assessment and contingency planning – these are reviewed by DECC, MCA, JNCC, NIEA and other relevant organisations. Additional conditions imposed by DECC, through block-specific licence conditions (i.e. "Essential Elements"), and seasonal periods of concern for drilling, within which there is a presumption for drilling activity to be refused unless appropriate mitigation measures can be agreed (defined at the project level). Project level mitigation defined through permitting/HRA of specific activities (including conditions attached to consents/permits or potentially consent/permit refusal). MCA is responsible for a National Contingency Plan and maintains a contractual arrangement for provision of aerial spraying, with aircraft based at East Midlands and if necessary, Inverness and counter-pollution equipment (booms, adsorbents etc.). The UK Government announced in 2012 that an Emergency Towing Vessel for the waters around the Northern and Western Isles will be stationed in Orkney up to 2015[11]. The government has also been in discussions with the oil industry on the potential of a commercial call-out arrangement to use their vessels[12] and BP have recently agreed to volunteer a vessel to help in an emergency should the MCA deem it appropriate[13].
In-combination effects	The competent authorities will assess the potential for in-combination effects during HRA of project specific consent applications; this process will ensure that mitigation measures are put in place to ensure that subsequent to licensing, specific projects (if consented) will not result in adverse effects on integrity of European sites.

[11] Orkney Islands Council website - http://www.orkney.gov.uk/OIC-News/emergency-vessel-to-be-stationed-in-orkney.htm
[12] Scotland Office website - http://www.scotlandoffice.gov.uk/scotlandoffice/17322.html
[13] https://www.gov.uk/government/news/moore-welcomes-bp-and-north-star-support-for-second-support-vessel

5 Consideration of sites & potential physical & other effects

5.1 Introduction

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

5.2 Physical damage at the seabed

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

- **Anchoring of semi-submersible rigs**. Semi-submersible rigs use anchors to hold position, typically between 8 and 12 in number at a radius depending on the water depth, and cause seabed disturbance from the anchors and chain or cables, and in cohesive sediments, leave 'anchor mounds' after their retrieval.

- **Placement of jack-up rigs**. Jack-up rigs, normally used in shallower water, leave three or four depressions from the feet of the rig (the spud cans) around 15-20m in diameter. In locations with an uneven seabed, material such as grout bags may be placed on the seabed to stabilise the rig feet.

- **Drilling of wells and wellhead removal**. The surface hole sections of exploration wells are typically drilled riserless, producing a localised (and transient) pile of surface-hole cuttings around the surface conductor. After installation of the surface casing (which will result in a small quantity of excess cement returns being deposited on the seabed), the blowout preventer (BOP) is positioned on the wellhead housing. These operations (and associated activities such as ROV operations) may result in physical disturbance of the immediate vicinity (a few metres) of the wellhead. When an exploration well is abandoned, the conductor and casing are plugged with cement and cut below the mudline (sediment surface) using a mechanical cutting tool deployed from the rig and the wellhead assembly is removed. The seabed "footprint" of the well is therefore removed although post-well sediments may vary in the immediate vicinity of the well compared to the surrounding

seabed. The time taken for full seabed recovery will depend on location, sediment type, and water depth.

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

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

High energy environments are characterised by clean, coarse sandy bottoms, whereas low energy environments are characterised by muddy sediments. Benthic communities that inhabit the different sediment types have adapted to different levels of recovery based on the frequency of natural disturbance in that environment. Species typical of shallow, wave exposed sandy sediments will possess the ability to recover from disturbance at a much more rapid rate. Species that inhabit deep, muddy environments are not as well adapted to physical disturbance of their habitat and it is likely they will take a significantly longer time to recover (Dernie *et al.* 2003; Snelgrove 1999).

Environmental Statements report a typical area that will be affected by anchor scarring as between 1.6km^2 and 2.4km^2 (e.g. Ithaca Energy 2008, Iona Energy 2012), while it is estimated that areas affected by anchor scarring will recover within 1-5 years (DECC 2011). Anchoring and catenary scarring are not expected to result in significant changes to sediment properties and rapid recovery of faunal communities within the disturbed area may be expected through a combination of larval settlement and immigration of animals from the adjacent seabed. Infill of scars can, however, produce alteration of sediment type within the feature which is longer-term than the topographic expression of the scar, since the infill is usually of finer sediment (e.g. Robinson *et al*. 2005). Anchoring in areas of stiff clay can result in long lasting mounds of sediment.

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

Rock placement may be undertaken to protect against scour in areas of strong tidal currents for rig stability. The introduction of rock (as well as steel or concrete structures) into an area with a seabed of sand and/or gravel can provide "stepping stones" which might facilitate biological colonisation including by non-indigenous species by allowing species with short lived larvae to spread to areas where previously they were effectively excluded. However, on the UK continental shelf such "stepping stones" are already widespread and numerous, as a result of for example rock outcrops, glacial dropstones and moraines, relicts of periglacial water flows, accumulations of large mollusc shells, carbonate cemented rock etc. Rig site surveys in UK waters typically reveal the presence of such natural "stepping stones". Those activities that could follow licensing of the Blocks (e.g. drilling of a well, as described by the proposed work programme) are unlikely to result in significant introduction of rock or structures to the marine environment, and are therefore unlikely to undermine the conservation objectives of SACs in the area. The nature, location and extent of any subsequent further development including the installation of steel or concrete structures and protective rock dump if necessary, is not currently known and would be more appropriately assessed through project level EIA and where relevant, HRA processes.

The broad distribution of large scale biotopes of conservation importance is relatively well understood in the region (e.g. see McBreen *et al.* 2011). Within the boundaries of designated and potential SACs the occurrence of habitats of interest is usually known with greater precision. The routine sources of potential physical damage are assessed and controlled by a range of regulatory processes, such as EIA and the Petroleum Offshore Notice for drilling activities (PON15B) and where relevant HRA's to underpin those applications. Provisions under the Marine and Coastal Access Act (2009) include certain activities such as decommissioning operations previously covered by the Food and Environment Protection Act which are now permitted through a Marine Licence. Based on the results of the assessments including HRA, DECC may require additional mitigation measures to avoid or minimise any adverse effects, or where this is not possible, refuse consent. Drilling activities outlined above require individual survey of the proposed rig location, reports from which are used to inform the technical feasibility of drilling. Additional survey work may be required, such as limited benthic survey, but this is considered on a case by case basis. Subject to the results of such surveys, the location of activities could be altered and/or additional survey work undertaken. Such reports are used to underpin operator environmental submissions (e.g. PON15B and Environmental Statements) and are typically made available to nature conservation bodies during the consultation phases of these assessments.

5.3 Marine discharges

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

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

require the onshore disposal, offshore treatment prior to discharge or reinjection of a proportion of waste material (DECC 2011).

In contrast to historic oil based mud discharges, effects on seabed fauna of the discharge of cuttings drilled with WBM and of the excess and spent mud itself are usually subtle or undetectable, although the presence of drilling material at the seabed close to the drilling location (<500m) is often detectable chemically (e.g. Cranmer 1988, Neff *et al.* 1989, Hyland *et al.* 1994, Daan & Mulder 1996). Considerable data has been gathered from the North Sea and other production areas, indicating that localised physical effects are the dominant mechanism of ecological disturbance where water-based mud and cuttings are discharged (DECC 2011).

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

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

OSPAR (2009) concluded that the discharge of drill cuttings and water-based fluids may cause some smothering in the near vicinity of the well location. The impacts from such discharges are localised and transient, but may be of concern in areas with sensitive benthic fauna, for example corals and sponges.

In addition to these mainly drilling rig-derived discharges, a range of discharges are associated with support vessels (sewage, cooling and drainage waters). Discharges from offshore oil and gas facilities have been subject to increasingly stringent regulatory controls over recent decades, and oil concentrations in the major streams (drilling wastes and produced water) have been substantially reduced or eliminated. Amendments to the Offshore Chemicals Regulations 2002 made in 2011 clarify the definition of chemical discharges to include a “discharge” as captured under the relevant operational permit, and a “release” which is any other emission of chemicals outside of that covered by the permit whether as a result of operational requirements or accident. The effects of marine discharges are judged to be negligible in the context of proposed licensing and the Natura 2000 sites in the area and are not considered further here. Discharges are considered in detail in project-specific Environmental Statements, HRAs (where

necessary) and chemical risk assessments[14] (e.g. PONs) under existing permitting procedures (see Figure 2.2).

5.4 Other effects

Through the transport and discharge of vessel ballast waters (and associated sediment), and to a lesser extent fouling organisms on vessel/rig hulls, non-native species may be introduced to the marine environment. Should these introduced species survive and form established breeding populations, they can exert a variety of negative effects on the environment. These include: displacing native species by preying on them or out-competing them for resources such as prey and habitat; irreversible genetic pollution through hybridisation with native species; increased occurrence of toxic algal blooms. The economic repercussions of these ecological effects can also be very significant. In response to these risks, a number of technical and procedural measures have been proposed (such as the use of ultraviolet radiation to treat ballast water) or introduced such as a mid-ocean exchange of ballast water (the most common mitigation against introductions of non-native species). International management of ballast waters is addressed by the International Maritime Organisation (IMO) through the International Convention for the Control and Management of Ships Ballast Water & Sediments, which was ratified in 30 States[15] in 2005. The Convention includes Regulations with specified technical standards and requirements (IMO Globallast website). Further oil and gas activity is unlikely to change the risk of the introduction of non-native species as the vessels typically operate in a geographically localised area although rigs may move between the Irish Sea to the North Sea and vice versa and the risk from hull fouling is low, given the geographical working region and scraping of hulls for regular inspection.

The potential effects of light on birds have been raised in connection with offshore oil and gas over a number of years (e.g. Wiese *et al*. 2001). As part of navigation and worker safety, oilfield installations and associated vessels are lit at night and the lights will be visible at distance (some 10-12nm in good visibility). Platform illumination has been shown to have an attractive effect on many species of migratory birds, with attraction enhanced in conditions of poor visibility such as fog, haze and drizzle (Wiese *et al*. 2001 and references therein). Responses to a recent OSPAR questionnaire seemed to indicate that the main cause of death was dehydration, starvation and exhaustion, although some birds had physical damage resulting from collisions with the infrastructure, and an even smaller number had interacted with the flare or turbine exhausts. Birds which are attracted to these light sources at night typically circle around the illuminated platform for extended periods of time (sometimes many hours) and it has been suggested that the circling increases the risk of collision leading to traumas and deaths (OSPAR 2012). It was concluded that there was evidence that conventional lighting of human-made offshore structures had an impact on birds, but it could not be concluded that the effect was significant at the population level (OSPAR 2012).

The temporary nature of drilling activities means that a drilling rig will be present for a relatively short period of time minimising the potential for significant interaction with migratory bird populations. It is also unlikely that drilling rigs will be located so close to shore as to illuminate

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

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

coastal habitats and affect the foraging behaviour of waders and waterfowl (e.g. Dwyer *et al.* 2012). It is therefore concluded that light effects will not affect site integrity, nor undermine the conservation objectives of sites with qualifying mobile species which could potentially interact with illuminated platforms and vessels.

As indicated by Table 7.3 and Section 7.3.3.1, given the number of coastal SPAs in the vicinity, a range of foraging birds may be present over the Northern Ireland Blocks, particularly during the breeding season. The presence and/or movement of vessels from and within the Blocks during drilling activities could potentially disturb foraging seabirds from sites within or close to the Blocks. However, given the projected limited scale and nature of the activities, and because mitigation is possible (which would be identified during activity specific assessment and permitting processes), adverse effects on the integrity of sites are not expected.

Since 2008, a number of dead seals (>76 animals) displaying corkscrew injuries (Bexton *et al.* 2012) have been found primarily on beaches in eastern Scotland, North Norfolk coast and Strangford Lough (Thompson *et al.* 2010). The injuries are consistent with those that might be expected if the seals had been drawn through a ducted propeller or some types of Azimuth thruster (widely used in marine industry vessels), although there is presently no definitive evidence to confirm this (SNCB 2012).

A SMRU research project is underway and in the interim, advice by the statutory nature conservation bodies (SNCB) sets out recommendations for regulators and industry with regards to understanding and minimising the risk of corkscrew injury to seals (SNCB 2012). For high risk areas (defined as within 4nm of a harbour seal SAC and areas where the harbour seal population is in significant decline), current SNCB advice is to consider alternatives to using ducted propellers or avoid the breeding season (1st June-31st August). If these measures are not possible then a Seal Corkscrew Injury Monitoring Scheme should be considered. Guidance for medium risk areas (activity proposed to take place between 4 and 30 nautical miles of a harbour seal SAC or within 4 nautical miles of a grey seal SAC) is similar with the grey seal breeding season identified as 1st October-31st December. Activities proposed to take place beyond 30nm from a harbour seal SAC and 4nm from a grey seal SAC are regarded as having a low risk and no mitigation measures are proposed. The SNCB advice will be reviewed as understanding of the issue improves. A number of Northern Ireland Blocks fall within the definition of medium risk areas including The Maidens cSAC (grey seal), Strangford Lough SAC and South-East Islay Skerries SAC (harbour seal). Given the temporary nature of the drilling and support activities that could follow licensing and the recommended mitigation, adverse effects on the integrity of sites are not expected.

The seal density maps presented in Figure 6.2 indicate that parts of the Northern Ireland area are important for seals. Harbour seals appear to use coastal waters to the south of the Blocks (likely to be associated with the Strangford Lough and Murlough SACs), and off the Scottish coast to the north of the Blocks. Grey seals appear to have a more offshore distribution using areas further to the north, off the Irish and Scottish coasts (although the figure does not include grey seal tagging data from Northern Ireland). The Blocks are within or close to areas of low (grey seal) and low to moderate (harbour seal) usage. Given the lack of information with respect to grey seal foraging and usage within The Maidens cSAC, it is possible that the density of grey seals within the Blocks is greater than Figure 6.2 indicates. Section 6.4 also indicated that harbour porpoise (qualifying feature of the Skerries and Causeway cSAC) may be present over the Blocks in low densities throughout the year. Therefore, the presence and/or movement of vessels from and within any of the Blocks during drilling activities could potentially disturb foraging marine mammals within or close to the Blocks. However, given the low number of individual marine mammals likely to be present over the Blocks at any one time, and the limited

temporal and spatial footprint of potential activities, no adverse effect on site integrity associated with the presence and/or movement of vessels from and within any of the Blocks is predicted.

Oil and gas development that could follow on from the exploration activities outlined in the initial block work programmes could include platform installation, though developments are increasingly based on subsea infrastructure and therefore any disturbance at the sea surface is reduced to periods of construction and decommissioning. Development level activities involving oil production and processing may be subject to EIA and require permitting for individual activities including drilling, pipelay, and discharges, and project level HRA will also be undertaken where appropriate.

5.5 Implications for relevant sites

The re-screening process (Appendix B) identified the potential for physical disturbance and marine discharge effects at a number of relevant sites. These are the Larne Lough SPA, Belfast Lough Open Water SPA, Belfast Lough SPA, Outer Ards SPA, Red Bay SCI and The Maidens cSAC as each encompasses or is overlapped by a number of the Blocks applied for.

5.5.1 Red Bay SCI

The Red Bay SCI is within Block 125/30 and adjacent to Block 126/26.

The Red Bay site contains Annex I sandbanks slightly covered by seawater at all times which are composed of maerl, sub-fossil maerl, coarse sands, gravels and cobbles. The Red Bay sandbanks are dominated by both living maerl and sub-fossil maerl and have been thoroughly mapped and characterised as part of SAC selection assessment.

With respect to the site, the construction and maintenance of structures, both within and adjacent to the sea, have the potential to cause direct loss or deterioration of qualifying habitats and communities[16]. The maerl habitat is particularly sensitive to disturbance, damage, pollution or extraction because they depend upon the survival of a surface layer of live maerl thalli that are sessile, brittle, slow-growing and long-lived with poor recruitment and limited spore dispersal. Post-impact, recovery of these habitats may take decades. The exposure of the Red Bay maerl beds to diffuse pollution, effluent discharge and eutrophication may be reduced by the strong tidal currents and open coast location. Other activities, however, may be fatal to the live maerl, particularly any physical disturbance that may lead to direct damage, increased siltation, burial, or extraction of the live maerl.

5.5.2 The Maidens cSAC

The Maidens cSAC is close to or within Blocks 111/1, 111/2 and 126/26.

Many of the reef habitats and species are rare, and in the UK some are only found in The Maidens, Rathlin and the Firth of Lorne. The many islets, emergent rocks and submerged pinnacles result in the presence of a wide range of hydrographic conditions, ranging from areas exposed to strong tidal streams (such as the Highlandman rock), to more sheltered areas protected from the main tidal flow by East and West Maiden. They also provide important haul-

[16] NIEA. Inshore Special Area of Conservation: Red Bay, County Antrim Conservation Objectives and Advice on Operations. Advice under Regulation 28(2) of The Conservation (Nature Habitats, etc.) Regulation (Northern Ireland) 1995. 2009.

out sites and foraging areas for grey seals. The maerl bed near the Sheafing Rock to the south of The Maidens represents an important sub-feature of Annex I sandbank.

With respect to the site, the construction and maintenance of structures, both within and adjacent to the sea, have the potential to cause direct loss or deterioration of qualifying habitats and communities[17]. The reef habitat is not thought to be sensitive to disturbance, damage, pollution or extraction and is thought to be in good condition. Much of The Maidens sandbank area is also thought to be in good condition. There has been no aggregate extraction and no evidence of mobile fishing gear in the shallow maerl bed areas, therefore the structure and function of the sandbank features is probably unchanged. Exposure of The Maidens maerl beds to diffuse pollution, effluent discharge and eutrophication may be reduced by the strong tidal currents and open coastal location. Other activities, however, may be fatal to the live maerl, particularly any physical disturbance that may lead to direct damage, increased siltation, burial or extraction of the live maerl.

Following licensing, the sites may be affected by a variety of activities as a result of the proposed work programme, including rig/installation placement and the drilling of a well, which can result in direct physical damage by abrasion, changes in suspended sediment disturbance and deposits of rock. The likelihood and significance of any physical loss or damage to the Annex I and supporting habitats for the grey seal qualifying feature (The Maidens cSAC) will depend on the location, extent and timing of any potential activities which result from licensing which are currently unknown. Given the sensitivity of the maerl habitat to physical disturbance, any proposed drilling activities and further seabed development would require extensive survey to characterise the seabed allowing potential interactions to be assessed and mitigation to be developed (e.g. containment of drilling discharges, alternative rig siting). All activities that may cause such physical disturbance would be subject to project-level assessment (e.g. EIA and HRA) and potential mitigation. Subject to these tests being undertaken and suitable mitigation being identified and implemented, it is not expected that such effects would result in a reduction in the diversity, community structure and typical species of the supporting habitats and sites as a whole, resulting in an adverse impact on site integrity.

Contamination by introduction of synthetic and/or non-synthetic compounds has been noted[17] as a potential threat to the sites. However, current rules effectively mean that only water based drill muds (WBM) would be discharged either on rock cuttings or as excess mud. Around 95% of the constituents of a typical WBM are naturally-occurring (and defined by OSPAR as posing little or no risk to the environment) while remaining chemicals would have low toxicity and bioaccumulation potential. There are strict regulatory controls over the use and discharge of offshore chemicals and toxic or enrichment effects are not envisaged. Dispersion of mud and cuttings is influenced by various factors. The range of cuttings particle size results in a significant variation in settling velocity, and a consequent gradient in the size distribution of settled cuttings, with coarser material close to the discharge location and finer material very widely dispersed away from the location. Extensive monitoring of the ecological effects of discharged WBM cuttings has been carried out in the North and Irish Seas (and internationally) and the consensus view is that any effects are subtle, very localised and transient. In view of the energetic hydrography of the area the sites are believed to be less sensitive to diffuse pollution, effluent discharge and eutrophication.

[17] NIEA. Inshore Special Area of Conservation: The Maidens Conservation Objectives and Advice on Operations. Advice under Regulation 28(2) of The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 as amended). 10th January 2011.

NIEA advice indicates that due to the location of The Maidens cSAC and the Red Bay SCI, within or close to the busy shipping route of the North Channel; the pumping of bilges, discharge of ballast water, accidental grounding, or accidental oil (or other chemical) spillage from commercial vessels could all occur close to the SAC. Such incidents have the potential to cause deterioration of qualifying habitats and communities through direct or indirect impacts. OPEPs should take into account specific qualifying interests and recognise the importance of marine SACs should such incidents occur. DECC would expect similar considerations to be applied for potential oil and gas activities in the Blocks.

5.5.3 Larne Lough SPA, Belfast Lough Open Water SPA and Belfast Lough SPA

Larne Lough SPA is of importance as a breeding and feeding area for a number of tern species as well as being a wintering site for light-bellied brent goose. The site also includes the subsumed SPA of Swan Island. The site is adjacent to Blocks 111/1 and 111/2.

Belfast Lough SPA is a large, open sea lough. The inner part of the lough comprises areas of intertidal foreshore, mainly mud-flats and lagoons, and lands which are important feeding and roosting sites for significant numbers of wintering waders and wildfowl. The extent of the SPA in the outer lough is restricted to mainly rocky shores with some small sandy bays and beach-head saltmarsh. The site is of importance for a wide range of wintering waterbirds and is close to Block 111/7.

The Belfast Lough Open Water SPA comprises the marine area below the mean low water mark. Water depths within the site are generally between 1m and 10m. The outer boundary is a notional line taken between the eastern limits of Belfast Lough SPA that is from Kilroot on the northern shore to Horse Rock near Grey Point on the southern. The open water supports the main part of the internationally important wintering population of great crested grebe. While the main roosting area for this species is in the inner lough area, the entire site is of importance for feeding and loafing activities. The site is close to Block 111/7.

For all three SPA sites, certain activities which could arise from the proposed work programme following licensing (see Section 2.2) could potentially undermine the conservation objectives of the qualifying features. The qualifying features (breeding terns, overwintering waterfowl and waders) are vulnerable to disturbance through noise and/or visual presence and therefore activities such as rig tow out and demobilisation, rig/vessel presence and movement (including helicopters), could impact the qualifying features. The likelihood and significance of any physical disturbance will depend on the location, extent and timing of any potential activities which result from licensing which are currently unknown. Available mitigation measures include strict use of existing shipping and aircraft routes, timing controls on temporary activities to avoid sensitive periods. Risks to overall site integrity from these activities would be prevented (mitigated) through the existing environmental regulatory framework for the respective activities (Figure 2.2), which includes HRA where necessary.

Some of the qualifying intertidal habitats and supporting habitats may also be vulnerable to physical loss and damage. Given the location of the Blocks outside the site boundaries and the limited footprint of a jack-up rig during rig placement, significant physical loss and damage of supporting habitats are unlikely.

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

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

Relevant sites	Relevant qualifying features	Relevant Blocks	Consideration against conservation objectives (see Appendix C)
Red Bay SCI	Sandbanks	125/30, 126/26	**Conservation objectives:** To avoid deterioration of the qualifying habitats and species thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term, subject to natural change: • Extent of the habitats on site • Distribution of the habitats within the site • Structure and function of the habitats • Processes supporting the habitats • Distribution of typical species of the habitats • Viability of typical species as components of the habitat • No disturbance of typical species of the habitat **Rig installation/ placement** Sensitivity and vulnerability of qualifying feature to physical damage and loss is high. The seabed footprint associated with placement of a jack up rig is small and temporary (Section 5.2). The likelihood and scale of any impact (deterioration in the extent, distribution or structure and function of the qualifying habitat) will be determined by the nature and location of activities which are currently unknown. **Drilling discharges** Sensitivity and vulnerability of qualifying feature, particularly maerl habitat to smothering is high. Discharge of drill cuttings and water-based fluids may cause smothering of habitats in the near vicinity of the well location. The impacts from such discharges are localised and transient (Section 5.3). The likelihood and scale of any impact (deterioration in the extent, distribution or structure and function of the qualifying habitat) will be determined by the nature and location of activities which are currently unknown. **Additional mitigation** With respect to Blocks 125/30 and 126/26, DECC will expect the operator to provide sufficient information on the potential impact of the proposed activity on the qualifying site in the application. Based on the advice from SNCBs, DECC may undertake an HRA to determine whether the proposals will have an adverse impact on the site integrity that would undermine the site conservation objectives. Depending on the outcome of the assessment, DECC may require additional mitigation measures (e.g. containment of drilling discharges) or refuse consent.

Relevant sites	Relevant qualifying features	Relevant Blocks	Consideration against conservation objectives (see Appendix C)
The Maidens cSAC	Reefs, sandbanks and grey seal	111/1, 111/2, 126/26	**Conservation objectives:** To avoid deterioration of the qualifying habitats and species thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term, subject to natural change: • Extent of the habitats on site • Distribution of the habitats within the site • Structure and function of the habitats • Processes supporting the habitats • Distribution of typical species of the habitats • Viability of typical species as components of the habitat • No disturbance of typical species of the habitat **Rig installation/ placement** Reef habitat not thought to be sensitive to disturbance or damage. Sensitivity and vulnerability of sandbanks, particularly maerl habitat to physical damage and loss is high. Whilst the seabed footprint associated with placement of a jack up rig is small and temporary (Section 5.2), has the potential to cause direct loss or deterioration of qualifying habitats and communities. The likelihood and scale of any impact will be determined by the nature and location of activities which are currently unknown. **Drilling discharges** Sensitivity and vulnerability of sandbanks, particularly maerl habitat to smothering is high. Discharge of drill cuttings and water-based fluids may cause smothering of habitats in the near vicinity of the well location. Whilst the impacts from such discharges are localised and transient (Section 5.3), have the potential to cause smothering or deterioration of qualifying habitats and communities. The likelihood and scale of any impact will be determined by the nature and location of activities which are currently unknown. **Additional mitigation** With respect to Blocks 111/1, 111/2 and 126/26, DECC will expect the operator to provide sufficient information on the potential impact of the proposed activity on the qualifying site in the application. Based on the advice from SNCBs, DECC may undertake an HRA to determine whether the proposals will have an adverse impact on the site integrity that would undermine the site conservation objectives. Depending on the outcome of the assessment, DECC may require additional mitigation measures (e.g. containment of drilling discharges) or refuse consent.
Larne Lough SPA	Breeding terns & overwintering geese	111/1, 111/2	**Conservation objectives:** • No significant decrease in the breeding populations of sandwich, roseate and common terns against national trends, caused by on-site factors • No significant decrease in light-bellied brent goose wintering population against national trends, caused by on-site factors

Relevant sites	Relevant qualifying features	Relevant Blocks	Consideration against conservation objectives (see Appendix C)
			• To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species (325 ha intertidal area), (breeding areas 1 ha) subject to natural processes • Maintain the extent of main habitat components subject to natural processes • Maintain or enhance sites utilised as roosts **Rig/vessel presence and movement** Vulnerability of qualifying features to physical disturbance is likely to be high. The presence and movement of vessels has the potential to disturb qualifying features both within and outside of the site. The likelihood and scale of impact will be determined by the location and timing of activities which are currently unknown. **Additional mitigation** With respect to Blocks 111/1 and 111/2, DECC will expect the operator to provide sufficient information on the potential impact of the proposed activity on the qualifying site in the application. Based on the advice from SNCBs, DECC may undertake an HRA to determine whether the proposals will have an adverse impact on the site integrity that would undermine the site conservation objectives. Depending on the outcome of the assessment, DECC may require additional mitigation measures or refuse consent.
Belfast Lough SPA	Overwintering waders and waterfowl	111/7	**Conservation objectives:** • No significant decrease in redshank wintering population against national trends, caused by on-site factors • No significant decrease in great crested grebe wintering population against national trends, caused by on-site factors • To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species, subject to natural processes • Maintain the extent of main habitat components subject to natural processes • Maintain or enhance sites utilised as roosts **Rig/vessel presence and movement** Vulnerability of qualifying features to physical disturbance is likely to be high. The presence and movement of vessels has the potential to disturb qualifying features both within and outside of the site. The likelihood and scale of impact will be determined by the location and timing of activities which are currently unknown. **Additional mitigation** With respect to Block 111/7, DECC will expect the operator to provide sufficient information on the potential impact of the proposed activity on the qualifying site in the application. Based on the advice from SNCBs, DECC may undertake an HRA to determine whether the proposals will have an adverse impact on the site integrity that would undermine the site conservation objectives. Depending on the outcome of the assessment, DECC may require additional mitigation measures or refuse consent.

Relevant sites	Relevant qualifying features	Relevant Blocks	Consideration against conservation objectives (see Appendix C)
Belfast Lough Open Water SPA	Overwintering great crested grebe	111/7	**Conservation objectives:** • No significant decrease in great crested grebe wintering population against national trends, caused by on-site factors • Maintain the extent of main habitat components subject to natural processes • Maintain all locations of roosting /loafing sites. **Rig/vessel presence and movement** Vulnerability of qualifying features to physical disturbance is likely to be high. The presence and movement of vessels has the potential to disturb qualifying features both within and outside of the site. The likelihood and scale of impact will be determined by the location and timing of activities which are currently unknown. **Additional mitigation** With respect to Block 111/7, DECC will expect the operator to provide sufficient information on the potential impact of the proposed activity on the qualifying site in the application. Based on the advice from SNCBs, DECC may undertake an HRA to determine whether the proposals will have an adverse impact on the site integrity that would undermine the site conservation objectives. Depending on the outcome of the assessment, DECC may require additional mitigation measures or refuse consent.

5.6 Conclusions

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

Taking into account the information presented above and in the Appendices, it is concluded that with mitigation, activities arising from the licensing of Blocks 111/1, 111/2, 111/7, 125/30 and 126/26 will not cause an adverse effect on the integrity of relevant sites, though consent for activities will not be granted unless the operator can demonstrate that the proposed activities which may include the drilling of a well and any related activity including the placement of a mobile rig, will not have an adverse effect on the integrity of relevant sites.

6 Consideration of sites and potential acoustic effects

6.1 Overview of effects of acoustic disturbance

Of all marine organisms, marine mammals are regarded as the most sensitive to acoustic disturbance. This is due to their use of acoustics for echolocation and vocal communication and their possession of lungs which are sensitive to rapid pressure changes. Most concern in relation to seismic noise disturbance has been related to cetacean species. However, some pinnipeds are known to vocalise at low frequencies (100-300Hz) (Richardson *et al*. 1995), suggesting that they have good low frequency hearing and are therefore sensitive to acoustic disturbance. Otters in coastal habitats may also experience acoustic disturbance from seismic exploration or piling. However, they generally occupy shallow, inshore areas where the propagation of seismic noise is very limited.

A period of concern (February to June) for seismic survey has been identified for the Blocks (see Table 2.2) because of potential adverse effects on marine fish spawning and it is envisaged that consent would not be granted for seismic survey during this period. Many species of fish are highly sensitive to sound and vibration (review in MMS 2004). Exposure to high sound pressure levels has been shown to cause long-term (>2 months) damage to sensory cells in fish ears (Hastings *et al*. 1996, McCauley *et al*. 2003). Other reported effects include threshold shifts (hearing loss), stress responses and other behaviour alterations (review in Popper *et al*. 2003). A number of field studies have observed displacement of fish and reduced catch rates, suggested to be attributable to behavioural responses to seismic exploration (e.g. Skalski *et al*. 1992, Engås *et al*. 1996, Hassel *et al*. 2004, Slotte *et al*. 2004). Relevant sites in the region include several designated for the presence of the Annex II migratory species Atlantic salmon (e.g. River Faughan and Tributaries SCI, River Foyle and Tributaries SAC, Owenkillew River, River Roe and Tributaries SAC, River Bladnoch SAC, Endrick Water SAC, River Eden, River Derwent and Bassenthwaite Lake SAC, River Ehen and River Finn (RoI)) and two species of lamprey (e.g. Solway Firth SAC, River Eden SAC, River Derwent and Bassenthwaite Lake SAC).

Atlantic salmon *Salmo salar* have been shown through physiological studies to respond to low frequency sounds (below 380Hz), with best hearing (threshold 95 dB re 1 µPa) at 160Hz. Hence, their ability to respond to sound pressure is regarded as relatively poor with a narrow frequency span, a limited ability to discriminate between sounds, and a low overall sensitivity (Hawkins & Johnstone 1978, cited by Gill & Bartlett 2010). There is, however, evidence that juvenile *S. salar* smolts (as well as other salmonid species) are sensitive to very low frequency sound. Knudsen *et al*. (1994) showed that a source of intense low frequency sound (10Hz)

within a river acted as an acoustic barrier to young salmon, with fish being displaced to an area where the intense sound was absent. Furthermore, numerous fish species present in the region provide important components of the diet of qualifying species of other relevant sites, such as harbour seal *Phoca vitulina* (e.g. Strangford Lough SAC, Murlough SAC, Eileanan agus Sgeiran Lios mor SAC and South-East Islay Skerries SAC), grey seal *Halichoerus grypus* (e.g. The Maidens cSAC, Treshnish Isles SAC, Horn Head and Rinclevan SAC (RoI)), harbour porpoise *Phocoena phocoena* (Skerries and Causeway cSAC) and several seabird species such as guillemot, herring gull, razorbill (e.g. Rathlin Island SPA, Ailsa Craig SPA).

There are currently no UK Natura 2000 sites with mobile marine invertebrates as qualifying features. However, invertebrates such as squid may form an important component of the diet of qualifying species of relevant sites, for example harbour seal. The study of effects of seismic noise on invertebrates is limited, and it has been suggested that no reliable conclusions can be made that negative effects exist or not (Moriyasu *et al.* 2004). Recent studies into the effects of seismic exploration on crustaceans have shown no significant long term effects on physiology, behaviour or catch rates (Christian *et al*. 2003, DFO 2004, Parry & Gason 2006). Due to their well developed nervous system, cephalopods such as squid may be more sensitive to seismic noise than other invertebrates; however, evidence for effects of seismic noise on them is very limited (review in Moriyasu *et al*. 2004). Andre *et al*. (2011) indicated that controlled exposure of four cephalopod species to low-frequency sounds resulted in permanent and substantial alterations of the sensory hair cells of the statocysts, the structures responsible for the animals' sense of balance and position.

Direct effects on seabirds because of seismic exploration noise could occur through physical damage, or through disturbance of normal behaviour. Diving seabirds (e.g. auks) may be most at risk of acute trauma (e.g. from Rathlin Island SPA located to the north west of the Blocks) and the Blocks impinge upon Larne Lough SPA and Outer Ards SPA (breeding tern species), and the Belfast Lough Open Water SPA (overwintering great crested grebe), all of which are diving birds. The physical vulnerability of seabirds to sound pressure is unknown, although McCauley (1994) inferred from vocalisation ranges that the threshold of perception for low frequency seismic in some species (e.g. penguins, considered as a possible proxy for auk species) would be high, hence only at short ranges would individuals be adversely affected. Mortality of seabirds has not been observed during extensive seismic operations in the North Sea and elsewhere. A study has 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). Impact on prey species (e.g. fish) could undermine conservation objectives for sites, for instance this may represent an indirect disturbance to qualifying species, or a temporary deterioration of the functioning of the habitats which support qualifying species, though mitigation measures are available (see Section 6.5) the implementation of which will also be assessed in detail once project plans are available.

Airborne noise, for example from helicopter overflights, could potentially disturb birds in coastal SPAs, although in the context of other military and civilian aircraft activities the anticipated level of Block activity related noise is insignificant. In specific cases of concern, including seasonal concerns (for instance, during moulting), mitigation through routeing restrictions could be implemented, and these will be considered at a project specific level.

6.2 Noise sources and propagation

Compared to the noise derived from seismic surveys and piling, noise from other oil and gas activities is relatively minor; previous DECC SEAs have assessed noise in some detail (e.g.

Section 5.3 of OESEA2 Environmental Report (DECC 2011), and the following discussion is focussed on seismic noise as the primary concern. The potential for significant effect is therefore largely related to the anticipated type, extent and duration of seismic survey associated with proposed licensing (a 2D seismic survey is proposed for the work programme although source size and area has not yet been defined). The range over which noise propagates (and effects may result) varies with water depth, density stratification, substrate and other factors, and is therefore area-specific.

6.2.1 Seismic survey

With the exception of explosives and modern military sonar (and possibly wind farm monopile piling), airgun arrays used for seismic surveys are the highest energy man made sound sources in the sea; broadband peak-to-peak (p-p) source levels of 248-259dB re 1µPa are typical of large arrays (Richardson *et al*. 1995). Airgun noise is impulsive (i.e. non-continuous), with a typical duty cycle of 0.3% (i.e. one 25ms pulse every 10s) and slow rise time (in comparison to explosive noise). These characteristics complicate both the measurement of seismic noise "dose" and the assessment of biological effects (many of which have been studied in relation to continuous noise). Most of the energy produced by airguns is below 200Hz, although some high frequency noise may also be emitted (Goold 1996). Peak frequencies of seismic arrays are generally around 100Hz; source levels at higher frequencies are low relative to that at the peak frequency but are still loud in absolute terms and relative to background levels.

The offshore energy SEA process has reviewed general aspects of noise propagation. Most environmental assessments of noise disturbance in deeper water use simple spherical propagation models to predict sound pressure levels at varying distances from source. However, additional signal modification and attenuation may result from a combination of reflection from sub-surface geological boundaries, sub-surface transmission loss due to frictional dissipation and heat; and scattering within the water column and sub-surface due to reflection, refraction and diffraction in the propagating medium. In shallow water, reflection of high frequency signals from the seabed results in approximately cylindrical propagation and therefore higher received spectrum levels than for spherically propagated low frequency signals (which penetrate the seabed).

In general, as distance from the source increases, higher frequencies are attenuated more rapidly. However, local propagation effects may have significant influence: for example frequency dependence due to destructive interference also forms an important part of the weakening of a noise signal. Simple models of geometric transmission loss may therefore be unreliable in relatively shallow water; in areas of complex seabed topography and acoustic reflectivity; where vertical density stratification is present in deep water; and where the noise does not originate from a point source. In the St George's Channel, Goold and Fish (1998) recorded 8kHz sounds above background levels at a range of 8km from the source, even in a high noise environment.

6.2.2 Other activities

Available measurements indicate that drilling activities produce mainly low-frequency continuous noise from several separate sources on the drilling unit (Richardson *et al*. 1995, Lawson *et al*. 2001). The primary sources of noise are various types of rotating machinery, with noise transmitted from a semi-submersible rig to the water column through submerged parts of the drilling unit hull, risers and mooring cables, and (to a much smaller extent) across the air-water interface. Noise transmission from jack-up drilling units used in shallower water is less because of reduced surface area contact between the water column and submerged parts of the drilling

unit. Under some circumstances, cavitation of thruster propellers is a further appreciable noise source, as may be the use of explosive cutting methods (e.g. for conductor removal).

Measured farfield sound pressure of around 170dB re 1µPa, in the frequency range 10-2,000Hz (Davis *et al.* 1991) is probably typical of drilling from a semi-submersible rig and is of the same order and dominant frequency range as that from large merchant vessels (e.g. McCauley 1994). Drilling noise has also been monitored west of Shetland, in the vicinity of the Foinaven and Schiehallion developments (Swift & Thompson 2000). High and variable levels of noise were initially believed to result from drilling related activity on two semi-submersible rigs operating in the area. However, subsequent analysis found more direct correlation between the use of thrusters and anchor handlers, during rig moves, and high levels of noise (Swift & Thompson 2000). Further measurements of drilling and pipelay noise in the North Sea have been undertaken (Nedwell & Needham 2001, Nedwell *et al*. 2001, Nedwell *et al*. 2002). Drilling duration may range from a few weeks for an exploration well, to years in the case of a large development programme.

A further source of noise associated with all stages of the offshore oil industry is helicopter overflights. There is relatively little quantitative information on the transmission of helicopter airborne noise to the marine environment (Richardson *et al*. 1995). Measurements of an air-sea rescue helicopter over the Shannon estuary (Berrow *et al*. 2002) indicated that due to the large impedance mismatch when sound travels from air to water, the penetration of airborne sound energy from the rotor blades was largely reflected from the surface of the water with only a small fraction of the sound energy coupled into the water.

6.3 Effects thresholds

Richardson *et al.* (1995) defined a series of zones of noise influence on marine mammals, which have been generally adopted by SEAs and EIAs undertaken in relation to previous Licensing Rounds. Similarly, data on marine mammal responses have been exhaustively reviewed (e.g. Richardson *et al*. 1995, Gordon *et al*. 1998, Lawson *et al*. 2001, Simmonds *et al*. 2003, Nowacek *et al*. 2007, Weilgart 2007, Southall *et al*. 2007). Four zones are recognised which will generally occur at increasing sound level: (1) the zone of audibility; (2) zone of responsiveness; (3) zone of masking; (4) zone of hearing loss, discomfort or injury. Potential acute effects include physical damage, noise-induced hearing loss (temporary and permanent threshold shifts, TTS and PTS respectively) and short-term behavioural responses. Postulated chronic effects (for which evidence is almost entirely absent) include long term behavioural responses, exclusion, and indirect effects. The most likely physical/physiological effects are generally considered to be shifts in hearing thresholds and auditory damage.

There is now a reasonable body of evidence to quantify noise levels associated with both seismic survey and pile-driving, and to understand the likely propagation of such noise within the marine environment. There is less clarity about the potential effects on marine mammals (and other receptors including fish), particularly in relation to distinguishing a significant behavioural response from an insignificant, momentary alteration in behaviour. Consequently, recent expert assessments have recommended that onset of significant behavioural disturbance resulting from a single pulse is taken to occur at the lowest level of noise exposure that has a measurable transient effect on hearing. A similar approach can be taken to multi-pulsed sounds although the evidence base is small and contradictory.

Behavioural responses to anthropogenic noise have generally been studied by visual or acoustic monitoring of abundance. Visual monitoring of cetaceans during seismic surveys has been carried out for several years throughout the UKCS. Statistical analysis of 1,652 sightings during

201 seismic surveys, representing 44,451 hours of observational effort, was reported by Stone (2003) and Stone & Tasker (2006). Sighting rates of white-sided dolphins, white-beaked dolphins, *Lagenorhynchus* spp., all small odontocetes combined and all cetaceans combined were found to be significantly lower during periods of shooting on surveys with large airgun arrays. In general, small odontocetes showed the strongest avoidance response to seismic activity, with baleen whales and killer whales showing some localised avoidance, pilot whales showing few effects and sperm whales showing no observed effects.

Both harbour and grey seals have shown short-term avoidance behaviour during controlled exposure experiments with small airguns (Thompson *et al*. 1998). In both cases seals abandoned foraging sites and swam away from airguns but returned to forage in the same areas on subsequent days. By contrast, Harris *et al.* (2001) making observations from a seismic vessel operating in a shallow lagoon system in the Canadian Arctic, found no significant change in sightings rate between firing and non firing periods. Mean radial distance to sightings did increase, suggesting some local avoidance behaviour (Hammond *et al.* 2006).

6.3.1 Injury and behavioural criteria

The Offshore Energy SEAs (DECC 2009, 2011) reviewed recent data and recommendations for injury and behavioural criteria for noise assessment in marine mammals, although with emphasis on pulse noise from high-energy deep geological seismic survey and pile-driving. The OESEA utilised injury criteria proposed by Southall *et al*. (2007) composed both of unweighted peak pressures and M-weighted sound exposure levels which are an expression for the total energy of a sound wave. The M-weighted function also takes the known or derived species-specific audiogram into account. For three functional hearing categories of cetaceans, proposed injury criteria are an unweighted 230dB re 1µPa p-p for all types of sounds and an M-weighted sound exposure level of 198 or 215dB re 1 $\mu Pa^2 \cdot s$ for pulsed and non-pulsed sounds respectively. For pinnipeds, the respective criteria are 218dB 1µPa p-p for all types of sound and 186 (pulsed) or 203 (non-pulse) dB re 1 $\mu Pa^2 \cdot s$ (M-weighted). These proposals are based on the level at which a single exposure is estimated to cause onset of permanent hearing loss (PTS), by extrapolating from available data for TTS.

Southall *et al*. (2007) concluded that developing behavioural criteria was challenging, in part due to the difficulty in distinguishing a significant behavioural response from an insignificant, momentary alteration in behaviour. Consequently, they recommended that onset of significant behavioural disturbance resulting from a single pulse is taken to occur at the lowest level of noise exposure that has a measurable transient effect on hearing (i.e. TTS-onset). These criteria for single pulses are an unweighted 224dB re 1µPa p-p and an M-weighted sound exposure level of 183dB re 1 $\mu Pa^2 \cdot s$ for three functional hearing categories of cetaceans, and 212dB re 1µPa (p-p) and 171dB re 1 $\mu Pa^2 \cdot s$ (M-weighted) for pinnipeds.

For multiple pulse and non-pulse (i.e. continuous) sources, Southall *et al*. (2007) were unable to derive explicit and broadly applicable numerical threshold values for delineating behavioural disturbance, and suggested that a context-based approach to deriving noise exposure criteria for behavioural responses will be necessary.

Based on the criteria developed by Southall *et al*. (2007), and the data reported by Lucke *et al*. (2009), indicative spatial ranges of injury and disturbance for cetaceans and pinnipeds may be calculated as indicated in Table 6.1 below. Calculated ranges for the Southall *et al*. (2007) criteria suggest that there is negligible risk of auditory damage to cetaceans, and a low to moderate risk of seals being within the required range (63m assuming modified cylindrical spreading) of seismic operations. Modified cylindrical spreading is usually considered to occur

in water depths <1.5x range, i.e. spherical spreading (20logR) will occur to a range of 60m in a water depth of 40m.

Table 6.1: Indicative spatial ranges of various injury and disturbance indicators for cetaceans and pinnipeds

	Cetaceans seismic	**Pinnipeds** seismic
Nominal vertical source level (dB p-p)	260	260
Horizontal array correction	-15	-15
Effective horizontal source level	245	245
Injury sound pressure level (multiple pulses; dB p-p)	230	218
Required propagation loss	15	27
Deep water (20logR) distance (m)	**5.6**	**22.4**
Shallow water (15logR) distance (m)	**10.0**	**63.1**
Behavioural response sound pressure level (single pulse; dB p-p)	224	212
Required propagation loss	21	33
Deep water (20logR) distance (m)	**11.2**	**44.7**
Shallow water (15logR) distance (m)	**25.1**	**158.5**
MTTS[18] (4kHz) response sound pressure level in porpoise (single pulse; dB p-p)	200	
Required propagation loss	45.3	
Deep water (20logR) distance (m)	**184**	
Shallow water (15logR) distance (km)	**1.05**	

Source: Southall et al. (2007), Lucke et al. (2009)

From Table 6.1, the ranges affected by potential auditory injury resulting from modelled seismic survey, represent a small proportion of the marine areas used by seals (and cetaceans) associated with relevant sites in the region. Larger proportions of the overall ranges may be affected by noise levels possibly associated with behavioural modification, although the ecological significance of such postulated effects have not been demonstrated. It is acknowledged here that injury and disturbance do not necessarily lead to an adverse impact on the integrity of a relevant site under the Habitats Directive, and indeed disturbance licences can be granted for certain levels of activity, without site integrity being compromised. Therefore, disturbance effects are not expected to have consequent effects on site integrity.

Popper *et al*. (2006) suggested interim criteria for injury of fish exposed to pile driving operations, although note that the majority of the evidence base for such criteria is derived from studies of seismic and explosive noise sources. A peak sound pressure level of 208dB re 1µPa for single pulses is proposed. This is supported by the findings of Popper *et al*. (2005) who

[18] Lucke *et al.* (2007) noted that the study harbour porpoise had an elevated hearing threshold compared to published audiograms which may have been due to auditory masking in the relatively noisy test environments or electrical "masking" in their equipment. They suggested therefore that the measured effects should be considered masked temporary threshold shifts (MTTS). MTTS is detected at higher exposure levels than TTS.

showed that TTS onset (physiological fatigue and not damage) in three species of fish exposed to seismic air-gun pulses occurred within the range of 205-210dB re 1 µPa (p-p). Popper *et al*. (2006) considered available data as too sparse to set clear-cut science-based criteria for behavioural disturbance of fish or auditory masking from pile driving.

6.4 Implications for relevant sites

As discussed above, it is considered that marine mammals and migratory fish are the only qualifying species which may potentially be affected (in terms of conservation status) by acoustic disturbance. It is noted that effects on fish which are also prey species (e.g. for marine mammals and birds), and may therefore result in the undermining of conservation objectives of qualifying species, are unlikely from noise sources associated with oil and gas activities, with noise levels suggested to cause injury to fish not extending beyond a few tens of metres around the noise source. Where necessary, HRA procedures will allow further consideration of the nature, timing and location of any planned activities and mitigation measures (see Section 6.5) deemed necessary to be defined (including conditions attached to consents/permits or potentially consent/permit refusal). The re-screening process (Appendix B) identified the potential for acoustic disturbance in the following sites:

6.4.1 Special Areas of Conservation

6.4.1.1 The Maidens cSAC

(Annex II species: grey seal *Halichoerus grypus*)

Seal count records exist for The Maidens from August 1993 to August 2011. However, monitoring effort has been inconsistent and large gaps in knowledge exist. Seals have been recorded at eight separate haut-outs within The Maidens area, including the Sheafing Rock, the Griddle, the Saddle, New Lighthouse Rock, Old Lighthouse Rock, Highlandman, Allens Rock and Russells Rock. Seals observed in the sea also contributed to the total counts. The records for grey seals show a maximum count of 70 adults (July 2000) (NIEA 2011), and more recent (August 2011) figures from an aerial survey observed 67 individuals in the area around The Maidens (Duck & Morris 2011). NIEA[19] indicates that monitoring effort of the grey seals has been inconsistent and large gaps in knowledge exist.

6.4.1.2 Skerries and Causeway cSAC

(Annex II species: harbour porpoise *Phocoena phocoena)*

The NIEA Cetacean Monitoring Programme and the Irish Whale and Dolphin Group observer programme have consistently recorded harbour porpoises during dedicated effort watches at 6 sites within the site boundary between 2004-2010. Population densities are relatively low with harbour porpoise mostly sighted as individuals or very small groups (sightings rate = 0.314 harbour porpoise/hour from 140 effort watches) (NIEA 2010b).

The Skerries and Causeway cSAC encompasses various oceanographic features which provide enhanced foraging opportunities for feeding on aggregations of prey items, including coastal headlands, strong tidal currents, tidal races and eddies. The main threats to harbour porpoise

[19] NIEA. Inshore Special Area of Conservation: The Maidens Conservation Objectives and Advice on Operations Advice under Regulation 28(2) of The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 as amended), 10th January 2011.

populations are generally thought to be by-catch in commercial fisheries and disturbance by waterborne recreational and commercial shipping[20].

6.4.1.3 Strangford Lough SAC and Murlough SAC

(Annex II species: harbour seal *Phoca vitulina*)

A thermal imaging survey of the entire coast of Northern Ireland during the moult in August 2002 counted 1,248 harbour seals, of which 180 seals were in Strangford Lough and 299 seals in the Murlough SAC (Duck 2006). Data from Strangford Lough (SCOS 2007) suggest that harbour seal counts have declined by 3% per annum (95% CI: 1-5%) producing a 35% decline over the period 1994 to 2006. More recently, aerial surveys by SMRU of seals in Strangford Lough as part of the Seagen environmental monitoring programme noted a gradual decline in seal numbers between 2006 and 2010 (Royal Haskoning 2010, 2011). In August 2011, a thermal imaging survey recorded 36 seals in Strangford Lough. This figure is unlikely to reflect reduced numbers of harbour seal in the area as much higher observations (up to 105, also in August 2011) were made by NIEA in boat based surveys in the area. It is thought that weather conditions at the time of the survey may have displaced seals from their haulouts.

Recent tracking studies of seals tagged within Strangford Lough over 2009 and 2010 indicated a high degree of variability between seals, but a high degree of consistency within individuals. Some seals spent their entire time within Strangford Lough, others never entered the Lough at all and some seals spent the entire time transiting up and down the Narrows. Some individuals travelled to distant haul out sites in the Irish Sea, indicating that seals in Strangford Lough/Narrows are not ecologically isolated from the remaining Northern Ireland population (Royal Haskoning 2011).

6.4.1.4 Eileanan agus Sgeiran Lios mor SAC

(Annex II species: harbour seal *Phoca vitulina*)

The small islands and skerries around Lismore consistently support a nationally important breeding colony of the harbour seal. Around 600 adults haul out at the site to rest, pup and moult. This represents one of the larger discrete colonies of harbour seals in the UK and is equivalent to around 2% of the UK and 1% of the EU populations of the species. The site is the most sheltered and enclosed harbour seal SAC on the west coast of Scotland and haul-out areas reflect the habit of west coast harbour seals to utilise rocky shores, islets and skerries. Attributes of the harbour seals habitat are the availability and ease of access to suitable and undisturbed breeding, pupping, moulting and haul-out areas. Also, the availability of undisturbed shores and adjacent areas of sea to facilitate adult social interactions, mating and to act as a nursery area. Surveys by the SMRU indicate that the population is stable (Scottish Natural Heritage 2006b).

[20] NIEA. Inshore Special Area of Conservation: Skerries and Causeway Conservation Objectives and Advice on Operations Advice under Regulation 28(2) of The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 as amended) 10th January 2011.

6.4.1.5 Treshnish Isles SAC

(Annex II species: grey seal *Halichoerus grypus*)

The Treshnish Isles consistently support an internationally important colony of the grey seal. Around 1,100 pups are produced at the site each year. This is equivalent to a total population of approximately 3,400 animals, representing around 3% of the UK and 2.8% of the EU populations of the species. The Treshnish Isles contribute to the series of sites around the coast that have been selected to maintain the geographic range and status of grey seal breeding colonies in the UK. Large colonies are important in maintaining overall population size and are significant as sources of emigration to smaller or newly established groups. Surveys by the SMRU indicate that the population is being maintained (Scottish Natural Heritage 2006c).

Attributes of the grey seal habitat are the availability and ease of access to suitable and undisturbed breeding, pupping, moulting and haul-out areas on the island. Also, the availability of undisturbed shores and adjacent areas of sea facilitate adult social interactions and mating, whilst also acting as a nursery area. Pools on the island are of particular importance, as they are frequently used by the seals as rookery locations. The near-shore habitats, particularly shallow bedrock reefs, are important foraging grounds for the seals. Grey seals are shy aquatic mammals that frequent remote and isolated coasts and offshore islands, and may desert a locality if subjected to disturbance.

6.4.1.6 South-East Islay Skerries SAC

(Annex II species: harbour seal *Phoca vitulina*)

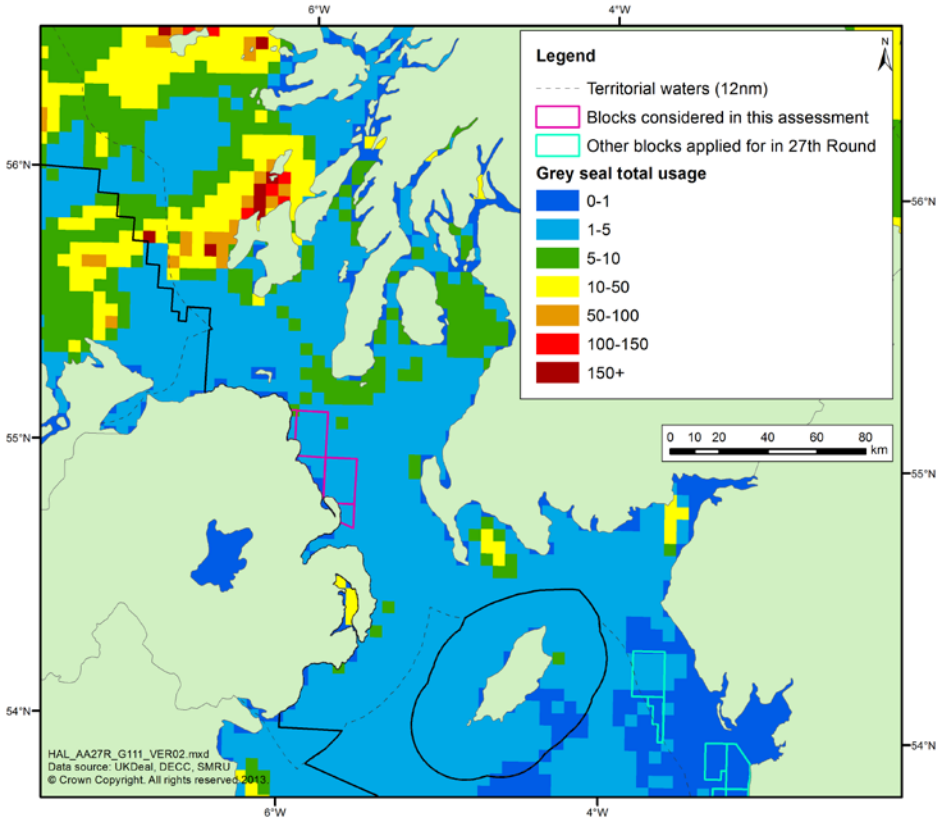
On the west coast of Scotland, harbour seals habitually utilise rocky shores, islets and skerries as haul-out areas to rest, pup and moult. The skerries, islets and undisturbed mainland shores in south-east Islay have consistently supported around 600 harbour seals, representing approximately 2% of the UK and 1% of the EU populations of the species. Surveys by the SMRU indicate that the population is stable.

The seals are usually scattered along seaweed covered tidal ledges in small groups of around fifty animals. Adult harbour seals can remain very faithful to particular haul-out areas, typically moving around the same group of favoured locations over a number of years. However, the use of particular haul-out areas can vary according to the annual cycle and local weather conditions. South-east Islay Skerries European marine site holds one of the largest discrete groups of harbour seals in south-west Scotland and the colony is representative of the Inner Hebridean and west coast population. Large colonies are important in maintaining overall population size and are significant as sources of emigration to smaller or newly established groups (Scottish Natural Heritage 2006a).

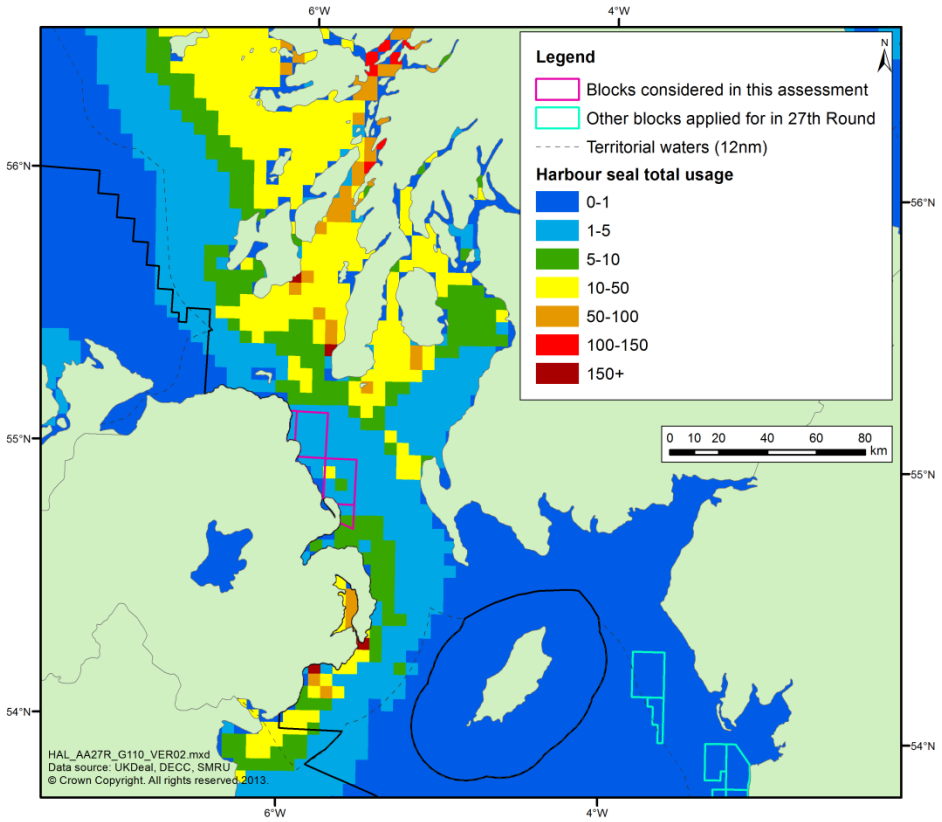
Maps showing the at-sea distribution of grey and harbour seals around the UK have been produced (Marine Scotland website). The density maps (Figure 6.1) indicate that parts of the Northern Ireland area are important for seals. Harbour seals appear to use coastal waters to the south of the Blocks (likely to be associated with the Strangford Lough and Murlough SACs), and off the Scottish coast to the north of the Blocks. Grey seals appear to have a more offshore distribution using areas further to the north, off the Irish and Scottish coasts (although the map does not include any grey seal tagging data from Northern Ireland). The Blocks are within or close to areas of low (grey seal) and low to moderate (harbour seal) usage. However, given the lack of information with respect to grey seal foraging and usage within The Maidens cSAC, it is possible that the density of grey seals within the Blocks is greater than Figure 6.1a indicates.

Figure 6.2: Estimated total density of seals in the Northern Ireland area

a) Grey seals



b) **Harbour seals**



Source: Marine Scotland website

There is little information on the abundance and distribution of harbour porpoise in the area. Goodwin & Speedie (2008) estimated the Northern Ireland population to be approximately 387 individuals, during the month of July. As part of the Irish Cetacean Review 2000-2009 (Berrow *et al.* 2010), a summary of land based sightings from Portmuck, situated on the northeast side of Islandmagee provides relevant information on the cetaceans that may be present in the area of the Blocks. Since December 2003 a total of 67 watches were carried out with a total of 69 sightings recorded, mainly harbour porpoise (93%). Harbour porpoise were recorded on between 67 and 100% of watches carried out each year and were recorded in all months.

6.4.1.7 Consideration

Simple calculations of sound propagation[21] can be made to estimate the likely maximum received sound levels at the boundaries of relevant sites should a typical 2D seismic survey occur in any one of the Blocks applied for; the results of these are presented in Table 6.2.

A number of the Blocks are within or adjacent to The Maidens cSAC and therefore a proposed 2D seismic survey in the Blocks could have a potential adverse effect on the integrity of the site, and possibly undermine conservation objectives with respect to the Annex II qualifying species feature grey seal. From Table 6.1, the range within which auditory damage to seals could occur is 63m of the seismic operations (assuming modified cylindrical spreading). The onset of significant behavioural disturbance resulting from a single pulse (i.e. TTS-onset) is estimated to occur within 159m. Whilst the survey location has yet to be defined, these ranges represent a very small proportion (0.013% for auditory damage and 0.08% for behavioural disturbance) of the total area of the site (9,784.8ha). There is limited information available on the distribution of grey seals in and around the site.

In the case of the Skerries and Causeway cSAC, Strangford Lough SAC, Murlough SAC, Treshnish Isles SAC and Eileanan agus Sgeiran Lios mór SAC, land barriers between the sites and Blocks applied for preclude tangible simple calculations of direct linear range and received noise levels within the sites. However, to inform the assessment the minimum distance between the Blocks and the sites has been used to provide general estimates of received sound levels at the sites (Table 6.2).

Table 6.2 indicates that with the exception of The Maidens cSAC, which is within some of the Blocks, the other sites for which there are relevant qualifying marine mammal species are a sufficient distance from the Blocks that the received sound levels will be considerably lower than the injury criteria proposed by Southall *et al.* (2007). The received levels will be below the inury criteria in cetaceans for both pulsed and non-pulsed sounds, and below those proposed for the

[21] Most environmental assessments of noise disturbance use simple spherical propagation models of the form SPL = SL – 20log(R), where SL = source level, R = source-receiver range, to predict sound pressure levels (SPL) at varying distances from source. Cylindrical spreading, SPL = SL – 10log(R), is usually assumed in shallow water, depth <R, where reflection of high frequency signals from the seabed results in approximately cylindrical propagation and therefore higher received spectrum levels than for spherically propagated low frequency signals (which penetrate the seabed). Given the large area covered by the AA and the varied water depths within it, an intermediate spreading model, SPL = SL – 15log(R) has been used to inform the consideration (see Figure 5.2 in OESEA2 Environmental Report). Attenuation of signal with distance is frequency dependent, with stronger attenuation of higher frequencies with increasing distance from the source due to a combination of reflection from sub-surface geological boundaries, sub-surface transmission loss due to frictional dissipation and heat; and scattering within the water column and sub-surface resulting from reflection, refraction and diffraction in the propagating medium. Frequency dependence due to destructive interference also forms an important part of the weakening of a noise signal.

onset of TTS for pulsed sounds in cetaceans (Southall *et al.* 2007), and the MTTS postulated for pulsed sounds in harbour porpoise (Lucke *et al.* 2007). For example, the minimum direct linear range from the Skerries and Causeway cSAC boundary to the nearest Block (125/30) is approximately 28km, giving a propagation loss (assuming 15logR) of around 67dB, or a received sound level of 163dB re 1μPa p-p for a typical seismic survey (Table 6.2).

Table 6.2: Estimated received sound levels in relevant sites associated with a typical seismic survey

Site	Relevant qualifying Annex II species	Minimum distance (km)	Received sound level (dB re 1μPa peak-to-peak)
The Maidens cSAC	Grey seal	Within or adjacent to Blocks 126/26, 111/1 & 111/2	See text above (PTS-onset within 63m TTS-onset within 159m)
Skerries and Causeway cSAC	Harbour porpoise	28km from 125/30	163
Strangford Lough SAC	Harbour seal	39km from 111/7	161
Murlough SAC	Harbour seal	44km from 111/7	160
South-East Islay Skerries SAC	Harbour seal	51km from 125/30	159
Eileanan agus Sgeiran Lios mór SAC	Harbour seal	147km from 125/30	152
Treshnish Isles SAC	Grey seal	148km from 125/30	152

Note: Assumes a source level of 250dB re 1μPa peak-to-peak, a correction factor of -20dB to compensate for horizontal array effects, and a propagation loss of 15log(R). Figures are rounded to the nearest whole number. Minimum straight line distance from the nearest Block to the site.

Deep geological seismic survey occurring in the proposed licence Blocks will be audible to seals over a large area of the coastal waters of Northern Ireland (low to localised areas of high usage) and south western Scotland (moderate to very high usage) (see Figure 6.2). Noise levels suggested to cause auditory damage in seals are rapidly attenuated with distance from source, and would with the exception of The Maidens cSAC, not propagate into the other relevant SACs and have very limited potential for spatial overlap with seals foraging beyond the boundary of the SACs. Furthermore, distances over which hearing damage may occur are well within the effective range of the mitigation measures which would be employed to minimise disturbance to marine mammals (see Section 6.5). Additionally, any future seismic survey plans would be subject to an extensive source- and site-specific assessment of the potential for adverse effects, including HRA, where necessary.

If significant ecological effects on prey species were to occur, even at considerable distances from the SACs, these may influence the breeding population of the site. However, noise levels suggested to cause injury to fish (the primary prey species of seals) would not extend beyond a few tens of metres around the noise source. The range over which non-injurious disturbance effects on fish might occur is not possible to define, although available evidence suggests that the extent of any such disturbance of prey is highly unlikely to undermine the conservation objectives in relation to grey and harbour seals from relevant SACs in the region (e.g. affect the distribution of the species within the sites, result in significant disturbance to the species or affect the viability of the population).

Periods of concern for seismic survey have been identified for Blocks 111/1, 111/2, 111/7 and 126/26 between February and June with respect to fish spawning. There is a presumption of refusal for the activity concerned during these periods. However, it may be possible to agree

appropriate mitigation measures at the project level to minimise potential adverse effects, and enable a waiver to be granted for the operations to proceed.

Noise levels associated with other activities potentially resulting from licensing of the Blocks such as rig site survey, VSP, drilling, vessel movements, pipe-laying operations, are of a considerably lower magnitude than those resulting from a deep geological seismic survey, and are not expected to have an adverse effect on the integrity of the SAC sites.

6.4.2 Migratory fish

The potential for acoustic disturbance effects was identified for the following riverine SACs due to their proximity to the Northern Ireland Blocks and the presence of Atlantic salmon as a qualifying feature: River Faughan and Tributaries SCI, River Foyle and Tributaries SAC, Owenkillew River SAC, River Roe and Tributaries SAC, River Bladnoch SAC, Endrick Water (SAC), River Eden SAC, River Derwent and Bassenthwaite Lake SAC, River Ehen SAC and River Finn SAC (Republic of Ireland). Salmonids play a critical role in the life cycle of the freshwater pearl mussel *Margaritifera margaritifera*, which is also a qualifying feature in the Upper Ballinderry River SAC, Owenkillew River SAC, River Ehen SAC and River Kent SAC. Any potential impacts on viability of the Atlantic salmon population, its distribution or supporting habitats, should also be considered in the context of the freshwater pearl mussel.

Atlantic salmon leave rivers to enter the marine environment during spring-summer as smolts, before migrating to feeding areas in Nordic Seas and West Greenland (Malcolm *et al.* 2010). Following 1-3 years at sea, adult salmon return to their home rivers primarily during summer months. Due to their low densities offshore and the highly localised range of noise levels likely to cause injury to fish, the potential for acoustic disturbance effects is restricted to disruption to their migration from, and principally to, the designated rivers. The potential for impact can be mitigated through timing of seismic survey to avoid the period of peak salmon entry into the rivers and consequently avoid undermining the conservation objectives in relation to both Atlantic salmon, and by association, the freshwater pearl mussel. No Blocks are located close to the entrance of the relevant sites and therefore seismic survey activities are not expected to have an adverse effect on the integrity of the SACs.

The Solway Firth, River Eden and River Derwent and Bassenthwaite Lake SACs maintain populations of river and sea lamprey. Significant propagation of underwater noise into shallow enclosed and semi-enclosed bays and estuaries is not expected, and therefore the potential for effects is restricted to lamprey which use marine areas. As with other qualifying anadromous species, the potential for impact can be mitigated through timing of seismic survey to avoid the migratory periods of lamprey entry into the rivers and consequently significant disturbance to this qualifying feature can be avoided.

Noise levels associated with other activities potentially resulting from licensing of the Blocks such as rig site survey, VSP, drilling and vessel movements, are of a considerably lower magnitude than those resulting from a deep geological seismic survey, and are not expected to have an adverse effect on the integrity of the riverine SACs.

6.4.3 Adjacent waters SACs

The potential for acoustic disturbance effects was identified for the Horn Head and Rinclevan SAC due to presence of grey seal as a qualifying Annex II species. Land barriers between the site and the Blocks applied for preclude a simple calculation of direct linear range and received noise levels within the site. However, to inform the assessment the minimum distance between the Blocks and the site has been used to provide a general estimate of received sound level at

the site. The minimum distance from the SAC boundary to the nearest Block (125/30) is approximately 118km, giving a received sound level of 154dB re 1μPa p-p for a typical seismic survey. This level is considerably lower than the injury criteria proposed by Southall *et al.* (2007) in pinnipeds for both pulsed and non-pulsed sounds, and also below those proposed for the onset of TTS (postulated as significant behavioural disturbance) for pulsed sounds.

Noise levels associated with other activities potentially resulting from licensing of the Blocks such as rig site survey, VSP, drilling and vessel movements, are of a considerably lower magnitude than those resulting from a deep geological seismic survey, and are not expected to have an adverse effect on the integrity of the SAC site in adjacent waters.

6.4.4 Consideration against Conservation Objectives

Table 6.3 provides a consideration of the potential acoustic impacts associated with the Block work programmes and the conservation objectives of relevant sites.

6.5 Regulation and mitigation

Both planning and operational controls cover acoustic disturbance resulting from activities on the UKCS, specifically including geophysical surveying and pile-driving. Application for consent to conduct seismic and other geophysical surveys is made to DECC using *Petroleum Operations Notice No 14* (PON14) which may be supported by an Environmental Assessment to enable an accurate assessment of the environmental effects of the survey (see Figure 2.3). Consultations with Government Departments and other interested parties are conducted as standard prior to issuing consent, and JNCC, Cefas (and possibly others) may request additional risk assessment, specify timing or other constraints, or advise against consent. Any proposed activity with a potentially significant acoustic impact on a designated SAC or SPA would also be subject to the requirement for HRA.

All seismic surveys in the UK are required as part of consent to adhere to JNCC's *Guidelines for minimising the risk of disturbance and injury to marine mammals from seismic surveys* (August 2010 revision reflects 2009 amendments to the *Conservation (Natural Habitats, &c.) Regulations 1995 (Northern Ireland)* and the *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (Offshore Marine Regulation*s, as amended in 2009 and 2010). It is a condition of consents issued under Regulation 4 of the *Petroleum Activities (Conservation of Habitats) Regulations 2001* (& 2007 Amendments) for oil and gas related seismic surveys that the JNCC Seismic Guidelines are followed. European Protected Species (EPS) disturbance licences can also be issued under the *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007*.

Table 6.3: Consideration of potential acoustic impacts and relevant site conservation objectives

Relevant sites	Relevant qualifying features	Relevant Blocks	Consideration against conservation objectives (see Appendix C)
SACs for marine mammals			
The Maidens cSAC	Grey seal	All Blocks	**Conservation objectives:** To avoid deterioration of the qualifying habitats and species thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term, subject to natural change: • Extent of the habitats on site • Distribution of the habitats within the site • Structure and function of the habitats • Processes supporting the habitats • Distribution of typical species of the habitats • Viability of typical species as components of the habitat • No disturbance of typical species of the habitat **Geophysical survey – 2D seismic, rig site survey, VSP** The telemetry data in Figure 6.2 did not include grey seals from the Northern Ireland management unit and this represents a significant data gap. Seals are likely to be present over the blocks, within and outside the site. There is therefore the potential to disturb individuals foraging around the blocks. The likelihood and scale of impact will be determined by the nature, location and timing of activities which are currently unknown. **Additional mitigation** With respect to the relevant Blocks, DECC will expect the operator to provide sufficient information on the potential impact of the proposed activity on the qualifying site in the application. Based on the advice from SNCBs, DECC may undertake an HRA to determine whether the proposals will have an adverse impact on the site integrity that would undermine the site conservation objectives. Depending on the outcome of the assessment, DECC may require additional mitigation measures or refuse consent.

The guidelines require visual monitoring of the area by a dedicated Marine Mammal Observer (MMO) prior to seismic survey being undertaken to determine if cetaceans are in the vicinity, and a slow and progressive build-up of sound to enable animals to move away from the source. Passive Acoustic Monitoring (PAM) may also be required. Seismic operators are required, as part of the application process, to justify that their proposed activity is not likely to cause a disturbance etc. under the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* (as amended) and *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007* (as amended). This assessment should consider all operational activities including shooting during hours of darkness or in poor visibility.

In their latest guidelines, JNCC (2010) advise that operators adopt mitigation measures which are appropriate to minimise the risk of an injury or disturbance offence[22] and stipulate, whenever possible, the implementation of several best practice measures, including:

- If marine mammals are likely to be in the area, only commence seismic activities during the hours of daylight when visual mitigation using Marine Mammal Observers (MMOs) is possible.

- Only commence seismic activities during the hours of darkness, or low visibility, or during periods when the sea state is not conducive to visual mitigation, if a Passive Acoustic Monitoring (PAM) system is in use to detect marine mammals likely to be in the area, noting the limitations of available PAM technology (seismic surveys that commence during periods of darkness, or low visibility, or during periods when the observation conditions are not conducive to visual mitigation, could pose a risk of committing an injury offence).

- Plan surveys so that the timing will reduce the likelihood of encounters with marine mammals. For example, this might be an important consideration in certain areas/times, e.g. during seal pupping periods near Special Areas of Conservation for harbour seals or grey seals.

- Provide trained MMOs to implement the JNCC guidelines.

- Use the lowest practicable power levels to achieve the geophysical objectives of the survey.

- Seek methods to reduce and/or baffle unnecessary high frequency noise produced by the airguns (this would also be relevant for other acoustic energy sources).

Like any offshore activity, seismic surveys are considered on a case-by-case basis, and DECC have the discretion to issue consents with conditions specific to activity taking place and the sensitivities within the area.

Passive acoustic monitoring (PAM) may be used as a mitigation tool where JNCC and country conservation agencies deem it appropriate. Periods of seasonal concern for seismic survey are also identified for a number of Blocks considered in this AA (see Table 2.2), for which there would be a presumption against such activity taking place.

[22] Defined under Regulation 39 1(a) and 1(b) (respectively) of the *Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007* (as amended).

In addition to marine mammal sensitivities, disturbance to populations of Atlantic salmon and other qualifying anadromous species can be mitigated through timing of seismic survey to avoid migratory periods and consequently significant disturbance can be avoided. In particular JNCC[23] highlight the sensitive post-smolt migration period for Atlantic salmon between April and May, and that mitigation, including a presumption against seismic survey at this time, is considered.

Though not constituting mitigation, it should be noted that targets associated with the noise descriptor for Good Environmental Status (GES) under the Marine Strategy Framework Directive (MSFD) were subject to consultation by Defra in March 2012 (HM Government 2012a), and may have wider implications for how noise is managed in UK waters in the coming years (see Section 8.1 for more information).

6.6 Conclusions

Significant effects arising from acoustic disturbance were only considered possible for SACs with marine mammals and fish as a primary or secondary feature. Although seismic survey, drilling and other oil industry noise is detectable by marine mammals, waterbirds and their prey, there is no evidence that such noise presents a risk to the viability of populations in UK waters and specifically not within designated Natura 2000 sites (see Defra (2010). This would require direct mortality, behavioural response with implications for reproductive success (e.g. disturbance at fixed breeding locations) or reduced long-term ecological viability (e.g. sustained displacement from foraging grounds). In the localised areas of Natura 2000 sites designated for marine mammals, acoustic disturbance from seismic resulting from proposed licensing would be intermittent and there is no evidence that cumulative effects of previous survey effort have been adverse. Despite considerable scientific effort, no causal link, or reasonable concern in relation to population viability has been found.

For the Northern Ireland Blocks under consideration, calculations considering the direct linear range to the SAC boundaries and the source level of a typical seismic survey suggest that received noise levels within relevant SACs will fall below relevant effects criteria as defined by Southall *et al*. (2007). A number of the Blocks are within or adjacent to The Maidens cSAC and whilst the exact survey location has yet to be defined, the range within which auditory damage and significant behavioural disturbance could occur represents a very small proportion (0.013% for auditory damage and 0.08% for behavioural disturbance) of the total area of the site.

Bearing in mind the information presented above and in the Appendices, it is concluded at the currently available level of definition, the proposed licensing of the Blocks would not be expected to cause an adverse effect on the integrity of the relevant sites, taking account of the following:

- Should a 2D seismic survey be proposed in the Northern Ireland Blocks (as indicated by the work programme), or a rig site and/or VSP survey be undertaken as part of proposed drilling operations, further HRA may be required to assess the potential for adverse effects on the integrity of sites once the area of survey, source size, timing and proposed mitigation measures are known and can form the basis for a definitive assessment. It is considered reasonable to conclude that no adverse effects on the integrity of other SACs in the vicinity of the Blocks will result.

[23] JNCC's response to the 26th and 27th Seaward licensing Round.

- The utilisation of areas outside the designated SAC boundaries is not well understood, but the known extensive range of grey and harbour seals, and available population monitoring indicates that neither previous activities, nor those associated with proposed licensing will undermine the conservation objectives of qualifying species.

- Individual activities (e.g. drilling, seismic) require individual consents which will not be granted unless the operator can demonstrate that the proposed activities which may include a 2D seismic survey will not adversely affect the site integrity of relevant sites. These activities will be subject to activity level EIA and HRA (where appropriate).

7 Consideration of potential effects from oil spills on relevant sites

7.1 Overview of spill effects and context

Oil spills can have potentially adverse environmental effects, and are accordingly controlled by a legal framework aimed at minimising their occurrence, providing for contingency planning, response and clean up, and which enables prosecutions. It is not credible to conclude that an oil spill will never occur as a result of 27th Round licensing, in spite of the regulatory controls and other preventative measures in place.

In April 2010, a major incident occurred in the US Gulf of Mexico. During drilling of an exploratory well in deep water approximately 50 miles offshore Louisiana, there was an explosion and fire on the semi-submersible drilling rig, Deepwater Horizon. The rig was drilling in a water depth of 5,000ft with the oil reservoir at 18,000ft. Several reports into the cause of the incident and implications for activities on the UKCS have been produced, with a number of recommendations being integrated into UK guidance (e.g. DECC 2012b). As part of the investigation UK regulators contacted their counterparts in the United States (the Bureau of Ocean Energy Management, Regulation, and Enforcement - BOEMRE) to understand the cause of the incident and whether there were implications for safety at offshore operations on the UK continental shelf. The independent, UK based, Maitland review panel (Maitland 2011) evaluated the recommendations emerging from these reports and considered their relevance to the oil and gas industry on the UKCS. They assessed to what extent modifications or improvements to the UK regulatory regime could be informed by lessons learnt from the Deepwater Horizon incident.

DECC (along with other parts of government) have considered the implications of these various findings and implemented a series of actions in response.

The Health and Safety Executive (HSE) is responsible for regulating the risks to health and safety arising from work in the offshore industry on the UKCS. Inspectors from HSE's Offshore Division undertake offshore inspections of well control/integrity arrangements and related safety issues, and also review well designs and procedures. In the UK a safety case regime exists with specific safeguards including:

- The *Offshore Installations (Safety Case) Regulations 2005* require written safety cases and risk assessments to be prepared by the operator, and then approved by HSE, for all mobile offshore drilling rigs operating in the UK.

- A system of well notification, where the HSE reviews well design and procedures.
- A requirement for the design and construction of a well to be examined by an independent and competent specialist.
- A scheme of independent verification of offshore safety critical equipment such as blowout preventers to ensure they are fit for purpose.
- Checks that workers involved in well operations have received suitable information, instruction, training and supervision.
- Offshore inspections of well control and integrity arrangements, and related safety issues, by specialist inspectors from HSE's Offshore Division.
- Weekly drilling reports submitted to HSE by operators.

A review has been carried out by DECC[24] which has found that the existing system is fit for purpose, but in light of the Deepwater Horizon spill the regime is being strengthened further:

1. DECC has increased the oversight of drilling operations through the recruitment of additional 'offshore environmental' inspectors in its Aberdeen office. This has increased the number of annual environmental inspections of mobile drilling rigs.

2. In light of the Gulf of Mexico incident, DECC has reviewed the indemnity and insurance requirements for operating in the UK Continental Shelf.

3. Industry trade association Oil and Gas UK established a group comprised of regulators, industry and trade union representatives (the Oil Spill Prevention and Response Advisory Group - OSPRAG) to examine the UK's strengths and weaknesses in responding to a Gulf like incident. OSPRAG was active for 16 months, before reaching conclusions that recommended the setting up of a number of bodies with responsibility for ensuring drilling operations in UK waters remain robust and fit for purpose. The Oil Spill Response Forum (under guidance of Oil and Gas UK) will keep the oil spill toolkit, including subsea dispersants and spill modelling, under review. The Well Life Cycle Practices Forum will have responsibility for drilling and well engineering management functions. Regular interaction between Oil and Gas UK and OPOL (Offshore Pollution Liability Association Limited) will be maintained to exchange views on financial responsibilities. Additionally, in June 2012, Oil and Gas UK issued draft guidelines on financial responsibility for well operations in the UKCS, including assessment methodology for potential costs of well control, pollution remediation and compensation.

4. In May 2011 exercise 'Sula' was undertaken to test the UK's capacity to respond to a deepwater drilling related oil spill to the West of Shetland. A tier 2/3 deployment demonstration took place in Sullom Voe, Shetland alongside a separate Emergency Equipment Response Deployment (EERD), designed to test the dispersion of free flowing oil from a well, clearing of a well head of debris and the placement of a capping device to close

[24] See: DECC (2012). Offshore Oil & Gas in the UK: Government Response to an Independent Review of the Regulatory Regime, December 2012.

off the flow from a well. An independent assessment of the deployments concluded that the ability to deploy all the equipment mobilised for the exercises (including surveillance equipment, aerial and surface dispersant application, containment and recovery and shoreline response) was proven and all the onshore equipment was seen in fully operational conditions with the oil spill response team fully conversant in its use.

5. DECC has issued letters (dated: 23rd December 2010, 21st July 2011, 20th September 2011) to all UK operators specifying a number of requirements and expectations regarding oil pollution prevention, response, emergency plans and consenting. These were combined in supplementary guidance issued by DECC[25] with OPEP guidance updated in July 2012[26].

6. The EU has asked companies operating in EU waters to provide assurances that they are ensuring safe practice and that they are able to take on full responsibilities for environmental and other damage if an incident were to occur.

The potential for oil spills associated with exploration and production, the consequences of accidental spillages, and the prevention, mitigation and response measures implemented have been assessed and reviewed in successive SEAs covering the UKCS area under consideration in the 27th Round, including the recent Offshore Energy SEA2. Previous SEAs have concluded that given the UK regulatory framework and available mitigation and response, in relation to objective risk criteria (such as existing exposure to risk as a result of shipping), the incremental risk associated with exploration and production (E&P) is moderate or low.

A large number of site- and activity-specific risk assessments have also been carried out as a component of Environmental Assessments and under the relevant legislation implementing the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) (see the *Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation Convention) Regulations 1998*).

The following section provides a high-level overview of risks, regulation, contingency planning and response capabilities; followed by an assessment of risks presented to relevant sites (Section 7.3) by activities resulting from the proposed licensing of the 5 Blocks in the 27th Round. As risks tend to be generic between sites, these have been categorised based on ecological sensitivity and an evaluation of spill probability and severity.

7.2 Spill risk

Risk assessment, under the terms of OPRC, includes considerations of probability and consequence, generally comprising an evaluation of: historical spill scenarios and frequency, fate of spilled oil, trajectory of any surface slick, and potential ecological effects. These considerations are discussed below.

The nature and extent of any hydrocarbons in the Northern Ireland Blocks is currently unknown as to date no hydrocarbons have been discovered by the limited drilling in the region. For the

[25] DECC website https://www.gov.uk/oil-and-gas-offshore-environmental-legislation#supplementary-guidance-issued-following-the-deepwater-horizon-incident

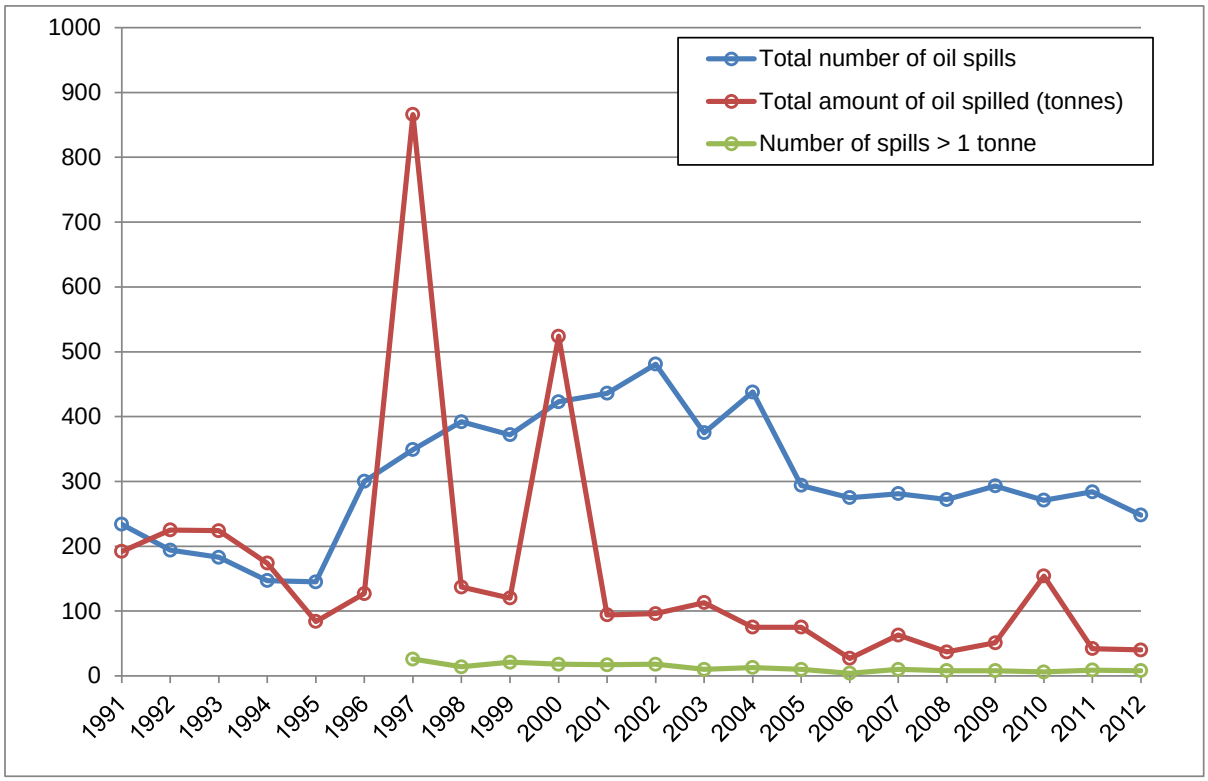
[26] Guidance notes to operators of UK offshore oil and gas installations (including pipelines) on Oil Pollution Emergency Plan requirements https://www.gov.uk/oil-and-gas-offshore-emergency-response-legislation

purposes of the consideration of the potential effects of spills, it has been assumed that any hydrocarbons from the Blocks would be oil.

7.2.1 Historical spill scenarios and frequency

Oil spills on the UKCS have been subject to statutory reporting since 1974 under PON1 (formerly under CSON7); annual summaries of which were initially published in the "Brown Book" series, now superseded by on-line data available from the DECC website[27] (Figure 7.1). Discharges, spills and emissions data from offshore installations are also reported by OSPAR (e.g. OSPAR 2009).

Figure 7.1: Number and volume of reported oil spills from UKCS oil and gas installations over the period 1991-2012



Source: DECC website

DECC data indicates that the most frequent types of spill from mobile drilling rigs have been organic phase drilling fluids (and base oil), diesel and crude oil. Topsides couplings, valves and tank overflows; and infield flowlines and risers are the most frequent sources of spills from production operations, with most spills being <1 tonne. A large proportion of reported oil spills in recent years (since about 1990) have resulted from process upsets (leading to excess oil in produced water). Estimated spill risk from UKCS subsea facilities was equivalent to a risk of 0.003 spills/year for an individual facility, with almost all reported spills less than a tonne (<5bbl) in size.

[27] Oil and chemical discharge notifications (accessed September 2013) https://www.gov.uk/oil-and-gas-uk-field-data#oil-spills

Collisions between vessels and installations on the UKCS resulting in the spillage of significant quantities have oil have been few. Historical data (HSE 2003, OGP 2010) reveals that despite a significant increase in the number of offshore platforms and the use of mobile rigs on the UKCS, the mean incident frequency (i.e. a collision, irrespective of magnitude) over the period 1975-2001 has reduced, with data since 1995 showing a frequency of ~0.05 incidents per installation (fixed, floating and jack-up), per year. When just considering moderate to severe incidence frequency for all installations, this reduces to almost zero (1989-2001). The vast majority of incidents (~96%, UKOOA 2003) involved in-field vessels (particularly supply and standby vessels), with relatively few being related to passing traffic. See section 7.4 for related mitigation.

Well control incidents (i.e. "blowouts" involving uncontrolled flow of fluids from a wellbore or wellhead) have been too infrequent on the UKCS for a meaningful analysis of frequency based on historic UKCS data. A review of blowout frequencies cited in UKCS Environmental Statements as part of the OESEA2 gives occurrence values in the range 1/1,000-10,000 well-years. Accident statistics for offshore units on the UKCS (Oil and Gas UK 2009), indicated an annual average frequency of blowouts for mobile drilling units of 6.6×10^{-3} for the period between 2000 and 2007.

An annual review of reported oil and chemical spills in the UKCS – covering both vessels and offshore installations – is made on behalf of the Maritime and Coastguard Agency (MCA) by the Advisory Committee on Protection of the Sea (e.g. Dixon 2012). This includes all spills reported by POLREP reports by the MCA and PON1 reports to DECC – note that notifications of releases through the PON1 process are now being published on the DECC website on a monthly basis[28]. The review noted a 19.9% increase was evident in the total number of reports by offshore oil and gas installations during 2011, however further analysis indicated that reports of the number of oil spills from offshore oil and gas installations during 2011 was the same number as the mean annual total reported between 2000 and 2010. Of these releases, 62.9% were fuel, lubrication or hydraulic oils; additionally, of the discharges with volume information, 93% were less than 455 litres.

Since the mid-1990s, the reported number of spills has increased (Figure 7.1) consistent with more rigorous reporting of very minor incidents (e.g. the smallest reported spill in 2012 was 0.000001 tonnes). However, the underlying trend in spill quantity (excluding specifically-identified large spills – for instance responsible for peak in total oil discharged in 2010) suggests a consistent annual average of around 100 tonnes. In comparison, oil discharged with produced water from the UKCS in 2012 totalled 2,248 tonnes (DECC website[29]).

Historic major spill events from UKCS production facilities include the 1986 Claymore pipeline leak (estimated 3,000 tonnes), 1988 Piper Alpha explosion (1,000 tonnes), 1996 Captain spill (685 tonnes), and 2000 Hutton TLP spill (450 tonnes). Although potentially significant at a local scale, these volumes are minor when compared to other inputs of oil to the marine environment, such as riverine inputs (OSPAR 2000).

Following the recent gas release and evacuation of personnel from Total E&P UK's Elgin production facilities, DECC convened a Government Interest Group (GIG) to enable interested

[28] https://www.gov.uk/oil-and-gas-uk-field-data#oil-spills
[29] Oil discharged with produced water 2005-2012
https://www.gov.uk/oil-and-gas-uk-field-data#oil-discharged-with-produced-water

parties, such as DECC, the Secretary of State's Representative, the Health and Safety Executive, the Scottish Government and the Maritime and Coastguard Agency, to share information about the incident and to discuss issues such as the operator's plans to stop the release. A GIG update[30] with respect to the environmental aspects of the incident indicated that the vast majority of the release from the 2012 Elgin field blowout was methane gas to atmosphere, but some of the condensate affected the sea surface resulting in a silvery sheen with occasional smaller patches of brown weathered material extending over some 5km^2 (DECC 2012c).

7.2.2 Trajectory and fate of spilled oil

The main oil weathering processes following a surface oil spill are spreading, evaporation, dispersion, emulsification, dissolution, oxidation, sedimentation and biodegradation. The anticipated reservoir hydrocarbon type in the Northern Ireland Blocks is unknown, therefore the potential risk of spills of crude oil must be considered. The persistence of spilled crude oil depends on the characteristics of the oil, but typically is of the order of days to weeks. Diesel spills generally evaporate and disperse without the need for intervention. A major diesel spill of approximately 1,000 tonnes would disperse naturally in about 8 hours and travel some 24km in conditions of a constant unidirectional 30 knot wind.

With respect to the recent Elgin gas release, the observed sea surface contamination (described above) was in line with modelling data derived for potential condensate spills, which predicted that there would be an equilibrium point when input was matched by natural loss as a result of evaporation and dispersion in the water column, with approximately 50% of the condensate evaporating within approximately 24 hours under conditions relevant to the Elgin release. The brown weathered material also appeared to disperse naturally and, during periods when the wind strength and wave height increased, this enhanced dispersion of the condensate and weathered material in the water column, reducing the quantity of material remaining on the sea surface (DECC 2012c).

Coincident with these weathering processes, surface and dispersed oil will be transported as a result of tidal (and other) currents, wind and wave action. Generally, the slick front will be wind-driven on a vector equivalent to current velocity plus approximately 3% of wind velocity. Although strong winds can come from any direction and in any season, the predominant winds are from between the south and north west which for the Northern Ireland Blocks would push spilled oil towards the west coast of Scotland and to the south into the Irish Sea. Local wind forcing rather than tidal or density driven flow is the principal driving mechanism for flow through the North Channel (Knight & Howarth 1999) with the largest transports generated by along-channel winds. Detailed measurement of currents across the North Channel (e.g. Knight & Howarth 1999) have shown that there is significant horizontal variability in the North Channel, with a long-term persistent southerly flow on the western side of the channel that can transport Atlantic water into the Irish Sea (Edwards *et al*. 1986). The strongest mean surface outflow was close to the Mull of Galloway, inshore of the Beaufort's Dyke, with current speeds up to 0.15ms^{-1}. This flow through the North Channel forms the basis for the Scottish Coastal Current which flows northward past the west coast of Scotland (Howarth 2005).

[30] National Archives website – http://webarchive.nationalarchives.gov.uk/20121217150421/http://og.decc.gov.uk/en/olgs/cms/environment/about_the_offs/elgin_gig/elgin_gig.aspx

Waves and turbulence at the sea surface can cause all or part of a slick to break up into fragments and droplets of varying sizes. These become mixed into the upper levels of the water column. Some of the smaller droplets will remain suspended in the sea water while larger ones will tend to rise back to the surface, where they may either coalesce with other droplets to reform a slick or spread out to form a very thin film. The oil that remains suspended in the water has a greater surface area than before dispersion occurred. This encourages other natural processes such as dissolution, biodegradation and sedimentation to occur. The speed at which an oil disperses is largely dependent upon the nature of the oil and the sea state, and occurs most quickly if the oil is light and of low viscosity and if the sea is very rough (ITOPF website[31]).

Given the proximity of the Blocks to the Northern Ireland coast, much of the Antrim and Down coast would be potentially vulnerable to an oil spill. To support environmental assessments of individual drilling or development projects, modelling is carried out for a major crude oil release, corresponding to a blowout (i.e. a worst case scenario based on expected well flow rates and nature of the crude oil, however unlikely that scenario might be), and for smaller diesel or fuel oil releases based on the bunkering capacity of facilities, which are expected to be less persistent. Also in response to the Deepwater Horizon spill, operators are required to consider and provide evidence of planning for the eventuality that a relief well may need to be drilled (e.g. time to acquire a suitable rig, time to drill the well etc.). Representative modelling cases from various parts of the UKCS have been reviewed by successive SEAs.

7.2.3 Potential ecological effects

The most vulnerable components of the ecosystem to oil spills in offshore and coastal environments are seabirds and marine mammals, due to their close association with the sea surface. Seabirds are affected by oil pollution in several ways, including oiling of plumage resulting in the loss of insulating properties and the ingestion of oil during preening. Pollution of the sea by oil, predominantly from merchant shipping, can be a major cause of seabird mortality. Although locally important numbers of birds have been killed on the UKCS directly by oil spills from tankers, for example common scoter off Milford Haven following the Sea Empress spill in 1996, population recovery has generally been rapid.

The Offshore Vulnerability Index (OVI) developed by JNCC (Williams *et al*. 1994) is used to assess the vulnerability of bird species to surface pollution; it considers four factors:

- the amount of time spent on the water
- total biogeographical population
- reliance on the marine environment
- potential rate of population recovery

Vulnerability scores for offshore areas (see Table 7.1 below) are determined by combining the density of each species of bird present with its vulnerability index score. Of the species commonly present offshore in UK offshore waters, gannet, skuas and auk species (e.g. SPA sites with relevant qualifying species include Rathlin Island and Ailsa Craig) may be considered

[31] International Tanker Owners Pollution Federation (ITOPF) website http://www.itopf.com/marine-spills/fate/weathering-process/

to be most vulnerable to oil pollution due to a combination of heavy reliance on the marine environment, low breeding output with a long period of immaturity before breeding, and the regional presence of a large percentage of the biogeographic population. In contrast, the aerial habits of the fulmar and gulls, together with large populations and widespread distribution, reduce vulnerability of these species. Vulnerability is seasonal, with a general trend of very high vulnerability in coastal areas adjacent to colonies during the breeding season through to autumn. In winter, vulnerability in inshore waters can also be high in some areas.

Table 7.1: Monthly seabird vulnerability to surface pollution in relevant 27th Round and adjacent Blocks

Block	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Overall
125/25	3	2	2	3	1	1	1	1	1	2	1	1	1
126/21	3	2	2	3	1	1	1	1	1	2	1	1	1
126/22	3	2	2	3	1	1	1	1	1	2	1	1	1
125/30	3	2	2	3	1	1	1	1	1	2	2	2	1
126/26	3	2	2	3	1	1	1	1	1	2	2	2	1
126/27	3	2	2	3	1	1	1	1	1	2	2	2	1
111/1	3	2	2	2	1	1	1	1	1	1	2	2	1
111/2	3	2	2	2	1	1	1	1	1	1	2	2	1
111/3	3	2	1	2	1	1	1	1	1	1	2	2	1
111/7	2	2	2	2	1	1	1	1	1	1	2	2	1
111/8	2	2	2	2	1	1	1	1	1	1	2	2	1

Note: 1 = very high, 2 = high, 3 = moderate, 4 = low.
Source: JNCC (1999).

Fortunately, there is little experience of major oil spills in the vicinity of seabird colonies in the UK. Census of seabird colonies in southwest Wales following the *Sea Empress* spill concluded that only guillemot and razorbill populations were impacted by the spill (Baines & Earl 1998). The *Sea Empress* spill occurred in February, when seabird numbers at colonies were relatively low, but the density of wintering birds including common scoter was high. Some species, particularly puffins, Manx shearwaters and storm petrels, had not returned to the area to breed and so avoided significant impact. Around 7,000 oiled birds were washed ashore following the spill, although it is likely that the total number of birds killed was several times higher than this (SEEEC 1998). Examination of seabird corpses suggested that most died directly from oil contamination rather than, for example, food chain effects. Over 90% of the oiled birds were of three species – common scoter, guillemot and razorbill. Counts of the breeding populations confirmed the impact on guillemots and razorbills. There were 13% fewer guillemots and 7% fewer razorbills counted at breeding colonies in the area in 1996 compared with 1995, while numbers for both species increased at nearby colonies. The SEEEC (1998) report concluded that by the 1997 breeding season, numbers had recovered significantly. Banks *et al*. (2008) report the results of annual surveys of common scoter within Carmarthen Bay, an area partially affected by the spilled oil. While numbers were greatly reduced following the spill, and changes in distribution suggested the use of potentially sub-optimal foraging zones, rapid revival was observed with numbers increasing to pre-spill levels and a return to previous distributions within three winters of the event. At ten years following the incident, numbers of common scoter were not different to those recorded immediately before the spill (Banks *et al*. 2008).

As the major breeding areas for most wildfowl and wader species are outside the UK (in the high Arctic for many species), population dynamics are largely controlled by factors including breeding success (largely related to short-term climate fluctuations, but also habitat loss and

degradation) and migration losses. Other significant factors include lemming abundance on Arctic breeding grounds (e.g. white-fronted goose). Variability in movements of wintering birds, associated with winter weather conditions in continental Europe, can also have a major influence on annual trends in UK numbers, as can variability in the staging stops of passage migrants.

Assessments are currently ongoing to document and quantify levels of injury and pathways of exposure for bird species resulting from the Deepwater Horizon incident. These assessments will use the results of aerial and beach bird surveys, alongside laboratory analysis and detailed modelling (Natural Resource Damage Assessment (NRDA) 2012).

Oil spill risks to marine mammals have been reviewed by successive SEAs[32] for previous licensing Rounds and their supporting technical reports (e.g. Hammond *et al*. 2008).

Generally, marine mammals are considered to be less vulnerable than seabirds to fouling by oil, but they are at risk from hydrocarbons and other chemicals that may evaporate from the surface of an oil slick at sea within the first few days, and any accidental ingestion or breathing of oily fumes could cause physiological stress (Law *et al.* 2011). Symptoms from acute exposure to volatile hydrocarbons include irritation to the eyes and lungs, lethargy, poor coordination and difficulty with breathing. Individuals may then drown as a result of these symptoms (Hammond *et al.* 2002).

The US National Oceanic and Atmospheric Administration (NOAA) reported a cetacean Unusual Mortality Event (UME)[33] in the northern Gulf of Mexico, with 754 cetacean strandings (5% stranded alive, 95% stranded dead) reported between 1st February 2010 and 15th July 2012 (NOAA Fisheries website[34]). This UME coincided with the Deepwater Horizon incident (April–August 2010) in the area, although 114 of the 754 strandings occurred prior to the blowout incident. An investigation is currently ongoing into the cause of the event, including direct or indirect effects of the Deepwater Horizon oil spill and clean up, although no definite cause or link has currently been identified (NOAA Fisheries website).

Grey and harbour seals come ashore regularly throughout the year between foraging trips and additionally spend significantly more time ashore during the moulting period (February-April in grey seals and August-September in harbour seals) and particularly the pupping season (October-December in grey seals and June-July in harbour seals). Animals most at risk from oil coming ashore on seal haulout sites and breeding colonies are neonatal pups, which rely on their prenatal fur and metabolic activity to achieve thermal balance during their first few weeks of life, and are therefore more susceptible than adults to external oil contamination.

Direct mortality of seals as a result of contaminant exposure associated with major oil spills has been reported, e.g. following the Exxon Valdez oil spill in Alaska in 1989. Animals exposed to oil over a period of time developed pathological conditions including brain lesions. Additional pup mortality was reported in areas of heavy oil contamination compared to un-oiled areas.

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

[33] An unusual mortality event (UME) is defined under the US Marine Mammal Protection Act 1972 (as amended) as: "a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response."

[34] NOOA Fisheries website (accessed October 2012) http://www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico2010.htm

Coastal otter populations are also vulnerable to fouling by oil, should it reach nearshore habitats. They are closely associated with the sea surface and reliant upon fur, rather than blubber, for insulation.

Benthic habitats and species may be sensitive to deposition of oil associated with sedimentation, or following chemical dispersion. The proportion of a surface spill that is deposited to the seabed might be expected to increase as a result of high turbulence and suspended solids concentrations in the water column, both associated with storm conditions in shallow water. Studies of macrobenthic infauna following the *Braer* spill (Kingston *et al*. 1995), which occurred under such conditions, found no significant changes in benthic community structure, as characterised by species richness, individual abundance and diversity, which could be related to the areas of seabed affected by the spill. This may have been because *Braer* oil was of low toxicity, or because the sampling programme was carried out too soon after the spill to enable the full effects of its impact to be detected. In recognition of this as part of the DECC SEA programme further sampling of the study area has been conducted, ten years after the spill, results from which have indicated a substantial decline in sediment hydrocarbon concentrations.

In contrast, evidence from the Florida barge spill (Buzzards Bay, Massachusetts, September 1969, in which 700m^3 of diesel fuel were released) suggests that in certain circumstances, contamination from oil spills could be long-term. Monitoring immediately following the spill suggested rapid recovery (reviewed by Teal & Howarth 1984), while subsequent studies (sampling in 1989) indicated that substantial biodegradation of aromatic hydrocarbons in saltmarsh sediments had occurred (Teal *et al.* 1992). However, thirty years after the spill, significant oil residues remain in deep anoxic and sulphate-depleted layers of local salt marsh sediments (Reddy *et al.* 2002, Peacock *et al.* 2005). The ecological consequences of this residual contamination are unclear, although there is potential for remobilisation of sediment-bound contaminants through bioturbation or storm events (in which case, aerobic biodegradation would be expected to be rapid).

A post spill damage assessment, remediation and restoration programme is currently underway in the Gulf of Mexico following the Deepwater Horizon event. Results from sampling in the 4 months after the stabilisation of the well showed no deposits of liquid phase oil from the spill in sub-surface sediments beyond the shoreline, although tar mats were present in shallow subtidal areas near the shore and there were traces of oil in deep-sea sediments within approximately 6 miles of the wellhead. The results found that within the 4 month period <1% of water samples and ~1% of sediment samples taken exceeded US environmental protection agency's aquatic life benchmarks for polycyclic aromatic hydrocarbons (PAH), with all of the samples exceeding the benchmark taken within 3km of the wellhead. There is evidence of dead or dying corals within two hard-bottomed coral communities *ca*. 5 and 11km from the wellhead respectively, although further interpretation and analysis of data is currently ongoing (NRDA 2012).

With respect to the recent Elgin gas release, sampling and monitoring programmes to date indicate that it is considered unlikely that the incident has had any significant impact on marine organisms in the water column, and likely that any impact on seabed marine organisms will be restricted to the area immediately surrounding the platform, an area that has already been impacted by routine discharges relating to previous drilling operations. Any hydrocarbons entering the water column would have been widely dispersed, and rapidly broken down by marine bacteria. Whilst the location and nature of the release, and the comparatively small area affected, indicated that the potential impact on marine mammals and seabirds was likely to be insignificant, Total have instructed a specialist contractor to undertake bespoke aerial surveys to

quantify and potentially identify any marine mammals or seabirds in a 200km^2 area around the Elgin facilities (DECC 2012c).

Those coastal and marine Annex I habitats which are most sensitive to oil spills are identified in Table 7.2, below. Generally, sheltered habitats of lower exposure to wave energy are considered most vulnerable; oil may persist for long periods in such environments.

7.3 Implications for relevant sites

The re-screening process (Appendix B) identified the potential for oil spill effects at relevant Natura 2000 sites. All sites where the potential for effects were identified are listed in detail in Appendix C. The identification of potential effects from oil spills on specific relevant sites considers the following factors:

- Oil spill probability and severity (taking into account distance from Blocks under offer, and probable hydrocarbon type)
- The ecological sensitivity of the qualifying feature(s) to oil spills
- Connected with the above, in what way an oil spill would have an immediate effect on the conservation objectives of SACs and SPAs as listed in Appendix C, and any long-term implications of a spill on these objectives

It should be noted that at a project level, DECC requirements for the preparation of OPEPs and ES submissions include, amongst other mitigation and response criteria, the modelling of a worst case blowout scenario considering a specific release location, crude oil type and historic metocean conditions as well as an unlikely 30 knot onshore wind, over a release time of 10 days. Detailed potential effects of an unmitigated release on Natura 2000 sites beyond a generic consideration would be considered at the project level.

7.3.1 Special Areas of Conservation

The ecological sensitivity of the qualifying features of relevant sites to oil spills varies and post-incident monitoring guidelines produced as part of the "PREMIAM: Pollution Response in Emergencies Marine Impact Assessment and Monitoring" project (Law *et al.* 2011), provide information on the sensitivity and vulnerability of relevant habitats and species. Additionally, where available Regulation 35 advice is provided on a site specific basis which considers the sensitivity of a given site to activities such as oil and gas exploration and production. For several Annex I habitats and Annex II species, it is considered that any potential source of effect is unlikely to degrade the qualifying habitat or habitat of species, or undermine the conservation objectives of related sites. These include:

- **Submerged reefs** – With respect to subtidal rock, the lack of substrata that could retain persistent oil contamination means that any impacts are only likely to be due to the acute effects of the dispersed oil, unless chronic oiling seeps down from an intertidal oil source. Generally considered unusual for notable quantities of dispersed oil from spills to reach depths greater than 10m, but there are known cases where this has happened (Law *et al.* 2011). Therefore not generally vulnerable to surface oil pollution, except possibly following application of chemical dispersants (generally not permitted in waters shallower than 20m). It is not expected that the extent, distribution or functioning of these habitats would be significantly affected, and therefore similarly, those of any species associated with, or relying on the functioning of these habitats.

- **Submerged sandbanks** - Dispersed oil in water and oil bound to shoreline sediments can make its way down to the seabed and contaminate subtidal sediments. Impacts to seabed sediment fauna have been described after a number of oil spills, but normally only in shallow depths where oil in water concentrations were particularly high or close to sandy beaches (Law *et al.* 2011). Therefore not generally vulnerable to surface oil pollution, except possibly following application of chemical dispersants (generally not permitted in waters shallower than 20m).

- **Lagoons, dunes** – sites above Mean High Water Springs are not generally vulnerable to surface oil pollution, except possibly to wind-blown oil or evaporated hydrocarbons. No cases of oil or chemical spills contaminating lagoons in UK or north-west Atlantic coasts have been found. Most UK lagoons are not very vulnerable to marine spills and their vulnerability will be dependent on the frequency and route by which seawater enters the lagoon. For those with narrow entrances, it is relatively simple to protect them by damming or booming (Law *et al.* 2011).

- **Sea cliffs, sea caves** – The vulnerability of rocky shores is mainly dependent on the wave exposure. Exposed rocky shores are normally considered to be one of the least vulnerable habitats to oil spills, because the oil is quickly removed by wave action. Sheltered rocky shores are often more vulnerable and sensitive, particularly if they include lots of rockpools and crevices (Law *et al*. 2011). It is not expected that the extent, distribution or functioning of these habitats would be significantly affected, and therefore similarly, those of any species associated with, or relying on the functioning of these habitats such that conservation status would be detrimentally affected.

- **Terrestrial and freshwater aquatic species –** effects on the conservation objectives of these species and their supporting habitats is essentially negated by their distribution, as these features do not utilise marine or estuarine environments. Habitats above the level of spring high tides are not normally vulnerable to marine oil spills (Law *et al*. 2011). Includes: freshwater pearl mussel (*Margaritifera margaritifera),* and non-coastal otter populations (*Lutra lutra*). It should be noted that salmonids play a critical role in the life cycle of the freshwater pearl mussel, and potential indirect effects of this association are considered in the assessment below.

Table 7.2 provides information on the Annex I habitats and Annex II species which may have their conservation objectives undermined if affected by an oil spill – those sites for which such potential effects from fuel and/or crude oil spills has been identified (see Appendix B) are listed. The relevant Blocks from which spills could theoretically affect the sites are also listed although for the purpose of the AA, these are based on basic proximity to the sites and the nature of the qualifying features rather than detailed information from oil spill modelling. A full impact assessment of the proposed activities must be provided at the project level and (where relevant) an HRA would be undertaken. In addition, an oil pollution emergency plan (OPEP) must be in place before exploration and appraisal drilling activities are permitted. Based on the limited information available on the foraging of Annex II qualifying species from sites within the area (see Section 6.4), relevant Blocks where qualifying species may forage are identified in Table 7.2. Note: several sites are represented in more than one risk category.

Table 7.2: Annex I habitat types and Annex II species potentially vulnerable to oil spills

Mudflats and sandflats
Number of physical and biological characteristics of sediment shores that can influence their vulnerability and sensitivity, including wave exposure, shore topography, sediment composition, height of water table, presence of large burrows, abundance and diversity of infauna, and use of the shore by birds for feeding and roosting. Wave-exposed clean sandy shores are often considered to have a low vulnerability and sensitivity due to the natural cleaning of the waves and the relatively poor fauna in the sediment (Law *et al.* 2011). Particularly vulnerable in sheltered areas where wave energy is low. The biological communities associated with these sites are related to the degree of sheltering and subsequent sediment type; sheltered sites with fine, muddy sediments may support a high diversity and abundance of invertebrates and waterfowl. **Sites potentially at risk (closest Block(s) from which an oil spill could directly impact site):** Block 111/7: Strangford Lough SAC, Murlough SAC, Luce Bay and Sands SAC, Solway Firth SAC, Drigg Coast SAC, Morecambe Bay SAC Blocks 125/30 & 126/26: Moine Mhor SAC, Sheephaven SAC (RoI), Tranarossan and Melmore Lough SAC (RoI), North Inishowen Coast SAC (RoI),
Estuaries
Complexes of several subtidal and intertidal habitats with varying freshwater influence. The sediments of estuaries support various biological communities, while the water column provides an important habitat for free-living species, such as fish, and juvenile stages of benthic plants and animals. Estuaries often contain several different Annex I habitats. **Sites potentially at risk (closest Block(s) from which an oil spill could directly impact site):** Block 111/7: Solway Firth SAC, Drigg Coast SAC, Morecambe Bay SAC Blocks 125/30 & 126/26: Lough Swilly SAC (RoI)
Saltmarshes
Comprise intertidal mud and sandflats colonised by vegetation due to protection from strong wave action. Pioneering saltmarsh vegetation exists where tidal flooding is frequent, with progression to more diverse, stable communities in upper reaches where tidal flooding is less frequent. Upper reaches can be valuable for plants, invertebrates and wintering or breeding waterfowl. Generally considered to be very vulnerable to oil spills, because they form in the upper part of sheltered muddy shores where oil becomes concentrated. Once oil gets into a marsh it is trapped by the vegetation where it becomes difficult to remove and causes long-term contamination (Law *et al.* 2011). **Sites potentially at risk (closest Block(s) from which an oil spill could directly impact site):** Block 125/30: Bann Estuary SAC, North Antrim Coast SAC Block 111/7: Strangford Lough SAC, Murlough SAC, Solway Firth SAC, Drigg Coast SAC, Morecambe Bay SAC Blocks 125/30 & 126/26: Moine Mhor SAC, Sheephaven SAC (RoI)
Inlets and Bays
Large indentations of the coast, and generally more sheltered from wave action than the open coast. They are relatively shallow, with water depth rarely exceeding 30m, and support a variety of subtidal and intertidal habitats and associated biological communities. **Sites potentially at risk (closest Block(s) from which an oil spill could directly impact site):** Block 111/7: Strangford Lough SAC, Luce Bay and Sands SAC, Morecambe Bay SAC Blocks 125/30 & 126/26: Mulroy Bay SAC (RoI)
Harbour porpoise
Sites comprise a variety of marine habitats utilised by harbour porpoise (*Phocoena phocoena*) for foraging and other activities, with extensive areas beyond the site boundary also utilised. Much of the evidence of cetacean injuries is circumstantial, but it seems likely that individuals are occasionally exposed to oil from large spills, sometimes being attracted to the spill area by the response activity.

While their skin is not thought to be particularly sensitive to oil, any accidental ingestion or breathing of oily fumes could cause physiological stress (Law *et al.* 2011).

Sites potentially at risk (closest Block(s) from which an oil spill could directly impact site):
Blocks 125/30 & 126/26: Skerries and Causeway cSAC.
There is little information on the abundance and distribution of harbour porpoise in the area. Harbour porpoise are a qualifying feature of the Skerries and Causeway cSAC and Berrow *et al.* (2010) indicate that harbour porpoises may be present in low densities in the area of the Blocks throughout the year.

Seals

Designated sites comprise coastal habitats (beaches, estuaries, sandflats and rocky shores) supporting important breeding colonies of harbour seals (*Phoca vitulina*) and/or grey seals (*Halichoerus grypus*). Seals spend considerable periods of time at these sites during the breeding season and during the moult. Seals forage for prey in surrounding waters and also travel considerable distances beyond the boundaries of sites (particularly grey seals). Toxic effects from oil vapours and aerosols can have severe effects on respiration and the nervous system and can result in death. If seals are trapped near the source of a spill, they may be seriously affected; particularly if the oil is light with a large proportion of aromatic hydrocarbons. Seal pups are likely to be more sensitive than the adults, and pups trapped on beaches when oil comes ashore will be more vulnerable (Law *et al.* 2011).

Sites potentially at risk (closest Block(s) from which an oil spill could directly impact site):
Block 111/2: The Maidens cSAC (grey seal)
Block 111/7: Strangford Lough SAC (harbour seal), Murlough SAC (harbour seal)
Blocks 125/30 & 126/26: Eileanan agus Sgeiran Lios mor SAC (harbour seal), Treshnish Isles SAC (grey seal), South-East Islay Skerries SAC (harbour seal), Horn Head and Rinclevan SAC (RoI) (grey seal).
The Blocks are within or close to areas of low (grey seal) and low to moderate (harbour seal) usage. However, given the lack of information with respect to grey seal foraging and usage within The Maidens cSAC, it is possible that the density of grey seals within the Blocks is greater than Figure 6.1 indicates. Therefore, an oil spill within any of the Blocks could impact foraging seals within or close to the Blocks.

Coastal otters

Sites contain shallow, inshore coastal areas utilised by important populations of otter (*Lutra lutra*) for feeding. Some coastal otters feed in nearshore and intertidal areas, but their reliance on these habitats and associated food resources is not well established as they are also likely to feed in freshwater habitats nearby. While there was some evidence of impacts to otter populations following the 1993 Braer oil spill in south Shetland there was no recorded evidence of impacts from the 1996 Sea Empress spill to otters in Pembrokeshire. However, the difficulty of making good estimates of population size and measuring impacts makes assessment of vulnerability unreliable (Law *et al.* 2011).

Sites potentially at risk (closest Block(s) from which an oil spill could directly impact site):
Blocks 125/30 & 126/26: Moine Mhor SAC, Tayvallich Juniper and Coast SAC, Mulroy Bay SAC (RoI), North Inishowen Coast SAC (RoI), Lough Swilly SAC (RoI)

Migratory fish

Fish are at greatest risk from contamination by oil spills when the water depth is very shallow. Below 10m, in open waters, the likelihood that contaminant concentrations will be high enough to affect fish populations is very small, even if chemical dispersants are used to disperse oil. In shallow or enclosed waters however, high concentrations of freshly dispersed oil may kill some fish and have sublethal effects on others. Juvenile fish, larvae and eggs are most sensitive to the oil toxicity (Law *et al*. 2011). Available evidence suggests that salmon smolts utilise shallow water depths (1-6m) and that adults show varying behaviour, swimming generally close to the surface (0- 40m depth), with occasional deeper dives – e.g. Holm *et al.* (2005, cited by Malcolm *et al.* 2010) noted dive depths of between 85 and 280m.

Sites potentially at risk (closest Block(s) from which an oil spill could directly impact site):
Blocks 125/30 & 126/26: River Faughan and Tributaries SCI, River Foyle and Tributaries SAC, Owenkillew River SAC, River Roe and Tributaries SAC, Endrick Water SAC, River Finn SAC (RoI)
Block 111/7: River Bladnoch SAC, River Eden SAC, River Derwent and Bassenthwaite Lake SAC, River Ehen SAC

Note: RoI – Republic of Ireland sites

7.3.1.1 Consideration

The qualifying features of the sites listed in Table 7.2 are potentially vulnerable due to their sensitivity to oil spill. There are a number of sites not listed in Table 7.2, which due to their proximity, a large oil spill in the Blocks could result in significant deterioration of habitats and disturbance to species. For example, the Red Bay SCI supports Annex I sandbanks slightly covered by seawater at all times which are composed of maerl, sub-fossil maerl, coarse sands, gravels and cobbles. Whilst sandbanks are not generally as ecologically sensitive to oil spill as those habitats described in Table 7.2, the site is potentially vulnerable to water quality issues and could be vulnerable to oil spills due to proximity of the Blocks. Similarly, Rathlin Island SAC which supports a number of Annex I habitats (e.g. reefs, sea cliffs, sea caves and sandbanks which are not generally as ecologically sensitive to oil spill as those habitats described in Table 7.2) could be vulnerable to large oil spills due to the proximity of the Blocks to the island. Additionally, such a spill could result in damage to supporting habitats including intertidal areas utilised by a variety of foraging animals including fish, birds and marine mammals. The draft management scheme for the Rathlin Island European Marine Site (DoE 2012) indicates that accidental discharges at sea may arise due to collision or grounding events where potential spillage of fuel oil or cargo can occur, with significant spills having an impact on intertidal and marine wildlife. It notes that, whilst sea-based discharges should be avoided, accidental sea-based discharges that may require the use of dispersants (oil spill treatment products) will need authorisation from the NIEA) within the SAC. The treatment process could cause harm to the marine communities within the site, therefore, consultation with the Department (NIEA) should be undertaken at the earliest opportunity. This advice is also relevant to oil and gas activities in the Blocks.

The Maidens cSAC is within the area of the Blocks and the NIEA advice on operations (NIEA 2011) indicates that due to its proximity to the Port of Larne and the North Channel shipping route, the pumping of bilges, discharge of ballast water, accidental grounding, or accidental oil (or other chemical) spillage from commercial vessels could all occur close to the SAC. Such incidents have the potential to cause deterioration of qualifying habitats and communities through direct or indirect impacts. Emergency and oil spillage contingency plans should take into account specific qualifying interests and recognise the importance of marine SACs should such incidents occur. This advice is also relevant to oil and gas activities in the Blocks.

The likelihood of a large oil spill is extremely low (blowout occurrence frequency in the range of 1/1,000-10,000 well years, see Section 7.2). The proposed work programme indicates a drill or drop well. The potential for spills to cause deterioration of qualifying habitats (and supporting habitats of Annex II species) or significant disturbance of Annex II species (e.g. from spill response activities) will be determined by the location, nature and timing of activities which are currently unknown (Note: oil spills are an accidental event and not a planned activity). Therefore, a detailed assessment of the potential for effects of a particular operation cannot be made at this time, but would be required subsequently, as part of project-level EIA. Where relevant, an HRA may also be undertaken for the proposed operations.

Following licensing, specific exploration drilling activities require permitting (see Figure 2.2) and those considered to present a risk to relevant sites would be evaluated by DECC under

mandatory contingency planning and HRA procedures which will allow mitigation measures to be defined (including conditions attached to consents/permits or potentially consent/permit refusal). In all cases, rigorous spill prevention, response and other mitigation measures are required of operators and monitored by the regulator for offshore exploration and production (Section 7.4). Detailed potential effects of such a release on Natura 2000 sites would be considered at the project level.

Consent for activities will not be granted unless the operator can demonstrate that the proposed activities which may include the drilling of a well will not have an adverse effect on the integrity of relevant SACs.

7.3.2 Migratory fish

(Annex II qualifying species: Atlantic salmon *Salmo salar*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, freshwater pearl mussel *Margaritifera margaritifera*)

Atlantic salmon undertake extensive migrations out to sea to feed before returning to "home" rivers to spawn. Spawning takes place in shallow excavations (redds), in shallow gravelly areas in clean rivers and streams. After a period of 1-6 years the young salmon migrate downstream to the sea as smolts. Salmon have a homing instinct and spawn in the river of their birth after 1-3 years in the sea. Atlantic salmon leave their home rivers in spring and early summer as smolts, and migrate towards feeding areas in the Nordic Seas and West Greenland. Malcolm *et al.* (2010) note that there is a general lack of data with regard to post-smolt migrations in the UK generally and in Scotland, though present observations of Atlantic salmon post-smolt activity revealed swimming depths of 1-3m, but up to 6m. Studies of adult salmon show a high degree of variability in behaviour, with individuals spending variable amounts of time between the surface and ~40m depth, with occasional dives. More generally it appears that they typically spend most of their time close to the surface, punctuated by deep dives.

Atlantic salmon are thought to travel to and from their feeding grounds along the Scottish Atlantic coast and hug the north coast of Northern Ireland before entering or leaving Lough Foyle to the west. It is also believed that salmon and sea trout may travel south through the North Channel and into the Irish Sea before entering sea loughs such as Carlingford[35].

Salmonids play a critical role in the life cycle of the freshwater pearl mussel *Margaritifera margaritifera* (e.g. Upper Ballindery River SAC, Owenkillew River SAC, River Ehen SAC, River Kent SAC). The freshwater pearl mussel is long lived with records of individuals over 100 years old (Bauer 1992). The larval stage (or glochidia) of the mussel is inhaled by juvenile Atlantic salmon and brown or sea trout where it attaches to the gills and encysts. Encysted larvae live and grow in the hyper-oxygenated environment on the gills before dropping off in the following spring.

The Solway Firth, River Eden and River Derwent and Bassenthwaite Lake SACs maintain populations of river and sea lamprey. Both the river lamprey and sea lamprey migrate up rivers to spawn and spend the larval stage buried in muddy substrates in freshwater. Once metamorphosis takes place, the adults migrate to the sea where they live as a parasite on various species of fish. Sea lampreys are thought to inhabit both shallow coastal and deep offshore waters, venturing further than river lampreys.

[35] Loughs Agency response to 26th Round Appropriate Assessment consultation.

There is the theoretical possibility of oil spill impact on these species, although this is considered very remote and largely restricted to shallow areas close to shore where the fish may be more vulnerable to spills (Law *et al.* 2011).

The likelihood of a large oil spill is extremely low (blowout occurrence frequency in the range of 1/1,000-10,000 well years, see Section 7.2). The proposed work programme indicates a drill or drop well. The potential for spills to cause deterioration of supporting habitats or significant disturbance of migratory fish (e.g. from spill response activities) will be determined by the location, nature and timing of activities which are currently unknown (Note: oil spills are an accidental event and not a planned activity). Therefore, a detailed assessment of the potential for effects of a particular operation cannot be made at this time, but would be required subsequently, as part of project-level EIA. Where relevant, an HRA may also be undertaken for the proposed operations.

Following licensing, specific exploration drilling activities require permitting (see Figure 2.2) and those considered to present a risk to relevant sites and species would be evaluated by DECC under mandatory contingency planning and HRA procedures which will allow mitigation measures to be defined (including conditions attached to consents/permits or potentially consent/permit refusal). In all cases, rigorous spill prevention, response and other mitigation measures are required of operators and monitored by the regulator for offshore exploration and production (Section 7.4). Detailed potential effects of such a release on Natura 2000 sites would be considered at the project level.

Consent for activities will not be granted unless the operator can demonstrate that the proposed activities, which may include the drilling of a well, will not have an adverse effect on the integrity of the riverine SACs listed in Table 7.2.

7.3.3 Special Protection Areas

Table 7.3 provides information on those SPA types which are potentially vulnerable to oil spills. Those sites where the potential for effects from fuel and/or crude oil spills has been identified (see Appendix B) are listed. The relevant Blocks from which spills could theoretically affect the sites are also listed although for the purpose of the AA, these are based on basic proximity to the sites and the nature of the qualifying features rather than detailed information from oil spill modelling. A full impact assessment of the proposed activities must be provided at the project level and (where relevant) an HRA would be undertaken. In addition, an oil pollution emergency plan (OPEP) must be in place before exploration and appraisal drilling activities are permitted. Based on information available on the foraging of seabirds (e.g. Thaxter *et al.* 2012, see Section 7.3.3.1 below), where relevant an attempt has been made to identify the qualifying feature from each SPA site that has the greatest mean maximum foraging range and identify those Blocks which fall within that range (e.g. of the qualifying features of the Rathlin Island SPA, it was estimated that puffin (part of the assemblage qualification) had the greatest foraging range: 105±46km, from Thaxter *et al.* 2012). All of the Northern Ireland Blocks fall within this range), thereby providing a very basic assessment of which protected species and sites may be potentially at risk from a spill within the Blocks. Note: several sites are represented in more than one risk category.

Table 7.3: SPA types potentially vulnerable to oil spills

Cliff-breeding seabird colonies
Designated for colonial breeding seabirds (including auks, fulmar, kittiwake, cormorant, and gannet, although due to their wide range foraging, gannets and fulmar are described separately below) which nest either on, or generally associated with sea cliffs. Birds utilise adjacent coastal waters for a variety of activities, and also forage beyond site boundaries. Seabirds feeding or resting on the sea surface are vulnerable to surface pollution, particularly during the breeding season when large numbers of birds are aggregated inshore, and for species of auk, during the autumnal moult, when gatherings of flightless birds form rafts on the water (see Section 7.2.3). **Sites potentially at risk (closest Block from which an oil spill could directly impact site):** Block 125/30: Sheep Island SPA, Rathlin Island SPA, North Colonsay & Western Cliffs SPA, Horn Head to Fanad Head SPA, Inishtrahull SPA (both RoI) Block 111/7: Copeland Islands SPA Block 126/26: Ailsa Craig SPA **Sites potentially at risk (Blocks within which an oil spill could theoretically impact foraging qualifying species from a relevant site*):** Block 125/30: Sheep Island SPA (cormorant) Blocks 111/2 & 111/7: Copeland Islands SPA (Manx shearwater) All Blocks: Rathlin Island SPA (puffin), Ailsa Craig SPA (guillemot), Horn Head to Fanad Head SPA (puffin, RoI)
Petrel, tern, skua or gull breeding populations
Designated for breeding seabirds, which generally forage over sea areas adjacent to (or in some cases at considerable distance from) breeding sites. **Sites potentially at risk (closest Block from which an oil spill could directly impact site):** Block 111/1: Larne Lough SPA Block 111/7: Copeland Islands SPA, Outer Ards SPA, Strangford Lough SPA, Carlingford Lough SPA, Duddon Estuary SPA, Morecambe Bay SPA Block 125/30: Treshnish Isles SPA, Horn Head to Fanad Head SPA (RoI), Lough Swilly SPA(RoI), Greers Isle SPA (RoI), Inishtrahull SPA (RoI) **Sites potentially at risk (Blocks within which an oil spill could theoretically impact foraging qualifying species from a relevant site*):** Blocks 111/1, 111/2 & 111/7: Copeland Islands SPA (Arctic tern) All Blocks: Larne Lough SPA (sandwich tern), Strangford Lough SPA (sandwich tern), Inishtrahull SPA (lesser black-backed gull, RoI)
Foraging gannets and fulmars
Gannets and fulmars are wide-ranging birds, with mean maximum foraging distances of 229km up to a maximum of 590km recorded in gannet and 400km up to 580km recorded in fulmar - foraging ranges which potentially brings birds from various colonies into contact with Blocks throughout UK waters. Work carried out studying the tracks of birds originating from each of the main gannet colonies around the UK coast suggest there is spatial segregation between foraging areas (Wakefield *et al*. 2013). Therefore, although some blocks may be comfortably within range of foraging gannets, there may be little or no evidence to suggest that birds from these colonies forage in the area. There is less information to describe foraging habits of fulmars. **Sites potentially at risk (closest Block from which an oil spill could directly impact site):** Block 125/30: Rathlin Island SPA, Horn Head to Fanad Head SPA (RoI), Inishtrahull SPA (RoI) Block 126/26: Ailsa Craig SPA **Sites potentially at risk (Blocks within which an oil spill could theoretically impact foraging qualifying species from a relevant site*):**

All Blocks: Ailsa Craig SPA (gannet), Rathlin Island SPA (fulmar), Horn Head to Fanad Head SPA (fulmar, RoI), Inishtrahull SPA (fulmar, RoI)
Red-throated diver overwintering populations utilising coastal waters
Inland sites designated for overwintering red-throated diver (*Gavia stellata*) which forage in neighbouring coastal waters. **Sites potentially at risk (closest Block from which an oil spill could directly impact site):** Block 111/7: Liverpool Bay/Bae Lerpwl marine SPA
Open coastline supporting wintering waders and seaduck
Contain coastal and intertidal habitats which support a variety of wintering waders and seaduck, often in large aggregations. The birds feed on wetlands and the surrounding shallow waters. Seaduck form non-breeding concentrations in certain shallow coastal areas, spending most of the time on the water, diving in shallow areas for bivalve shellfish, and are therefore very vulnerable to oil spills (Law *et al.* 2011). **Sites potentially at risk (closest Block from which an oil spill could directly impact site):** Block 111/7: Outer Ards SPA, Killough Bay SPA Block 125/30: Treshnish Isles SPA, Rinns of Islay SPA, Laggan, Islay SPA, Bridgend Flats, Islay SPA, Horn Head to Fanad Head SPA (RoI), Trawbreaga Bay SPA (RoI), Inishtrahull SPA (RoI)
Firths, lochs, loughs and estuaries supporting wintering waterfowl
Contain enclosed and semi-enclosed coastal and intertidal habitats (particularly wetlands) supporting a variety of wintering waterfowl and waders, often in large aggregations. Some species (e.g. seaducks) feed beyond the boundaries of sites. Waterfowl appear to have a relatively low vulnerability to the direct effects of oil spills. The primary concern for waterfowl during oil spills is the effects of the oil and the clean-up on their feeding and roosting resources. Avoidance of oiled sediment flats, which can be exacerbated by disturbance from clean-up activity, drives the birds away to find feeding and roosting areas elsewhere (Law *et al.* 2011). **Sites potentially at risk (closest Block from which an oil spill could directly impact site):** Block 111/1: Larne Lough SPA Block 111/2: Upper Solway flats and Marshes SPA Block 111/7: Belfast Lough Open Water SPA, Strangford Lough SPA, Carlingford Lough SPA, Duddon Estuary SPA, Morecambe Bay SPA, Liverpool Bay/Bae Lerpwl SPA Block 125/30: Lough Foyle SPA, Gruinart Flats, Islay SPA, Lough Swilly SPA, Lough Foyle SPA (RoI) Block 126/26: Kintyre Goose Roosts SPA, Loch of Inch & Torrs Warren SPA

*Note: *Block is within the mean maximum foraging range of a qualifying feature (listed in brackets, after Thaxter et al. 2012), which relates to a site considered in this AA. Therefore an oil spill in the block could in theory adversely affect site integrity through impacting qualifying features from the site foraging within the block.*

7.3.3.1 Consideration

The qualifying features of the sites listed in Table 7.3 are potentially vulnerable to a large oil spill due to both coastal and wider foraging, and for some species, time spent at the sea surface (see Section 7.2), which could result in significant disturbance to species. Additionally, such a large spill could result in damage to supporting habitats including intertidal areas utilised by a variety of wintering waterfowl and waders.

NIEA have advised[36] that work has been undertaken to define an extension of Belfast Lough Open Water SPA relating to non-breeding red-throated diver and a marine extension to the

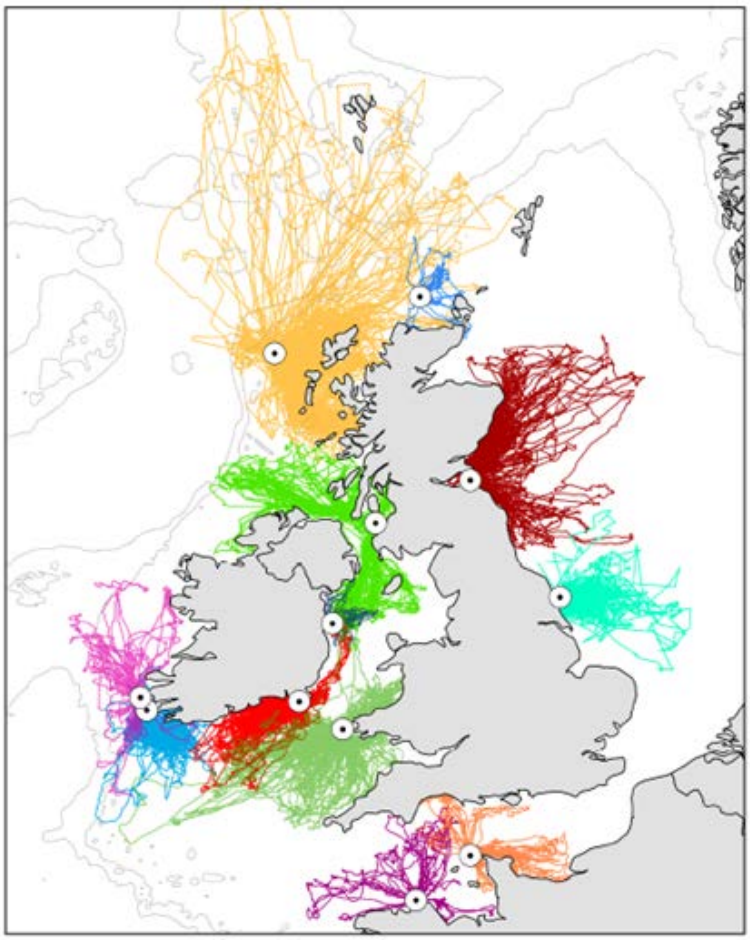
[36] NIEA response dated 4th September 2012 to draft 27th Round HRA screening document.

Copeland Islands SPA relating to the utilisation of sea areas by the Manx shearwater. NIEA plan to progress these amendments in 2013/14. Additionally, NIEA has indicated that various colony extensions are proposed for sites designated for breeding terns to cover foraging areas. Relevant sites in Northern Ireland include Carlingford Lough, Strangford Lough, Outer Ards, Copeland Islands and Larne Lough SPA.

As referred to in Table 7.3 above, Thaxter *et al.* (2012) reviewed available information on seabird foraging ranges. As noted by the authors, the use of species-specific foraging ranges is subject to some error, for instance through density-dependent effects (e.g. Lewis *et al*. 2001), annual and inter-annual variation in foraging behaviour (e.g. Hamer *et al.* 2007), or simply differences in marine systems. Caution is therefore needed when using limited foraging range data, for example from a single breeding season or location, to provide ‘‘representative’’ foraging range information. The foraging distances presented in Thaxter *et al.* (2012) provide an indication of the range within which protected species and sites may be potentially at risk.

With respect to gannet foraging, tracking data from Wakefield *et al*. (2013) indicated that some gannets from Ailsa Craig SPA (16 birds tagged in 2011) in the North Channel may forage close to or over the Northern Ireland Blocks (Figure 7.2).

Figure 7.2: Satellite tracks from gannets from main UK colonies



Source: Wakefield et al. (2013)

Important areas of seabird activity, outside designated, protected sites have been identified around the UK coast as part of an ongoing process to identify possible marine SPAs for seabirds (Kober *et al.* 2010, 2012). Important areas were identified using statistically derived

threshold levels of abundance, and in the Northern Ireland area, an area (based on a 5% threshold, see Kober *et al*. 2010) was identified for breeding guillemot (May-June) to the north of the Blocks. Kober *et al*. (2012) identified further important areas for breeding gannet and herring gull associated with the Ailsa Craig SPA and surrounding waters. Birds congregating in these areas will be vulnerable to surface pollution from an accidental spill in the Blocks. Offshore Vulnerability Index (OVI) values for the Northern Ireland Blocks and those to the north are very high throughout this period (see Table 7.2).

Guilford *et al*. (2008) indicated that within the Irish Sea, observations at sea (e.g. Pollock *et al.* 1997) have shown that Manx shearwaters are not particularly abundant in March and April, become more common during May and June, and peak during July and August. Peak numbers tend to occur in the south Irish Sea, in the North Channel (Mull of Kintyre to Mull of Galloway) and in the Irish Sea close to the Irish coast from about Dublin north to Dundalk. The North Channel area may be associated with local movements of birds from the Copeland Islands breeding colony (Guilford *et al.* 2008), to the south of the Blocks.

The likelihood of a large oil spill is extremely low (blowout occurrence frequency in the range of 1/1,000-10,000 well years, see Section 7.2). The proposed work programme indicates a drill or drop well. The potential to cause deterioration of the habitats of SPA qualifying species or impact the population or distribution of the qualifying species will be determined by the location, nature and timing of activities which are currently unknown (Note: oil spills are an accidental event and not a planned activity). Therefore, a detailed assessment of the potential for effects of a particular operation cannot be made at this time, but would be required subsequently, as part of project-level EIA. Where relevant, an HRA may also be undertaken for the proposed operations.

Following licensing, specific exploration drilling activities require permitting (see Figure 2.2) and those considered to present a risk to relevant sites would be evaluated by DECC under mandatory contingency planning and HRA procedures which will allow mitigation measures to be defined (including conditions attached to consents/permits or potentially consent/permit refusal). In all cases, rigorous spill prevention, response and other mitigation measures are required of operators and monitored by the regulator for offshore exploration and production (Section 7.4). Detailed potential effects of such a release on Natura 2000 sites would be considered at the project level.

Consent for activities will not be granted unless the operator can demonstrate that the proposed activities which may include the drilling of a well will not have an adverse effect on the integrity of the SPAs listed in Table 7.3.

7.3.4 Adjacent waters SACs and SPAs

The potential for oil spills to impact the integrity of SACs and SPAs in the Republic of Ireland has been assessed. Tables 7.2 and 7.3 above highlight those Irish sites that could be vulnerable to oil spills. Given the rigorous spill prevention, response and other mitigation measures that would be in place these sites are unlikely to be impacted by spills originating from activities in the Blocks.

Consent for activities will not be granted unless the operator can demonstrate that the proposed activities which may include the drilling of a well will not have an adverse effect on the integrity of SACs and SPAs in the Republic of Ireland.

7.4 Regulation and controls

Spill prevention and mitigation measures are implemented for offshore exploration and production inter alia through the *Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation) Regulations 1998* and the *Offshore Installations (Emergency Pollution Control) Regulations 2002*. The required measures include spill prevention and containment measures, risk assessment and contingency planning. Under the Regulations, all operators of an offshore installation or oil handling facility must have an Oil Pollution Emergency Plan (OPEP) in place. The plans are reviewed by DECC, MCA and relevant environmental consultees, such as the relevant Devolved Authority, the Joint Nature Conservation Committee, the relevant inshore statutory nature conservation body, e.g. Northern Ireland Environment Agency, and other relevant organisations. An OPEP will only be approved by DECC following consultation and satisfactory operator response to any comments. Approval of an OPEP does not constitute approval of the operations covered by the plan. Operators are responsible for ensuring compliance with all other regulatory requirements. OPEPs set out the arrangements for responding to incidents with the potential to cause marine pollution by oil, with a view to preventing such pollution or reducing or minimising its effect. Additional conditions can be imposed by DECC, through Block-specific licence conditions (i.e. "Essential Elements"). Operators are required to follow international and UK best practice when responding to oil spills (i.e. consistent with DECC's OPEP requirements) and must have in place the capability to employ response strategies for a spill of any severity. The minimum requirements for a response to spills of various sizes are shown in Table 7.4.

Table 7.4: Guidance on minimum standards required for oil pollution incident response

Estimated Oil Quantity (tonnes)	Dispersant combat rate (tonnes/hr)	Oil Type[1]	Aerial Surveillance Capability	Response Times	
				For Block Specific Vulnerability[2] of 1 (very high)	All other Vulnerability Categories (low to high)
0 to 25	10	2; 3 and 4	Within 4 hours	Monitor and dispersant within 1 hour	Monitor and dispersant available but no "within 1 hour requirement"
25 to 100		2, 3 and 4		Monitor and dispersant within 2 hours	Monitor and dispersant available but no "within 2 hour requirement"
100 to 500	50	2; 3 and 4		Monitor and dispersant within 6 hours	Monitor and dispersant within 6 hours
>500	>50	2; 3 and 4		Monitor and dispersant within 18 hours	Monitor and dispersant within 18 hours

Notes: [1]Oil type based on ITOPF groups, [2] based on JNCC (1999), see Table 7.1)
Source: DECC OPEP Guidance, July 2012

Activity level management measures (e.g. which should be implemented through an accredited Environmental Management System) can help to reduce the potential for spills of oil and chemicals of all sizes through, for instance, inventories of environmentally critical equipment, related maintenance schedules, training and good practice. Dependent on the activity being undertaken, DECC inspectors at the permitting stage, and on occasions prior to operations taking place, may conduct an onshore and/or offshore inspection of the installation to ensure that crews are aware of procedures in place to prevent spills and their responsibilities in spill prevention and reporting. Offshore, primary responsibility for oil spill response lies with the relevant Operator and their third party accredited pollution responders, although the Secretary of State's Representative may intervene if necessary. The MCA is responsible for a National

Contingency Plan and maintains a contractual arrangement for provision of aerial spraying, with aircraft based at East Midlands and if necessary, Inverness. Within two days, aircraft can deliver sufficient dispersant to treat a 16,000 tonne spill within 50 miles of the coast anywhere around the UK. MCA holds 1,400 tonnes of dispersant stockpiled in 14 locations around the UK, in addition to counter-pollution equipment (booms, adsorbents etc.) which can be mobilised within 2-12 hours depending on incident location. The UK Government announced in 2012 that an Emergency Towing Vessel for the waters around the Northern and Western Isles will be stationed in Orkney up to 2015[37]. The government has also been in discussions with the oil industry on the potential of a commercial call-out arrangement to use their vessels[38] and BP have recently agreed to volunteer a vessel to help in an emergency should the MCA deem it appropriate[39].

For activities in proximity to sensitive shorelines, the Department's guidance (DECC 2012b) requires that the risk of shoreline contamination be determined through an appropriate risk assessment, and operators with oil spill scenarios that could impact the shoreline must have access to appropriate oil spill response resources suitable for shoreline clean-up operations. Additional resources are required for installations operating in any Block wholly or partly within 25 miles of the coastline dependent on the hydrocarbon inventory and the oil pollution incident scenarios identified, including:

- The presence near the facility at all times of a vessel:
    - with the capability of spraying dispersant[40] within 30 minutes of an oil pollution incident notification
    - has a stock of dispersant sufficient to deal with an oil pollution incident of 25 tonnes, and if required, have the capability (equipment and capacity) of recovering any oil likely to be lost from the installation under a Tier 1[41] scenario
- In the event of a Tier 2 incident, Tier 2 resources must be available on scene within half the time taken for the oil to reach shore in 30 knot wind conditions

[37] Orkney Islands Council website - http://www.orkney.gov.uk/OIC-News/emergency-vessel-to-be-stationed-in-orkney.htm

[38] Scotland Office website - http://www.scotlandoffice.gov.uk/scotlandoffice/17322.html

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

[40] Chemical dispersant use is generally inappropriate in shallow sheltered waters, in water depths of less than 20 metres and in waters extending up to 1.15 miles (equivalent to 1 nautical mile) beyond the 20 metre contour, or on refined oil products such as diesel, gasoline or kerosene which should disperse naturally prior to reaching the coast or any sensitive environments. The use of chemical dispersants will, therefore, be dependent upon several factors including the quantity of oil, oil type, sea temperature, time of year, prevailing weather and environmental sensitivities.

[41] Oil pollution incidents are classified according to the response levels they are most likely to require and not the volume of oil pollution, unless this is supported by a location specific risk assessment. For example, if a pollution incident requires the use of resources from a regional centre, this would be used to classify the necessary response level, irrespective of its size.
For consistency with the National Contingency Plan, the following Tier definitions apply:
- Tier 1 Local (within the capability of the operator on site);
- Tier 2 Regional (beyond the in-house capability of the operator);
- Tier 3 National (requiring national resources).

- Details of resources to deal with a Tier 3 incident (i.e. an oil pollution incident that cannot be controlled by Tier 1 or 2 resources), including sources, transport and delivery system

- A Shoreline Protection Strategy Plan

UK oil spill contingency planning and response capabilities have been reviewed and revised following the Deepwater Horizon spill (see Section 7.1). Oil & Gas UK established the Oil Spill Prevention and Response Advisory Group (OSPRAG) to provide a focal point for the sector's review of the industry's practices in the UK, in advance of the conclusion of investigations into the Gulf of Mexico incident. OSPRAG's work is documented in their final report, *Strengthening UK Prevention and Response*, published September 2011 and the Secretary of State is examining its findings closely.

In relation to OPEP's, the assessment and approval process and the toolkit of response measures which UKCS operators can draw upon have been strengthened by a more robust approach to oil spill trajectory modelling which includes worst case scenario planning and the availability of the new OSPRAG capping device which is now built and ready for deployment. The Oil Spill & Emergency Response Review Group (OSERRG) also recommended that a new forum, the Oil Spill Response Forum (OSRF), be set up to 'further develop and maintain an effective, robust and sustainable oil spill response capability for upstream operations on the UKCS'. This includes workgroups on oil pollution emergency planning, subsea dispersant injection, shoreline response and science and new technology.

OSPRAG's technical review group reviewed the UK offshore oil and gas industry's practices in the following areas: well examination verification and primary well control, blowout preventers (BOPs) and competency, behaviours and human factors. This work concluded that there is a high degree of confidence in the UK regulatory regime and that it drives the right safety and environmental behaviours. The Well Life Cycle Practices Forum (WLCPF) will advance recommendations made by OSPRAG and facilitate the dissemination of lessons from Macondo and other similar events, with a specific focus (among others) on BOP issues, including liaison with the HSE on the recommendation made by the House of Commons Select Committee that it examines the case for prescribing the equipment of BOPs on the UKCS with two blind shear rams.

In addition to loss of well control, risk of oil and diesel loss resulting from collision is considered for drilling activities. A consent to locate a drilling rig is required in advance of drilling (see Figure 2.2), which is subject to consultation with relevant stakeholders (e.g. the MCA, MoD). Such consent requires vessel traffic surveys and a collision risk assessment, and requires the movement and location of the rig to be notified to other users of the sea (e.g. through notices to mariners). A statutory 500m safety zone is established around the rig when in the field, and a standby and/or guard vessel is also located next to the rig during drilling operations to ensure that vessels do not enter the safety zone, and to provide emergency response.

Whilst the indemnity and insurance group of OSPRAG concluded that the current Offshore Pollution Liability Association Limited (OPOL) level of US $250 million is appropriate in the majority of scenarios, in certain limited cases spill clean up and compensation costs could result in claims above this limit. Guidance issued by Oil & Gas UK (OGUK) in November 2012 outlines a new process by which operators assess the potential cost of well control, pollution

remediation and compensation, with a subsequent requirement to demonstrate to DECC financial capability to address these potential consequences. DECC released a guidance note to industry[42] effective from January 1st 2013 on the demonstration of financial responsibility before consent may be granted for exploration and appraisal wells. It was noted in this document that, though not constituting DECC guidance, considerable weight would be given to operators who can show that they have met the criteria set out in the OGUK guidance. DECC require that an operator must demonstrate the cost of well control and the cost of financial remediation and compensation from pollution at the time of OPEP submission, and verify this responsibility by, for instance: insurance, parent company guarantee, reliance on credit/financial strength rating of the operator.

7.5 Conclusions

Individual relevant sites have been categorised in terms of potential vulnerability, based on location in relation to known hydrocarbon prospectivity of the proposed licence Blocks (currently unknown but assumed to be oil as worst case in terms of potential spill impacts) and therefore the nature and magnitude of credible risks. Two categories of vulnerability were identified:

- Those sites considered to be at potential risk (see Tables 7.2 and 7.3), with the possibility of impacts in the event of a significant spill of crude oil, bunker or lube oil (i.e. where site conservation objectives are at risk of being undermined)

- Many sites are considered not to be at risk from oil spills associated with activities in the Blocks, due to their distance from the Blocks and relative sensitivity of the features.

The incremental risk associated with activities resulting from the proposed licensing (i.e. additional to existing risk; primarily associated with shipping and other maritime activities) is low. This results from the combination of low probability and low severity (since most spills would be small in volume). The overall risks of a major crude oil spill, which would require catastrophic loss of well control, are quantitatively and qualitatively comparable to those considered ALARP (As Low As Reasonably Practicable) under the relevant UK health and safety regulations. The activities which could reasonably be expected to follow from the proposed licensing would not have a significant effect on the existing risks associated with other activities.

Oil spills can have potentially adverse effects, and are controlled in direct proportion to this by a legal framework that minimises their occurrence, provides for contingency planning, response and clean up, and which creates an offence of such spills to enable prosecutions. It is not possible to say that in spite of the regulatory controls and other preventative measures, an oil spill will never occur as a result of activities which may follow licensing; however, as oil spills are not intended or planned activities, a risk-based assessment is appropriate.

Following licensing, specific exploration drilling activities require permitting (see section above) and those considered to present a risk to relevant sites would be evaluated by DECC under mandatory contingency planning and HRA procedures which will allow mitigation measures to be defined (including conditions attached to consents/permits or potentially consent/permit refusal). In all cases, rigorous spill prevention, response and other mitigation measures are required of operators and monitored by the regulator for offshore exploration and production.

[42] DECC Guidance Note To UK Offshore Oil and Gas Operators On The Demonstration Of Financial Responsibility Before Consent May Be Granted for Exploration and Appraisal Wells On The UKCS (December 2012).

Given the availability of prevention and mitigation measures which are applied prior to consenting any activity including project specific safety, oil spill risk assessment, response, inspection and other monitoring, and the requirement for project specific HRA, DECC considers that the granting of a Seaward Production Licence (or Licences) for Blocks 111/1, 111/2, 111/7, 125/30 and 126/26 would not adversely affect the integrity of relevant sites.

Consent for activities will not be granted unless the operator can demonstrate that the proposed activities, which may include the drilling of a well, will not adversely affect the site integrity of Natura 2000 sites.

8 In-combination effects

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

The Department of Enterprise, Trade and Investment Northern Ireland (DETINI) completed a scoping exercise in relation to an SEA for a plan to licence two areas (Belfast Lough and Larne Lough) for oil and gas. This is in response to the Hydrocarbons Licensing Directive Regulations (Northern Ireland) 2010 which extends DETINI's ownership and licensing remit to include internal waters. It is expected that following the scoping exercise, that the SEA and draft plan will be finalised by autumn 2013, and the review of consultation responses/plan adoption will take place in winter 2013. The timing of activities which may follow licensing is uncertain, and drilling could take place from shore and therefore not involve direct offshore/inshore activities. Four onshore areas (Central Larne Lough-Neagh Basin, Lough Allen Basin, Rathlin mainland Basin, Rathlin island Basin) were granted licences in 2011 and have a five year initial exploration term. The Belfast and Larne Lough inshore areas are most closely associated with the Central Larne-Lough Neagh Basin[43], and are adjacent to Blocks 111/1, 111/2 and 111/7 considered in this assessment. Each of the oil and gas prospects which have been licensed or for which licensing is yet to be proposed, are yet to be subject to rigorous exploration and appraisal activities in order to characterise each of the basins and understand whether commercial reserves are present. Presently all oil and gas licensing in Northern Ireland (onshore, inshore and offshore) is at an exploratory phase. If the inshore and offshore areas are licensed, the initial exploration terms could potentially coincide, but given the relatively discrete temporal and spatial footprint of such activities (see Table 2.2), and that drilling for the inshore areas may be from land, there is considerable scope to avoid interactions. Moreover, DETI have stated that they do not expect intensive seismic survey to take place in these areas, and given relative timings of potential awards, interactions with 27th Round activities are unlikely[44].

Other activities taking place offshore include fishing, shipping, aggregate extraction and tidal and wind lease areas, which are discussed in the sections which follow.

[43] The prospectivity of the Larne Lough-Neagh Basin has been reviewed in Merlin Energy Resources (2013) utilising seismic data. A suitable wellsite is yet to be identified for appraisal drilling. There is additional spatial overlap between the lease area for the proposed Islandmagee storage facility and the proposed inshore licensing area at Larne Lough – see Section 8.2.3, Marine Discharges.
[44] DETI Response to the 27th HRA consultation.

8.1 Underwater Noise

Seismic survey and other noise producing activities that might follow the proposed licensing are anticipated to be widely separated in space and time. Therefore, any acoustic disturbance to marine mammals with the potential to cause displacement from foraging areas will be short-term and infrequent. SMRU (2007) note that "The effects of repeated surveys are not known, but insignificant transient effects may become important if potentially disturbing activities are repeated and/or intensified". The region has not been exposed to intensive seismic survey activities in the past and is unlikely to be in the future given the limited prospectivity. Oil and gas activities across the region (including both shelf waters and deeper waters to the north and west) are limited and as a result significant in-combination effects with oil and gas activities in existing licensed blocks are not foreseen.

Other noise producing activities which are likely to occur within the region include those associated with the development of marine renewable energy. Offshore wind energy is expected to undergo large-scale development in the region over the next decade. There are exclusivity agreements in place for significant development in Scottish territorial waters. Of relevance are the proposed Islay (680MW) and Argyll Array (1,500MW) sites[45] (Figure 8.1). In addition, there are a number of Round 2 offshore wind farm sites under construction and following the Offshore Energy SEA, The Crown Estate have entered a Round 3 zonal development agreement for the generation of up to 4GW of offshore wind energy respectively from an Irish Sea zone. The consenting of developments in this region will be subject to detailed project-specific EIA and Habitats Regulations Assessments.

The Marine Current Turbine Seagen device in Strangford Lough and the Wavegen Limpet wave device on Islay are currently the only infrastructure deployed in the region associated with the extraction of wave and tidal energy. An offshore renewable energy strategic action plan (ORESAP) to develop up to 900MW of offshore wind and 300MW from tidal resources in Northern Ireland waters by 2020 was published in March 2012 (DETI 2012a), having undergone Strategic Environmental Assessment (AECOM & Metoc 2009). A post adoption statement was published in July 2012 (DETI 2012b). The Blocks are close to three zones of potential tidal energy resource (Zone 2: Rathlin Island and Torr Head, Zone 3: Maiden Islands and Zone 4: Copeland Islands). The smaller Maiden Islands and Copeland Islands tidal resource zones were not considered suitable for commercial development due to potential significant effects on the environment and other marine users (e.g. shipping), though DETI (2011b) note that small scale demonstration sites may not be precluded. The SEA identified a number of relevant potential cumulative effects for the larger Rathlin Island and Torr Head zone including:

- Effects on benthic ecology from substratum loss and disturbance from piled foundations and gravity bases.
- The presence of important seabird populations and breeding colonies.
- Potential for piling and operational noise from tidal developments located around Rathlin Island to affect marine mammals, marine reptiles and fish and potentially cause a barrier to movement of marine mammals and fish around Rathlin Island and through the channel between the island and the mainland.

[45] Proposed sites at Kintyre (378MW), the Solway Firth (300MW) and Wigtown Bay (280MW) were deemed unsuitable following SEA and HRA of the draft plan (Marine Scotland 2011).

- Potential displacement of fishermen from traditional fishing grounds in particular scallop, lobster and crab potting areas.

- The close proximity to main shipping channels could reduce navigational safety and restrict navigation channels.

- Offshore wind developments in this zone could affect the seascape value of Antrim Coast and Glens AONB.

It is considered that the various marine energy industries are not incompatible in this area, and that potential effects on relevant sites can be adequately controlled through existing mechanisms. DETI have recently released Regional Locational Guidance (RLG) for offshore renewable energy developments in Northern Ireland waters (September 2011) which provides non-statutory guidance and information on the opportunities for, and key considerations influencing the siting and consenting of offshore renewable energy developments in Northern Ireland waters, including the Rathlin Island and Torr Head tidal resource zone. Similar Regional Locational Guidance has been produced by Marine Scotland[46] for wave and tidal energy sites in Scottish waters, including for potential tidal stream sites south west of Islay.

In October 2012, The Crown Estate announced the award of development rights for three offshore renewable energy sites in Northern Ireland's coastal waters. The projects, which together could deliver 800MW of electricity, comprise an area located off the south east coast of County Down (to the south of the Blocks) for development of a 600MW offshore wind farm (First Flight Wind Exclusivity Area) and areas off the north east coast of County Antrim (just to the north of the Blocks) for two tidal stream projects each of up to 100MW near to Torr Head and Fair Head (Figure 8.1). All parties have now signed legal agreements with The Crown Estate which will enable the companies to take their proposals forward and carry out detailed surveys and planning work before their proposals are submitted to the relevant Northern Ireland bodies for consent (The Crown Estate website[47]). It is expected that the Torr Head scheme could be constructed between 2014 and 2016 assuming all consents are granted. No timescale has yet been proposed for the Fair Head scheme.

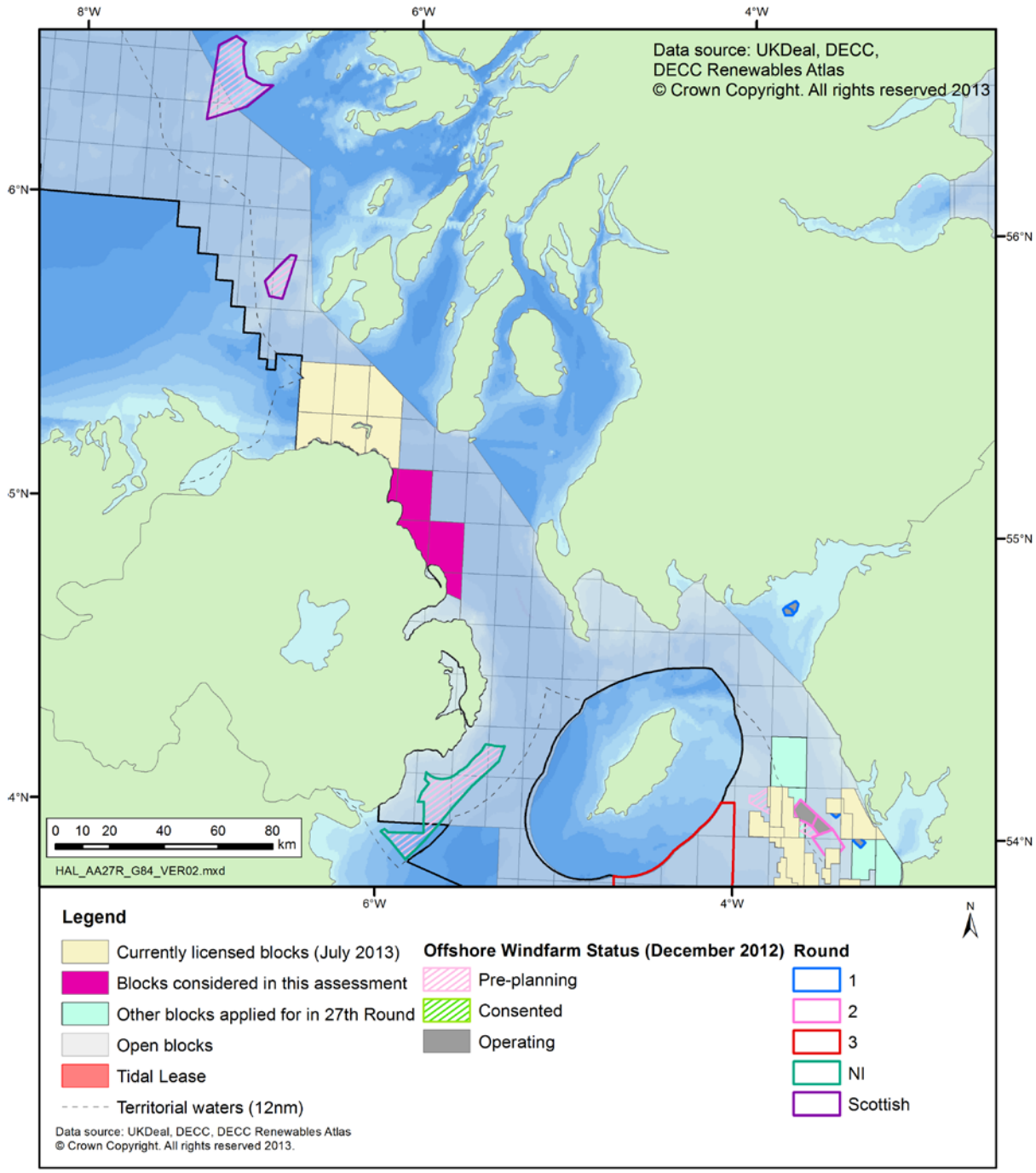
While the operation, maintenance and decommissioning of marine renewable energy developments will introduce noise into the marine environment, these are typically of low intensity. The greatest noise levels arise during the construction phase, and it is these which have the greatest potential for acoustic disturbance effects (see Faber Maunsell & Metoc 2007, DECC 2009, 2011a). Pile-driving of mono-pile foundations is the principal source of construction noise, which will be qualitatively similar to pile-driving noise resulting from harbour works, bridge construction and oil and gas platform installation. Mono-pile foundations are the most commonly used for offshore wind farm developments at present, and are likely to be widely utilised in Round 3 and initial Scottish territorial water developments.

In relation to offshore pile-driving, standard conditions on consents for Round 2 offshore wind farms (and anticipated for Round 3 zones) include various protocols to minimise the potential for acoustic disturbance of marine life, including the use of soft start, MMOs and PAM. For future developments, additional measures are likely to be required in areas where EIA suggests that

[46] Scottish Government website - http://www.scotland.gov.uk/Publications/2010/09/17095123/0
[47] The Crown Estate website - http://www.thecrownestate.co.uk/news-media/news/2012/northern-ireland-offshore-energy-successful-bidders/

high cetacean densities or site fidelity may occur; these may include technical measures such as pile sleeves (see Nehls *et al*. 2007). The "Statutory nature conservation agency protocol for minimising the risk of disturbance and injury to marine mammals from piling noise" (August 2010) outlines a protocol for the mitigation of potential underwater noise impacts arising from pile driving during offshore wind farm construction.

Figure 8.1: Relevant marine renewable energy development in the area



In addition to those activities which may follow licensing of the Northern Ireland Blocks under consideration and future marine renewable energy development, there are a variety of other existing (e.g. shipping, fishing, military exercise areas) noise-producing activities in overlapping or adjacent areas. Despite this, DECC is not aware of any projects or activities which are likely

to cause cumulative or synergistic effects that when taken in-combination with the likely number and scale of activities proposed by the work programme (see Section 2.2) would adversely affect the integrity of the relevant sites. This is due to the presence of effective regulatory mechanisms in place to ensure that operators, DECC and other relevant consenting authorities take such considerations into account during activity permitting. In respect of oil and gas activities and other developments with the potential to affect Natura 2000 sites, these mechanisms also include project specific Habitats Regulations Assessments.

The Marine Strategy Framework Directive (2008/56/EC) (MSFD) requires that the European Commission establish criteria and methodological standards to allow consistency in approach in evaluating the extent to which Good Environmental Status (GES) is being achieved. Task Group 11 reported on underwater noise and other forms of energy (though note that at present only noise is considered), and developed three possible indicators of underwater sound (Tasker *et al*. 2010). In no case was the Task Group able to define precisely (or even loosely) when GES occurs on the axes of these indicators. This is partly to do with insufficient evidence and recognised scientific challenges but also to no fully accepted definition of when, for example, a behavioural change in an organism is not good. The EC decided in 2010 that guidance was needed to help member states implement the indicators. Established in 2010, the Technical Sub Group, Noise, focussed on clarifying the purpose, use and limitation of the indicators and described methodology that would be unambiguous, effective and practicable (Van der Graaf *et al.* 2012).

A UK Government consultation was undertaken on proposals for characteristics of GES for the UK's seas and for more detailed targets and indicators of GES (HM Government 2012a), and a Government response was published in December 2012[48]. The report recognised that there was insufficient data to provide a quantitative assessment of the current status and trends of underwater noise due to the lack of monitoring studies. However, increases in construction levels were likely to have contributed to localised increases in noise levels. The document indicated that further research, monitoring and investigation were necessary to fully understand the effects of noise at an individual and population level, the risks and significance of sound inputs to the environment, and appropriate options for mitigation. However, currently there is no evidence to suggest that current levels of noise in UK waters were having an impact at the population level on cetaceans or other noise sensitive animals (HM Government 2012a).

Following consultation a Government (HM Government 2012b) response defined the UK characteristics of Good Environmental Status for noise (covering impulsive sound, caused primarily by activities such as oil and gas seismic activity and pile driving for wind farms) as:

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

[48] HM Government (2012b). Marine Strategy Part One: UK Initial Assessment and Good Environmental Status.

It was recognised in the consultation document (HM Government 2012a) that setting a specific target representing GES was difficult, given current uncertainties. Due to the high level of uncertainty about the effects of noise, it has not been possible for experts to recommend a specific target for either impulsive sounds or ambient sounds which they believe to be equivalent to GES. Instead, an operational target has been developed for impulsive sounds and a surveillance indicator developed for ambient sounds (HM Government 2012b):

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

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

It is anticipated that monitoring data arising from the latter ambient noise surveillance indicator will help to develop an appropriate target for 2018. The noise registry would likely be managed by JNCC and require a degree of coordination from regulating authorities around the UK. It would enable a better understanding of the potential for cumulative and in-combination effects, and allow for some adjustment in the scheduling of activities if it appeared significant adverse impacts may arise (HM Government 2012a, b).

DECC is cognisant of the ongoing efforts to determine an indicator, descriptor of good environmental status and targets for noise. DECC will review the results of the ongoing process closely with respect to the consenting of relevant activities which may result from the draft plan/programme, as well as other activities which generate noise in the marine environment.

8.2 Other potential in-combination effects

8.2.1 Physical damage/change to features and habitats

Potential sources of physical disturbance to the seabed, and damage to biotopes, associated with oil and gas activities were identified by the OESEA2 as anchoring of semi-submersible rigs; wellhead placement and recovery; production platform jacket installation and piling; subsea template and manifold installation and piling; pipeline, flowline and umbilical installation and trenching and decommissioning of infrastructure (DECC 2011), though the work programmes discussed would only entail rig siting, wellhead placement and recovery, and there is no spatial overlap between offshore renewable energy lease areas and the blocks.

In general, cumulative effects are likely to be dominated by trawling, with potential scour and physical damage from cable laying associated with potential offshore wind and marine renewable developments likely to be more important in the future. It is generally accepted that the principal source of human physical disturbance of the seabed and seabed features is bottom trawl fishing (Hall-Spencer *et al*. 2002). Trawl scarring is a major cause of concern with regard to conservation of shelf and slope habitats and species (e.g. Witbaard & Klein 1993, de Groot and Lindeboom 1994, Kaiser *et al*. 2002a, Kaiser *et al*. 2002b, Gage *et al*. 2005). The long-term effects of bottom fishing disturbance is less well understood due to the complex nature of the changes and the lack of pre-impact or control data (Frid *et al.* 2000, Bradshaw *et al.* 2002). Analysis of 101 experimental fishing impact studies undertaken by Kaiser *et al.* (2006) predicted recovery times in sand and gravel habitats after a scallop trawl as *ca.* 8 years; muddy sand as *ca.* 1.6 years and reef as *ca.* 3.2 years), with the scallop trawl being particular severe in terms of

benthic disturbance (Mason 1983). Beam and otter trawling of sandy and muddy sediments exhibited a quicker recovery rate of the benthic species. However, the recovery rate of muddy sand after beam and otter trawl is still predicted at *ca.* 0.6-0.65 years respectively (Kaiser *et al.* 2006). Given the forecast scale of activity, it is likely that there will be considerable spatial and temporal separation between disturbance "footprints" and a low probability of incremental overlap of affected areas. Recovery of affected seabed through sediment mobility, and faunal recovery and recolonisation is expected to be rapid (less than five years) where the source of effects is transient (e.g. anchoring).

8.2.2 Physical presence

Physical presence of offshore infrastructure and support activities may also potentially cause behavioural responses in fish, birds and marine mammals. Previous SEAs have considered the majority of such behavioural responses resulting from interactions with offshore oil and gas infrastructure (whether positive or negative) to be insignificant; in part because the number of surface facilities is relatively small (of the order of a few hundred) and because the majority are at a substantial distance offshore. To date no wells have been drilled in the blocks licensed in the 26th Round, and as a result no individual reservoir appraisal or project work has been proposed. Any cumulative effects which could arise from the initial work programmes proposed for the 27th Round are likely to be in the form of enhanced shipping and presence of a drilling rig. The limited temporal and spatial scale of these activities (see Table 2.2.) allows for considerable scope to avoid effects (e.g. in relation to other offshore activities, including offshore wind and tidal energy), and mitigation through activity timing and rig siting can be achieved once individual activity level plans are known. An HRA undertaken for the ORESAP (Entec 2011) identified bird features as those at risk from plan implementation, though adverse effects on site integrity could be avoided with appropriate development level mitigation, primarily consisting of it being demonstrated that a project design and location is such that there will be no effects on birds sufficient to cause adverse effects on integrity. Appropriate mitigation will need to be applied, wherever appropriate for any activities following the licensing of any blocks. This will be through the EIA process and regardless of whether a HRA is required.

There are no shipping density data for the blocks being applied for in the 27th Round, though shipping levels in adjacent blocks are high to very high. The blocks are in close proximity to the coast and AIS data (see DECC 2009) indicates primary navigation routes from Belfast Lough and Larne Lough across the Irish Sea and through the North Channel. Additional traffic associated with the work programme will be modest (2-3 transits per week), with the total number of trips proportionate to the length of the exploration drilling (see Table 2.2 for indicative timescales). As a single drill-or-drop well is proposed, and given the possibility of mitigation (e.g. avoidance of high traffic areas, activity timing, rig siting, charting and safety zones), there is considerable scope to avoid cumulative effects from work programme activities with other users of the sea, which could result in effects for protected European species and habitats.

The larger numbers of individual surface or submerged structures associated with offshore wind developments, the presence of rotating turbine blades and considerations of their location and spatial distribution (e.g. in relation to coastal breeding or wintering locations for waterbirds and important areas for marine mammals), indicate a higher potential for physical presence effects. Potential displacement and barrier effects will likely be an important consideration at the project level for the large offshore wind developments that are planned in the region and will likely form an important part of associated HRAs.

8.2.3 Marine discharges

Previous discharges of WBM cuttings in the UKCS have been shown to disperse rapidly and to have minimal ecological effects (Section 5.3). Dispersion of further discharges of mud and cuttings could lead to localised accumulation in areas where reduced current allows the particles to accumulate on the seabed. However, in view of the scale of the proposed activity, extent of the region, the water depths and currents, this is considered unlikely to be detectable and to have negligible cumulative ecological effect (DECC 2011).

Islandmagee Storage Limited is proposing to create an underground natural gas storage facility consisting of 7 storage caverns at a depth of approximately 1,500m below the surface. The caverns will be directionally drilled underneath Larne Lough from a terrestrial site close to Ballylumford in Islandmagee. A by-product of this process will be brine (up to 30% salt), which would be pumped back to the surface. It is currently proposed that the most appropriate means of dealing with the waste brine would be to pump it across Islandmagee and return it to the sea by managed dispersal through an outfall discharging point around 450m offshore of the eastern coast of Islandmagee in a water depth of approximately 27m (Islandmagee Storage Limited 2010). The potential for in-combination effects with the Islandmagee storage project can only be assessed when the location of the potential drill or drop well is known. However, the current controls on terrestrial and marine industrial activities, can be expected to prevent significant in-combination effects on relevant sites.

8.3 Conclusions

Available evidence from other areas of the UKCS (e.g. the Moray Firth) indicates that past oil and gas activity and discharges has not led to adverse impacts on the integrity of relevant sites in the area. The current controls on terrestrial and marine industrial activities, including oil and gas operations that could follow licensing, can be expected to prevent significant in-combination effects affecting relevant sites.

The competent authorities will assess the potential for in-combination effects during Habitats Regulations Assessments of project specific consent applications; this process will ensure that mitigation measures are put in place to ensure that subsequent to licensing, specific projects (if consented) will not result in adverse effects on the integrity of relevant sites. Therefore, bearing this in mind, it is concluded that the in-combination of effects from activities arising from the licensing of Blocks 111/1, 111/2, 111/7, 125/30 and 126/26 with those from existing and planned activities will not adversely affect the integrity of the relevant sites.

9 Overall conclusion

Taking account of all the matters discussed, the Secretary of State is able to grant consent to the plan/programme (as defined) under the Habitats Directive and award the licences covering Blocks 111/1, 111/2, 111/7, 125/30 and 126/26 (considered further in Sections 5-8). This is because there is certainty, within the meaning of the ECJ Judgment in the ***Waddenzee*** case, that implementation of the plan will not adversely affect the integrity of relevant European Sites, taking account of the mitigation measures that can be imposed through existing permitting mechanisms on the planning and conduct of activities.

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

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

10 References

AECOM & Metoc (2009). Strategic Environmental Assessment (SEA) of offshore wind and marine renewable energy in Northern Ireland. Report prepared for the Department of Enterprise, Trade and Investment (DETI), Northern Ireland, 394pp + appendices.

André M, Solé M, Lenoir M, Durfort M, Quero C, Mas A, Lombarte A, van der Schaar M, López-Bejar M, Morell M, Zaugg S & Houégnigan L (2011). Low-frequency sounds induce acoustic trauma in cephalopods. *Frontiers in Ecology and the Environment* **9**: 489–493

Baines ME & Earl SJ (1998). Breeding seabird survey of south-west Wales colonies 1996-1998. Report No. PR1FBC. CCW Sea Empress Contract Report, 74pp. plus appendix.

Banks AN, Sanderson WG, Hughes B, Cranswick PA, Smith LE, Whitehead S, Musgrove AJ, Haycock B & Fairney NP (2008). The *Sea Empress* oil spill (Wales, UK): Effects on common scoter *Melanitta nigra* in Carmarthen Bay and status ten years later. *Marine Pollution Bulletin* **56**: 895-902.

Bauer G (1992). Variation in the life span and size of the freshwater pearl mussel. *Journal of Animal Ecology* **61**: 425-436.

Berrow S, Holmes B & Goold J (2002). The distribution and intensity of ambient and point source noises in the Shannon estuary. Final report to the Heritage Council. http://www.shannondolphins.ie/downloads/Berrow_SourceNoisesShannonEstuary.pdf

Berrow SD, Whooley P, O'Connell M & Wall D (2010). Irish Cetacean Review (2000-2009). Irish Whale and Dolphin Group, 60pp.

Bradshaw C, Veale LO & Brand AR (2002). The role of scallop-dredge disturbance in long-term changes in Irish Sea benthic communities: a re-analysis of an historical dataset. *Journal of Sea Research* **47**: 161-184.

Brandt MJ, Diederichs A, Betke K & Nehls G (2011). Responses of harbour porpoises to pile driving at the Horns Rev II offshore wind farm in the Danish North Sea. *Marine Ecology Progress Series* **421**: 205–216.

Camphuysen CJ (2007). Chronic oil pollution in Europe: a status report. A report by the Royal Netherlands Institute for Sea Research for IFAW, 88pp.

Christian JR, Mathieu A, Thompson DH, White D & Buchanan RA (2003). Effect of seismic energy on snow crab (*Chionoecetes opilio*) 7th November 2003. Environmental Research Funds Report No. 144, Calgary, 106pp

Coyle MD & Wiggins SM (2010). European marine site risk review. Natural England Research Reports No. 38.

Cranmer G (1988). Environmental survey of the benthic sediments around three exploration well sites. Report No 88/02. Report to the United Kingdom Offshore Operators Association. Aberdeen University Marine Studies Ltd, Aberdeen, UK, 33pp.

Currie DR & Isaacs LR (2005). Impact of exploratory offshore drilling on benthic communities in the Minerva gas field, Port Campbell, Australia. *Marine Environmental Research* **59**: 217–233

Daan R & Mulder M (1996). On the short-term and long-term impact of drilling activities in the Dutch sector of the North Sea. *ICES Journal of Marine Science* **53**: 1036-1044.

Dahne M, Gilles A, Lucke K, Peschko V, Adler S, Krugel K, Sundermeyer J & Siebert U (2013). Effects of pile-driving on harbour porpoises (*Phocoena phocoena*) at the first offshore wind farm in Germany. Environmental Research Letters 8: [doi:10.1088/1748-9326/8/2/025002]

Davis RA, Richardson WW, Thiele L, Dietz R & Johansen P (1991). State of the Arctic Environment report on underwater noise. Arctic Center Publications 2, Finland special issue. *The State of The Arctic Environment Reports*: 154-269.

De Groot SJ & Lindeboom HJ (1994). Environmental impact of bottom gear on benthic fauna in relation to natural resources management and protection of the North Sea. NIOZ Rapport 1994-11, Texel, The Netherlands.

DECC (2009). Offshore Energy Strategic Environmental Assessment, Environmental Report. Department of Energy and Climate Change, UK, 307pp plus appendices. http://www.offshore-sea.org.uk/site/scripts/book_info.php?consultationID=16&bookID=11

DECC (2011). Offshore Energy Strategic Environmental Assessment 2, Environmental Report. Department of Energy and Climate Change, UK, 443pp plus appendices. http://www.offshore-sea.org.uk/site/scripts/book_info.php?consultationID=17&bookID=18

DECC (2012a). Habitats Regulation Assessment Phase 1 – Block Screening. Offshore Oil & Gas Licensing 27th Seaward Round.

DECC (2012b). Guidance notes to operators of UK offshore oil and gas installations (including pipelines) on Oil Pollution Emergency Plan requirements, 58pp.

DECC (2012c). Elgin gas release, environmental aspects update. Government Interest Group, 16 May 2012.

Defra (2010). Charting Progress 2: An assessment of the state of UK seas. Published by the Department for Environment Food and Rural Affairs on behalf of the UK Marine Monitoring and Assessment Strategy community, London, 194pp.

Defra (2013). Report on the work of the Habitats and Wild Birds Directives – Marine Evidence Group. May 2013.

Dernie KM, Kaiser MJ & Warwick RM (2003). Recovery rates of benthic communities following physical disturbance. *Journal of Animal Ecology*. **72**: 1043-1056

DETI (2012a). Offshore Renewable Energy Strategic Action Plan 2012-2020. Department of Enterprise, Trade and Investment Northern Ireland, 45pp.

DETI (2012b). Offshore Renewable Energy Strategic Action Plan (ORESAP) Strategic Environmental Assessment (SEA) Post Adoption Statement. Department of Enterprise, Trade and Investment Northern Ireland, 54pp.

DFO (2004). Potential impacts of seismic energy on snow crab. DFO (Fisheries and Ocean Canada) Canadian Science Advisory Secretariat. Habitat Status Report 2004/003

Dixon T (2012). Annual survey of reported discharges attributed to vessels and offshore oil and gas installations operating in the United Kingdom pollution control zone 2011. Advisory Committee on Protection of the Sea (ACOPS). 80pp.

DoE (2012). Rathlin Island European Marine Site Management Scheme Consultation Report. Department of the Environment Northern Ireland, 63pp.

DoENI (2011). Supplementary planning guidance to Draft Planning Policy Statement 2 Natural Heritage (Revised). Consultation document, March 2011. Department of the Environment, Northern Ireland, 70pp.

Duck CD (2009). Grey seal pup production in Britain in 2008. SCOS briefing paper

Duck CD & Mackey BL (2008). Grey seal pup production in Britain in 2007. SCOS briefing paper

Duck CD & Morris C (2011). Seals in Northern Ireland. Helicopter survey of harbour and grey seals, August 2011 Survey Report. Report produced by the Sea Mammal Research Unit.

Dwyer RG, Bearhop S, Campbell HA & Bryant DM (2012). Shedding light on light: benefits of anthropogenic illumination to a nocturnally foraging shorebird. *Journal of Animal Ecology* doi: 10.1111/1365-2656.12012

EC (2000) Managing NATURA 2000 Sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, 69pp.

Edwards A, Baxter MS, Ellet DJ, Martin JHA, Meldrum DT & Griffiths CR (1986). Clyde Sea hydrography. *Proceedings of the Royal Society of Edinburgh B* **90**: 67-83.

Engås A, Løkkeborg S, Ona E & Soldal AV (1996). Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*). *Canadian Journal of Fisheries and Aquatic Sciences* **53**: 2238-2249.

Faber Maunsell & Metoc (2007). Marine renewables Strategic Environmental Assessment (SEA). Report to The Scottish Government. Faber Maunsell & Metoc, UK.

Foden J, Rogers SI & Jones AP (2009). Recovery rates of UK seabed habitats after cessation of aggregate extraction. *Marine Ecology Progress Series*. **390**: 15-26.

Frid CLJ, Harwood KG, Hall SJ & Hall JA (2000). Long-term changes in the benthic communities on North Sea fishing grounds. *ICES Journal of Marine Science* **57**: 1303-1309.

Gage JD, Roberts JM, Hartley JP & Humphery JD (2005). Potential impacts of deep-sea trawling on the benthic ecosystem along the northern European continental margin: a review. In: PW Barnes & JP Thomas Eds. *Benthic habitats and the effects of fishing*. American Fisheries Society, Symposium 41, Bethesda, Maryland. pp. 503-517.

Gill AB & Bartlett M (2010). Literature review on the potential effects of electromagnetic fields and subsea noise from marine renewable energy developments on Atlantic salmon, sea trout and European eel. Scottish Natural Heritage Commissioned Report No.401, 43pp.

Goodwin I & Speedie C (2008). Relative abundance, density and distribution of the harbour porpoise (Phocoena phocoena) along the west coast of the UK. *Journal of the Marine Biological Association of the United Kingdom* **88**: 1221–1228.

Goold JC & Fish PJ (1998). Broadband spectra of seismic survey air-gun emissions, with reference to dolphin auditory thresholds. *Journal of Acoustical Society of America* **103**: April 1998

Goold JC (1996). Acoustic assessment of populations of common dolphin, *Delphinus delphis*, in conjunction with seismic surveying. *Journal of the Marine Biological Association of the UK* **76**: 811-820.

Gordon JCD, Gillespie D, Potter J, Frantzis A, Simmonds M & Swift R (1998). The effects of seismic surveys on marine mammals. In: ML Tasker & C Weir Eds. *Proceedings of the Seismic and Marine Mammals Workshop*, 23-25 June 1998, London.

Guildord TC, Meade J, Freeman R, Biro D, Evans T, Bonadonna F, Boyle D, Roberts S & Perrine CM (2008). GPS tracking of the foraging movements of Manx shearwaters *Puffinus puffinus* breeding on Skomer Island, Wales. *Ibis* **150**: 462–473.

Hall-Spencer J, Allain V & Fossa JH (2002). Trawling damage to Northeast Atlantic ancient coral reefs. *Proceedings of the Royal Society B: Biological Sciences* **269**: 507-511.

Hamer KC, Humphreys EM, Garthe S, Hennicke J, Peters G, Grémillet D, Phillips RA, Harris MP & Wanless S (2007). Annual variation in diets, feeding locations and foraging behaviour of gannets in the North Sea: flexibility, consistency and constraint. *Marine Ecology Progress Series* **338**: 295–305.

Hammond PS, Gordon JCD, Grellier K, Hall AJ, Northridge SP, Thompson D & Harwood J (2002). Background information on marine mammals relevant to Strategic Environmental Assessments 2 and 3. Sea Mammal Research Unit, 78pp.

Hammond PS, Northridge SP, Thompson D, Gordon JCD, Hall AJ, Duck CD, Aarts G, Cunningham L, Embling CB & Matthiopoulos J (2006). Background information on marine mammals for Strategic Environmental Assessment 7. Report to the DTI from Sea Mammal Research Unit, University of St. Andrews, UK, 63pp. plus appendices.

Hammond PS, Northridge SP, Thompson D, Gordon JCD, Hall AJ, Murphy SN & Embling CB (2008). Background information on marine mammals for Strategic Environmental Assessment 8. Report to the Department for Business, Enterprise and Regulatory Reform. Sea Mammal Research Unit, St. Andrews, Scotland, UK, 52pp.

Hampton S, Kelly PR & Carter HR (2003). Tank vessel operations, seabirds and chronic oil pollution in California. *Marine Ornithology* **31**: 29-34.

Hanson N & Lonergan M (2012). Seaward extension of UK seal Management Units. Sea Mammal Research Unit, draft: 14/05/2012, 9pp.

Harris RE, Miller GW & Richardson WJ (2001). Seal responses to airgun sounds during summer seismic surveys in the Alaskan Beaufort Sea. *Marine Mammal Science* **17**: 795-812.

Hassel A, Knutsen T, Dalen J, Skaar, K, Løkkeborg S, Misund OA, Øivind Ø, Fonn M & Haugland EK (2004). Influence of seismic shooting on the lesser sandeel (*Ammodytes marinus*). *ICES Journal of Marine Science* **61**: 1165-1173.

Hastings MC, Popper AN, Finneran JJ & Lanford PJ (1996). Effect of low frequency underwater sound on hair cells of the inner ear and lateral line of the teleost fish *Astronotus ocellatus*. *Journal of the Acoustical Society of America* **99**: 1759-1766.

HM Government (2011). UK Marine Policy Statement. HM Government, Northern Ireland Executive, Scottish Government, Welsh Assembly Government. 51pp.

HM Government (2012a). Marine Strategy Framework Directive consultation - UK initial assessment and proposals for Good Environmental Status, 148pp.

HM Government (2012b). Marine Strategy Part One: UK Initial Assessment and Good Environmental Status. December 2012, 163pp.

Hoskin R & Tyldesley D (2006). How the scale of effects on internationally designated nature conservation sites in Britain has been considered in decision making: A review of authoritative decisions. English Nature Research Reports, No 704.

Howarth MJ (2005). Hydrography of the Irish Sea SEA 6 Technical Report. Proudman Oceanographic Laboratory, Liverpool.

HSE (2003). Ship/platform collision incident database (2001). Prepared by Serco Assurance for the Health and Safety Executive 2003. Research report 53, 137pp.

Hyland J, Hardin D, Steinhauer M, Coats D, Green R & Neff J (1994). Environmental impact of offshore oil development on the outer continental shelf and slope off Point Arguello, California. *Marine Environmental Research* **37**: 195-229.

IMO (International Maritime Organisation) GloBallast website (accessed October 2012) http://globallast.imo.org/

Iona Energy Company (UK) Ltd (2012). Kells Field Development, Block 3/8d. Environmental Statement, February 2012, 198pp.

Islandmagee Storage Limited (2010). Islandmagee Storage Project Environmental Impact Statement. Islandmagee Storage http://www.islandmageestorage.com/index.php?option=com_content&task=view&id=167&Itemid=59

Ithaca Energy (UK) Ltd (2008). Jacky Development, Block 12/21c. Environmental Statement, April 2008, 322pp.

JNCC (2010). JNCC guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys. August 2010, 16pp.

JNCC (1999). Seabird vulnerability in UK waters: block specific vulnerability. Joint Nature Conservation Committee, Aberdeen.

Kaiser MJ, Clarke KR, Hinz H, Austen MCV, Somerfield PJ & Karakassis I (2006). Global analysis of response and recovery of benthic biota to fishing. *Marine Ecology Progress Series* **311**: 1-14.

Kaiser MJ, Collie JS, Hall SJ, Jennings S & Poiner IR (2002a). Impacts of fishing gear on marine benthic habitats. In: M Sinclair & G Valdimarsson Eds. *Responsible fisheries in the marine ecosystem*. CABI Publishing, Wallingford, pp.197-217.

Kaiser MJ, Collie JS, Hall SJ, Jennings S & Poiner IR (2002b). Modification of marine habitats by trawling activities: prognosis and solutions. *Fish and Fisheries* **3**: 114-133.

Kingston PF, Dixon IMT, Hamilton S & Moore DC (1995). The impact of the Braer oil spill on the macrobenthic infauna of the sediments off the Shetland Islands. *Marine Pollution Bulletin* **30**: 445-459.

Knight PJ & Howarth MJ (1999). The flow through the North Channel of the Irish Sea. *Continental Shelf Research* **19**: 693-716.

Knudsen FR, Enger PS & Sand O (1994). Avoidance responses to low frequency sound in downstream migrating Atlantic salmon smolt, *Salmo salar*. *Journal of Fish Biology* **45**: 227-233.

Kober K, Webb A, Win I, Lewis L, O'Brien S, Wilson LJ & Reid J (2010). An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs. JNCC Report 431. JNCC Peterborough.

Kober K, Wilson LJ, Black J, O'Brien S, Allen S, Win I, Bingham C & Reid JB (2012). The identification of possible marine SPAs for seabirds in the UK: the application of Stage 1.1-1.4 of the SPA selection guidelines. JNCC Report No. 461, 88pp.

Lacroix DL, Lanctot RB, Reed JA & McDonald TL (2003). Effect of underwater seismic surveys on molting male long-tailed ducks in the Beaufort Sea, Alaska. *Canadian Journal of Zoology* **81**: 1862-1875

Law RJ, Kirby MF, Moore J, Barry J, Sapp M & Balaam J (2011). PREMIAM – Pollution Response in Emergencies Marine Impact Assessment and Monitoring: Post-incident monitoring guidelines. Science Series Technical Report, Cefas, Lowestoft,146: 164pp.

Lawson JW, Malme CI & Richardson WJ (2001). Assessment of noise issues relevant to marine mammals near the BP Clair Development. Report to BP from LGL Ltd., Environmental Research Associates and Engineering and Science Services.

Lewis S, Sherratt TN, Hamer KC & Wanless S (2001). Evidence of intra-specific competition for food in a pelagic seabird. *Nature* **412**: 816–819.

Lonergan M, Duck CD, Thompson D, Moss S & McConnell B (2011). British grey seal (*Halichoerus grypus*) abundance in 2008: an assessment based on aerial counts and satellite telemetry. *ICES Journal of Marine Science* **68**: 2201-2209.

Lucke K, Siebert U, Lepper PA & Blanchet M-A (2009). Temporary shift in masked hearing thresholds in a harbour porpoise (*Phocoena phocoena*) after exposure to seismic airgun stimuli. *Journal of the Acoustical Society of America* **125**: 4060-4070.

Maitland G (2011). Offshore oil and gas in the UK - an independent review of the regulatory regime, December 2011, 205pp.

Malcom IA, Godfrey J & Youngson AF (2010). Review of migratory routes and behaviour of Atlantic salmon, sea trout and European eel in Scotland's coastal environment: implications for the development of marine renewables. Scottish Marine and Freshwater Science Vol 1 No 14, Marine Scotland Science, 72pp.

Marine Scotland (2011). Blue Seas – Green Energy: A sectoral marine plan for offshore wind energy in Scottish Territorial Waters Part A The Plan.

Mason J (1983). Scallop and queen fisheries in the British Isles. Fishing News Books Ltd. Surrey, England.

Matthiopoulos J, McConnell B, Duck C & Fedak M (2004). Using satellite telemetry and aerial counts to estimate space use by grey seals around the British Isles. *Journal of Applied Ecology* **41**: 476-491.

McBreen F, Askew N, Cameron A, Connor D, Ellwood H & Carter A (2011). UK SeaMap 2010 Predictive mapping of seabed habitats in UK waters. JNCC Report 446, 109pp.

McCauley RD (1994). Seismic surveys. In, Swan, JM, Neff, JM and Young, PC (Eds) Environmental implications of offshore oil and gas developments in Australia. The findings of an independent scientific review. Australian Petroleum Exploration Association, Sydney, NSW. 696pp.

McCauley RD, Fewtrell J & Popper AN (2003). High intensity anthropogenic sound damages fish ears. *Journal of the Acoustical Society of America* **113**: 638-642.

McConnell BJ, Fedak MA, Lovell P & Hammond PS (1999). Movements and foraging areas of grey seals in the North Sea. *Journal of Applied Ecology* **36**: 573-590.

MMS (2004). Geological and geophysical exploration for mineral resources on the Gulf of Mexico Outer Continental Shelf. Final programmatic environmental assessment. Report no. MMS 2004-054. Report to the U.S. Department of the Interior Minerals Management Service, New Orleans, 487pp.
http://www.ocsbbs.com/2004-054.pdf

Moriyasu M, Allain R, Benhalima K & Claytor R (2004). Effects of seismic and marine noise on invertebrates: A literature review. Canadian Science Advisory Secretariat. Research Document 2004/126.

National Commission (2011). National Commission on the BP Deepwater Horizon Spill and Offshore Drilling. Deep water: The Gulf oil disaster and the future of offshore drilling: Report to the president. US Government report. 398pp.

National Research Council (NRC) (2005). Marine mammal populations and ocean noise. Determining when noise causes biologically significant effects. Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals, National Research Council. The National Academies Press, Washington DC. 126pp.

Natural Resource Damage Assessment (2012). Status update for the Deepwater Horizon oil spill. 91pp.

Nedwell JR & Needham K (2001). Measurement of drill rig noise. Subacoustech Ltd. Report No. 452R0102.

Nedwell JR, Edwards B & Needham K (2002). Noise measurements during pipeline laying operations around the Shetland Islands for the Magnus EOR project. Subacoustech Ltd. Report No. 473R0212.

Nedwell JR, Needham K & Edwards B (2001). Report on measurements of underwater noise from the Jack Bates Drill Rig. Subacoustech Ltd. Report No. 462R0202.

Neff JM, Bothner MH, Maciolek NJ & Grassle JF (1989). Impacts of exploratory drilling for oil and gas on the benthic environment of Georges Bank. *Marine Environmental Research* **27**: 77-114.

Nehls G, Betke K, Eckelmann S & Ros M (2007). Assessment and costs of potential engineering solutions for the mitigation of the impacts of underwater noise arising from the construction of offshore windfarms. Report to COWRIE Ltd. BioConsult SH report, Husum, Germany, 47pp.

Northern Ireland Environment Agency (NIEA) (2009). Inshore Special Area of Conservation: Red Bay, County Antrim Conservation Objectives and Advice on Operations. Advice under Regulation 28(2) of The Conservation (Nature Habitats, etc.) Regulation (Northern Ireland) 1995

Northern Ireland Environment Agency (NIEA) (2010a). Inshore Special Area of Conservation: The Maidens SAC selection assessment, 34pp.

Northern Ireland Environment Agency (NIEA) (2010b). Inshore Special Area of Conservation: Skerries and Causeway SAC Selection Assessment, 38pp.

Northern Ireland Environment Agency (NIEA) (2011). Inshore Special Area of Conservation: The Maidens conservation objectives and advice on operations. Advice under Regulation 28(2) of The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 as amended), 10th January 2011, 18pp

Nowacek DP, Thorne LH, Johnston DW & Tyack PL (2007). Responses of cetaceans to anthropogenic noise. *Mammal Review* **37**: 81-115.

ODPM (2005). Government circular: Biodiversity and geological conservation - statutory obligations and their impact within the planning system. ODPM Circular 06/2005. Office of the Deputy Prime Minister, UK, 88pp.

Oil and Gas UK (2009). Accident statistics for offshore units on the UKCS 1990-2007 Issue 1 April 2009, 127pp.

OGP (2010). Ship/installation collisions. Report No. 434-16, 21pp.

OSPAR (2000). Quality Status Report 2000. OSPAR Commission, London. http://www.ospar.org/eng/html/qsr2000/QSR2000welcome3.htm

OSPAR (2009). Assessment of impacts of offshore oil and gas activities in the North-East Atlantic. OSPAR Commission, 40pp.

OSPAR (2010). Quality Status Report 2010. OSPAR Commission, London, 176pp.

OSPAR (2012). Report of the OSPAR Workshop on research into possible effects of regular platform lighting on specific bird populations. Offshore Industry Series, 17pp.

Parry GD & Gason A (2006). The effect of seismic surveys on catch rates of rock lobsters in western Victoria, Australia. *Fisheries Research* **79**: 272-284.

Peacock EE, Nelson RK, Solow AR, Warren JD, Baker JL, & Reddy CM (2005). The West Falmouth oil spill: 100 kg of oil persists in marsh sediments. *Environmental Forensics* **6**:273-281.

Popper AN, Carlson TJ, Hawkins AD, Southall BJ & Gentry RL (2006). Interim Criteria for Injury of Fish Exposed to Pile Driving Operations: A White Paper. Report to the Fisheries Hydroacoustic Working Group, California Department of Transportation, USA, 15pp.

Popper AN, Fewtrell J, Smith ME & McCauley RD (2003). Anthropogenic sound: Effects on the behaviour and physiology of fishes. *Marine Technology Society Journal* **37**: 35-40.

Popper AN, Smith ME, Cott PA, Hanna BW, MacGillivray AO, Austin ME & Mann DA (2005). Effects of exposure to seismic airgun use on hearing of three fish species. *Journal of the Acoustical Society of America* **117**: 3958-3971.

Reddy CM, Eglinton TI, Hounshell A, White HK, Xu L, Gaines RB & Frysinger GS (2002). The West Falmouth oil spill after thirty years: the persistence of petroleum hydrocarbons in marsh sediments. *Environmental Science and Technology* **36**: 4754 -4760.

Richardson WJ, Greene CR Jr, Malme CI & Thomson DH (1995). *Marine Mammals and Noise.* Academic Press, San Diego, US, 576pp.

Robinson JE, Newell RC, Seiderer LJ & Simpson NM (2005). Impacts of aggregate dredging on sediment composition and associated benthic fauna at an offshore dredge site in the southern North Sea. *Marine Environmental Research* **60**: 51-68.

Royal Haskoning (2010). SeaGen environmental monitoring programme - SeaGen biannual environmental monitoring March 2010 – Oct 2010. December 2010, 39pp.

Royal Haskoning (2011). SeaGen environmental monitoring programme - Final Report. Marine Current Turbines 16 January 2011, 81pp.

Russell DJF, McConnell B, Thompson D, Duck C, Morris C, Harwood J & Matthiopoulos J (2013). Uncovering the links between foraging and breeding regions in a highly mobile mammal. *Journal of Applied Ecology* doi: 10.1111/1365-2664.12048

SCOS (2007). Scientific advice on matters related to the management of seal populations: 2007.

Scottish Natural Heritage (2006a). South-East Islay Skerries SAC Special Area of Conservation. Advice under Regulation 33(2) of The Conservation (Natural Habitats, & c.) Regulations 1994. Scottish Natural Heritage.

Scottish Natural Heritage (2006b). Eileanan agus Sgeiran Lios mór Special Area of Conservation. Advice under Regulation 33(2) of The Conservation (Natural Habitats, & c.) Regulations 1994. Scottish Natural Heritage.

Scottish Natural Heritage (2006c). Treshnish Isles Special Area of Conservation. Advice under Regulation 33(2) of The Conservation (Natural Habitats, & c.) Regulations 1994. Scottish Natural Heritage.

SEEEC (1998). The environmental impact of the *Sea Empress* oil spill. Final report of the *Sea Empress* Environmental Evaluation Committee. The Stationery Office, London.

SEERAD (2000). Nature conservation: implementation in Scotland of EC directives on the conservation of natural habitats and of wild flora and fauna and the conservation of wild birds ("the Habitats and Birds Directives"). June 2000. Revised guidance updating Scottish Office circular no. 6/199.

Simmonds M, Dolman S & Weilgart L (2003). Oceans of Noise. A Whale and Dolphin Conservation Society Science Report.

Skalski JR, Pearson WH & Malme CI (1992). Effects of sounds from a geophysical survey device on catch-per-unit-effort in a hook-and-line fishery for rockfish (*Sebastes* spp.). *Canadian Journal of Fisheries and Aquatic Science* **49**: 1343-1356.

Slotte A, Hansen K, Dalen J & Ona E (2004). Acoustic mapping of pelagic fish distribution and abundance in relation to a seismic shooting area off the Norwegian west coast. *Fisheries Research* **67**: 143-150.

SMRU (2007). Potential impact of oil and gas exploration and development on SACs for bottlenose dolphins and other marine mammals in the Moray Firth and Cardigan Bay/Pembrokeshire. Report to the DTI. Sea Mammal Research Unit, University of St Andrews, Scotland, 13pp.

SNCB (2012). Guidance for staff advising on the potential risk of seal corkscrew injuries April 2012.

Snelgrove PVR (1999). Getting to the bottom of marine biodiversity: Sedimentary habitats. *BioScience* **49**: 129-138.

Southall BL, Bowles AE, Ellison WT, Finneran JJ, Gentry RL, Greene Jr. CR, Kastak D, Ketten DR, Miller JH, Nachtigall PE, Richardson WJ, Thomas JA & Tyack PL (2007). Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals 33: 411-522.

Stemp R (1985). Observations on the effects of seismic exploration on seabirds. In: Greene GD, Engelhardt FR & Paterson RJ (Eds) *Proceedings of the Workshop on Effects of Explosives Use in the Marine Environment*. Jan 29-31, 1985, Halifax, Canada.

Stone CJ & Tasker ML (2006). The effects of seismic airguns on cetaceans in UK waters. *Journal of Cetacean Research and Management* **8**: 255-263.

Stone CJ (2003). The effects of seismic activity on marine mammals in UK waters, 1998-2000. JNCC Report no. 323. Joint Nature Conservation Committee, Peterborough.

Swift RJ & Thompson PM (2000). Identifying potential sources of industrial noise in the Foinaven and Schiehallion region. Report prepared for BP Amoco Exploration, UK Operations, Farburn Industrial Estate, Dyce, Aberdeen, Scotland.

Tasker ML, Amundin M, Andre M, Hawkins A, Lang W, Merck T, Scholik-Schlomer A, Teilmann J, Thomsen F, Werner S & Zakharia M (2010). Underwater noise and other forms of energy: Marine Strategy Framework Directive Task Group 11 report, 64pp.

Teal JM & Howarth RW (1984). Oil spill studies: a review of ecological effects. *Environmental Management* **8**: 27-43

Teal JM, Farrington JW, Burns KA, Stegeman JJ, Tripp BW, Woodin B & Phinney C (1992). The West Falmouth oil spill after 20 years: fate of fuel oil compounds and effects on animals. *Marine Pollution Bulletin* **24**: 607-614.

Thaxter CB, Lascelles B, Sugar K, ASCP Cook, Roos S, Bolton M, Langston RHW & Burton NHK (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation* **156**: 53–61.

Thompson D, Sjoberg M, Bryant ME, Lovell P & Bjorge A (1998). Behavioural and physiological responses of harbour (*Phoca vitulina*) and grey (*Halichoerus grypus*) seals to seismic surveys. Report the European Commission of BROMMAD Project.

Trannum HC, Nilsson HC, Schaanning MT & Øxnevad S (2010). Effects of sedimentation from water-based drill cuttings and natural sediment on benthic macrofaunal community structure and ecosystem processes. *Journal of Experimental Marine Biology and Ecology* **383**: 111–121

Trannum HC, Setvik Å, Norling K & Nilsson HC (2011). Rapid macrofaunal colonization of water-based drill cuttings on different sediments. *Marine Pollution Bulletin* **62**: 2145–2156

Tyldesley & Associates (2012). Habitats Regulations Appraisal of Plans: Guidance for Plan-making Bodies in Scotland. Scottish Natural Heritage report no. 1739, Version 2, 75pp.

UKOOA (2003). UKOOA guidelines for ship/installation collision avoidance. Issue 1, 88pp.

Van der Graaf AJ, Ainslie MA, André M, Brensing K, Dalen J, Dekeling RPA, Robinson S, Tasker ML, Thomsen F, Werner S (2012). European Marine Strategy Framework Directive - Good Environmental Status (MSFD GES): Report of the Technical Subgroup on Underwater noise and other forms of energy, 75pp.

Wakefield ED, Bodey TW, Bearhop S, Blackburn J, Colhoun K, Davies R, Dwyer RG, Green J, Grémillet D, Jackson AL, Jessopp MJ, Kane A, Langston RHW, Lescroël A, Murray S, Le Nuz M, Patrick SC, Péron C, Soanes L, Wanless S, Votier SC & Hamer KC (2013). Space partitioning without territoriality in gannets. *Science*. Published online 6 June 2013 [DOI:10.1126/science.1236077]

Weilgart LS (2007). The impacts of anthropogenic ocean noise on cetaceans and implications for management. *Canadian Journal of Zoology* **85**: 1091-1116.

Wiese FK, Montevecchi WA, Davoren GK, Huettmann F, Diamond AW & Linke J (2001). Seabirds at risk around offshore oil platforms in the North-west Atlantic. *Marine Pollution Bulletin* **42**: 1285-1290.

Williams JM, Tasker ML, Carter IC & Webb A (1994). Method for assessing seabird vulnerability to surface pollutants. *Ibis* **137**: 147-152.

Witbaard R & Klein R (1993). A method to estimate the bottom trawl intensity independently from fisheries itself by using internal molluscan growth lines. *ICES CM 1993* **K:16**, 8pp.

Merlin Energy Resources (2013). Prospectivity review of PL1/10. Larne-Lough Neagh Basin, Onshore Northern Ireland. Merlin Energy Resources for Infrastrata plc, March 2013. 27pp.

Appendix A – The sites

The migratory and/or Annex I bird species for which SPAs are selected in the UK are listed in Box A.1, and the SPAs and their qualifying features are given in Table A.1 and their locations shown in the Map A.1. JNCC[49] note that, "*The legal list of qualifying species, for which a Special Protection Area (SPA) has been selected and is managed, is given on the relevant SPA citation (available from the country agency concerned). A review of UK network of SPAs was co-ordinated by JNCC in the late 1990s. Following formal submission to, and agreement by, relevant Ministers, the results were published in 2001. This Review revised the list of qualifying species at some SPAs.*

However, it is taking some time to revise all the relevant SPA citations in the light of these agreed changes to the affected lists of qualifying species. Where there is a mismatch between species listed in extant citations and listed in the 2001 Review for the same sites, there has been confusion as to the 'correct' list of qualifying species to be used at any site for purposes of management, assessment and development control.

The individual site accounts in 2001 Review should be taken as the definitive list of qualifying species at the SPAs concerned. However, at sites where there remain differences between that list of qualifying species and the extant site citation, then the relevant country agency should be contacted for further guidance."

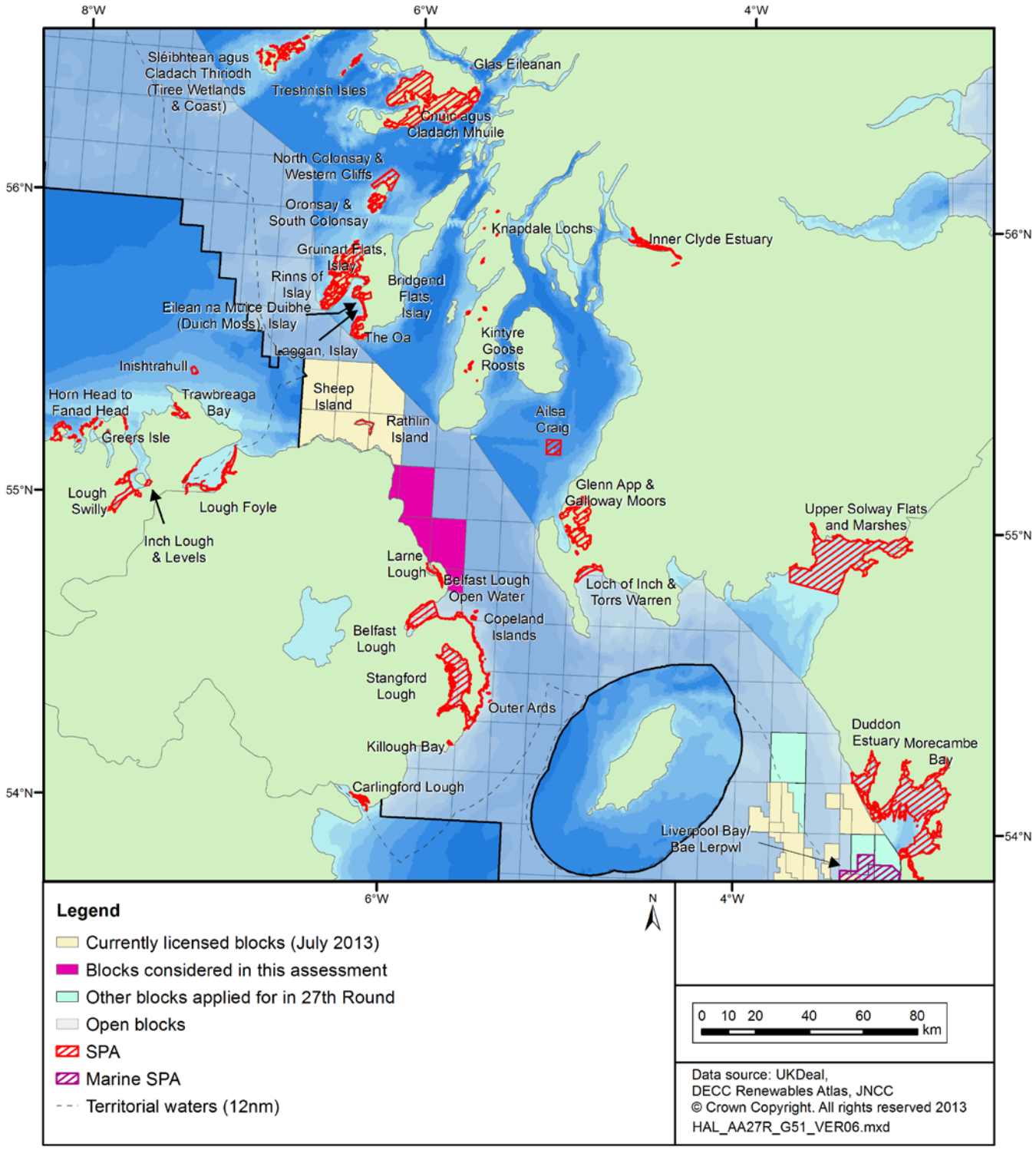
A review of SPA sites was undertaken to identify where a mismatch between the qualifying species lists existed. Each country agency (NE, SNH, CCW, NIEA) was contacted to clarify those features which should be considered. The species listed in Table A.1 reflect the outcome of this review.

Additionally, the Natural England Designations Strategy[50] states that, "A further review (2010 SPA Review) of the terrestrial and coastal SPA network is currently underway. This is targeting parts of the current UK network to ensure UK obligations under Article 4 of the Birds Directive are met. This review will provide information to be used to further support the development of the current UK terrestrial and coastal SPA network. The outcome of this work is likely to result in significant amendments to the SPA series in England... [and is]…likely to impact on the recommendations of the earlier 2001 SPA review".

[49] http://jncc.defra.gov.uk/page-5485 (accessed: October 2012)
[50] Natural England Designations Strategy – July 2012.

A1 Coastal and Marine Special Protection Areas

Map A.1: Location of Special Protection Areas



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

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

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

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

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

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

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

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

Waterfowl
Bewick's swan *Cygnus columbianus bewickii*
Whooper swan *Cygnus cygnus*
Bean goose *Anser fabalis*
Pink-footed goose *Anser brachyrhynchus*
Russian white-fronted goose *Anser albifrons albifrons*
Greenland white-fronted goose *Anser albifrons flavirostris*
Icelandic greylag goose *Anser anser*
Greenland barnacle goose *Branta leucopsis*
Svalbard barnacle goose *Branta leucopsis*
Dark-bellied brent goose *Branta bernicla bernicla*
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*

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[51]
Northern Ireland				
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
Sheep Island SPA	3.5	Breeding: Cormorant	N/A	N/A
Rathlin Island SPA	3344.62	Breeding: Peregrine	Breeding: Guillemot Razorbill Kittiwake	Breeding: Seabird
Larne Lough SPA	395.94	Breeding: Common tern Roseate tern Sandwich tern	Over winter: Canadian light-bellied brent goose	N/A
Belfast Lough Open Water SPA	5592.99	N/A	Over winter: Great crested grebe	N/A
Belfast Lough SPA	432.14	Over winter: Bar-tailed godwit	Over winter: Redshank Turnstone	Overwinter: Waterfowl
Copeland Islands SPA	201.52	Breeding: Arctic tern	Breeding: Manx shearwater	N/A
Outer Ards SPA	1410.41	Breeding: Arctic tern Over winter: Golden plover	Over winter: Light-bellied brent goose Ringed plover Turnstone	N/A
Strangford Lough SPA	15580.79	Breeding: Arctic tern Common tern Sandwich tern Over winter: Bar tailed godwit Golden plover	Over winter: Knot Canadian light-bellied brent goose Redshank Shelduck	Over winter: Waterfowl
Killough Bay SPA	104.23	N/A	Over winter: Canadian light-bellied brent goose	N/A
Carlingford Lough SPA	827.12	Breeding: Common tern Sandwich tern	Over winter: Canadian light-bellied brent goose	N/A
Scotland				
Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast) SPA	1938.59	Overwinter: Greenland white-fronted goose Barnacle goose	Breeding: Dunlin Oystercatcher Redshank	

[51] - 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[51]
			Ringed plover Overwinter: Turnstone Ringed plover	
Treshnish Isles SPA	240.67	Breeding: Storm petrel Overwinter: Greenland barnacle goose	N/A	N/A
Glas Eileanan SPA	1.43	Breeding: Common tern	N/A	N/A
Cnuic agus Cladach Mhuile (Mull Coast and Hills) SPA	29248.97	Resident: Golden eagle	N/A	N/A
North Colonsay and Western Cliffs SPA	3307.22	Breeding: Chough Overwinter: Chough	Breeding: Kittiwake Guillemot	Breeding: Seabird
Oronsay and South Colonsay SPA	2016.86	Breeding: Corncrake Chough Overwinter: Chough	N/A	N/A
Gruinart Flats, Islay SPA	3261.32	Breeding: Chough Overwinter: Barnacle goose Greenland white-fronted goose Chough	Overwinter: Canadian light-bellied brent goose	N/A
Rinns of Islay SPA	9407.46	Breeding: Chough Corncrake Hen harrier On passage: Whooper swan Overwinter: Greenland white-fronted goose Chough	Breeding: Common scoter	N/A
Eilean na Muice Duibhe (Duich Moss), Islay SPA	576.42	Overwinter: Greenland white-fronted goose	N/A	N/A
Laggan, Islay SPA	1230.02	Overwinter: Barnacle goose Greenland white-fronted goose	N/A	N/A
The Oa SPA	1943	Breeding: Chough	N/A	N/A

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[51]
Bridgend Flats, Islay SPA	331.16	Overwinter: Barnacle goose	N/A	N/A
Knapdale Lochs SPA	112.39	Breeding: Black-throated diver	N/A	N/A
Kintyre Goose Roosts SPA	412.37	Overwinter: Greenland white-fronted goose	N/A	N/A
Inner Clyde Estuary SPA	1826.02	N/A	Overwinter: Redshank	N/A
Ailsa Craig SPA	2759.57	N/A	Breeding: Gannet Lesser black-backed gull	Seabirds
Glen App-Galloway Moors SPA	8942.38	Breeding: Hen harrier	N/A	N/A
Loch of Inch & Torrs Warren SPA	2111.04	Over winter: Greenland white-fronted goose Hen harrier	N/A	N/A
Upper Solway Flats and Marshes SPA	30706.26	Over winter: Bar-tailed godwit Barnacle goose Golden plover Whooper swan	On passage: Ringed plover Over winter: Curlew Dunlin Sanderling Knot Oystercatcher Pink-footed goose Pintail Redshank Shoveler Teal Turnstone Scaup Goldeneye Grey plover Shelduck	Over winter: Waterfowl
England				
Duddon Estuary SPA	6806.3	Breeding: Sandwich tern	On passage: Ringed plover Sanderling Over winter: Knot Pintail Redshank	Over winter: Waterfowl
Morecambe Bay SPA	37404.6	Breeding: Sandwich tern Little tern Over winter: Bar-tailed godwit Golden plover	Breeding: Herring gull Lesser black backed gull On passage: Ringed plover Sanderling Over winter:	Breeding: Seabird Non-breeding: Waterfowl

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[51]
			Curlew Dunlin Grey plover Knot Oystercatcher Pink-footed goose Pintail Redshank Shelduck Turnstone Bar-tailed godwit	
Liverpool Bay/ Bae Lerpwl SPA	170292.94	Over winter: Red-throated diver	Over winter: Common scoter	Non breeding: Waterfowl

A2 SPAs in adjacent member states

See Map A1 for details of site locations.

Table A.2: SPAs and their Qualifying Features in the Republic of Ireland

Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[52]
Horn Head to Fanad Head SPA	2430.70	Overwinter: Greenland white-fronted goose Whooper Swan Greenland Barnacle goose Resident: Peregrine Chough	Overwinter: Teal Mallard Tufted duck Pochard Coot Breeding: Common sandpiper Razorbill Dunlin Puffin Snipe Herring gull Shag Cormorant Kittiwake Guillemot Lapwing Fulmar	N/A
Lough Swilly SPA	3734.44	Overwinter: Whooper swan Greenland white-fronted goose Bar-tailed godwit Golden plover Breeding:	Overwinter: Great crested grebe Shelduck Wigeon Teal Mallard Scaup Shoveler	Overwinter: Waterfowl

[52] - 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[52]
		Common tern Sandwich tern	Goldeneye Red-breasted merganser Coot Oystercatcher Knot Dunlin Curlew Redshank Greenshank Lapwing Ringed plover Cormorant Greylag goose Common gull Greenland white-fronted goose Black headed gull Ruddy turnstone Bar-tailed godwit Light bellied brent goose Tufted duck	
Greers Isle SPA	19.14	Breeding: Sandwich tern Common tern Arctic tern	Breeding: Common gull Black-headed gull	N/A
Trawbreaga Bay SPA	1003.4	Overwinter: Light-bellied brent goose Barnacle goose Whooper Swan Bar-tailed godwit Breeding: Chough	Overwinter: Lapwing Common gull Oystercatcher Red-breasted merganser Barnacle goose Wigeon Ringed plover Dunlin Curlew Redshank Mallard	N/A
Inishtrahull SPA	474.45	Overwinter: Barnacle goose	Breeding: Shag Common gull Fulmar Lesser black-backed gull Kittiwake Herring gull	N/A
Lough Foyle SPA	587.93	N/A	Overwinter: Great crested grebe Cormorant Brent goose Shelduck Wigeon Mallard Red-breasted merganser Oystercatcher	Waterbirds

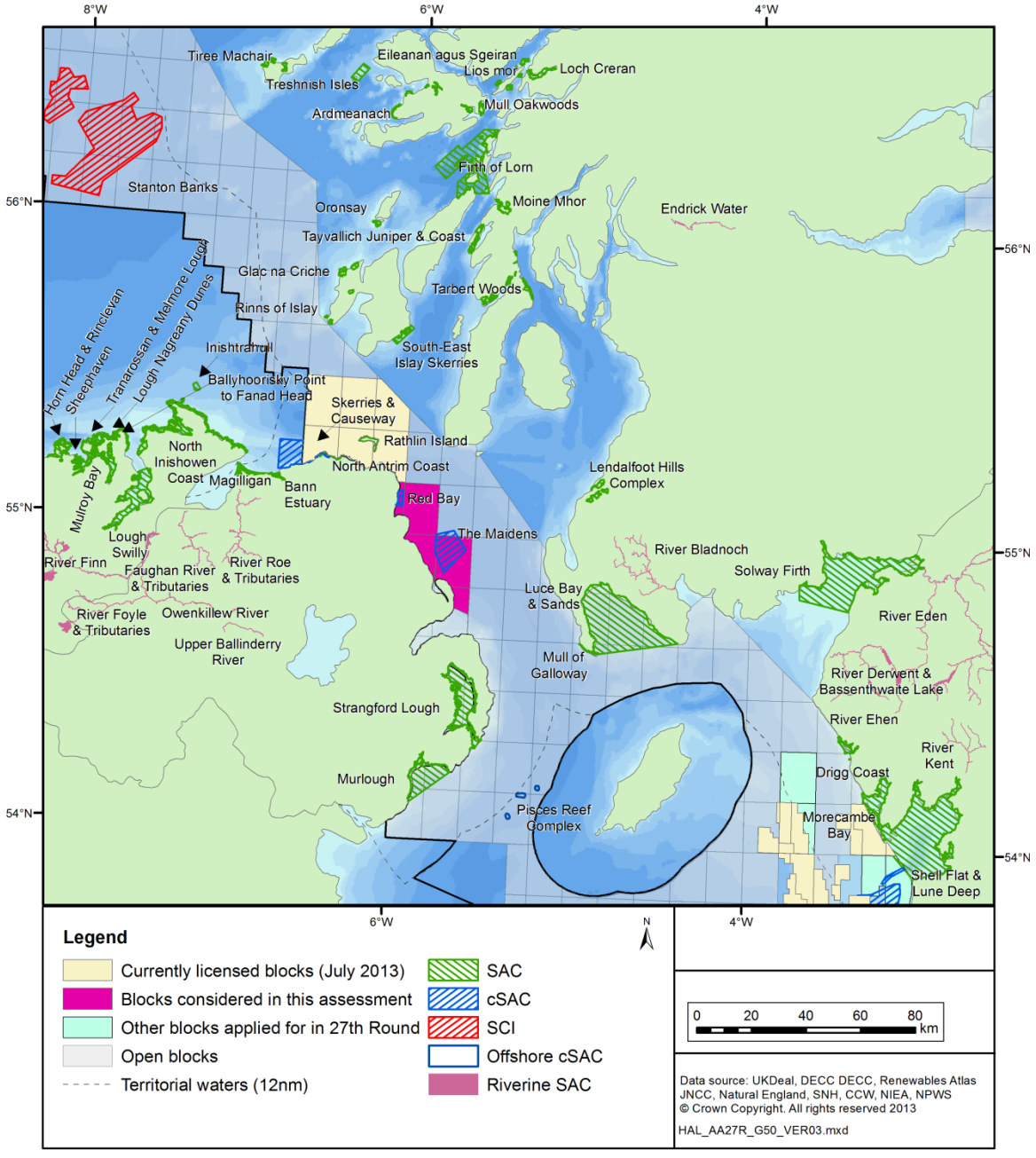
Site Name	Area (ha)	Article 4.1 Species	Article 4.2 Migratory species	Article 4.2 Assemblages[52]
			Knot Curlew Redshank Greenshank Ruddy Turnstone Black-headed gull Common gull Barnacle goose Berwick's swan Whooper swan Greylag goose Teal Eider Golden plover Northern Lapwing Dunlin Bar-tailed godwit Herring gull	

A3 Coastal and Marine Special Areas of Conservation

This section includes coastal or nearshore marine (within 12nm boundary) Special Areas of Conservation (SAC) sites which contain one or more of the Annex I coastal habitats listed in Box A.2 (below) or examples of Annex II qualifying marine species. Abbreviations for the Annex 1 habitats used in SAC site summaries (Tables A.3, A.4, A.5 and A.6 and Map A.2) are listed in Box A.2.

Relevant offshore (outside or crossing the 12nm boundary) SACs are included on Map A.2 and described in Section A4. Riverine/freshwater SACs which are designated for migratory fish and/or freshwater pearl mussel are included on Map A.2 and considered in Section A5.

Map A.2: Location of coastal, marine and offshore Special Areas of Conservation



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

Annex I Habitat (abbreviated)	Annex I Habitat(s) (full description)
Bogs	Active raised bogs * Priority feature Blanket bogs * Priority feature Bog Woodland * Priority feature Degraded raised bogs still capable of natural regeneration Depressions on peat substrates of the *Rhynchosporion* Transition mires and quaking bogs
Caves	Caves not open to the public
Coastal dunes	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) Coastal dunes with *Juniperus* spp. Decalcified fixed dunes with *Empetrum nigrum* Dunes with *Hippophae rhamnoides* Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) Embryonic shifting dunes Fixed dunes with herbaceous vegetation (`grey dunes`) * Priority feature Humid dune slacks Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`)
Coastal lagoons	Coastal lagoons *Priority feature
Estuaries	Estuaries
Fens	Alkaline fens Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* * Priority feature Petrifying springs with tufa formation (*Cratoneurion*) * Priority feature
Forest	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) * Priority feature Old sessile oak woods with *Quercus robur* on sandy plains *Tilio-Acerion* forests of slopes, screes and ravines * Priority feature Killarney fern *Trichomanes speciosum* Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*) *Asperulo-Fagetum* beech forests Old acidophilous oak woods with *Quercus robur* on sandy plains
Grasslands	Alpine and subalpine calcareous grasslands Calaminarian grasslands of the *Violetalia calaminariae* Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) Semi-natural dry grasslands and scrubland facies: on calcareous substrates

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

Table A.3: Coastal SACs and their Qualifying Features

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Northern Ireland					
Magilligan SAC	1058.22	Coastal dunes	Coastal dunes	N/A	Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia* Petalwort *Petalophyllum ralfsii*
Skerries and Causeway cSAC	10,862	Reefs Sandbanks Sea caves	N/A	N/A	Harbour porpoise *Phocoena phocoena*
Bann Estuary SAC	347.94	Coastal dunes	Salt marshes and salt meadows Coastal dunes	N/A	N/A
North Antrim Coast SAC	314.59	Sea cliffs	Vegetation of drift lines Salt marshes and salt meadows Coastal dunes Grasslands	Narrow-mouthed whorl snail *Vertigo angustior*	N/A
Rathlin Island SAC	3344.62	Reefs Sea cliffs Sea caves	Sandbanks Vegetation of drift lines	N/A	N/A
Red Bay SCI	965.54	Sandbanks	N/A	N/A	N/A
The Maidens cSAC	7461.36	Sandbanks Reefs	N/A	N/A	Grey seal *Halichoerus grypus*
Strangford Lough SAC	15398.54	Mudflats and sandflats Coastal lagoons Inlets and bays Reefs	Vegetation of drift lines Vegetation of stony banks Salt marshes and salt meadows	N/A	Harbour seal *Phoca vitulina*
Murlough SAC	11902.03	Coastal dunes	Sandbanks Mudflats and sandflats	Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*	Harbour seal *Phoca vitulina*

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
			Salt marshes and salt meadows Coastal dunes		
Scotland					
Tiree Machair SAC	785.46	Coastal dunes Machairs Standing freshwater	Coastal dunes	N/A	N/A
Eileanan agus Sgeiran Lios mór SAC	1139.62	N/A	N/A	Harbour seal *Phoca vitulina*	N/A
Loch Creran SAC	1226.39	Reefs	N/A	N/A	N/A
Treshnish Isles SAC	1962.66	N/A	Reefs	Grey seal *Halichoerus grypus*	N/A
Ardmeanach SAC	374.79	Grassland	Sea cliffs	N/A	N/A
Mull Oakwoods SAC	1401.89	Forest	N/A	N/A	Otter *Lutra lutra*
Firth of Lorn SAC	20975.01	Reefs	N/A	N/A	N/A
Moine Mhor SAC	1150.41	Bogs	Mudflats and sandflats Salt marshes and salt meadows Forest	N/A	Otter *Lutra lutra* Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*
Tarbert Woods SAC	1595.97	Forests	N/A	N/A	N/A
Oronsay SAC	340.07	Machairs	N/A	N/A	N/A
Tayvallich Juniper and Coast SAC	1213.47	Scrub (matorral)	N/A	Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*	Otter *Lutra lutra*
Glac na Criche SAC	265.33	Bogs	Sea cliffs Heaths	N/A	Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*
Rinns of Islay SAC	1149.7	N/A	N/A	Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*	N/A
South-East Islay Skerries SAC	1498.3	N/A	N/A	Harbour seal *Phoca vitulina*	N/A
Lendalfoot Hills Complex SAC	1309.71	Grassland Fens	Heaths Grasslands Bogs	N/A	N/A

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Luce Bay and Sands SAC	48759.28	Inlets and bays Coastal dunes	Sandbanks Mudflats and sandflats Reefs	N/A	Great crested newt *Triturus cristatus*
Mull of Galloway SAC	136.39	Sea cliffs	N/A	N/A	N/A
Solway Firth SAC	43636.72	Sandbanks Estuaries Mudflats and sandflats Salt marshes and salt meadows	Reefs Vegetation of stony banks Coastal dunes	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis*	N/A
England					
Drigg Coast SAC	1397.44	Estuaries Coastal dunes	Mudflats and sandflats Salt marshes and salt meadows Coastal dunes	N/A	N/A
Morecambe Bay SAC	61506.22	Estuaries Mudflats and sandflats Inlets and bays Vegetation of stony banks Salt marshes and salt meadows Coastal dunes	Sandbanks Coastal lagoons Reefs Coastal dunes	Great crested newt *Triturus cristatus*	N/A
Shell Flat and Lune Deep SCI	10565	Sandbanks Reefs	N/A	N/A	N/A

A4 Offshore Special Areas of Conservation

The locations of relevant offshore Special Areas of Conservation are detailed on Map A.2 above.

Table A.4: Offshore SACs and their Qualifying Features from Northern Ireland

Site Name	Area (ha)	Annex I Habitat	Annex II Species
Stanton Bank SCI	81,727	Reefs	N/A
Pisces Reef Complex cSAC	873	Reefs	N/A

A5 Riverine and Freshwater Special Areas of Conservation

The following riverine and freshwater SACs designated for migratory fish and/or the freshwater pearl mussel are also considered. The locations of relevant Special Areas of Conservation are detailed on Map A.2 above.

Table A.5: Relevant riverine and freshwater SACs designated for migratory fish and/or the freshwater pearl mussel

Site Name	Freshwater pearl mussel *Margaritifera margaritifera*	Migratory fish[1]
Northern Ireland		
River Faughan and Tributaries		AS
River Foyle and Tributaries		AS
Upper Ballinderry River	✓	-
Owenkillew River	✓	AS
River Roe and Tributaries		AS
Scotland		
River Bladnoch		AS
Endrick Water		RL, AS
England		
River Eden		SL, RL, AS
River Derwent & Bassenthwaite Lake		SL, RL, AS
River Ehen	✓	AS
River Kent	✓	-
Republic of Ireland		
River Finn		AS

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

A6 SACs in adjacent member states

See Map A2 for details of site locations.

Table A.6: Coastal SACs and their Qualifying Features in the Republic of Ireland

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
Horn Head and Rinclevan SAC	2344.32	Coastal dunes Machairs	N/A	N/A	Grey seal *Halichoerus grypus*

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
					Whorl snail *Vertigo geyeri* Petalwort *Petalophyllum ralfsii* Slender naiad *Najas flexilis*
Sheephaven SAC	1841.97	Mudflats and sandflats	Mudflats and sandflats Salt marshes and salt meadows Forest Dunes	N/A	Petalwort *Petalophyllum ralfsii*
Tranarossan and Melmore Lough SAC	653.63	Standing freshwater Sea cliffs Coastal dunes	Mudflats and sandflats Vegetation of stony banks Vegetation of drift lines Heaths	N/A	Petalwort *Petalophyllum ralfsii*
Mulroy Bay SAC	3209.14	Inlets and bays Reefs	N/A	N/A	Otter *Lutra lutra*
Ballyhoorisky Point to Fanad Head	1293.04	Sea cliffs	Standing freshwater Vegetation of stony banks	N/A	Narrow-mouthed whorl snail *Vertigo angustior* Slender naiad *Najas flexilis*
Lough Nagreany dunes SAC	221.15	Coastal dunes	N/A	N/A	Slender naiad *Najas flexilis*
North Inishowen Coast SAC	6290.80	Sea cliffs	Vegetation of drift lines Coastal dunes Salt marshes and salt meadows Grasslands	N/A	Otter *Lutra lutra* Narrow-mouthed whorl snail *Vertigo angustior*
Inishtrahull SAC	471.22	Sea cliffs	N/A	N/A	N/A
Lough Swilly SAC	9262.71	Coastal lagoons Estuaries	N/A	N/A	Otter *Lutra lutra*

Site Name	Area (ha)	Annex 1 Habitat Primary	Annex 1 Habitat Qualifying	Annex II Species Primary	Annex II Species Qualifying
		Forests Salt marshes and salt meadows			

A7 RAMSAR Sites

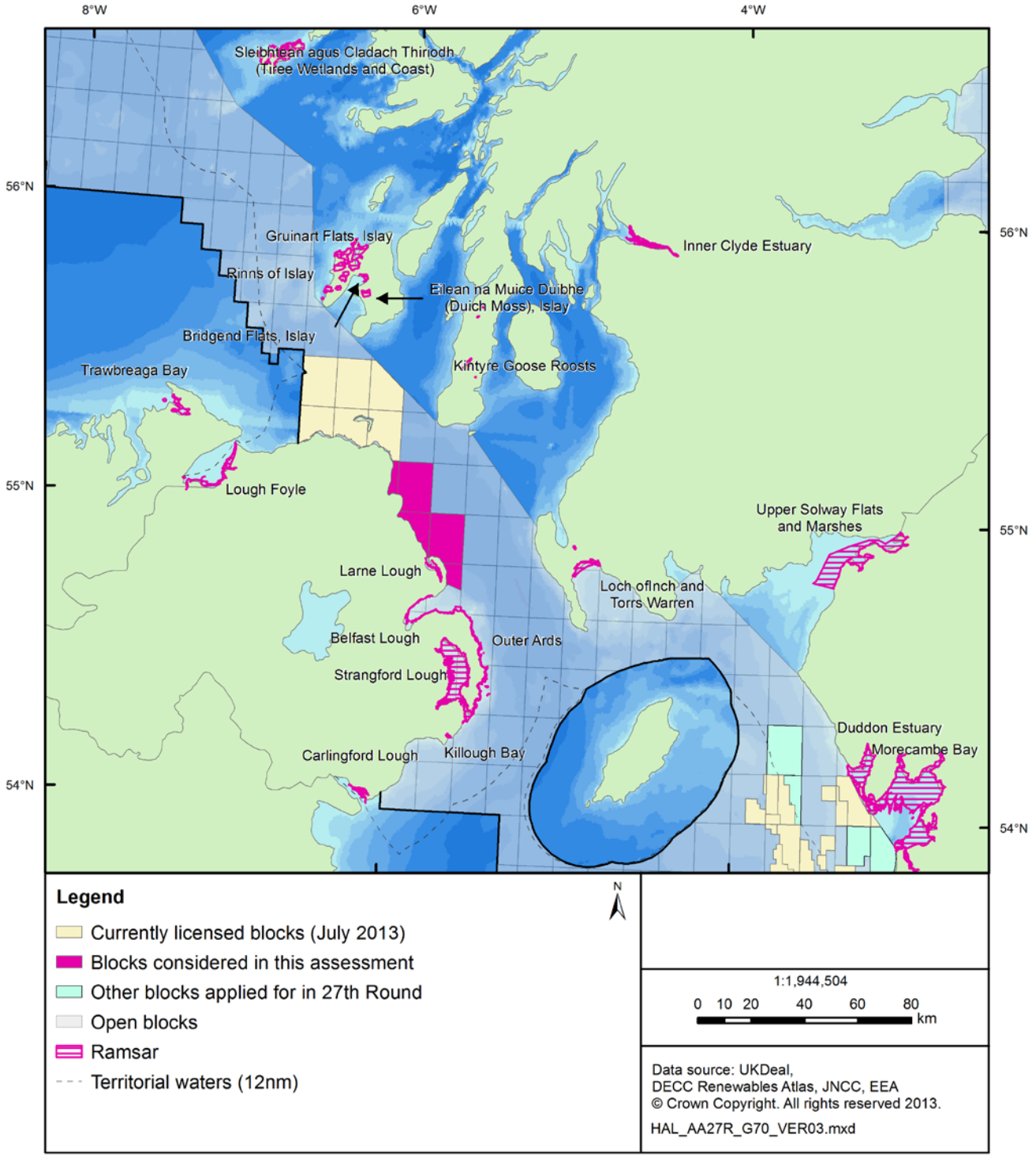
The coastal Ramsar sites are also SPA.s and/or SACs (although site boundaries are not always strictly coincident and a Ramsar site may comprise one or more Natura 2000 sites), see tabulation below.

Table A.7: Coastal Ramsar sites and corresponding Natura 2000 sites

Ramsar Name	SPA Name	SAC Name
Belfast Lough	Belfast Lough	
	Belfast Lough Open Water	
	Outer Ards	
Bridgend Flats, Islay	Bridgend Flats, Islay	
Carlingford Lough	Carlingford Lough	
Duddon Estuary	Duddon Estuary	Morecambe Bay
	Morecambe Bay	
Eilean na Muice Duibhe (Duich Moss), Islay	Eilean na Muice Duibhe (Duich Moss), Islay	
Gruinart Flats, Islay	Gruinart Flats, Islay	Rinns of Islay
	Rinns of Islay	
Inner Clyde Estuary	Inner Clyde Estuary	
Killough Bay	Killough Bay	
Kintyre Goose Roosts	Kintyre Goose Roosts	
Larne Lough	Larne Lough	
Loch of Inch and Torrs Warren	Loch of Inch and Torrs Warren	Luce Bay and Sands
Lough Foyle		Faughan River and Tributaries
		Magilligan
Morecambe Bay	Duddon Estuary	Morecambe Bay
Outer Ards	Belfast Lough	Strangford Lough
	Outer Ards	
	Strangford Lough	
Rinns of Islay	Rinns of Islay	Glac na Criche
		Rinns of Islay
Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	Tiree Machair
Strangford Lough	Outer Ards	
	Strangford Lough	Strangford Lough

Ramsar Name	SPA Name	SAC Name
Trawbreaga Bay	Trawbreaga Bay	
Upper Solway Flats and Marshes	Upper Solway Flats and Marshes	River Eden
		Solway Firth

Map A.3: Location of coastal Ramsar sites



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

In the original block screening assessment, the implications of geophysical survey, drilling and physical effects were considered in a generic way for all Blocks applied for in the 27th Round (DECC 2012) for sites where there was a foreseeable possibility of interactions[53]. Subsequent to the publication of the screening assessment (DECC 2012), proposed work programmes for the Blocks have been confirmed by the applicant companies (see below), or in some cases applications made for Blocks have been withdrawn.

The proposed work programme for the Blocks from the range of licence applications received is as follows, (see also Section 2.2 for details):

- 111/1, 111/2, 111/7, 125/30, 126/26 - Drill or drop well, shoot 2D seismic

In light of the proposed work programme, and confirmation of those Blocks proposed to be taken forward for licensing, those sites initially identified in the screening document as having a foreseeable interaction with offshore oil and gas activities are re-screened below. The potential for likely significant effects on relevant Natura 2000 sites (listed in Appendix A) is considered in the table below and where relevant,

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

the location of further appropriate assessment is clearly signposted. More information on the conservation objectives and status of those sites identified as requiring consideration in the AA is provided in Appendix C.

Activities which may be carried out following the grant of a licence, and which by themselves or in combination with other activities can affect the conservation objectives of relevant sites are considered under the following broad headings:

- Physical disturbance and other effects (e.g. rig siting, marine discharges)
- Underwater noise (in particular, deep geological seismic and other site surveys, and VSP)
- Oil spills (including all liquid phase hydrocarbons)
- In-combination effects (e.g. cumulative and synergistic and secondary/indirect effects)

B1 Coastal and marine Special Protection Areas

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
Northern Ireland								
Lough Foyle	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering waterfowl and waders **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Sheep Island	✓	-	-	✓	-	-	-	**Qualifying features:** Breeding cormorant **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features. However, mitigation would be possible and the cormorants

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								predominantly feed on inland rivers and lakes. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Rathlin Island	✓	-	-	✓	-	-	-	**Qualifying features:** Breeding seabirds and peregrine **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging within and outside the boundaries of the SPA, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Larne Lough	✓	✓	-	✓	✓	-	✓	**Qualifying features:** Breeding terns and overwintering geese **Consideration of likely significant effects:** Certain activities in or related to Blocks 111/1 and 111/2 could potentially undermine conservation objectives through physical disturbance (by physical damage or loss of supporting habitats from smothering by drilling discharges, the installation of infrastructure and cables; and/or the disturbance of qualifying species). In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although mitigation would be possible. Potential in-combination effects for activities in Blocks 111/1 and 111/2 with potential disturbance associated with proposed gas storage facility on Island Magee. **Appropriate Assessment:** See Sections 5.5, 6.4, 7.3 and 8. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Belfast Lough Open Water	-	✓	-	✓	✓	-	✓	**Qualifying features:** Overwintering great crested grebe **Consideration of likely significant effects:** Certain activities in or

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								related to, Block 111/7 could potentially undermine conservation objectives through physical disturbance (by physical damage or loss of supporting habitats from smothering by drilling discharges, the installation of infrastructure and cables; and/or the disturbance of qualifying species). In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying feature, although mitigation would be possible. Potential in-combination effects for activities in Block 111/7 in relation to shipping activities and disturbance of birds within the lough. **Appropriate Assessment:** See Sections 5.5, 6.4, 7.3 and 8. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Belfast Lough	-	✓	-	✓	✓	-	✓	**Qualifying features:** Overwintering waders and waterfowl **Consideration of likely significant effects:** Certain activities in or related to, Block 111/7 could potentially undermine conservation objectives through physical disturbance (by physical damage or loss of supporting habitats from smothering by drilling discharges, the installation of infrastructure and cables; and/or the disturbance of qualifying species). In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although mitigation would be possible. Potential in-combination effects for activities in Block 111/7 in relation to shipping activities and disturbance of birds within the lough. **Appropriate Assessment:** See Sections 5.5, 6.4, 7.3 and 8. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Copeland Islands	✓	-	-	✓	-	-	-	**Qualifying features:** Breeding tern and Manx shearwater **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging within and outside the boundaries of the SPA, although

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Outer Ards	✓	✓	-	✓	-	-	-	**Qualifying features:** Breeding tern and overwintering waders **Consideration of likely significant effects:** Certain activities in or related to, Block 111/7 could potentially undermine conservation objectives through physical disturbance (by physical damage or loss of supporting habitats from smothering by drilling discharges, the installation of infrastructure and cables; and/or the disturbance of qualifying species). In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging within and outside the boundaries of the SPA, although mitigation would be possible. **Appropriate Assessment:** See Sections 5.5, 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Strangford Lough	✓	✓	-	✓	-	-	✓	**Qualifying features:** Breeding terns, overwintering waterfowl and waders **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although mitigation would be possible. Potential in-combination effects in relation to disturbance of foraging birds by activities in Block 111/7 and the Seagen tidal energy generator in the Narrows. **Appropriate Assessment:** See Sections 7.3 and 8. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Killough Bay	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering geese **Consideration of likely significant effects:** Conservation objectives

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Carlingford Lough	✓	-	-	✓	-	-	-	**Qualifying features:** Breeding terns and overwintering geese **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Scotland								
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	✓	✓	-		-	-	-	**Qualifying features:** Overwintering waterfowl and waders **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Treshnish Isles	✓	✓	-	✓	-	-	-	**Qualifying features:** Breeding storm petrel and overwintering geese **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging outside the boundaries of the SPA, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								mitigation measures would be defined by subsequent HRA once project plans are known.
Glas Eileanan	✓	-	-	-	-	-	-	**Qualifying features:** Breeding tern **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Cnuic agus Cladach Mhuile (Mull Coast and Hills)	✓	✓	-	-	-	-	-	**Qualifying features:** Golden eagle **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
North Colonsay and Western Cliffs	✓	✓	-	✓	-	-	-	**Qualifying features:** Breeding/overwintering chough, breeding seabirds **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging outside the boundaries of the SPA, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Oronsay and South Colonsay	✓	✓	-	-	-	-	-	**Qualifying features:** Breeding corncrake/chough, overwintering chough **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Gruinart Flats, Islay	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering geese

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								Consideration of likely significant effects: Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging within the SPA, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Rinns of Islay	✓	✓	✓	✓	-	-	-	**Qualifying features:** Breeding chough, corncrake, hen harrier, common scoter, passage whooper swan and overwintering geese **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although the site includes limited marine habitats which are not particularly sensitive to spills and mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Eilean na Muice Duibhe (Duich Moss), Islay	-	✓	-	-	-	-	-	**Qualifying features:** Overwintering geese **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil is not likely to affect the qualifying feature as the site does not include marine habitats. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Laggan, Islay	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering geese **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								Blocks, weathered spilled crude oil could affect the qualifying features when foraging within the SPA, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
The Oa	✓	-	-	-	-	-	-	**Qualifying features:** Breeding chough **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil is not likely to affect the qualifying features as not particularly vulnerable to an oil spill in the marine environment. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Bridgend Flats, Islay	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering geese **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging within the SPA, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Knapdale Lochs	✓	-	-	-	-	-	-	**Qualifying features:** Breeding black-throated diver **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil is not likely to affect the qualifying feature as the site includes very limited marine habitat coverage. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
Kintyre Goose Roosts	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering geese **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging outside the SPA, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Inner Clyde Estuary	-	✓	-	-	-	-	-	**Qualifying features:** Overwintering redshank **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Ailsa Craig	✓	-	-	✓	-	-	-	**Qualifying features:** Breeding seabirds **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging within the SPA and in adjacent areas, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Glen App and Galloway Moors	✓	-	-	-	-	-	-	**Qualifying features:** Breeding hen harrier **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
Loch of Inch and Torrs Warren	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering geese and hen harrier **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features when foraging within the SPA, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Upper Solway Flats and Marshes	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering waders and waterfowl **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although mitigation would be possible. **Appropriate Assessment:** See Sections 7.3 and 8. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
England								
Duddon Estuary	✓	✓	-	✓	-	-	-	**Qualifying features:** Breeding tern, overwintering waterbirds and waders **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, within the site or foraging in adjacent waters, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Morecambe Bay	✓	✓	✓	✓	-	-	-	**Qualifying features:** Breeding tern and seabirds, on passage and

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								overwintering waterbirds and waders **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features within the site or foraging in adjacent waters, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Liverpool Bay/ Bae Lerpwl	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering divers and waterfowl **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features within the site or foraging in adjacent waters, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Republic of Ireland								
Horn Head to Fanad Head	✓	✓	-	✓	-	-	-	**Qualifying features:** Breeding seabirds and waterfowl, overwintering waterfowl **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features within the site or foraging in adjacent waters, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								plans are known.
Lough Swilly	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering waterfowl and waders **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Greers Isle	✓	-	-	✓	-	-	-	**Qualifying features:** Breeding terns and gulls **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features within the site or foraging in adjacent waters, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Trawbreaga Bay	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering geese and waders **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Inishtrahull	✓	✓	-	✓	-	-	-	**Qualifying features:** Overwintering geese and breeding seabirds **Consideration of likely significant effects:** Site is remote from Blocks

Site name	Features present[1]			Vulnerability to effects[2]				Consideration
	Breeding	Wintering	Passage	Oil spills	Physical Disturbance	Acoustic Disturbance	In-combination	
								and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features within the site or foraging in adjacent waters outside the site boundaries, although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Lough Foyle	-	✓	-	✓	-	-	-	**Qualifying features:** Overwintering seabirds, grebe, waterfowl and waders **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.

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

B2 Coastal and marine Special Areas of Conservation

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
Northern Ireland							
Magilligan	✓	✓	-	-	-	-	**Qualifying features:** Coastal dunes, butterfly, petalwort **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the qualifying habitat features (coastal dunes), although features not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Skerries and Causeway cSAC	✓	✓	✓	-	✓	-	**Qualifying features:** Reefs, sandbanks, sea caves and harbour porpoise **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the qualifying features, although features not considered particularly sensitive to spills and mitigation would be possible. Vulnerability of the site, as indicated on the SAC standard data form, is identified as comprising threats such as the loss of feeding grounds or seismic and sonar disturbance. Certain activities (i.e. seismic surveys) in any of the Blocks may cause temporary acoustic disturbance to the species features (harbour porpoise) both within and outside of the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Section 6.4. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Bann Estuary	✓	-	✓	-	-	-	**Qualifying features:** Coastal dunes, salt marshes and salt meadows **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect sensitive qualifying features (salt marshes and

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							salt meadows), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
North Antrim Coast	✓	✓	✓	-	-	-	**Qualifying features:** Sea cliffs, vegetation of drift lines, salt marshes and salt meadows, coastal dunes, grasslands and snail **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect some of the sensitive qualifying habitat features (salt marshes and salt meadows), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Rathlin Island	✓	-	✓	-	-	-	**Qualifying features:** Reefs, sea cliffs, sea caves, sandbanks, vegetation of drift lines **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, spilled crude oil could theoretically affect the qualifying habitat features, although features not considered particularly sensitive to spills. However the variety of marine Annex I habitats and proximity to the Blocks means that a spill could undermine the conservation objectives of the qualifying features although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Red Bay SCI	✓	-	✓	✓	-	-	**Qualifying features:** Sandbanks **Consideration of likely significant effects:** Certain activities in or related to, Blocks 125/30 and 126/26 could potentially undermine conservation

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							objectives through physical damage or loss from smothering by drilling discharges, the installation of infrastructure and cables. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying habitat features, although features not considered particularly sensitive to spills and mitigation would be possible. **Appropriate Assessment:** See Sections 5.5 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
The Maidens cSAC	✓	✓	✓	✓	✓	-	**Qualifying features:** Reefs, sandbanks and grey seal **Consideration of likely significant effects:** Certain activities in or related to, Blocks 126/26, 111/1 and 111/2 could potentially undermine conservation objectives through physical damage or loss from smothering by drilling discharges, the installation of infrastructure and cables. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features, although features not considered particularly sensitive to spills and mitigation would be possible. Certain activities (i.e. seismic surveys) may cause temporary acoustic disturbance to the species features (grey seal) within the site boundaries although mitigation would be possible. The site falls within the definition of a medium risk area of corkscrew injury to seals with respect to the presence and/or movement of vessels associated with activities in the Blocks. **Appropriate Assessment:** See Sections 5.4, 5.5, 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Strangford Lough	✓	✓	✓	✓	✓	✓	**Qualifying features:** Mudflats and sandflats, coastal lagoons, inlets and bays, reefs, vegetation of drift lines and stony banks, salt marshes and salt meadows, harbour seal **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect sensitive qualifying features (mudflats and

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							sandflats, large shallow inlets and bays, salt meadows, harbour seal), although mitigation would be possible. Certain activities (i.e. seismic surveys) in any of the Blocks may cause temporary acoustic disturbance to the species features (harbour seal) outside of the site boundaries although mitigation would be possible. The site falls within the definition of a medium risk area of corkscrew injury to seals with respect to the presence and/or movement of vessels associated with activities in the Blocks. Potential for in-combination effects with respect to underwater noise (e.g. seismic survey) from any of the Blocks and the presence of a tidal turbine in Strangford Lough Narrows. **Appropriate Assessment:** See Sections 5.4, 6.4, 7.3 and 8. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Murlough	✓	✓	✓	-	✓	-	**Qualifying features:** Coastal dunes, sandbanks, mudflats and sandflats, salt marshes and salt meadows, butterfly and harbour seal **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect sensitive qualifying features (mudflats and sandflats, salt marshes and salt meadows, harbour seal), although mitigation would be possible. Certain activities (i.e. seismic surveys) in any of the Blocks may cause temporary acoustic disturbance to the species features (harbour seals) outside of the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Scotland							
Tiree Machair	✓	-	-	-	-	-	**Qualifying features:** Coastal dunes, machairs, standing freshwater **Consideration of likely significant effects:** Site is remote from Blocks and

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills as qualifying features not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Eileanan agus Sgeiran Lios mor	-	✓	-	-	✓	-	**Qualifying features:** Harbour seal **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills. Certain activities (i.e. seismic surveys) in any of the Blocks may cause temporary acoustic disturbance to the qualifying feature outside of the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Section 6.4. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Loch Creran	✓	-	-	-	-	-	**Qualifying features:** Reefs **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills as the qualifying feature is not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Treshnish Isles	✓	✓	-	-	✓	-	**Qualifying features:** Reefs and grey seal **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills as the habitat feature is not considered particularly sensitive to spills. Certain activities (i.e. seismic surveys) in any of the Blocks may cause temporary acoustic disturbance to the species feature outside of the site boundaries although mitigation would be possible.

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							Appropriate Assessment: See Section 6.4. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Ardmeanach	✓	-	-	-	-	-	**Qualifying features:** Grassland, sea cliffs **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills as qualifying features not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Mull Oakwoods	✓	✓	-	-	-	-	**Qualifying features:** Forest, otter **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills as habitat feature not considered sensitive to spills. The site does not include any marine habitats and therefore the species features are unlikely to be affected by spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Firth of Lorn	✓	-	-	-	-	-	**Qualifying features:** Reefs **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the qualifying feature, although feature not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Moine Mhor	✓	✓	✓	-	-	-	**Qualifying features:** Bogs, mudflats and sandflats, salt marshes and salt meadows, forest, otter and butterfly **Consideration of likely significant effects:** Site is remote from Blocks and

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect sensitive qualifying features (mudflats and sandflats, salt marshes and salt meadows, otter), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Tarbert Woods	✓	-	-	-	-	-	**Qualifying features:** Forests **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills as qualifying feature not considered sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Oronsay	✓	-	-	-	-	-	**Qualifying features:** Machairs **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills as habitat feature not considered sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Tayvallich Juniper and Coast	✓	✓	✓	-	-	-	**Qualifying features:** Scrub, butterfly and otter **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could affect the species features (otter), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							plans are known.
Glac na Criche	✓	✓	-	-	-	-	**Qualifying features:** Bogs, sea cliffs, heaths, butterfly **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the qualifying features, although not considered sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Rinns of Islay	-	✓	-	-	-	-	**Qualifying features:** Butterfly **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills as qualifying feature not considered sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
South-East Islay Skerries	-	✓	✓	✓	✓	-	**Qualifying features:** Harbour seal **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could affect the qualifying feature, although mitigation would be possible. Certain activities (i.e. seismic surveys) in any of the Blocks may cause temporary acoustic disturbance to the qualifying feature within and outside of the site boundaries although mitigation would be possible. The site falls within the definition of a medium risk area of corkscrew injury to seals with respect to the presence and/or movement of vessels associated with activities in the Blocks. **Appropriate Assessment:** See Sections 5.4, 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
Lendalfoot Hills Complex	✓	-	-	-	-	-	**Qualifying features:** Grassland, fens, heaths and bogs **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations or accidental spills as qualifying features not considered sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Luce Bay and Sands	✓	✓	✓	-	-	-	**Qualifying features:** Inlets and bays, coastal dunes, sandbanks, mudflats and sandflats, reefs and newt **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect sensitive qualifying features (large shallow inlets and bays, mudflats and sandflats), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Mull of Galloway	✓	-	-	-	-	-	**Qualifying features:** Sea cliffs **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although features not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Solway Firth	✓	✓	✓	-	✓	-	**Qualifying features:** Sandbanks, estuaries, mudflats and sandflats, salt marshes and salt meadows, reefs, vegetation of stony banks, coastal dunes, sea and river lamprey **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							spilled crude oil could affect sensitive qualifying features (estuaries, mudflats and sandflats, salt marshes and salt meadows), although mitigation would be possible. Certain activities (i.e. seismic surveys) in any of the Blocks may cause temporary acoustic disturbance to the species features (sea and river lamprey) outside of the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Sections 6.4, 7.3 and 8. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
England							
Drigg Coast	✓	-	✓	-	-	-	**Qualifying features:** Estuaries, coastal dunes, mudflats and sandflats, salt marshes and salt meadows, coastal dunes **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect sensitive qualifying features (estuaries, mudflats and sandflats, salt marshes and salt meadows), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Morecambe Bay	✓	✓	✓	-	-	-	**Qualifying features:** Estuaries, mudflats and sandflats, inlets and bays, vegetation of stony banks, salt marshes and salt meadows, coastal dunes, sandbanks, coastal lagoons, reefs, newt **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect sensitive qualifying features (estuaries, mudflats and sandflats, inlets and bays, salt marshes and salt meadows), although mitigation would be possible.

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							Appropriate Assessment: See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Shell Flat and Lune Deep SCI	✓	-	-	-	-	-	**Qualifying features:** Sandbanks, reefs **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the qualifying features, although features not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Republic of Ireland							
Horn Head and Rinclevan	✓	✓	-	-	✓	-	**Qualifying features:** Coastal dunes, machairs, grey seal, snail, petalwort, slender naiad **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although not considered particularly sensitive to spills. Certain activities (i.e. seismic surveys) in any of the Blocks may cause temporary acoustic disturbance to the species features (grey seals) outside of the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Section 6.4. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Sheephaven	✓	✓	✓	-	-	-	**Qualifying features:** Mudflats and sandflats, salt marshes and salt meadows, forest, dunes, petalwort **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect sensitive qualifying features (mudflats and sandflats, salt marshes and salt meadows), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Tranarossan and Melmore Lough	✓	✓	✓	-	-	-	**Qualifying features:** Standing freshwater, sea cliffs, coastal dunes, mudflats and sandflats, vegetation of stony banks and drift lines, heaths, petalwort **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect sensitive qualifying habitat features (mudflats and sandflats), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Mulroy Bay	✓	✓	✓	-	-	-	**Qualifying features:** Inlets and bays, reefs, otter **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect the qualifying features (inlets and bays, otter), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Ballyhoorisky Point to Fanad	✓	✓	-	-	-	-	**Qualifying features:** Sea cliffs, standing freshwater, vegetation of stony

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
Head							banks, snail, slender naiad **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the features although not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Lough Nagreany Dunes	✓	✓	-	-	-	-	**Qualifying features:** Coastal dunes, slender naiad **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the features although not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
North Inishowen Coast	✓	✓	✓	-	-	-	**Qualifying features:** Mudflats and sandflats, heaths, machairs, coastal dunes, vegetation of stony banks, sea cliffs, otter, snail **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect sensitive qualifying features (mudflats and sandflats, otter), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Inishtrahull	✓	-	-	-	-	-	**Qualifying features:** Sea cliffs **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the features although not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Lough Swilly	✓	✓	✓	-	-	-	**Qualifying features:** Coastal lagoons, estuaries, forests, otter **Consideration of likely significant effects:** Conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely events of a major crude oil spill from any of the Blocks, weathered spilled crude oil could affect sensitive qualifying features (estuaries, otter), although mitigation would be possible. **Appropriate Assessment:** See Section 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.

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

B3 Offshore Special Areas of Conservation

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
Stanton Banks	✓	-	-	-	-	-	**Qualifying features:** Reefs **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the qualifying features, although features not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Pisces Reef Complex	✓	-	-	-	-	-	**Qualifying features:** Reefs **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from the Blocks, weathered spilled crude oil could theoretically affect the qualifying features, although features not considered particularly sensitive to spills. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect

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

B5 Riverine Special Areas of Conservation

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
Northern Ireland							
River Faughan and Tributaries	✓	✓	✓	-	✓	-	**Qualifying features:** Atlantic salmon **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to the qualifying feature outside the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
River Foyle and Tributaries	✓	✓	✓	-	✓	-	**Qualifying features:** Atlantic salmon **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to the qualifying feature, outside the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Upper Ballinderry River	✓	✓	-	-	-	-	**Qualifying features:** Freshwater pearl mussel **Consideration of likely significant effects:** Site is remote from Blocks

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							and its conservation objectives would not be undermined by emissions or discharges from routine operations and accidental spills. The gills of migratory salmonids provide an essential mode of dispersal for the larvae of the qualifying feature; despite the potential for temporary acoustic disturbance of such salmonids outside of the site boundaries, adverse effects on conservation objectives are highly unlikely. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Owenkillew River	✓	✓	✓	-	✓	-	**Qualifying features:** Atlantic salmon, freshwater pearl mussel **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to qualifying features (Atlantic salmon), outside the site boundaries although mitigation would be possible. The gills of migratory salmonids provide an essential mode of dispersal for the larvae of the freshwater pearl mussel; despite the potential for temporary acoustic disturbance of such salmonids outside of the site boundaries, adverse effects on conservation objectives are highly unlikely. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
River Roe and Tributaries	✓	✓	✓	-	✓	-	**Qualifying features:** Atlantic salmon **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to qualifying feature, outside the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Scotland							
River Bladnoch	-	✓	✓	-	✓	-	**Qualifying features:** Atlantic salmon **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to qualifying feature, outside the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
Endrick Water	-	✓	✓	-	✓	-	**Qualifying features:** River lamprey, Atlantic salmon **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to qualifying features, outside the site boundaries although mitigation would be possible.

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							Appropriate Assessment: See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
England							
River Eden	✓	✓	✓	-	✓	-	**Qualifying features:** Sea and river lamprey, Atlantic salmon **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to qualifying features, outside the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
River Derwent & Bassenthwaite Lake	✓	✓	✓	-	✓	-	**Qualifying features:** Sea and river lamprey, Atlantic salmon **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to qualifying features, outside the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
River Ehen	-	✓	✓	-	✓	-	**Qualifying features:** Atlantic salmon, freshwater pearl mussel

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							Consideration of likely significant effects: Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to qualifying features (Atlantic salmon), outside the site boundaries although mitigation would be possible. The gills of migratory salmonids provide an essential mode of dispersal for the larvae of the freshwater pearl mussel; despite the potential for temporary acoustic disturbance of such salmonids outside of the site boundaries, adverse effects on conservation objectives are highly unlikely. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.
River Kent	✓	✓	✓	-	-	-	**Qualifying features:** Freshwater pearl mussel **Consideration of likely significant effects:** Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. The gills of migratory salmonids provide an essential mode of dispersal for the larvae of the qualifying feature; despite the potential for temporary acoustic disturbance of such salmonids outside of the site boundaries, adverse effects on conservation objectives are highly unlikely. **Appropriate Assessment:** No foreseeable interaction between plan activities and site negates likely significant effect
Republic of Ireland							
River Finn	✓	✓	✓	-	✓	-	**Qualifying features:** Atlantic salmon

Site name	Features present[1]		Vulnerability to effects[2]				Consideration
	Habitats	Species	Oil spills[3]	Physical Disturbance	Acoustic Disturbance	In-combination	
							Consideration of likely significant effects: Site is remote from Blocks and its conservation objectives would not be undermined by emissions or discharges from routine operations. In the unlikely event of a major crude oil spill from any of the Blocks, weathered spilled crude oil could theoretically affect the qualifying features although only if qualifying features are present in shallow coastal areas and mitigation would be possible. Certain activities (i.e. seismic survey) in any of the Blocks could cause temporary acoustic disturbance to qualifying feature, outside the site boundaries although mitigation would be possible. **Appropriate Assessment:** See Sections 6.4 and 7.3. Further, project specific mitigation measures would be defined by subsequent HRA once project plans are known.

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

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

C1 Coastal and marine Special Protection Areas

The following tables provide detailed information of the relevant sites, including full listing of their qualifying features. For Scottish sites where available, information is provided on the assessed condition of the qualifying features, as stated on the SNH sitelink website.

Northern Ireland

Site Name: Lough Foyle SPA	
Location	Latitude 55º 05'24"N Longitude 07º 01'37"W
Area (ha)	2204.36
Summary	Lough Foyle lies on the north-west coast of Northern Ireland and straddles the international border with the Irish Republic. The site comprises a large, shallow sea lough that includes the estuaries of the rivers Foyle, Faughan and Roe. The site contains extensive intertidal mud-flats and sand-flats (with mussel *Mytilus edulis* beds), saltmarsh and associated brackish ditches. The diversity of coastal habitats has resulted in the lough being of major importance for a diverse assemblage of waterbirds both during the spring and autumn migration periods, and in winter. These include swans, geese, ducks and waders. The lough is especially notable in supporting a high proportion of the international population of Canada/Ireland light-bellied brent goose *Branta bernicla hrota*.
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **Overwinter:** Bar-tailed godwit *Limosa lapponica*, 1,896 individuals representing 10.8% of the wintering population in Ireland (5 year peak mean 1991/2 - 1995/6) Bewick's swan Cygnus *columbianus bewickii*, 78 individuals representing 3.1% of the wintering population in Ireland (5 year peak mean 1991/2 - 1995/6) Golden plover *Pluvialis apricaria*, 4,891 individuals representing 2.4% of the wintering population in Ireland (5 year peak mean 1991/2 - 1995/6) Whooper swan *Cygnus cygnus*, 890 individuals representing 8.9% of the wintering population in Ireland (5 year peak mean 1991/2 - 1995/6) ***Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:***	

Site Name: Lough Foyle SPA

Overwinter:
Light-bellied brent goose *Branta bernicla hrota*, 3,730 individuals representing 18.6% of the wintering Canada/Ireland population (5 year peak mean 1991/2 - 1995/6)

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
Assemblage qualification: A wetland of international importance.
Over winter, the area regularly supports 37,310 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: teal *Anas crecca*, whooper swan *Cygnus cygnus*, golden plover *Pluvialis apricaria*, bar-tailed godwit *Limosa lapponica*, light-bellied brent goose *Branta bernicla hrota*, great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo*, greylag goose *Anser anser*, Bewick's swan Cygnus *columbianus bewickii*, wigeon *Anas penelope*, redshank *Tringa totanus*, mallard *Anas platyrhynchos*, eider *Somateria mollissima*, red-breasted merganser *Mergus serrator*, oystercatcher *Haematopus ostralegus*, lapwing *Vanellus vanellus*, knot *Calidris canutus*, dunlin *Calidris alpina alpina*, curlew *Numenius arquata*, shelduck *Tadorna tadorna*.

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Bewick's swan wintering population	No significant decrease in population against national trends, caused by on-site factors
Whooper swan wintering population	No significant decrease in population against national trends, caused by on-site factors
Golden plover wintering population	No significant decrease in population against national trends, caused by on-site factors
Bar-tailed godwit wintering population	No significant decrease in population against national trends, caused by on-site factors
Light-bellied brent goose wintering population	No significant decrease in population against national trends, caused by on-site factors
Great crested grebe wintering population	No significant decrease in population against national trends, caused by on-site factors
Cormorant wintering population	No significant decrease in population against national trends, caused by on-site factors
Greylag goose wintering population	No significant decrease in population against national trends, caused by on-site factors
Shelduck wintering population	No significant decrease in population against national trends, caused by on-site factors
Wigeon wintering population	No significant decrease in population against national trends, caused by on-site factors
Teal wintering population	No significant decrease in population against national trends, caused by on-site factors
Mallard wintering population	No significant decrease in population against national trends, caused by on-site factors
Eider wintering population	No significant decrease in population against national trends, caused by on-site factors
Red-breasted merganser wintering population	No significant decrease in population against national trends, caused by on-site factors
Oystercatcher wintering population	No significant decrease in population against national trends, caused by on-site factors
Lapwing wintering population	No significant decrease in population against national trends, caused by on-site factors
Knot wintering population	No significant decrease in population against national trends, caused by on-site factors
Dunlin wintering population	No significant decrease in population against national trends, caused by on-site factors
Curlew wintering population	No significant decrease in population against national trends, caused by on-site factors
Redshank wintering population	No significant decrease in population against national trends, caused by on-site factors
Waterfowl assemblage wintering population	No significant decrease in Waterfowl Assemblage population against national trends, caused by on-site factors
Waterfowl assemblage wintering population	Maintain species diversity contributing to the Waterfowl Assemblage
Habitat extent	Maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species. (2056.13 ha intertidal area) subject to natural processes
Habitat extent	Maintain the extent of main habitat components subject to natural processes
Roost sites wintering population	Maintain or enhance sites utilised as roosts

Site Name: Sheep Island SPA	
Location	Latitude 55º 14'56"N Longitude 06º 21'00"W
Area (ha)	3.5
Summary	Sheep Island is located off the north coast of County Antrim in Northern Ireland. It is a small, exposed island with steep cliffs and rocky shores, and holds a breeding colony of Cormorant *Phalacrocorax carbo carbo.*
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **During the breeding season:** Cormorant *Phalacrocorax carbo*, 249 pairs representing at least 0.6% of the breeding Northwestern Europe population (5 year mean 1992-1996)	
Conservation objectives:	
To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:	

Feature	Component Objective
Cormorant breeding population	No significant decrease in breeding population against national trends, caused by on-site factors
Cormorant breeding population	Fledging success
Habitat extent	To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species, subject to natural processes.

Site Name: Rathlin Island SPA

Location	Latitude 55º 17'30"N Longitude 06º 13'30"W
Area (ha)	3344.62
Summary	Rathlin Island is a large inhabited island located some 4km off the north coast of County Antrim in Northern Ireland. It has basalt and chalk cliffs, some as high as 100m, as well as several sea-stacks on the north and west shores of the island, many of which are important for seabirds. The south and east shores are more gently sloping with areas of maritime grassland and rocky shore. The length of the coastline is approximately 30km. Inland there are wetlands, a limited amount of maritime heath and a mosaic of grazing of varying intensity. The island supports an important breeding assemblage of seabirds, especially including auk and gull species. Large numbers of peregrine *Falco peregrinus* also nest on the cliffs. Although the SPA supports a substantial marine area, the seabirds also feed outside the SPA in surrounding marine areas.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Peregrine *Falco peregrinus*, 6 pairs representing at least 1.6% of the breeding population in Ireland (5 year mean, 1992-1996)

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

During the breeding season:
Guillemot *Uria aalge*, 28,064 pairs representing at least 1.2% of the breeding East Atlantic population (Seafarer Count 1985)

Razorbill *Alca torda*, 5,978 pairs representing at least 1.0% of the breeding population

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds
Assemblage qualification: A seabird assemblage of international importance.

During the breeding season, the area regularly supports 66,000 individual seabirds including: puffin *Fratercula arctica*, kittiwake *Rissa tridactyla*, herring gull *Larus argentatus*, lesser black-backed gull *Larus fuscus*, common gull *Larus canus*, fulmar *Fulmarus glacialis*, razorbill *Alca torda*, guillemot *Uria aalge*.

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Peregrine falcon breeding population	No significant decrease in population against national trends, caused by on-site factors
Guillemot breeding population	No significant decrease in population against national trends, caused by on-site factors
Razorbill breeding population	No significant decrease in population against national trends, caused by on-site factors
Fulmar breeding population	No significant decrease in population against national trends, caused by on-site factors
Common gull breeding population	No significant decrease in population against national trends, caused by on-site factors
Lesser black-backed gull breeding population	No significant decrease in population against national trends, caused by on-site factors
Herring gull breeding population	No significant decrease in population against national trends, caused by on-site factors
Kittiwake breeding population	No significant decrease in population against national trends, caused by on-site factors
Puffin breeding population	No significant decrease in population against national trends, caused by on-site factors
Seabird assemblage breeding population	No significant decrease in population against national trends, caused by on-site factors
Seabird assemblage breeding population	Maintain species diversity contributing to the breeding seabird assemblage
Habitat	To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species subject to natural processes

Site Name: Larne Lough SPA

Location	Latitude 54º 48'54"N Longitude 05º 44'38"W
Area (ha)	395.94

Site Name: Rathlin Island SPA

Summary

Larne Lough is a sea lough on the east coast of Northern Ireland. It is enclosed to the east by the peninsula of Island Magee. Much of the estuary is shallow, having become extensively infilled with sediments of fine muddy sand, and at low water the largest areas of intertidal flats are exposed in the south of the estuary. The northern parts of the estuary are wider and relatively deep, especially at the mouth where dredging is regularly carried out. In the upper reaches of the estuary at Ballycarry, there is an area of saltmarsh. As the effects of salinity and differing tidal inundation are not greatly felt in the upper parts of Larne Lough, the saltmarsh zonation patterns are not distinct. The vegetation is dominated by mid-upper saltmarsh communities and a *Phragmites australis* reedbed, with some saltmarsh pans. The lough is of importance as a breeding and feeding area for a number of tern species as well as being a wintering site for the Canada/Ireland population of light-bellied brent goose *Branta bernicla hrota*. The site also includes the subsumed SPA of Swan Island which was subject to separate classification.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Common tern *Sterna hirundo*, 180 pairs representing 5.8% of the breeding population in Ireland

Roseate tern *Sterna dougallii*, 6 pairs representing 1.5% of the breeding population in Ireland (5 year mean, 1993-1997)

Sandwich tern *Sterna sandvicensis*, 165 individuals representing 3.8% of the breeding population in Ireland

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

Overwinter:
Light-bellied brent goose *Branta bernicla hrota*, 227 individuals representing 1.1% of the wintering Canada/Ireland population (5 year peak mean 1991/2 - 1995/6)

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Sandwich tern breeding population	No significant decrease in breeding population against national trends, caused by on-site factors
Sandwich tern breeding population	Fledging success
Roseate tern breeding population	No significant decrease in breeding population against national trends, caused by on-site factors
Roseate tern breeding population	Fledging success
Common tern breeding population	No significant decrease in breeding population against national trends, caused by on-site factors
Common tern breeding population	Fledging success
Light-bellied brent goose wintering population	No significant decrease in population against national trends, caused by on-site factors
Habitat extent	To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species (325 ha intertidal area), (breeding areas 1 ha) subject to natural processes
Habitat extent	Maintain the extent of main habitat components subject to natural processes
Roost sites	Maintain or enhance sites utilised as roosts

Site Name: Belfast Lough Open Water SPA	
Location	Latitude 54º 41'00"N Longitude 05º 49'00"W
Area (ha)	5592.99
Summary	Belfast Lough is a large intertidal sea lough situated at the mouth of the River Lagan on the east coast of Northern Ireland. The inner part of the lough comprises a series of mudflats and lagoons and the outer lough is restricted to mainly rocky shores with some small sandy bays. The Belfast Lough Open Water site comprises the marine area below the mean low water mark. The Special Protection Area boundary is entirely coincident with that of Outer Belfast Lough Area of Special Scientific Interest. The site is of importance for supporting a wintering population of great crested grebe.

Qualifying features for which the site is designated:

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

Overwinter:
Great crested grebe *Podiceps cristatus*, 1677 individuals representing 0.35% of the wintering Northwestern Europe population (5 year peak mean 1996/7 - 2000/1)

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Great crested grebe wintering population	No significant decrease in population against national trends, caused by on-site factors
Habitat extent	Maintain the extent of main habitat components subject to natural processes
Roosting/loafing sites	Maintain all locations of sites.

Site Name: Belfast Lough SPA

Location	Latitude 54º 38'00"N Longitude 05º 54'00"W
Area (ha)	432.14
Summary	Belfast Lough is a large, open sea lough located on the north-eastern coast of Northern Ireland. The inner part of the lough comprises areas of intertidal foreshore, mainly mud-flats and lagoons, and land (subject to past and current land claim) which forms important feeding and roosting sites for significant numbers of wintering waders and wildfowl. The extent of the SPA in the outer lough is restricted to mainly rocky shores with some small sandy bays and beach-head saltmarsh. The site is of importance for a wide range of wintering waterbirds.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Overwinter:
Bar-tailed godwit *Limosa lapponica*, 232 individuals representing 1.3% of the wintering population in Ireland (5 year peak mean 1991/2 - 1995/6)

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

Overwinter:
Redshank *Tringa totanus*, 2,466 individuals representing 1.6% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/1992 - 1995/1996)

Turnstone *Arenaria interpres*, 734 individuals representing 1.0% of the wintering Western Palearctic - wintering population (5 year peak mean 1991/2 - 1995/6)

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
Assemblage qualification: A wetland of international importance.
Over winter, the area regularly supports 20,492 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: goldeneye *Bucephala clangula*, redshank *Tringa totanus*, turnstone *Arenaria interpres*, great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo*, shelduck *Tadorna tadorna*, mallard *Anas platyrhynchos*, bar-tailed godwit *Limosa lapponica*, eider *Somateria mollissima*, curlew *Numenius arquata*, red-breasted merganser *Mergus serrator*, oystercatcher *Haematopus ostralegus*, ringed plover *Charadrius hiaticula*, lapwing *Vanellus vanellus*, knot *Calidris canutus*, dunlin *Calidris alpina alpina*, black-tailed godwit *Limosa limosa islandica*, scaup *Aythya marila.*

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Redshank wintering population	No significant decrease in population against national trends, caused by on-site factors
Great crested grebe wintering population	No significant decrease in population against national trends, caused by on-site factors
Habitat extent	To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species (X ha intertidal area, yet to be determined), subject to natural processes
Habitat extent	Maintain the extent of main habitat components subject to natural processes
Roost sites	Maintain or enhance sites utilised as roosts

Site Name: Copeland Islands SPA

Location	Latitude 54º 41'17"N Longitude 05º 31'03"W
Area (ha)	201.52
Summary	The Copeland Islands site comprises three islands (Copeland Island, referred to as Big Copeland, together with Light House Island and Mew Island), together with associated islets, off the north-east Co. Down coast and close to the entrance to Belfast Lough. The site encompasses the islands down to the low water mark, excluding buildings and associated structures. It includes rocky shores together with limited areas of sand/mud and cobble/boulder beaches. Terrestrial habitats include saltmarsh, freshwater marsh, maritime grassland, limited extent of inland cliff and semi-improved agricultural grassland. The principal interests are the breeding colonies of Manx shearwater and Arctic tern.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Arctic tern *Sterna paradisaea*, 566 pairs representing at least 22.6% of the breeding population in Ireland (5 year mean, 1998-2002)

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

During the breeding season:
Manx shearwater *Puffinus puffinus*, 4800 pairs representing at least 1.7% of the world population (Total survey 2000-2002)

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Manx shearwater breeding population	No significant decrease in population against national trends, caused by on-site factors
Manx shearwater breeding population	Fledging success
Arctic tern breeding population	No significant decrease in population against national trends, caused by on-site factors
Arctic tern breeding population	Fledging success
Habitat extent	To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species, (breeding areas 201.20ha) subject to natural processes
Habitat extent	Maintain the extent of main habitat components subject to natural processes

Site Name: Outer Ards SPA

Location	Latitude 54º 30'06"N Longitude 05º 29'00"W
Area (ha)	1410.41
Summary	The Outer Ards Peninsula is the most sheltered stretch of open rocky coast in Northern Ireland. The width of this rocky intertidal zone is determined by the orientation of outcrop but generally comprises low platforms, up to 200 m across, separated by wide areas of mobile sediments. Other habitats represented include intertidal areas of boulder, cobble, gravel, sand- and mud-flats, together with dune and maritime grassland, maritime heath and cliff ledge vegetation, as well as saltmarsh, tidal and non-tidal fens and wet flushes. The site contains about 8% of the Northern Irish coastline and has a very high proportion of offshore reefs and islands. The Copeland Islands hold breeding populations of European importance of a number of seabirds, including Arctic Tern *Sterna paradisaea*. In winter, the site is of importance for its Canada/Greenland population of Light-bellied Brent Goose *Branta bernicla hrota,* as well as waders, especially Ringed Plover *Charadrius hiaticula* and Turnstone *Arenaria interpres.*

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Arctic tern *Sterna paradisaea*, 207 pairs representing at least 8.3% of the breeding population in Ireland (5 year mean, period not specified)

Over winter:
Golden plover *Pluvialis apricaria*, 2079 pairs representing at least 1.0% of the wintering population in Ireland (5 year peak mean, 1991/92-1995/96)

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

Over winter:
Light-bellied brent goose *Branta bernicla hrota*, 245 individuals representing at least 1.2% of the wintering Canada/Ireland population (WeBS 5 year peak mean 1990/91-1994/95)

Ringed plover *Charadrius hiaticula*, 545 individuals representing at least 1.1% of the wintering Europe/Northern Africa wintering population (WeBS 5 year peak mean 1990/91-1994/95)

Turnstone *Arenaria interpres*, 1241 individuals representing at least 1.8% of the wintering Western Palearctic wintering population (WeBS 5 year peak mean 1990/91-1994/95)

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Manx shearwater breeding population	No significant decrease in population against national trends, caused by on-site factors
Manx shearwater breeding population	Fledging success
Arctic tern breeding population	No significant decrease in population against national trends, caused by on-site factors
Arctic tern breeding population	Fledging success
Light-bellied brent goose wintering population	No significant decrease in population against national trends, caused by on-site factors
Golden plover wintering population	No significant decrease in population against national trends, caused by on-site factors
Ringed plover wintering population	No significant decrease in population against national trends, caused by on-site factors
Turnstone wintering population	No significant decrease in population against national trends, caused by on-site factors
Habitat extent	To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species (1001ha intertidal area), (breeding areas 125ha) subject to natural processes
Habitat extent	Maintain the extent of main habitat components subject to natural processes
Roost sites	Maintain or enhance sites utilised as roosts

Site Name: Strangford Lough SPA

Location	Latitude 54º 26'40"N

Site Name: Outer Ards SPA	
	Longitude 05º 35'40"W
Area (ha)	15580.79
Summary	Strangford Lough is located on the east coast of Northern Ireland in County Down. It is a shallow sea lough with an indented shoreline and a wide variety of marine and intertidal habitats. The west shore has numerous islands typical of flooded drumlin topography. The lough contains extensive areas of mud-flat, saltmarsh and rocky coastline. The diversity of sheltered estuarine habitats means that it is the most important coastal site in Northern Ireland for wintering waterbirds, holding large numbers of geese, ducks and waders. It is especially notable as an autumn arrival site for most of the world population of the Canadian population of Light-bellied Brent Goose *Branta bernicla hrota.* Smaller numbers remain to spend the winter after most have dispersed to other sites in Ireland. In summer, the lough supports three species of breeding terns.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Arctic tern *Sterna paradisaea*, 210 pairs representing at least 8.4% of the breeding population in Ireland (5 year peak mean, 1992/93-1996/97)

Common tern *Sterna hirundo*, 603 pairs representing at least 19.5% of the breeding population in Ireland (5 year peak mean, 1992/93-1996/97)

Sandwich tern *Sterna sandvicensis*, 593 pairs representing at least 13.5% of the breeding population in Ireland (5 year peak mean, 1992/93-1996/97)

Over winter:
Bar-tailed godwit *Limosa lapponica*, 882 individuals representing at least 5.0% of the wintering population in Ireland (5 year peak mean, 1991/92-1995/96)

Golden plover *Pluvialis apricaria*, 6,526 individuals representing at least 3.3% of the wintering population in Ireland (5 year peak mean, 1991/92-1995/96)

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

Over winter:
Knot *Calidris canutus*, 8723 individuals representing at least 2.5% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean, 1992/93-1996/97)

Light-bellied brent goose *Branta bernicla hrota*, 10527 individuals representing at least 52.6% of the wintering Canada/Ireland population (5 year peak mean, 1992/93-1996/97)

Redshank *Tringa totanus*, 3176 individuals representing at least 2.1% of the wintering Eastern Atlantic - wintering population (5 year peak mean, 1992/93-1996/97)

Shelduck *Tadorna tadorna*, 3871 individuals representing at least 1.3% of the wintering Northwestern Europe - population (5 year peak mean, 1991/92-1995/96)

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
Assemblage qualification: A waterfowl assemblage of international importance.
Over winter, the area regularly supports 60,220 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: mallard *Anas platyrhynchos*, bar-tailed godwit *Limosa lapponica*, light-bellied brent goose *Branta bernicla hrota*, shelduck *Tadorna tadorna*, knot *Calidris canutus*, redshank *Tringa totanus*, little grebe *Tachybaptus ruficollis*, great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo*, greylag goose *Anser anser,* wigeon *Anas penelope*, golden plover *Pluvialis apricaria*, teal *Anas crecca*, turnstone *Arenaria interpres*, pintail *Anas acuta*, shoveler *Anas clypeata*, goldeneye *Bucephala clangula*, red-breasted merganser *Mergus serrator*, coot *Fulica atra*, oystercatcher *Haematopus ostralegus*, ringed plover *Charadrius hiaticula*, grey plover *Pluvialis squatarola*, lapwing *Vanellus vanellus*, dunlin *Calidris alpina alpina*, curlew *Numenius arquata*, gadwall *Anas strepera*

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Sandwich tern breeding population	No significant decrease in breeding population against national trends, caused by on-site factors

Site Name: Outer Ards SPA	
Sandwich tern breeding population	Fledging success
Common tern breeding population	No significant decrease in breeding population against national trends, caused by on-site factors
Common tern breeding population	Fledging success
Arctic tern breeding population	No significant decrease in breeding population against national trends, caused by on-site factors
Arctic tern breeding population	Fledging success
Golden plover wintering population	No significant decrease in population against national trends, caused by on-site factors
Bar-tailed godwit wintering population	No significant decrease in population against national trends, caused by on-site factors
Light-bellied brent goose wintering population	No significant decrease in population against national trends, caused by on-site factors
Shelduck wintering population	No significant decrease in population against national trends, caused by on-site factors
Knot wintering population	No significant decrease in population against national trends, caused by on-site factors
Redshank wintering population	No significant decrease in population against national trends, caused by on-site factors
Great crested grebe wintering population	No significant decrease in population against national trends, caused by on-site factors
Wigeon wintering population	No significant decrease in population against national trends, caused by on-site factors
Gadwall wintering population	No significant decrease in population against national trends, caused by on-site factors
Teal wintering population	No significant decrease in population against national trends, caused by on-site factors
Mallard wintering population	No significant decrease in population against national trends, caused by on-site factors
Pintail wintering population	No significant decrease in population against national trends, caused by on-site factors
Shoveler wintering population	No significant decrease in population against national trends, caused by on-site factors
Goldeneye wintering population	No significant decrease in population against national trends, caused by on-site factors
Red-breasted merganser wintering population	No significant decrease in population against national trends, caused by on-site factors
Coot wintering population	No significant decrease in population against national trends, caused by on-site factors
Oystercatcher wintering population	No significant decrease in population against national trends, caused by on-site factors
Ringed plover wintering population	No significant decrease in population against national trends, caused by on-site factors
Grey plover wintering population	No significant decrease in population against national trends, caused by on-site factors
Lapwing wintering population	No significant decrease in population against national trends, caused by on-site factors
Dunlin wintering population	No significant decrease in population against national trends, caused by on-site factors
Curlew wintering population	No significant decrease in population against national trends, caused by on-site factors
Turnstone wintering population	No significant decrease in population against national trends, caused by on-site factors
Waterfowl Assemblage	No significant decrease in population against national trends, caused by on-site factors
Habitat Extent	To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species (3781ha intertidal area), (breeding areas Xha) subject to natural processes
Habitat Extent	Maintain the extent of main habitat components subject to natural processes
Roost sites	Maintain or enhance sites utilised as roosts

Site Name: Killough Bay SPA	
Location	Latitude 54º 15'21"N Longitude 05º 37'50"W
Area (ha)	104.23
Summary	Killough Harbour is located on the south-east coast of County Down in Northern Ireland. It is a small harbour with tidal mud-flats and shingle banks. The site is of importance as a wintering area for light-bellied brent goose *Branta bernicla hrota* of the Canada/Ireland population.

Qualifying features for which the site is designated:

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

Over winter:
Light-bellied brent goose *Branta bernicla hrota*, 354 individuals representing 1.8% of the world Canada/Ireland population (WeBS 5 year peak mean 1992/93-1996/97)

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Light-bellied brent goose wintering population	No significant decrease in population against national trends, caused by on-site factors
Habitat extent	To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species (94ha intertidal area), subject to natural processes
Habitat extent	Maintain the extent of main habitat components subject to natural processes

Site Name: Carlingford Lough SPA	
Location	Latitude 54º 03'00"N Longitude 06º 07'00"W
Area (ha)	827.12
Summary	Carlingford Lough lies on the east coast of Northern Ireland and straddles the international border with the Irish Republic. It is a narrow sea lough surrounded by mountains. The northern shore lies in Northern Ireland and includes the most significant mud-flats in the lough and an area of saltmarsh. These provide important feeding areas for wintering light-bellied brent goose *Branta bernicla hrota* of the Canada/Ireland population. At the mouth of the lough are several small rock and shingle islands which are of importance to breeding terns, which feed in the shallow waters of the lough.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Common tern *Sterna hirundo*, 339 pairs representing 10.9% of the breeding population in Ireland (5 year mean, 1993-1997)

Sandwich tern *Sterna sandvicensis*, 575 pairs representing 13.1% of the breeding population in Ireland (5 year mean, 1993-1997)

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

During the breeding season:
Light-bellied brent goose *Branta bernicla hrota*, 319 individuals representing at least 1.6% of the wintering Canada/Ireland population (WeBS 5year peak mean 1990/91-1994/95)

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Component Objective
Sandwich tern breeding population	No significant decrease in breeding population against national trends, caused by on-site factors
Sandwich tern breeding population	Fledging success
Common tern breeding population	No significant decrease in breeding population against national trends, caused by on-site factors
Common tern breeding population	Fledging success
Light-bellied brent goose wintering	No significant decrease in population against national trends, caused by on-site factors
Habitat extent	To maintain or enhance the area of natural and semi-natural habitats potentially usable by Feature bird species (780ha intertidal area), (breeding areas 201.20ha) subject to natural processes
Habitat extent	Maintain the extent of main habitat components subject to natural processes

Scotland

Site Name: Treshnish Isles SPA	
Location	Latitude 56º 29'30"N Longitude 06º 25'10"W
Area (ha)	240.6
Summary	The Treshnish Isles are located in the Inner Hebrides of western Scotland. They are a series of small islands and skerries off the west coast of Mull in Argyll. They are rocky, with cliffs, screes and raised beaches, and support strongly maritime grassland and heath. The islands are important for their breeding seabird colonies, especially storm petrel *Hydrobates pelagicus*. The most important seabird colonies are on Lunga, which supports the majority of storm petrels. The Treshnish Isles are also of importance as a traditional wintering locality for Greenland barnacle goose *Branta leucopsis*.
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **During the breeding season:** European storm petrel *Hydrobates pelagicus*, 5,040 pairs representing 5.9% of the GB breeding population (Count, as at 1996) **Over winter:** Barnacle goose *Branta leucopsis*, 82 individuals representing 0.3% of the GB population (Three count mean, 1994, 1995 & 1997)	
Conservation objectives:	
To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term: • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species	

Site Name: North Colonsay and Western Cliffs SPA	
Location	Latitude 56º 06'44"N Longitude 06º 10'40"W
Area (ha)	3,295.9
Summary	The North Colonsay and Western Cliffs SPA is located on the island of Colonsay in the southern Inner Hebrides off the west coast of Scotland. It comprises the northern promontory of Colonsay and a 2km section of cliffs on the western coast. The hills rise to about 140m above sea level and the cliffs include some almost sheer sections up to about 100m in height. The whole area is craggy, and the mainly acidic rocks support dry and wet heath over the northern hills. On the west coast in particular, there is a strong influence of sea spray, giving a herb-rich sward. Sand dunes, including the 60m high Leac Bhuidhe dune, are found in two areas in the north and are rich in characteristic plant species. The site is of importance for breeding seabirds, including gulls and auks. These feed outside the SPA in surrounding waters as well as further away. Chough *Pyrrhocorax pyrrhocorax* is also a resident species, breeding on cliff areas and foraging widely. They depend on the diverse mix of habitats present within the site and their continued low-intensity agricultural management.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Chough *Pyrrhocorax pyrrhocorax*, 9 pairs representing at least 2.6% of the breeding population in Great Britain (Count, as at 1998)

Over winter:
Chough *Pyrrhocorax pyrrhocorax*, 18 pairs representing at least 2.6% of the wintering population in Great Britain (Count as at 1998)

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds
Assemblage qualification: A seabird assemblage of international importance.
During the breeding season, the area regularly supports 30,000 individual seabirds including: kittiwake *Rissa tridactyla* and guillemot *Uria aalge*.

Conservation objectives:

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Gruinart Flats SPA	
Location	Latitude 55º 50'42"N Longitude 06º 19'33"W
Area (ha)	3261.32
Summary	Gruinart Flats are located on the Hebridean island of Islay on the west coast of Scotland. The SPA comprises a diverse array of coastal habitats typical of western Scotland. The main features are a sheltered estuarine and intertidal sea loch (holding sand- and mud-flats as well as an extensive saltmarsh and sand dunes) surrounded by pastoral farmland and backed by semi-natural upland habitats (including ombrogenous peatlands). The grass fields of the farmland support large wintering goose populations which roost at night on the saltmarsh, whilst the intertidal areas support a diverse assemblage of wintering waterbirds important in a regional context. The entire population of the Greenland race of barnacle goose *Branta leucopsis* arrives at the site in early autumn before dispersing to other wintering areas in Ireland and western Scotland.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Breeding:
Chough *Pyrrhocorax pyrrhocorax*, an average of 4.6 breeding pairs annually between 2000-2004, representing over 1..3% of the Great Britain population

Overwinter:
Barnacle goose *Branta leucopsis*, 20,000 individuals representing at least 74.1% of the wintering population in Great Britain (5 year peak mean 1991/2-1995/6) [favourable maintained]

Greenland white-fronted goose *Anser albifrons flavirostris*, 1,000 individuals representing at least 7.1% of the wintering population in Great Britain (Count, as at mid-1990s) [favourable maintained]

Chough *Pyrrhocorax pyrrhocorax*, a winter mean of over 42 indviduals roosting and 43 feeding birds between 2001/02-2003/04, representing more than 4.4 and 4.5% of the Great Britain population respectively

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

On passage:
Canadian light-bellied brent goose *Branta bernicla hrota*, 300 indviduals representing 2% of the East Canadian, High Arctic biogeographic population (Count, as at1985) [favourable maintained]

Conservation objectives:

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Rinns of Islay SPA	
Location	Latitude 55º 46'55"N Longitude 06º 21'00"W
Area (ha)	9,407.46
Summary	The Rinns of Islay SPA is located on the Hebridean island of Islay on the west coast of Scotland. It comprises extensive areas of the western side of the island, being a mosaic of natural and semi-natural habitats including bog, moorland, dune grassland, maritime grassland, marsh and farmland. Much of the natural vegetation is utilised as rough grazing for sheep and cattle and is managed extensively. These habitats are used by an extremely rich assemblage of scarce bird species throughout the year. The site is of particular importance for a number of breeding and wintering birds, including raptors, Greenland white-fronted goose *Anser albifrons flavirostris* and chough *Pyrrhocorax pyrrhocorax*. The choughs depend on the diverse mix of habitats present and their continued low-intensity agricultural management. The site also includes the subsumed SPAs of Glac na Criche and Feur Lochain, which were subject to separate classification.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Chough *Pyrrhocorax pyrrhocorax*, 31 pairs representing at least 9.1% of the breeding population in Great Britain (Count, as at 1998)

Corncrake *Crex crex*, 2 individuals representing at least 0.4% of the breeding population in Great Britain (5 year mean, 1993-1997)

Hen harrier *Circus cyaneus*, 7 pairs representing at least 1.4% of the breeding population in Great Britain (Count, as at 1998)

On passage:
Whooper swan *Cygnus cygnus*, 140 individuals representing at least 2.5% of the population in Great Britain (Count, as at 1988)

Over winter:
Chough *Pyrrhocorax pyrrhocorax*, 62 pairs representing at least 9.0% of the wintering population in Great Britain (Count as at 1998)

Greenland white-fronted goose *Anser albifrons flavirostris*, 1,600 individuals representing at least 11.4% of the wintering population in Great Britain (Count, as at 1993/4)

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

During the breeding season:
Common scoter *Melanitta nigra,* 10 pairs representing <0.1% of the breeding Western Siberia/Western & Northern Europe/Northwestern Africa population (Count, as at 1997)

Conservation objectives:

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Laggan Islay SPA	
Location	Latitude 55º 43'16"N Longitude 06º 18'24"W
Area (ha)	1,230.02
Summary	Laggan is located on the Hebridean island of Islay on the west coast of Scotland. The Laggan Peninsula is situated on the eastern shore of Loch Indaal, a sea loch, and comprises the rocky headland of Laggan Point and the land backing Laggan Point and Laggan Bay. The bay is an 11km long sandy sweep open to the Atlantic. This is backed by a rare and uninterrupted habitat transition from sand dunes and intertidal rocky shore habitats through acidic dune grassland, coastal heath and ultimately to blanket bog. The blanket bog is used as a roost by wintering Greenland white-fronted goose *Anser albifrons flavirostris*. Intensively managed farmland on the site is an important feeding area for wintering Greenland barnacle goose *Branta leucopsis*. Goose using this site as a feeding area also use roosts elsewhere (including Bridgend Flats SPA for Greenland barnacle goose and Eilean nan Muice Duibhe SPA for Greenland white-fronted goose).
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **Over winter:** Barnacle goose *Branta leucopsis*, 1,800 individuals representing at least 6.7% of the wintering population in Great Britain (Count, as at mid 1990s) Greenland white-fronted goose *Anser albifrons flavirostris*, 300 individuals representing at least 2.1% of the wintering population in Great Britain (Count, as at mid 1990s)	
Conservation objectives:	
To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term: • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species	

Site Name: Bridgend Flats, Islay SPA	
Location	Latitude 55º 46'22"N Longitude 06º 16'05"W
Area (ha)	331.16
Summary	Bridgend Flats are located on the Hebridean island of Islay on the west coast of Scotland. The site lies in a sheltered location at the head of Loch Indaal and comprises natural saltmarsh and intertidal sand and mud-flats. The flats are used as a roosting site for overwintering geese that feed during the day outside the SPA on surrounding areas of farmland as well as in other wetland habitats.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Overwinter:
Barnacle goose *Branta leucopsis*, 6,700 individuals representing at least 24.8% of the wintering population in Great Britain (No count period specified) [favourable maintained]

Conservation objectives:

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Kintyre Goose Roosts	
Location	Latitude 55º 31'00"N Longitude 05º 37'00"W
Area (ha)	412.37
Summary	The Kintyre Goose Roosts SPA is located on the Kintyre peninsula in south-west Scotland. The site comprises five hill lochs (Loch Garasdale, Loch an Fhraoich, Loch Lussa, Tangy Loch and Black Loch (north)) together with an area of grassland and heath at Rhunahaorine Point. The site supports an important population of Greenland white-fronted goose *Anser albifrons flavirostris*. The geese roost on the site at night and fly to feed on nearby agricultural land outside the SPA during the day.
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **Overwinter:** Greenland white-fronted goose *Anser albifrons flavirostris*, 2,323 individuals representing at least 16.6% of the wintering population in Great Britain (Winter peak mean) [favourable maintained]	
Conservation objectives:	
To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term: • Population of the species as a viable component of the site • Distribution of the species within site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species	

Site Name: Ailsa Craig SPA	
Location	Latitude 55º 15'15"N Longitude 05º 07'00"W
Area (ha)	99.94
Summary	Ailsa Craig is a cone-shaped granitic island, rising to 338m, situated in the outer part of the Firth of Clyde, western Scotland. Cliffs up to 100m encircle the island and provide nesting sites for a range of seabird species, notably one of the largest colonies of gannet *Morus bassanus* in the world. The seabirds nesting here feed in surrounding waters outside the SPA as well as further afield.

Qualifying features for which the site is designated:

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

During the breeding season:
Gannet *Morus bassanus*, 32,460 pairs representing at least 12.3% of the breeding North Atlantic population (Count, as at 1995) [favourable maintained]

Lesser black-backed gull *Larus fuscus*, 1,800 pairs representing at least 1.5% of the breeding Western Europe/Mediterranean/Western Africa population (Count, as at 1987) [unfavourable declining]

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds
Assemblage qualification: A seabird assemblage of international importance.
During the breeding season, the area regularly supports 65,000 individual seabirds including: guillemot *Uria aalge*, gannet *Morus bassanus*, kittiwake *Rissa tridactyla*, herring gull *Larus argentatus*, lesser black-backed gull *Larus fuscus* [all unfavourable declining, except gannet and guillemot: favourable maintained]

Conservation objectives:

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Loch of Inch and Torrs Warren SPA	
Location	Latitude 54º 50'30"N Longitude 04º 52'30"W
Area (ha)	2111.04
Summary	Loch of Inch and Torrs Warren SPA is located on the south coast of Galloway in south-west Scotland. It comprises two separate areas: a large eutrophic freshwater loch (Loch of Inch) and an area of foreshore and sand dunes (Torrs Warren). The latter system contains important examples of dune slacks. Both components of the site support, in winter, important numbers of Greenland white-fronted goose *Anser albifrons flavirostris* and hen harrier *Circus cynaeus*.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Over winter:
Greenland white-fronted goose *Anser albifrons flavirostris*, 534 individuals representing up to 3.8% of the wintering population in Great Britain (5 year peak mean, 1991/2-1995/6)

Hen harrier *Circus cyaneus*, 8 individuals representing up to 1.1% of the wintering population in Great Britain (5 year peak mean 1991/2-1995/6)

Conservation objectives:

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Upper Solway Flats and Marshes SPA	
Location	Latitude 54º 58'04"N Longitude 03º 19'17"W
Area (ha)	30,706.26
Summary	The Upper Solway Flats and Marshes SPA lies on the west coast on the border between England and Scotland. The flats and marshes of the Upper Solway form one of the largest continuous areas of intertidal habitat in Britain. The geomorphology and vegetation of the estuarine saltmarshes or merses are of international importance, with broad transistions to mature 'upper-marsh' being particularly well represented. The whole estuarine complex is of importance for wintering wildfowl (ducks, geese and swans) and waders, and is a vital link in a chain of west coast UK estuaries used by migrating waterbirds. The SPA supports virtually all of the Svalbard population of barnacle goose *Branta leucopsis* over the winter.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Over winter:
Bar-tailed godwit *Limosa lapponica*, 2,367 individuals representing at least 4.5% of the wintering population in Great Britain (5 year peak mean 1991/2-1995/6)

Barnacle goose *Branta leucopsis*, 13,595 individuals representing at least 11.3% of the wintering population in Great Britain (5 year peak mean 1991/2-1995/6)

Golden plover *Pluvialis apricaria*, 6,121 individuals representing at least 2.4% of the wintering population in Great Britain (5 year peak mean 1991/2-1995/6)

Whooper swan *Cygnus Cygnus*, 117 individuals representing at least 2.1% of the wintering population in Great Britain (5 year peak mean 1991/2-1995/6)

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

On passage:
Ringed plover *Charadrius hiaticula*, 729 individuals representing at least 1.5% of the European/Northern Africa-wintering population (5 year peak mean 1991/2-1995/6)

Over winter:
Curlew *Numenius arquata*, 5,881 individuals representing at least 1.7% of the wintering Europe-breeding population (5 year peak mean 1991/2-1995/6)

Dunlin *Calidris alpina alpina*, 14,566 individuals representing at least 1.0% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2-1995/6)

Knot *Calidris canutus*, 12,271 individuals representing at least 3.5% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean 1991/2-1995/6)

Oystercatcher *Haematopus ostralegus*, 34,694 individuals representing at least 3.9% of the wintering Europe & Northern/Western Africa population (5 year peak mean 1991/2-1995/6)

Pink-footed goose *Anser brachyrhynchus*, 15,983 individuals representing at least 7.1% of the wintering Eastern Greenland/Iceland/UK population (5 year peak mean 1991/2-1995/6)

Pintail *Anas acuta*, 2,253 individuals representing at least 3.8% of the wintering Northwestern Europe population (5 year peak mean 1991/2-1995/6)

Redshank *Tringa totanus*, 3,088 individuals representing at least 2.1% of the wintering Eastern Atlantic population (5 year peak mean 1991/2-1995/6)

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
Assemblage qualification: A wetland of international importance.
Over winter, the area regularly supports 133,222 individual waterfowl including: Redshank *Tringa totanus*, Barnacle goose *Branta leucopsis,* Golden plover *Pluvialis apricaria*, Bar-tailed godwit *Limosa lapponica*, Pink-footed goose *Anser brachyrhynchus*, Pintail *Anas acuta*, Oystercatcher *Haematopus ostralegus*, Knot *Calidris canutus*, Whooper swan *Cygnus cygnus,* Curlew *Numenius arquata*, Lapwing *Vanellus vanellus*, Great crested grebe *Podiceps cristatus*, Cormorant *Phalacrocorax carbo*, Shelduck *Tadorna tadorna*, Mallard *Anas platyrhynchos*, Scaup *Aythya marila*, Goldeneye *Bucephala clangula*, Ringed plover *Charadrius hiaticula*, Grey plover *Pluvialis squatarola*, Dunlin *Calidris alpina alpina*.

Conservation objectives:

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following

Site Name: Upper Solway Flats and Marshes SPA

are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

England

Site Name: Duddon Estuary SPA	
Location	Latitude 54º 10'39"N Longitude 03º 15'24"W
Area (ha)	6,806.3
Summary	The Duddon Estuary is located north-west of Morecambe Bay on the coast of Cumbria in north-west England. It is formed where the River Duddon and the smaller Kirkby Pool opens into the Irish Sea. It is a complex site, mostly consisting of intertidal sand and mud-flats, important for large numbers of wintering and passage waterbirds. A range of grazed and ungrazed saltmarsh habitats occurs around the edge of the estuary, especially the sheltered inner section. The site is the most important in Cumbria for sand-dune communities including large areas of calcareous dunes at Sandscale and Haverigg Haws and contrasting acid dunes on North Walney. There are a number of settlements and industrial areas on the periphery of the site. Artificial habitats include slag banks and a flooded iron-ore working known as Hodbarrow Lagoon forms the largest coastal lagoon in north-west England. The intertidal sand- and silt-flats contain abundant invertebrates that support important numbers of wintering waterbirds, especially waders, during the migration and winter periods. Saltmarshes, sand dunes and Hodbarrow Lagoon act as important high-tide roosts for wintering waders and wildfowl. High-tide roosts are also found outside the site boundary on the landward side. The site is also of importance for breeding terns which nest in dune areas and slag banks, and feed in the shallow waters of the estuary and surrounding waters. Hodbarrow Lagoon is a key high-tide roosting site for terns.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Sandwich tern *Sterna sandvicensis*, 210 pairs representing at least 1.5% of the breeding population in Great Britian (5 year mean, 1998-1992)

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

On passage:
Ringed plover *Charadrius hiaticula*, 628 individuals representing at least 1.3% of the European/Northern Africa-wintering population (5 year peak mean 1991/2-1995/6)

Sanderling *Calidris alba*, 1,055 individuals representing at least 1.1% of the Eastern Atlantic/Western & Southern Africa wintering population (5 year peak mean 1991/2-1995/6)

Over winter:
Knot *Calidris canutus*, 4,495 individuals representing at least 1.3% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean 1991/2-1995/6)

Pintail *Anas acuta*, 1,636 individuals representing at least 2.7% of the wintering Northwestern Europe population (5 year peak mean 1991/2-1995/6)

Redshank *Tringa totanus*, 2,289 individuals representing at least 1.5% of the wintering Eastern Atlantic population (5 year peak mean 1991/2-1995/6)

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
Assemblage qualification: A wetland of international importance.
Over winter, the area regularly supports 78,415 individual waterfowl (5 year peak mean 1991/2-1995/6) including: Curlew *Numenius arquata*, Dunlin *Calidris alpina alpina*, Sanderling *Calidris alba*, Oystercatcher *Haematopus ostralegus*, Red-breasted merganser *Mergus serrator*, Shelduck *Tadorna tadorna*, Redshank *Tringa totanus*, Knot *Calidris canutus*, Pintail *Anas acuta*.

Conservation objectives:

With regard to the individual species and/or assemblage of species for which the site has been classified (the Qualifying Features listed above), avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.

Subject to natural change, to maintain or restore:

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The populations of the qualifying features
- The distribution of the qualifying features within the site

Site Name: Morecambe Bay SPA	
Location	Latitude 54º 07'19"N Longitude 02º 57'21"W
Area (ha)	37,404.6
Summary	Morecambe Bay is located on the Irish Sea coast of north-west England. It is one of the largest estuarine systems in the UK and is fed by five main river channels (the Leven, Kent, Keer, Lune and Wyre) which drain through the intertidal flats of sand and mud. Mussel *Mytilus edulis* beds and banks of shingle are present, and locally there are stony outcrops. The whole system is dynamic, with shifting channels and phases of erosion and accretion affecting the estuarine deposits and surrounding saltmarshes. The flats contain an abundant invertebrate fauna that supports many of the waterbirds using the bay. The capacity of the bay to support large numbers of birds derives from these rich intertidal food sources together with adjacent freshwater wetlands, fringing saltmarshes and saline lagoons, as well as dock structures and shingle banks that provide secure roosts at high tide. The site is of European importance throughout the year for a wide range of bird species. In summer, areas of shingle and sand hold breeding populations of terns, whilst very large numbers of geese, ducks and waders not only overwinter, but (especially for waders) also use the site in spring and autumn migration periods. The bay is of particular importance during migration periods for waders moving up the west coast of Britain.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season:
Little tern *Sterna albifrons*, 26 pairs representing at least 1.1% of the breeding population in Great Britain (Count, as at 1994)

Sandwich tern *Sterna sandvicensis*, 290 pairs representing at least 2.1% of the breeding population in Great Britain (5 year peak mean for 1992-1996)

Over winter:
Bar-tailed godwit *Limosa lapponica*, 2,611 individuals representing at least 4.9% of the wintering population in Great Britain (5 year peak mean 1991/2-1995/6)

Barnacle goose *Branta leucopsis*, 4.097 individuals representing at least 1.6% of the wintering population in Great Britain (5 year peak mean 1991/2-1995/6)

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

During the breeding season:
Herring gull *larus argentatus*, 11,000 pairs representing at least 1.2% of the breeding Northwestern Europe and Iceland/Western Europe – breeding population (5 year peak mean 1991/2-1995/6)

Lesser black-backed gull *Larus fuscus*, 22,000 pairs representing at least 17.7% of the breeding Western Europe/Mediterranean/Western Africa population ((5 year peak mean 1991/2-1995/6)

On passage:
Curlew *Numenius arquata*, 13,620 individuals representing at least 3.9% of the wintering Europe-breeding population (5 year peak mean 1991/2-1995/6)

Dunlin *Calidris alpina alpina*, 52,671 individuals representing at least 3.8% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2-1995/6)

Grey plover *Pluvialis squatarola*, 1,813 individuals representing at least 1.2% of the wintering Eastern Atlantic – wintering population (5 year peak mean 1991/2-1995/6)

Knot *Calidris canutus*, 29,426 individuals representing at least 8.4% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean 1991/2-1995/6)

Oystercatcher *Haematopus ostralegus*, 47,572 individuals representing at least 5.3% of the wintering Europe & Northern/Western Africa population (5 year peak mean 1991/2-1995/6)

Pink-footed goose *Anser brachyrhynchus*¸2,475 individuals representing at least 1.1% of the wintering Eastern Greenland/Iceland/UK population (5 year peak mean for 1991/92-1995/96

Pintail *Anas acuta*, 2,804 individuals representing at least 4.7% of the wintering Northwestern Europe population (5 year peak mean 1991/2-1995/6)

Site Name: Morecambe Bay SPA

Redshank *Tringa totanus*, 6,336 individuals representing at least 4.2% of the wintering Eastern Atlantic population (5 year peak mean 1989/90-1993/94)

Shelduck *Tadorna tadorna*, 6,372 individuals representing at least 2.1% of the wintering Northwestern Europe population (5 year peak mean 1991/2-1995/6)

Turnstone *Arenaria interpres*, 1,583 individuals representing at least 2.3% of the wintering Western Palearctic – wintering population (5 year peak mean 1991/2-1995/6)

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds
Assemblage qualification: A seabird assemblage of international importance.
During the breeding season, the area regularly supports 61,858 individual seabirds (5 year peak mean for 1991/92 to 1995/96) including: Herring gull *Larus argentatus*, Lesser black-backed gull *Larus fuscus*, Little tern *Sterna albifrons*, Sandwich tern *Sterna sandvicensis*.

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
Assemblage qualification: A wetland of international importance.
Over winter, the area regularly supports 210,668 individual waterfowl (5 year peak mean for 1991/92 to 1995/96) including: Great crested grebe *Podiceps cristatus*, Bar-tailed godwit *Limosa lapponica*, Pink-footed goose *Anser brachyrhynchus*, Shelduck *Tadorna tadorna*, Pintail *Anas acuta*, Oystercatcher *Haematopus ostralegus*, Grey plover *Pluvialis squatarola*, Knot *Calidris canutus*, Dunlin *Calidris alpina alpina*, Curlew *Numenius arquata*, Golden plover *Pluvialis apricaria*, Turnstone *Arenaria interpres*, Black-tailed godwit *Limosa limosa islandica*, Cormorant *Phalacrocorax carbo*, Wigeon *Anas penelope*, Teal *Anas crecca*, Mallard *Anas platyrhynchos*, Eider *Somateria mollissima*, Goldeneye *Bucephala clangula*, Red-breasted merganser *Mergus serrator*, Ringed [lover *Charadrius hiaticula*, Lapwing *Vanellus vanellus*, Sanderling *Calidris alba*, Redshank *Tringa totanus*, Whimbrel *Numenius phaeopus*.

Conservation objectives:

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Bae Lerpwl / Liverpool Bay marine SPA	
Location	Latitude 53º 36'10"N Longitude 03º 12'34"W
Area (ha)	170,292.94
Summary	Liverpool Bay is located in the south-eastern region of the northern part of the Irish Sea, bordering north-west England and north Wales. The SPA is a broad arc from Morecambe Bay to the east coast of Anglesey. The sea bed of the SPA consists of a wide range of mobile sediments. Large areas of muddy sand stretch from Rossall Point to the Ribble Estuary, and sand predominates in the remaining areas, with a concentrated area of gravelly sand off the Mersey Estuary and a number of prominent sandbanks off the English and Welsh coasts. The tidal currents throughout the SPA are generally weak, which combined with a relatively large tidal range facilitates the deposition of sediments. The seabed and waters of the site provide an important habitat in the non-breeding season for major concentrations of red-throated divers *Gavia stellata* and sea-ducks, notably common scoter *Melanitta nigra*, which visit the area to feed on the fish, mollusc and crustacean populations. The area is also a feeding ground for breeding and passage terns.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Over winter:
Red throated diver 922 individuals representing at least 5.6% of the UK population (5 year mean, 2001-2006)

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

Over winter:
Common scoter *Melanitta nigra*, 54,675 individuals representing 3.4% of the population in NW Europe (5 year mean, 2001-2006)

Under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
Assemblage qualification: A wetland of international importance.
In the non-breeding season the area regularly supports: 55597 waterfowl 5 year peak mean 2001/02 - 2006/07 (Insufficient data recorded for period 2003/2004) including: Red throated diver *Gavia stellata* and common scoter *Melanitta nigra*.

Conservation objectives:

Red-throated diver (*Gavia stellata*)

To maintain the red-throated diver population and its supporting habitats in favourable condition. The interest feature red-throated diver will be considered to be in favourable condition only when all of the following conditions are met:

- The 5 year peak mean population size for the red-throated diver population is no less than 922 individuals (i.e. the five-year peak mean between 2001/02 – 2006/07);
- (The overall presence and abundance of prey species within the site is maintained;
- (Red-throated divers are not exposed to significant human-induced mortality, and areas where they congregate in higher densities are not subject to significant disturbance.

Common scoter (*Melanitta nigra*)

To maintain the common scoter population and its supporting habitats in favourable condition. The interest feature common scoter will be considered to be in favourable condition only when all of the following conditions are met:

- The 5 year peak mean population size for the common scoter population is no less than 54,675 individuals (i.e. the five-year peak mean between 2001/02 – 2006/07);
- The overall presence and abundance of benthic prey species within the site is maintained, along with its associated features;
- Common scoters are not exposed to significant human-induced mortality, and their aggregations are not subject to significant disturbance;
- The movement of common scoters between feeding and resting areas is not significantly impeded.

Area being used by over 20,000 waterfowl or 20,000 seabirds in any season

To maintain the waterfowl assemblage and its supporting habitat in favourable condition:

- The interest feature waterfowl assemblage will be considered to be in favourable condition when all of the following conditions are met:
- The peak mean population size for the waterfowl assemblage is no less than 55,597 (ie the five-year peak mean between 2001/02 – 2006/07);
- Aggregations of waterfowl and seabirds at feeding and resting sites are not subject to significant disturbance.

Republic of Ireland

Site Name: Horn Head to Fanad Head SPA	
Location	Latitude 55º 11'57"N Longitude 08º 01'10"W
Area (ha)	2,386.35
Summary	Horn Head to Fanad Head SPA comprises a number of separate sections of the north County Donegal coastline stretching some 70km eastwards from Dooros Point, southwest of Horn Head to just south of Saldanha Head, south of Fanad Head. The site includes the high coast areas and sea cliffs, the land adjacent to the cliff edge and the sand dunes and lake at Dunfanaghy/Rinclevan. The high water mark forms the seaward boundary, except at Horn Head where the adjacent sea area to a distance of 500m from the cliff base is included. Sea cliffs are present along virtually all the site. Almost all are greater than 10m in height. They are often over 30m and rise impressively to over 200m in a few places. Large areas of habitat included in the site are semi-natural, often on unenclosed land, but there is some improved and semi-improved agricultural land also. Apart from the ubiquitous and well-developed vegetated sea cliff and cliff top habitat, the seminatural habitat present include fixed dunes, Marram (*Ammophila arenaria*) dunes, dune heath, dune slacks, machair, dry heath, wet grassland, improved and semiimproved grassland, and lakes.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Overwinter:
Whooper swan *Cygnus cygnus* 31 individuals
Barnacle goose *Branta leucopsis* 187 individuals
Greenland white-fronted goose *Anser albifrons flavirostris* 231 individuals

Resident:
Peregrine falcon *Falco peregrinus* 7 pairs
Chough *Pyrrhocorax pyrrhocorax* 30 pairs

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

Overwinter:
Teal *Anas crecca* 109 individuals
Mallard *Anas platyrhynchos* 87 individuals
Pochard *Aythya ferina* 234 individuals
Tufted duck *Aythya fuligula* 93 individuals
Coot *Fulica atra* 52 individuals

During the breeding season:
Lapwing *Vanellus vanellus* 10 pairs
Snipe *Gallinago gallinago* 6 pairs
Dunlin *Calidris alpina* 6 pairs
Sandpiper *Actitis hypoleucos* 2 pairs
Fulmar *Fulmarus glacialis* 1974 pairs
Cormorant *Phalacrocorax carbo* 79 pairs
Shag *Phalacrocorax aristotelis* 110 pairs
Herring gull *Larus argentatus* 21 pairs
Kittiwake *Rissa tridactyla* 3853 pairs

Guillemot *Uria aalge* 4387 pairs
Razorbill *Alca torda* 4515 pairs
Puffin *Fratercula arctica* 189 pairs

Conservation objectives:

To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [breeding] *Fulmarus glacialis*
- [breeding] *Phalacrocorax aristotelis*
- [breeding] *Falco peregrinus*
- [breeding] *Rissa tridactyla*
- [breeding] *Uria aalge*
- [breeding] *Alca torda*
- [breeding] *Pyrrhocorax pyrrhocorax*

Site Name: Horn Head to Fanad Head SPA
• [wintering] *Anser albifrons flavirostris* • [wintering] *Branta leucopsis*

Site Name: Lough Swilly SPA	
Location	Latitude 55º 01'00"N Longitude 07º 34'00"W
Area (ha)	8,563.23
Summary	This site, situated in the northern part of County Donegal, comprises the inner part of Lough Swilly, a long inlet of the sea that cuts through a variety of metamorphic rocks on the west side of the Inishowen Peninsula. The Lough Swilly SPA extends from just below Letterkenny north to Rathmullan and, except in the area between Farsetmore and Blanket Nook on the southern side of Lough Swilly, the site is bounded by the High Water Mark; its seaward boundary is the Low Water Mark. Between Farsetmore and Blanket Nook a series of improved pasture and arable fields of importance to geese and swans are included. The site includes sections of the estuaries of the River Swilly, the River Leannan and the Isle Burn and the predominant habitat is a series of extensive sand and mud flats which are exposed at low tide – both estuaries and sand/mud flats are listed on Annex I of the E.U. Habitats Directive. Other habits represented on the site are salt marshes, lakes which are lagoonal in character (at Blanket Nook), rivers and streams, sand and shingle beaches, lowland wet, dry and improved grasslands, arable land, drainage ditches, reedbeds and scrub. The adjacent Inch Lough and Levels are included in a separate SPA.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Overwinter:
Whooper swan *Cygnus cygnus* 1850 individuals
Golden plover *Pluvialis apricaria* 1885 individuals
Bar-tailed godwit Limosa lapponica 122 individuals
Greenland white-fronted goose *Anser albifrons flavirostris* 1157 individuals
Loon *Gavia immer* 17 individuals

During the breeding season:
Sandwich tern *Sterna sandvicensis* 258 pairs
Common tern *Sterna hirundo* 89 pairs

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

Overwinter:
Great crested grebe *Podiceps cristatus* 172 individuals
Greylag goose *Anser anser* 2183 individuals
Brent goose *Branta bernicla* 451 indiviuals
Shelduck *Tadorna tadorna* 515 indiviuals
Wigeon *Anas penelope* 1271 indiviuals
Teal *Anas crecca* 2066 indiviuals
Mallard *Anas platyrhynchos* 994 indiviuals
Shoveler *Anas clypeata* 41 indiviuals
Tufted duck *Aythya fuligula* 688 indiviuals
Scaup *Aythya marila* 83indiviuals
Goldeneye *Bucephala clangula* 120 indiviuals
Red-breasted merganser *Mergus serrator* 88 indiviuals
Oystercatcher *Haematopus ostralegus* 1883 indiviuals
Ringed plover *Charadrius hiaticula* 81 indiviuals
Lapwing *Vanellus vanellus* 2172 indiviuals
Knot *Calidris canutus* 638 indiviuals
Dunlin *Calidris alpina* 4192 indiviuals
Black-tailed godwit *Limosa limosa* 192 indiviuals
Curlew *Numenius arquata*1839 indiviuals

Redshank *Tringa totanus* 2176 indiviuals
Greenshank *Tringa nebularia* 59 indiviuals
Turnstone *Arenaria interpres* 73 indiviuals
Coot *Fulica atra* 486 individuals
Grey heron *Ardea cinerea* 55 individuals
Common gull *Larus canus* 1379 individuals

Conservation objectives:

To maintain the favourable conservation condition of:

- [wintering] Great crested grebe *Podiceps cristatu* [moderately unfavourable]
- [wintering] Grey heron *Ardea cinerea* [favourable]
- [wintering] Whooper swan *Cygnus cygnus* [favourable]

Site Name: Lough Swilly SPA

- [wintering] Greylag goose *Anser anser* [favourable]
- [wintering] Shelduck *Tadorna tadorna* [intermediate (unfavourable)]
- [wintering] Wigeon *Anas Penelope* [favourable]
- [wintering] Teal *Anas crecca* [favourable]
- [wintering] Mallard *Anas platyrhynchos* [favourable]
- [wintering] Shoveler *Anas clypeata* [favourable]
- [wintering] Scaup *Aythya marila* [intermediate (unfavourable)]
- [wintering] Goldeneye *Bucephala clangula* [moderately unfavourable]
- [wintering] Red-breasted merganser *Mergus serrator* [intermediate (unfavourable)]
- [wintering] Coot *Fulica atra* [favourable]
- [wintering] Oystercatcher *Haematopus ostralegus* [favourable]
- [wintering] Knot *Calidris canutus* [favourable]
- [wintering] Dunlin *Calidris alpine* [moderately unfavourable]
- [wintering] Curlew *Numenius arquata* [intermediate (unfavourable)]
- [wintering] Redshank *Tringa totanus* [favourable]
- [wintering] Greenshank *Tringa nebularia* [favourable]
- [breeding] Black-headed gull *Larus ridibundus*
- [wintering] Common gull *Larus canus* [intermediate (unfavourable)]
- [breeding] Sandwich tern *Sterna sandvicensis*
- [breeding] Common tern *Sterna hirundo*
- [wintering] Greenland White-fronted goose *Anser albifrons flavirostris* [favourable]
- Wetlands & Waterbirds - To maintain the favourable conservation condition of the wetland habitat in Lough Swilly SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

Site Name: Greers Isle SPA	
Location	Latitude 55º 12'42"N Longitude 07º 42'50"W
Area (ha)	19.14
Summary	Greers Isle SPA is a very small island in the enclosed and highly sheltered marine waters of Mulroy Bay, County Donegal. The island is approximately 500m from the mainland. The underlying bedrock is probably part of a metadolerite intrusion. The surrounding water to a distance of 200m is included in the site
Qualifying features for which the site is designated:	
Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: **During the breeding season:** Sandwich tern *Sterna sandvicensis* 217 pairs Common tern *Sterna hirundo* 10 pairs Arctic tern *Sterna paradisaea* 17 pairs ***Under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:*** **During the breeding season:** Common gull *Larus canus* 30 pairs Black-headed gull *Larus ridibundus* 200 pairs	
Conservation objectives:	
To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA: • [breeding] Black-headed gull *Larus ridibundus* • [breeding] Common tern *Larus canus* • [breeding] Sandwich tern *Sterna sandvicensis*	

Site Name: Trawbreaga Bay SPA	
Location	Latitude 55º 16'60"N Longitude 07º 16'60"E
Area (ha)	1003.4
Summary	Trawbreaga Bay is a well-sheltered sea bay which lies on the north-western coast of the Inishowen Peninsula, Co. Donegal. An estimated 80% of the bay area empties at low tide to expose a mixture of mudflats, sandbanks and stony/rocky substrates. The intertidal flats provide the main feeding area for the majority of wintering waterfowl. Trawbreaga Bay supports a good diversity of wintering waterfowl though numbers of most species are relatively low. The main importance of the site lies in the barnacle goose population, which is of international importance.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Breeding:
Chough *Pyrrhocorax pyrrhocorax*

Overwinter:
Barnacle goose *Branta leucopsis* 645 individuals
Whooper swan *Cygnus cygnus* 10 individuals
Bar-tailed godwit *Limosa lapponica* 37 individuals
Light-bellied brent goose *Branta bernicla hrota*

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

Overwinter:
Brent goose *Branta bernicla* 362 individuals
Wigeon *Anas penelope* 214 individuals
Mallard *Anas platyrhynchos* 161 individuals
Red breasted merganser *Mergus serrator* 11 individuals
Oystercatcher *Haematopus ostralegus* 163 individuals
Ringed plover *Charadrius hiaticula* 89 individuals
Lapwing *Vanellus vanellus* 247 individuals
Dunlin *Calidris alpina* 288 individuals
Curlew *Numenius arquata* 190 individuals
Redshank *Tringa totanus* 34 individuals
Black headed gull *Larus ridibundus* 206 individuals
Common gull *Larus canus* 75 individuals

Conservation objectives:

To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [wintering] *Branta bernicla hrota*
- [wintering] Chough *Pyrrhocorax pyrrhocorax*
- [wintering] *Branta leucopsis*
- Wetlands & Waterbirds

Site Name: Inishtrahull SPA	
Location	Latitude 55º 26'13"N Longitude 07º 14'20"E
Area (ha)	474.45
Summary	This site is situated approximately 12.5km north-east of Malin Head and comprises the whole of the island of Inishtrahull and a group of islands, the Tor Rocks, which lie approximately 2km north north west of Inishtrahull, and the intervening sea. For most of its length the coastline of Inishtrahull is of cliffs which support important populations of a variety of seabirds during the breeding season. On occasions, the site supports a flock of Barnacle geese. These birds are considered part of the population which nowadays mostly frequents Trawbreaga Bay, however, the island provdes a safe refuge and useful feeding site.

Qualifying features for which the site is designated:

Under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Overwinter:
Barnacle goose *Branta leucopsis* (77 individuals).

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

During the breeding season:
Fulmar *Fulmarus glacialis* 95 pairs
Common gull *Larus canus* 30 pairs
Lesser black-backed gull *Larus fuscus* 35 pairs
Black-legged kittiwake *Rissa tridactyla* 43 pairs
Shag *Phalacrocorax aristotelis* 127 pairs
Herring gull *Larus argentatus* 20 pairs

Conservation objectives:

To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [breeding] Shag *Phalacrocorax aristotelis*
- [breeding] Common gull *Larus canus*
- [wintering] Barnacle goose *Branta leucopsis*

Site Name: Lough Foyle SPA	
Location	Latitude 55º 05'0"N Longitude 07º 14'00"E
Area (ha)	587.93
Summary	The site comprises a section of the western shore of Lough Foyle between Muff and White Castle in Co. Donegal. It is almost entirely comprised of intertidal mudflat, but does include small areas of sand and shingle. This site is a relatively small part of the Lough Foyle estuarine complex, which itself is a site of high ornithological importance. The Lough Foyle SPA provides feeding habitat for a range of wintering waterfowl species. Due to its small size the numbers of birds using the site is relatively low.

Qualifying features for which the site is designated:

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

Overwinter:
Great crested grebe *Podiceps cristatus* 21 individuals
Cormorant *Phalacrocorax carbo* 38 individuals
Brent goose *Branta bernicla* 79 individuals
Shelduck 17 *Tadorna tadorna* individuals
Wigeon *Anas penelope* 115 individuals
Mallard *Anas platyrhynchos* 91 individuals
Red-breasted merganser *Mergus serrator* 11 individuals
Oystercatcher *Haematopus ostralegus* 275 individuals
Ringed plover *Charadrius hiaticula* 28 individuals
Knot *Calidris canutus* 47 individuals
Curlew *Numenius arquata 3*90 individuals
Redshank *Tringa totanus* 31 individuals
Greenshank *Tringa nebularia* 9 individuals
Turnstone *Arenaria interpres* 29 individuals
Black-headed gull *Larus ridibundus* 174 individuals
Common gull *Larus canus* 130 individuals

Conservation objectives:

To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

- [[wintering] Black-throated diver *Gavia arctica*
- [wintering] Great crested grebe *Podiceps cristatus*
- [wintering] Bewick's swan *Cygnus columbianus*
- [wintering] Whooper swan *Cygnus cygnus*
- [wintering] Greylag goose *Anser anser*
- [wintering] Light-bellied brent goose *Branta bernicla hrota*
- [wintering] Shelduck*Tadorna tadorna*
- [wintering] Wigeon *Anas penelope*
- [wintering] Teal *Anas crecca*
- [wintering] Mallard *Anas platyrhynchos*
- [wintering] Common eider *Somateria mollisima*
- [wintering] Red-breasted merganser *Mergus serrator*
- [wintering] Oystercatcher *Haematopus ostralegus*
- [wintering] Golden plover *Pluvialis apricaria*
- [wintering] Northern lapwing *Vanellus vanellus*

C2 Coastal and marine Special Areas of Conservation

Northern Ireland

Site Name: Skerries and Causeway cSAC	
Location	Latitude 55º 14.33'N Longitude 06º 35.48'W
Area (ha)	10862
Summary	The Skerries and Causeway cSAC site is located adjacent to the coastline of Portstewart, Portrush, Bushmills and the Giant's Causeway World Heritage Site. The area is subject to strong tidal streams and highly exposed to wave action, resulting in mobile sand offshore with sand scour dominating the biological community composition. The site has been designated for the habitats 'reefs', 'sandbanks which are slightly covered by seawater all the time' and 'submerged or partial submerged sea caves' and harbour porpoise.
Qualifying features for which the site is designated:	
Annex 1 Habitat Primary features: Sandbanks which are slightly covered by sea water all the time, reefs, submerged or partially submerged sea caves Qualifying features: None ***Annex II Species*** Primary: None Qualifying: Harbour porpoise *Phocoena phocoena*	
Draft conservation objectives:	
The conservation objectives are as follows: • To avoid deterioration of the qualifying habitats and species thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. • To ensure for the qualifying habitats that the following are maintained in the long term, subject to natural change: ▪ Extent of the habitats on site ▪ Distribution of the habitats within the site ▪ Structure and function of the habitats ▪ Processes supporting the habitats ▪ Distribution of typical species of the habitats ▪ Viability of typical species as components of the habitat ▪ No disturbance of typical species of the habitat	

Site Name: Bann Estuary SAC

Location	Grid Ref: C797363 (central point) Latitude 55º 10'03"N Longitude 06º 44'57"W
Area (ha)	347.94
Summary	Centred on the mouth of the River Bann, the site is dominated by the major beach and dune system at Portstewart, with smaller dunes at Grangemore and Castlerock, the latter also has a beach. The site is of earth science importance with contemporary coastal processes and associated dune forms, together with features important to understanding post-glacial sea-level history. The dune systems have notable archaeological records. Apart from the dune habitats, the site hosts significant saltmarsh, wet grassland and fen communities, with natural transitions present between many of these – a rare occurrence for Northern Ireland. Notable species of both higher and lower plants occur.

Qualifying features for which the site is designated:

Annex I Habitat
Primary features: Fixed dunes with herbaceous vegetation (`grey dunes`) (priority feature)
Secondary features: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`)

Annex II Species
Primary features: None
Secondary features: None

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Global Status	Component Objective
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	C	To maintain or extend, as appropriate, the area of saltmarsh, subject to natural processes To maintain or enhance, as appropriate, the composition of the saltmarsh communities To maintain transitions between saltmarsh communities and to other adjoining habitats To permit the continued operation of formative and controlling natural processes acting on the saltmarsh communities
Embryonic shifting dunes	C	Maintain or enhance the extent of embryonic shifting dunes subject to natural processes. Allow the natural processes that determine the development and extent of embryonic shifting dunes to operate appropriately.
Fixed dunes with herbaceous vegetation (grey dunes)	B	Maintain and expand the extent of existing species-rich fixed dune, SD8. Maintain and enhance species diversity within the SD8 community including the presence of notable species. Seek nature conservation management over suitable areas immediately outside the SAC where there is possibility of restoring fixed dune. Maintain the diversity and quality of habitats associated with the fixed dunes, e.g. neutral grasslands and scrub, especially where these exhibit a natural transition to fixed dune vegetation.
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	C	Maintain and enhance the extent of white dunes subject to natural processes. Allow the natural processes that determine the development and extent of white dunes to operate appropriately. Maintain and enhance, as appropriate, the species diversity within this community.

Site Name: North Antrim Coast SAC

Location	Grid Ref: D022440 (central point) Latitude 55º 13'57"N Longitude 06º 23'36"W
Area (ha)	314.59
Summary	The North Antrim Coast represents an extensive area of hard cliff along one of the most exposed coastlines in Northern Ireland. The site exhibits contrasting geology. The western part is centred on the Giant's Causeway with its geochemically alkali and intermediate basaltic high cliff, interspersed with a series of coves. The eastern section hosts the limited active and extensive fossil chalk sea-cliffs. The basalt series supports a range of communities including those associated with rock crevices and cliff ledges, and with a range of typical maritime grasslands and heath.

Qualifying features for which the site is designated:

Annex I Habitat

Primary features: Vegetated sea cliffs of the Atlantic and Baltic coasts

Secondary features: Annual vegetation of drift lines, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), fixed dunes with herbaceous vegetation (`grey dunes`) (priority feature), shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) (priority feature)

Annex II Species

Primary features: Narrow-mouthed whorl snail *Vertigo angustior*

Secondary features: None

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Global Status	Component Objective
Annual vegetation of drift lines	C	Maintain and enhance the extent of annual vegetation of drift lines subject to natural processes Allow the natural processes which determine the development and extent of annual vegetation of drift lines to operate appropriately Maintain and enhance, as appropriate, the species diversity within this community including the presence of notable species
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	C	To maintain or extend, as appropriate, the area of saltmarsh, subject to natural processes To maintain or enhance, as appropriate, the composition of the saltmarsh communities To maintain transitions between saltmarsh communities and to other adjoining habitats To permit the continued operation of formative and controlling natural processes acting on the saltmarsh communities
Fixed dunes with herbaceous vegetation (grey dunes)	C	Maintain and expand the extent of existing species-rich fixed dune, SD8. Maintain and enhance species diversity within the SD8 community including the presence of notable species. Maintain the diversity and quality of habitats associated with the fixed dunes, e.g. neutral grasslands, scrub, especially where these exhibit natural transition to fixed dune vegetation.
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	C	Maintain and enhance the extent of white dunes subject to natural processes Allow the natural processes which determine the development and extent of white dunes to operate appropriately Maintain and enhance, as appropriate, the species diversity within this community
Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe)	C	Maintain and expand the extent of existing species-rich dry calcareous grasslands (CG10). Maintain and enhance species diversity within the CG10 community including the presence of notable species. Seek nature conservation management over suitable areas immediately outside the cSAC where there is possibility of restoring calcareous grassland

Site Name: North Antrim Coast SAC		
		Maintain the diversity and quality of habitats associated with the calcareous grassland, e.g. acid grasslands, wet heath, scrub, especially where these exhibit natural transition to calcareous grassland.
Vegetated sea cliffs of the Atlantic and Baltic coasts	B	Maintain the extent of vegetated sea cliff subject to natural processes Allow the natural processes which determine the development and extent of vegetated sea cliffs to operate appropriately Maintain and enhance, as appropriate, range of maritime rock crevice and cliff ledge communities Maintain and enhance, as appropriate, range of sea-bird cliff communities Maintain and enhance, as appropriate, range of maritime grassland communities Maintain and enhance, as appropriate, range of maritime heath communities Maintain and enhance, as appropriate, range of transitions and other communities No increase in status of non-native species, undesirable invasive species and species not characteristic of typical communities Maintain and enhance, as appropriate, status of rare and notable species Monitor cliff top or near cliff management activities to ensure they do not lead to loss or enrichment of sea cliff associated communities
Vertigo angustior	B	To maintain (and if feasible enhance) population numbers and distribution *. To maintain (and if feasible enhance) the extent and quality (composition and structure) of suitable snail habitat, particularly the fenny grassland

Site Name: Rathlin Island SAC

Location	Grid Ref: D133518 (central point) Latitude 55º 18'00"N Longitude 06º 13'00"W
Area (ha)	3344.62
Summary	Rathlin Island lies six miles off the north coast of Northern Ireland. It is surrounded by a wide range of rocky habitats and is one of the best examples of reefs in Northern Ireland. Strong tidal streams prevail around most of the island, and there is little silt and turbidity is generally low. Reef habitats include the steep limestone and basalt cliffs on the north wall of the island and areas of boulders on the east and south coasts. A very wide range of species has been recorded around the island, including a high proportion of species of particular interest. Caves are found mainly on the north wall at depth from 0-60+m. Some partially submerged caves are used for breeding by grey seals.

Qualifying features for which the site is designated:

Annex I Habitat

Primary features: Reefs, vegetated sea cliffs of the Atlantic and Baltic coasts, submerged or partially submerged sea caves,
Secondary features: Sandbanks which are slightly covered by sea water all the time, annual vegetation of drift lines

Annex II Species

Primary features: None
Secondary features: None

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Global Status	Component Objective
Reefs	A	Maintain and enhance, as appropriate the extent of the reefs Allow the natural processes which determine the development, structure, function and extent of the reefs, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat.
Submerged or partially submerged sea caves	B	Maintain and enhance, as appropriate the extent of the submerged or partially submerged sea caves Allow the natural processes which determine the development, structure, function and extent of the submerged or partially submerged sea caves, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat.
Vegetated sea cliffs of the Atlantic and Baltic coasts	B	Maintain the extent of vegetated sea cliff subject to natural processes Allow the natural processes which determine the development and extent of vegetated sea cliffs to operate appropriately Maintain and enhance, as appropriate, range of maritime rock crevice and cliff ledge communities Maintain and enhance, as appropriate, range of sea-bird cliff communities Maintain and enhance, as appropriate, range of maritime grassland communities Maintain and enhance, as appropriate, range of maritime heath communities Maintain and enhance, as appropriate, range of transitions and other communities No increase in status of non-native species, undesirable invasive species and species not characteristic of typical communities Maintain and enhance, as appropriate, status of rare and notable species Monitor cliff top or near cliff management activities to ensure they do not lead to loss or enrichment of sea cliff associated communities
Annual	C	Maintain and enhance the extent of annual vegetation of drift lines subject to natural processes

Site Name: Rathlin Island SAC		
vegetation of drift lines		Allow the natural processes which determine the development and extent of annual vegetation of drift lines to operate appropriately Maintain and enhance, as appropriate, the species diversity within this community including the presence of notable species
Sandbanks which are slightly covered by sea water	C	Allow the natural processes which determine the development, structure and extent of sandbanks which are slightly covered by sea water all the time, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat. Maintain the extent and volume of sandbanks which are slightly covered by sea water all the time, subject to natural processes.

Site Name: Red Bay SCI	
Location	Latitude 55º 06.52'N Longitude 06º 01.25'W
Area (ha)	965.54
Summary	The Red Bay site is located off the County Antrim village of Cushendun. It contains the Annex I primary habitat 'sandbanks slightly covered by seawater at all the time'. The sandbanks are dominated by both living maerl and sub-fossil maerl, including the presence of large 2-3m high mega-ripples of sub-fossil maerl which is unique to the site. The mega-ripples are comprised of maerl, gravel and sands on the crests, and cobbles and globular sub-fossil maerl in the troughs, with occasional sand patches on the slopes.

Qualifying features for which the site is designated:

Annex 1 Habitat
Primary features: Sandbanks which are slightly covered by sea water at all the time
Qualifying feature: None

Annex II Species
Primary: None
Qualifying: None

Draft conservation objectives:

The conservation objectives are as follows:

- To avoid deterioration of the qualifying habitats and species thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.
- To ensure for the qualifying habitats that the following are maintained in the long term, subject to natural change:
  - Extent of the habitats on site
  - Distribution of the habitats within the site
  - Structure and function of the habitats
  - Processes supporting the habitats
  - Distribution of typical species of the habitats
  - Viability of typical species as components of the habitat
  - No disturbance of typical species of the habitat

Site Name: The Maidens cSAC	
Location	Latitude 54º 57.407'N Longitude 05º 44.375'W
Area (ha)	9784.83
Summary	The Maidens draft SAC is a group of rocky reefs detached from the coast. The nearest part to the mainland is the south western edge of the boundary that is approximately parallel to the coast and around 5km out. The primary reason for the designation of The Maidens as an SAC is for the Annex I habitat reef. Most of the reef area is bedrock reef with a smaller proportion of stony reef.

Qualifying features for which the site is designated:

Annex 1 Habitat
Primary features: Reef
Qualifying feature: Sandbanks which are slightly covered by sea water all the time

Annex II Species
Primary: None
Qualifying: Grey Seal *Halichoerus grypus*

Draft conservation objectives:

The conservation objectives are as follows:

- To avoid deterioration of the qualifying habitats and species thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.
- To ensure for the qualifying habitats that the following are maintained in the long term, subject to natural change:
  - Extent of the habitats on site
  - Distribution of the habitats within the site
  - Structure and function of the habitats
  - Processes supporting the habitats
  - Distribution of typical species of the habitats
  - Viability of typical species as components of the habitat
  - No disturbance of typical species of the habitat

Site Name: Strangford Lough SAC	
Location	Latitude 54º 26'40"N Longitude 05º 35'40"E
Area (ha)	15398.54
Summary	The intertidal mudflats and sandflats in the north of Strangford Lough represent the largest single continuous area of such habitat in Northern Ireland. There are very extensive areas of muddy sand from Newtownards to Ardmillan Bay in the west and to Greyabbey in the east. The habitat also occurs in the south-west reaches of the Lough along the northern shore of Lecale. The northern flats support luxuriant beds of the eelgrasses *Zostera noltei* and *Z. angustifolia*. Common eelgrass *Z. marina* and tasselled pondweed *Ruppia maritima* are also present, the latter being widespread but quite local in its distribution. Such extensive beds are rare in the British Isles.

Qualifying features for which the site is designated:

Annex I Habitat

Primary: Mudflats and sandflats not covered by seawater at low tide, coastal lagoons *priority feature, large shallow inlets and bays, reefs

Secondary: Annual vegetation of drift lines, perennial vegetation of stony banks, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-puccinellietalia maritimae*).

Annex II Species

Secondary: Harbour seal *Phoca vitulina*

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Global Status	Component Objective
Large shallow inlet and bay	A	Maintain the extent of the large shallow inlet and bay Allow the natural processes which determine the development, structure, function and extent of the large shallow inlet and bay, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat.
Coastal lagoons	B	Maintain the extent of the coastal lagoons Allow the natural processes which determine the development, structure, function and extent of the coastal lagoons, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat.
Mudflats and sandflats not covered by sea water at low tide	B	Maintain the extent of mudflats and sandflats not covered by sea water at low tide Allow the natural processes which determine the development, structure and extent of mudflats and sandflats not covered by sea water at low tide, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat.
Reefs	B	Maintain the extent of the reefs Allow the natural processes which determine the development, structure, function and extent of the reefs, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat.
Annual vegetation of drift lines	C	Maintain and enhance the extent of annual vegetation of drift lines subject to natural processes Allow the natural processes which determine the development and extent of annual vegetation of drift lines to operate appropriately Maintain and enhance, as appropriate, the species diversity within this community including the presence of notable species
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	C	To maintain or extend, as appropriate, the area of saltmarsh, subject to natural processes To maintain or enhance, as appropriate, the composition of the saltmarsh communities To maintain transitions between saltmarsh communities and to other adjoining habitats

Site Name: Strangford Lough SAC		
		To permit the continued operation of formative and controlling natural processes acting on the saltmarsh communities
Perennial vegetation of stony banks	C	Maintain and enhance the extent of perennial vegetation of stony banks subject to natural processes Allow the natural processes which determine the development and extent of perennial vegetation of stony banks to operate appropriately Maintain and enhance, as appropriate, the species diversity within this community including the presence of notable species
Salicornia and other annuals colonising mud and sand	C	Maintain and enhance the extent of *Salicornia* and other annuals colonising mud and sand subject to natural processes Allow the natural processes which determine the development and extent of *Salicornia* and other annuals colonising mud and sand, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat.
Phoca vitulina	C	Maintain and enhance, as appropriate, the harbour seal population Maintain and enhance, as appropriate, physical features used by harbour seals within the site

Site Name: Murlough SAC

Location	Latitude 54º 12'40"N Longitude 05º 47'00"E
Area (ha)	11902.03
Summary	Murlough is one of the most diverse and natural dune systems in Northern Ireland. The site is an ancient system with acidic sands and a long history of traditional management. A complex mosaic of different communities, some of which are very species-rich, covers the 'grey dunes'. Marram *Ammophila arenaria* and red fescue *Festuca rubra* are dominant over much of the area, while species such as common restharrow *Ononis repens* and wild thyme *Thymus polytrichus* are prevalent where the sward is shorter and more herb-rich. These grey dunes form part of a well-developed natural succession from 2110 Embryonic shifting dunes and 2120 Shifting dunes along the shoreline on the seaward side, to areas of dune heath and gorse *Ulex europaeus* scrub on the landward side.

Qualifying features for which the site is designated:

Annex I Habitat

Primary: Fixed dunes with herbaceous vegetation (grey dunes)*priority feature, Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)*priority feature

Secondary: Sandbanks which are slightly covered by seawater all the time, mudflats and sandflats not covered by seawater at low tide, Atlantic salt meadows (*Glauco-puccinellietalia maritimae*), embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria*, dunes with *Salix repens spp.argentea* (*Salicion arenariae*).

Annex II Species

Primary: Marsh fritillary butterfly *Euphydryas aurinia*

Secondary: Harbour seal *Phoca vitulina*

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Global Status	Component Objective
Atlantic decalcified fixed dunes (Calluno-Ulicetea)	A	Maintain and if feasible, expand the extent of existing decalcified fixed dune, H 11 and H10. Increase permitted into areas of rank dune grassland, NOT into spp-rich short turf (Grey Dune SD8). Maintain and enhance structural and species diversity within the H11 and H10 communities including the presence of notable species. Seek nature conservation management over suitable areas immediately outside the cSAC where there is possibility of restoring decalcified fixed dune – *to be determined* Maintain the diversity and quality of habitats associated with the decalcified fixed dunes, e.g. neutral grasslands, scrub, especially where these exhibit natural transition to decalcified fixed dune vegetation.
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	C	Maintain or extend, as appropriate, the area of saltmarsh, subject to natural processes Maintain or enhance, as appropriate, the composition of the saltmarsh communities Maintain transitions between saltmarsh communities and to other adjoining habitats Permit the continued operation of formative and controlling natural processes acting on the saltmarsh communities
Dunes with *Salix repens ssp. Argentea* (*Salicion arenariae*)	C	Maintain and expand the extent of existing Fixed dunes with *Salix repens.* Increase permitted into areas of rank dune grassland, NOT into spp-rich short turf (Grey Dune SD8). Maintain and enhance species diversity within the SD16 community including the presence of notable species. Seek nature conservation management over suitable areas immediately outside the cSAC where there is possibility of restoring fixed dune with *Salix repens – to be determined*
Embryonic shifting dunes	C	Maintain or enhance the extent of embryonic shifting dunes subject to natural processes Allow the natural processes which determine the development and extent of embryonic shifting dunes to operate appropriately
Fixed dunes with herbaceous vegetation (grey dunes)	B	Maintain and expand the extent of existing species-rich fixed dune, SD8. Maintain and enhance species diversity within the SD8 community including the presence of notable species.

Site Name: Murlough SAC		
		Seek nature conservation management over suitable areas immediately outside the cSAC where there is possibility of restoring fixed dune – *to be determined* Maintain the diversity and quality of habitats associated with the fixed dunes, e.g. neutral grasslands, scrub, especially where these exhibit natural transitions to fixed dune vegetation.
Mudflats and sandflats not covered by seawater at low tide	C	Maintain the extent of mudflats and sandflats not covered by sea water at low tide Allow the natural processes which determine the development, structure and extent of mudflats and sandflats not covered by sea water at low tide, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat.
Sandbanks which are slightly covered by sea water all the time	C	Allow the natural processes which determine the development, structure and extent of sandbanks which are slightly covered by sea water all the time, to operate appropriately Maintain and enhance, as appropriate, the species diversity within this habitat. Maintain the extent and volume of sandbanks which are slightly covered by sea water all the time, subject to natural processes.
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	C	Maintain and enhance the extent of white dunes subject to natural processes Allow the natural processes which determine the development and extent of white dunes to operate appropriately Maintain and enhance, as appropriate, the species diversity within this community
Eurodryas aurinia	B	Maintain (and if feasible enhance) population numbers and distribution. Maintain (and if feasible enhance) the extent and quality of suitable Marsh Fritillary breeding habitat, particularly suitable rosettes of the larval food plant *Succisa pratensis*
Phoca vitulina	C	Maintain (and if feasible enhance) population numbers and distribution of harbour seal. Maintain and enhance, as appropriate, physical features used by harbour seals within the site

Scotland

Site Name: Eileanan agus Sgeiran Lios mór SAC	
Location	Grid Ref: NM888471 (central point) Latitude 56º 34'05"N Longitude 05º 26'15"W
Area (ha)	1139.62
Summary	The island of Lismore on the west coast of Scotland provides the most sheltered and enclosed site for the harbour seal *Phoca vitulina*. Lismore is a composite site comprising five groups of small offshore islands and skerries which are extensively used as haul-out sites by the colony. Seal numbers represent just over 1% of the UK population.
Qualifying features for which the site is designated [condition]:	
Annex I Habitat Primary features: None Secondary features: None ***Annex II Species*** Primary features: Harbour seal *Phoca vitulina* [favourable maintained] Secondary features: None	
Conservation objectives:	
For Annex II Species To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term: • Population of the species as a viable component of the site • Distribution of the species within the site • Distribution and extent of habitats supporting the species • Structure, function and supporting processes of habitats supporting the species • No significant disturbance of the species	

Site Name: Treshnish Isles SAC	
Location	Grid Ref: NM289429 (central point) Latitude 56º 30'00"N Longitude 06º 24'24"W
Area (ha)	1962.66
Summary	The site includes the Treshnish Isles, a remote chain of uninhabited islands and skerries situated in south-west Scotland. The islands, numerous skerries, islets and reefs support a breeding colony of grey seals *Halichoerus grypus*, contributing just under 3% of annual UK pup production.

Qualifying features for which the site is designated [condition]:

Annex I Habitat
Primary features: None
Secondary features: Reefs [favourable maintained]

Annex II Species
Primary features: Grey seal *Halichoerus grypus* [favourable maintained]
Secondary features: None

Conservation objectives:

For Annex I Habitats
To avoid deterioration of the qualifying habitats (listed above), thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term:

- Extent of the habitats on site
- Distribution of the habitats within site
- Structure and function of the habitats
- Processes supporting the habitats
- Distribution of typical species of the habitats
- Viability of typical species as components of the habitats
- No significant disturbance of typical species of the habitats

For Annex II Species
To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within the site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Mòine Mhór SAC	
Location	Grid Ref: NR812934 (central point) Latitude 56º 04'50"N Longitude 05º 31'05"W
Area (ha)	1150.41
Summary	The site is located on the west coast of Scotland in Argyll and Bute. The site consists of a waterlogged system of pools and raised bog. The raised bog is very close to sea level and has maritime affinities, grading into saltmarsh. A transition to saltmarsh is an unusual ecological feature of this site. The bog and marsh system supports mosses and grasses.

Qualifying features for which the site is designated [condition]:

Annex I Habitat

Primary features: Active raised bogs (priority feature)[unfavourable recovering], degraded raised bogs still capable of natural regeneration

Secondary features: Mudflats and sandflats not covered by seawater at low tide [favourable maintained], Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [favourable recovered], degraded raised bog [unfavourable recovering], old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [unfavourable recovering]

Annex II Species

Primary features: None

Secondary features: Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia* [unfavourable declining], otter *Lutra lutra* [favourable maintained]

Conservation objectives:

For Annex I Habitats

To avoid deterioration of the qualifying habitats (listed above), thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term:

- Extent of the habitats on site
- Distribution of the habitats within site
- Structure and function of the habitats
- Processes supporting the habitats
- Distribution of typical species of the habitats
- Viability of typical species as components of the habitats
- No significant disturbance of typical species of the habitats

For Annex II Species

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within the site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Tayvallich Juniper and Coast SAC	
Location	Grid Ref: NR712825 (central point) Latitude 55º 58'50"N Longitude 05º 40'05"W
Area (ha)	1213.47
Summary	Tayvallich represents an important and extensive outlier of *Juniperus communis* formations on the west coast of Argyll. This is the only representation in the SAC series of the habitat in western Scotland. The juniper formations occur in an extremely varied habitat mosaic – dry wooded ridges grade into heathland and grassland, with flushes, valley mires and open water transition communities. The juniper is regenerating locally. The site contains a number of marsh fritillary *Euphydryas aurinia* sub-populations which are most likely part of the same metapopulation present at Taynish and Knapdale Woods. Together with the latter site, Tayvallich Juniper and Coast represents the species in the northern part of its UK range. Otter (*Lutra lutra*) are also a qualifying feature of the site.

Qualifying features for which the site is designated:

Annex I Habitat
Primary features: *Juniperus communis* formations on heaths or calcareous grasslands

Annex II Species
Primary features: Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia*
Secondary features: Otter *Lutra lutra*

Conservation objectives:

For Annex I Habitats
To avoid deterioration of the qualifying habitats (listed above), thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term:

- Extent of the habitats on site
- Distribution of the habitats within site
- Structure and function of the habitats
- Processes supporting the habitats
- Distribution of typical species of the habitats
- Viability of typical species as components of the habitats
- No significant disturbance of typical species of the habitats

For Annex II Species
To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within the site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: South-East Islay Skerries SAC	
Location	Grid Ref: NR446474 (central point) Latitude 55º 39'10"N Longitude 06º 03'40"W
Area (ha)	1498.3
Summary	The site encompasses the skerries, islands and rugged coastline of the Inner Hebridean island of Islay. The site is designated for a nationally-important population of harbour seal *Phoca vitulina*. The south-east coastline areas are extensively used as pupping, moulting and haul-out sites by the seals, which represent between 1.5% and 2% of the UK population.

Qualifying features for which the site is designated [condition]:

Annex I Habitat
Primary features: None
Secondary features: None

Annex II Species
Primary features: Harbour seal *Phoca vitulina* [favourable maintained]
Secondary features: None

Conservation objectives:

For Annex II Species
To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within the site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Luce Bay and Sands SAC	
Location	Grid Ref: NX223434 (central point) Latitude 54º 45'00"N Longitude 04º 45'00"W
Area (ha)	48759.28
Summary	The site represents a high-quality large shallow inlet and bay, with sediments ranging from mixed-sized boulders, deep sediments and highly mobile fringing sands, all of which supporting rich plant and animal communities typical of large emayment in south west Scotland. Several dunes systems at the site qualify as an Annex I habitat, namely embryonic shifiting dunes, white dunes, grey dunes and Atlantic decalcified fixed dunes.

Qualifying features for which the site is designated [condition]:

Annex I Habitat
Primary features: Large shallow inlets and bays, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes'), fixed dunes with berbaceous vegetation ('grey dunes'), Atlantic decaldified fixed dunes (*Calluno-Ulicetea*)
Secondary features: Sandbanks which are slightly covered by seawater all the time, mudflats and sandflats not covered by seawater at low tide, reefs.

Annex II Species
Primary features: None
Secondary features: Great crested newt *Triturus cristatus*

Conservation objectives:

For Annex I Habitats
To avoid deterioration of the qualifying habitats (listed above), thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term:

- Extent of the habitats on site
- Distribution of the habitats within site
- Structure and function of the habitats
- Processes supporting the habitats
- Distribution of typical species of the habitats
- Viability of typical species as components of the habitats
- No significant disturbance of typical species of the habitats

For Annex II Species
To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within the site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Solway Firth SAC	
Location	Latitude 54º 58'15"N Longitude 03º 20'12"E
Area (ha)	43636.72
Summary	The Solway is representative of sublittoral sandbanks on the coast of north-west England/south-west Scotland. The sandbanks comprise mainly gravelly and clean sands, owing in part to the very dynamic nature of the estuary. The inner estuary contains constantly changing channels, and a predominance of sand is characteristic of such high-energy systems. There is a transition to less extreme conditions in the outer estuary. The dominant species of the infaunal communities comprise different annelid worms, crustaceans, molluscs and echinoderms, depending on the nature of the substrate.

Qualifying features for which the site is designated:

Annex I Habitat

Primary: Sandbanks which are slightly covered by seawater all the time, estuaries, mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-puccinellietalia maritimae*)

Secondary: Reefs, perennial vegetation of stony banks, fixed dunes with herbaceous vegetation*priority feature

Annex II Species

Primary: Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*

Conservation objectives:

For Annex I Habitats

To avoid deterioration of the qualifying habitats (listed above), thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term:

- Extent of the habitats on site
- Distribution of the habitats within site
- Structure and function of the habitats
- Processes supporting the habitats
- Distribution of typical species of the habitats
- Viability of typical species as components of the habitats
- No significant disturbance of typical species of the habitats

For Annex II Species

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within the site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

England

Site Name: Drigg Coast SAC	
Location	Grid Ref: SD071960 (central point) Latitude 54º21'02"N Longitude 03º25'47"W
Area (ha)	1397.44
Summary	The Drigg Coast is located on the north-west coast of England. It is fed by three rivers (the Irt, Mite and Esk) which discharge through a mouth that has been narrowed by large sand and shingle spits. There is a substantial freshwater influence in the upper reaches of all three rivers. There are substantial areas of Atlantic decalcified fixed dunes, showing a wide range of ecological variation. Dunes with *Salix repens* ssp. *argentea* is another qualifying feature of the site.
Qualifying features for which the site is designated:	
Annex I Habitat Primary features: Estuaries, Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) Secondary features: Mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), embryonic shifting dunes,shifiting dunes along the shoreline with *Ammophila arenaria* ('white dunes'), fixed dunes with herbaceous vegetation ('grey dunes'), humid dune slacks. ***Annex II Species*** Primary features: None Secondary features: None	
Conservation objectives:	
For Annex I Habitats To avoid deterioration of the qualifying habitats (listed above), thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term: • Extent of the habitats on site • Distribution of the habitats within site • Structure and function of the habitats • Processes supporting the habitats • Distribution of typical species of the habitats • Viability of typical species as components of the habitats • No significant disturbance of typical species of the habitats	

Site Name: Morecambe Bay SAC	
Location	Grid Ref: SD371697 (central point) Latitude 54º07'09"N Longitude 02º57'42"W
Area (ha)	61506.22
Summary	Morecambe Bay in north-west England is the confluence of four principal estuaries, the Leven, Kent, Lune and Wyre, together with other smaller examples such as the Keer. Collectively these form the largest single area of continuous interdial mudflats and sandflats in the UK. The site is also the second largest embayment in the UK, and supports exceptionally large beds of mussels *Mytilus edulis* and small areas of reefs. Pioneer saltmarsh colonise the mud and sand along the coast, transitioning to distinctive Atlantic salt meadows dominated by *Puccinellia/Festuca* communities, of which over 1000 ha occur here. Other qualifying features include several types of dune formations with associated vegetation, namely white dunes, grey dunes and dune slacks. Breeding colonies of great crested newts are known to occur in approximately 20 ponds within the Bay.

Qualifying features for which the site is designated:

Annex I Habitat

Primary features: Estuaries, mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, reefs, perennial vegetation of stony banks, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes'), fixed dunes with herbaceous vegetation ('grey dunes'), humid dune slacks.

Secondary features: Sandbanks which are slightly covered by sea water all the time, coastal lagoons, reefs, embryonic shifting dunes, Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*).

Annex II Species

Primary features: Great crested newt *Triturus cristatus*
Secondary features: None

Conservation objectives:

For Annex I Habitats

To avoid deterioration of the qualifying habitats (listed above), thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying habitats that the following are maintained in the long term:

- Extent of the habitats on site
- Distribution of the habitats within site
- Structure and function of the habitats
- Processes supporting the habitats
- Distribution of typical species of the habitats
- Viability of typical species as components of the habitats
- No significant disturbance of typical species of the habitats

For Annex II Species

To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within the site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Republic of Ireland

Site Name: Horn Head and Rinclevan SAC	
Location	Latitude 55º 11'36"N Longitude 07º 49'59"E
Area (ha)	2344.32
Summary	Horn Head extends northwards into the Atlantic ocean from Dunfanaghy, County Donegal. This site also extends westwards, reaching just beyond Dooros Point. It is a diverse coastal site containing a wide range of habitats from high rocky quartzite cliffs in the north to mud flats, sand flats, dunes and a brackish lake in the south. In the south-western part of the site is a dune system which is impressive in terms of its size, range of dune types and its relatively undisturbed nature. Of particular note is the area of fixed dunes, a priority habitat listed on Annex I of the EU Habitats Directive. The site also contains Port Lough, a meso/oligotrophic lake of good water quality which has a diverse flora and supports an important population of slender naiad (*Najas flexilis*). This species is listed on Annex II of the EU Habitats Directive.
Qualifying features for which the site is designated:	
Annex I Habitat Fixed dunes with herbaceous vegetation (`grey dunes`) (priority feature), shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), embryonic shifting dunes, humid dune slacks, machairs ***Annex II Species*** Whorl snail *Vertigo geyeri,* grey seal *Halichoerus grypus,* petalwort *Petalophyllum ralfsii,* slender naiad *Najas flexilis*	
Conservation objectives:	
To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected: • *Vertigo geyeri* • *Halichoerus grypus* • *Petalophyllum ralfsii* • *Najas flexilis* • Embryonic shifting dunes • Shifting dunes along the shoreline with Ammophila arenaria ("white dunes") • Fixed coastal dunes with herbaceous vegetation ("grey dunes") • Dunes with Salix repens ssp.argentea (Salix arenariae) • Humid dune slacks • Machairs (* in Ireland)	

Site Name: Sheephaven SAC	
Location	Latitude 55º 09'27"N Longitude 07º 51'10"E
Area (ha)	1841.97
Summary	Sheephaven Bay is a north-facing bay, situated north of Creeslough on the north-west coast of Co. Donegal. The site occupies the entire inner part of the bay, and includes the intertidal area at Carrickgart. The site receives the flows of a number of rivers, notably the Lackagh River, the Duntally River, the Faymore River and the Carrownamaddy River. The site contains a diversity of habitats ranging from mudflats, salt marshes and sand dunes to lakes, rivers, heath, scrub and woodland.

Qualifying features for which the site is designated:

Annex I Habitat

Mudflats and sandflats not covered by seawater at low tide, old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean salt meadows (*Juncetalia maritimi*), shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"), machairs, fixed coastal dunes with herbaceous vegetation ("grey dunes")

Annex II Species

Petalwort *Petalophyllum ralfsii*

Conservation objectives:

To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- Mudflats and sandflats not covered by seawater at low tide
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- *Petalophyllum ralfsii*
- Mediterranean salt meadows (*Juncetalia maritimi*)

- Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")
- Fixed coastal dunes with herbaceous vegetation ("grey dunes")
- Machairs (* in Ireland)
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

Site Name: Tranarossan and Melomore Lough SAC	
Location	Latitude 55º 13'24"N Longitude 07º 48'07"E
Area (ha)	653.63
Summary	The site encompasses the west coast of the Rosguill peninsula from Gladdaghlahan Bay up to Tranarossan Bay, and the whole of the peninsula north of this point (including Rosses Strand and Gortnalughoge Bay). The main habitats are machair, sand dunes, shingle beach, rocky coast, heathland and wetland areas. Machair, a priority habitat on Annex I of the EU Habitats Directive, occurs as extensive, flat to gently undulating plains at both Tranarossan and Melmore.

Qualifying features for which the site is designated:

Annex I Habitat

Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., mudflats and sandflats not covered by seawater at low tide, decalcified fixed dunes with *Empetrum nigrum*, alpine and boreal heaths, european dry heaths, dunes with *Salix repens* ssp. argentea (*Salicion arenariae*), embryonic shifting dunes, machairs, fixed coastal dunes with herbaceous vegetation ("grey dunes"), shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes"), perennial vegetation of stony banks, vegetated sea cliffs of the Atlantic and Baltic coasts

Annex II Species

Petalwort *Petalophyllum ralfsii*

Conservation objectives:

To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- Mudflats and sandflats not covered by seawater at low tide
- Annual vegetation of drift lines
- Perennial vegetation of stony banks
- Vegetated sea cliffs of the Atlantic and Baltic coasts
- *Petalophyllum ralfsii*
- Embryonic shifting dunes
- Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")
- Fixed coastal dunes with herbaceous vegetation ("grey dunes")
- Decalcified fixed dunes with Empetrum nigrum
- Dunes with Salix repens ssp.argentea (Salix arenariae)
- Machairs (* in Ireland)
- Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
- European dry heaths
- Alpine and Boreal heaths

Site Name: Mulroy Bay SAC		
Location	Latitude	55º 10'43"N
	Longitude	07º 43'58"E
Area (ha)	3209.13	
Summary	Mulroy Bay is an extremely sheltered, narrow inlet situated on the north coast of Co. Donegal. Mulroy Bay displays excellent examples of two habitats listed on Annex I of the EU Habitats Directive – reefs and large shallow inlets and bays. The site contains a good range of different sediment types which includes coarse sand, the free-living red alcareous algae called maerl (also known as 'coral') and a variety of exposed and sheltered reefs with strong to weak currents. Extremely sheltered reefs subject to weak currents, as found in Mulroy Bay, are rare in Ireland. The Bay also supports significant numbers of wintering birds and a population of otter, listed on Annex II of the EU Habitats Directive.	
Qualifying features for which the site is designated:		
Annex I Habitat Large shallow inlets and bays, reefs ***Annex II Species*** Otter *Lutra lutra*		
Conservation objectives:		
To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected: • Large shallow inlets and bays • Reefs • *Lutra lutra*		

Site Name: North Inishowen Coast SAC	
Location	Latitude 55º 17'41"N Longitude 07º 17'37"E
Area (ha)	7069.09
Summary	The North Inishowen Coast, covering the most northerly part of the island of Ireland, stretches from Crummies Bay in the west up to Malin Head and back down to Inishowen Head to the east. It encompasses an excellent variety of coastal habitats including high rocky cliffs, offshore islands, sand dunes, salt marsh, a large intertidal bay, and rocky, shingle and sand beaches. Sea cliffs and their associated flora is a feature of the site. Otter is regularly seen along the shoreline and may breed within the site and is listed on Annex II of the EU Habitats Directive.

Qualifying features for which the site is designated:

Annex I Habitat
Primary features: Vegetated sea cliffs of the Atlantic and Baltic coasts
Secondary features: Annual vegetation of drift lines, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), fixed dunes with herbaceous vegetation (`grey dunes`) (priority feature), shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) (priority feature)

Annex II Species
Narrow-mouthed whorl snail *Vertigo angustior*, otter *Lutra lutra*

Conservation objectives:

To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

- *Vertigo angustior*
- Mudflats and sandflats not covered by seawater at low tide
- Perennial vegetation of stony banks
- Vegetated sea cliffs of the Atlantic and Baltic coasts
- *Lutra lutra*
- Fixed coastal dunes with herbaceous vegetation ("grey dunes")
- Machairs
- European dry heath

Site Name: Lough Swilly SAC	
Location	Latitude 55º 03'01"N Longitude 07º 32'03"E
Area (ha)	9261.64
Summary	The SAC is a large site, situated in the northern part of Co. Donegal, comprises the inner part of Lough Swilly. It extends from below Letterkenny to just north of Buncrana. Lough Swilly is a long sea-lough, cutting through a variety of metamorphic rocks on the west side of Inishowen. The site is estuarine in character, with shallow water and intertidal sand and mud flats being the dominant habitats. Salt marshes are well represented in the inner sheltered areas of the site. Lough Swilly is an important site for waterfowl in autumn and winter. The shallow waters provide suitable habitat for grebes and diving duck, while the intertidal flats are used by an excellent diversity of wildfowl and waders. The site supports a population of otter, a species listed on Annex II of the EU Habitats Directive.
Qualifying features for which the site is designated:	
Annex I Habitat Estuaries, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, *Spartina* swards (*Spartinion maritimae*), coastal lagoons ***Annex II Species*** Otter *Lutra lutra*	
Conservation objectives:	
To maintain the favourable conservation condition of Estuaries in Lough Swilly SAC To restore the favourable conservation condition of Lagoons in Lough Swilly SAC To restore the favourable conservation condition of Atlantic salt meadows in Lough Swilly SAC To restore the favourable conservation condition of Otter in Lough Swilly SAC To restore the favourable conservation condition of Old oak woodland with *Ilex* and *Blechnum* in Lough Swilly SAC	

C3 Riverine Special Areas of Conservation

Northern Ireland

Site Name: River Faughan and Tributaries SCI	
Location	Grid Ref: C513087 (central point) Latitude 54º55'25"N Longitude 07º11'57"W
Area (ha)	293.27
Summary	The River Faughan and Tributaries includes the River Faughan and its tributaries the Burntollet River, Bonds Glen and the Glenrandal River (and its tributary the Inver River). It is estimated that the number of returning salmon entering the river system is on average around 3,500, which is approximately 6% of the Northern Ireland spawning population, making the River Faughan and Tributaries one of the most important salmon rivers in the British Isles. The River Faughan and its tributaries are among the most productive rivers with the main run of fish occurs during the summer months and significant numbers also entering in the autumn. The River Faughan also has a considerable run of migratory sea trout. The abundance of fish also attracts larger predators such as otter. Evidence of otter activity, in the form of spraints, is found along the length of the River Faughan and its main tributaries. The main woodland blocks are predominantly oakwood which is acidic in nature. It can have a mixed canopy comprised of Sessile oak, downy birch, hazel, ash, alder and willows, in addition to introduced species such as beech and sycamore.
Qualifying features for which the site is designated	
Annex I Habitat Primary features: None Secondary features: Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles ***Annex II Species*** Primary features: Atlantic salmon *Salmo salar* Secondary features: Otter *Lutra lutra*	
Conservation objectives:	
To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:	
Feature	**Objective**
Atlantic salmon *Salmo salar*	Maintain and if possible expand existing population numbers and distribution (preferably through natural recruitment), and improve age structure of population. Maintain and if possible enhance the extent and quality of suitable Salmon habitat - particularly the chemical and biological quality of the water and the condition of the river channel and substrate.
Otter *Lutra lutra*	Maintain and if possible increase population numbers and distribution. Maintain the extent and quality of suitable Otter habitat, in particular the chemical and biological quality of the water and all associated wetland habitats
Upland oak woodlands	Maintain and where feasible expand the extent of existing oak woodland but not at the expense of other features. (There are areas of degraded heath, wetland and damp grassland which have the potential to develop into oak woodland) Maintain and enhance oak woodland species diversity and structural diversity. Maintain the diversity and quality of habitats associated with the oak woodland, e.g. fen, swamp, grasslands, scrub, especially where these exhibit natural transition to oak woodland Seek nature conservation management over adjacent forested areas outside the ASSI where there may be potential for woodland rehabilitation. Seek nature conservation management over suitable areas immediately outside the ASSI where there may be potential for woodland expansion.

Site Name: River Foyle and Tributaries SAC	
Location	Grid Ref: H353876 (central point) Latitude 54º44'10"N Longitude 07º27'06"W
Area (ha)	770.12
Summary	The River Foyle and Tributaries is a large, cross-border river in the north-west of Britain and Ireland. The river is notable for the physical diversity and naturalness of the banks and channels, especially in the upper reaches, and the richness and naturalness of its plant and animal communities. The river has the largest population of Atlantic salmon *Salmo salar* in Northern Ireland, with around 15% of the estimated spawning numbers.

Qualifying features for which the site is designated

Annex I Habitat
Primary features: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
Secondary features: None

Annex II Species
Primary features: Atlantic salmon *Salmo salar*
Secondary features: Otter *Lutra lutra*

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Grade	Objective
Atlantic salmon *Salmo salar*	B	Maintain and if possible expand existing population numbers and distribution (preferably through natural recruitment), and improve age structure of population. Maintain and if possible enhance the extent and quality of suitable salmon habitat - particularly the chemical and biological quality of the water and the condition of the river channel and substrate.
Water courses of plain to montane levels with the Ranunculus fluitans and Callitricho-Batrachion vegetation	B	Maintain and if possible enhance extent and composition of community. Improve water quality Improve channel substrate quality by reducing siltation. Maintain and if feasible enhance the river morphology
Otter *Lutra lutra*	C	Maintain and if possible increase population numbers and distribution. Maintain the extent and quality of suitable otter habitat, in particular the chemical and biological quality of the water and all associated wetland habitats

Site Name: Owenkillew River SAC

Location	Grid Ref: H559870 (central point) Latitude 54º43'40"N Longitude 07º07'56"W
Area (ha)	770.12
Summary	The Owenkillew River rises in the Sperrin Mountains in Northern Ireland and flows westwards, forming part of the Lough Foyle system. It is a large river, being ultra-oligotrophic in its upland reaches, and then gradually becoming oligotrophic and oligo-mesotrophic through its middle and lower reaches. The Owenkillew River is notable for the physical diversity and naturalness of the bank and channel, and the richness and naturalness of its plant and animal communities. Beds of stream water-crowfoot *Ranunculus penicillatus* ssp. *penicillatus* occur throughout its middle and lower reaches, typically in association with intermediate water-starwort *Callitriche hamulata*. The freshwater pearl mussel *Margaritifera margaritifera* population, which is estimated to have a minimum number of 10,000 individuals, is confined to 4km of undisturbed river channel in its upper reaches. It is the largest known population surviving in Northern Ireland. The Owenkillew River is associated with several woodlands which in combination represent one of the best examples of old sessile oak wood in Northern Ireland. The woods contain a number of associated physical features, including waterfalls, gorges, cliffs and scattered boulder scree, which contribute to the diversity of the woodland communities.

Qualifying features for which the site is designated

Annex I Habitat
Primary features: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
Secondary features: Bog woodland

Annex II Species
Primary features: Freshwater pearl mussel *Margaritifera margaritifera*
Secondary features: Atlantic salmon *Salmo salar*, otter *Lutra lutra*

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Grade	Objective
Freshwater pearl mussel *Margaritifera margartifera*	B	Maintain and if feasible enhance population numbers through natural recruitment. Improve age structure of population. Improve water quality. Improve channel substrate quality by reducing siltation. Ensure host fish population is adequate for recruitment. Increase the amount of shading through marginal tree cover along those sections of river currently supporting this species.
Water courses of plain to montane levels with the *Ranunculus fluitans* and *Callitricho-Batrachion* vegetation	B	Maintain and if feasible enhance extent and composition of community. Improve water quality Improve channel substrate quality by reducing siltation. Maintain and if feasible enhance the river morphology
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	B	Maintain and expand the extent of existing oak woodland. (There is an area of degraded bog, wetland and damp grassland which have the potential to develop into oak woodland Maintain and enhance Oak woodland species diversity and structural diversity. Maintain the diversity and quality of habitats associated with the Oak woodland, e.g. fen, swamp, grasslands, scrub, especially where these exhibit natural transition to Oak woodland Seek nature conservation management over adjacent forested areas outside the ASSI where there may be potential for woodland rehabilitation. Seek nature conservation management over suitable areas immediately outside the ASSI where there may be potential for woodland expansion.
Bog woodland	C	Maintain and expand the extent of existing bog woodland. (There is an area of degraded bog, wetland and damp grassland that have the potential to develop into bog woodland. Maintain and enhance bog woodland species diversity and structural diversity.

Site Name: Owenkillew River SAC		
		Maintain the diversity and quality of habitats associated with the bog woodland, e.g. fen, swamp, especially where these exhibit natural transition to swamp woodland. Seek nature conservation management over adjacent forested areas outside the ASSI where there may be potential for woodland rehabilitation. Seek nature conservation management over suitable areas immediately outside the ASSI where there may be potential for woodland expansion.
Otter *Lutra lutra*	C	Population numbers and distribution to be maintained and if possible, expanded. Maintain the extent and quality of suitable otter habitat, in particular the chemical and biological quality of the water, and all associated wetland habitats
Salmon *Salmo salar*	C	Maintain and if possible, expand existing population numbers and distribution Maintain and where possible, enhance the extent and quality of suitable salmon habitat, in particular the chemical and biological quality of the water

Site Name: River Roe and Tributaries SAC

Location	Grid Ref: C687159 (central point) Latitude 54º59'41"N Longitude 06º55'44"W
Area (ha)	407.6
Summary	The River Roe and Tributaries SAC site is located in Northern Ireland. The area is notable for the physical diversity and naturalness of the banks and channels, especially in the upper reaches, and the richness and naturalness of its plant and animal communities, in particular the population of Atlantic salmon, which is of international importance and in the extent of upland oakwood present.

Qualifying features for which the site is designated

Annex I Habitat
Primary features: None
Secondary features: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

Annex II Species
Primary features: Atlantic salmon *Salmo salar*
Secondary features: Otter *Lutra lutra*

Conservation objectives:

To maintain each feature in favourable condition. For each feature there are a number of component objectives which are outlined below:

Feature	Grade	Objective
Atlantic salmon *Salmo salar*	B	Maintain and if possible expand existing population numbers and distribution (preferably through natural recruitment), and improve age structure of population. Maintain and if possible enhance the extent and quality of suitable salmon habitat - particularly the chemical and biological quality of the water and the condition of the river channel and substrate.
Water courses of plain to montane levels with the *Ranunculus fluitans* and *Callitricho-Batrachion* vegetation	C	Maintain and if possible enhance extent and composition of community. Improve water quality Improve channel substrate quality by reducing siltation. Maintain and if feasible enhance the river morphology
Old Sessile Oak Woodlands with *Ilex* and *Blechnum* in the British Isles	C	Maintain and where feasible expand the extent of existing oak woodland but not at the expense of other SAC (ABC) features. (There are areas of degraded heath, wetland and damp grassland which have the potential to develop into oak woodland) Maintain and enhance oak woodland species diversity and structural diversity. Maintain the diversity and quality of habitats associated with the oak woodland, e.g. fen, swamp, grasslands, scrub, especially where these exhibit natural transition to oak woodland Seek nature conservation management over adjacent forested areas outside the ASSI where there may be potential for woodland rehabilitation. Seek nature conservation management over suitable areas immediately outside the ASSI where there may be potential for woodland expansion.
Otter *Lutra lutra*	C	Maintain and if possible increase population numbers and distribution. Maintain the extent and quality of suitable otter habitat, in particular the chemical and biological quality of the water and all associated wetland habitats

Scotland

Site Name: River Bladnoch SAC	
Location	Grid Ref: NX347604 (central point) Latitude 54º54'30"N Longitude 04º35'00"W
Area (ha)	300.02
Summary	The River Bladnoch supports a high-quality salmon population in south-west Scotland, which unusually for rivers in this area still supports a spring run of salmon. The river drains a moderate-sized catchment with both upland and lowland areas, and this variety is reflected in the river's ecological and water quality characteristics. Whilst there are problems in the river's headwaters arising from acidification, national and local initiatives are both reducing and ameliorating the worst effects of this pollution source.

Qualifying features for which the site is designated

Annex I Habitat
Primary features: None
Secondary features: None

Annex II Species
Primary features: Atlantic salmon *Salmo salar*
Secondary features: None

Conservation objectives:

For Annex II Species
To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within the site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

Site Name: Endrick Water SAC	
Location	Grid Ref: NS506873 (central point) Latitude 56º03'20"N Longitude 04º24'00"W
Area (ha)	239.11
Summary	The Endrick Water has been designated as a Special Area of Conservation (SAC) because of its important populations of Atlantic salmon, river lamprey and brook lamprey. The Endrick Water is the largest river flowing into Loch Lomond and is the main spawning ground for salmon in the loch catchment. The river lamprey population is the only one in Great Britain that lives its adult stage in freshwater (Loch Lomond) rather than the sea. The SAC covers most of the main stem of the river, from the Loup of Fintry waterfall downstream to Loch Lomond. The main land use in the catchment is farming, with sheep rearing in the upper reaches and mixed farming lower down. Other land uses along the Endrick include forestry and areas for public recreation.

Qualifying features for which the site is designated

Annex I Habitat
Primary features: None
Secondary features: None

Annex II Species
Primary features: Brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*
Secondary features: Atlantic salmon *Salmo salar*

Conservation objectives:

For Annex II Species
To avoid deterioration of the habitats of the qualifying species (listed above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest. To ensure for the qualifying species that the following are established then maintained in the long term:

- Population of the species as a viable component of the site
- Distribution of the species within the site
- Distribution and extent of habitats supporting the species
- Structure, function and supporting processes of habitats supporting the species
- No significant disturbance of the species

England

Site Name: River Eden SAC	
Location	Grid Ref: NY462237 (central point) Latitude 54º36'19"N Longitude 02º49'58"W
Area (ha)	2,463.23
Summary	The Eden is an outstanding floristically rich, northern river on sandstone and hard limestone. The diversity of aquatic plants is amongst the highest of all rivers in Britain. The aquatic flora includes uncommon species and those at the geographical limit of their British distribution. Some of the headwaters of the Eden comprise one of the most important British sites for the native white-clawed crayfish. The river is also of high invertebrate interest for species associated with river shingles and sandbanks. The fish fauna includes Atlantic salmon, bullhead and all three species of lamprey found in British rivers.

Qualifying features for which the site is designated

Annex I Habitat
Primary features: Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) *
Priority feature
Secondary features: None

Annex II Species
Primary features: White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, Atlantic salmon *Salmo salar*, bullhead *Cottus gobio*, otter *Lutra lutra*
Secondary features: None

Conservation objectives:

To maintain*, in favourable condition, the river as a habitat for:

- *Ranunculus* communities
- Populations of Atlantic salmon and bullhead
- Populations of sea, river and brook lamprey
- Populations of white-clawed crayfish

And the river and adjoining land as habitat for:
- Populations of otter

And to maintain* the following features in favourable condition:
- Residual alluvial woodland
- Oligotrophic to mesotrophic standing waters of plains to sub-alpine levels.

* Maintenance implies restoration if the feature is not already in favourable condition.

Site Name: River Derwent and Bassenthwaite Lake SAC	
Location	Grid Ref: NY262207 (central point) Latitude 54º34'35"N Longitude 03º08'32"W
Area (ha)	1,832.96
Summary	The Derwent-Cocker is the largest oligotrophic, or nutrient poor, river in England that still retains high water quality and a natural channel. This low nutrient status is reflected in the abundance of bryophytes and the absence of a number of other plant species found in more nutrient rich rivers. There is, however, a natural succession of plant communities from source to mouth reflecting a slight increase in nutrient status downstream. Both rivers flow through two lakes, Derwentwater and Bassenthwaite on the Derwent and Buttermere and Crummock Water on the Cocker. These lakes have a hydrological buffering effect which helps stabilise the flow regimes. The nationally rare plant floating water plantain occurs in Derwentwater. In places around Derwentwater a transition from open water to wet woodland, fen and swamp is present. The fish fauna of the Rivers Derwent and Cocker include salmon and sea, brook, and river lampreys. Derwentwater has populations of the nationally rare fish vendace. Apart from Derwentwater, in Britain vendace is only known from Bassenthwaite Lake in the same catchment. Crummock Water has Arctic charr, a nationally scarce member of the trout family found in oligotrophic lakes. The Derwent catchment supports otters.

Qualifying features for which the site is designated

Annex I Habitat
Primary features: Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*
Secondary features: Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

Annex II Species
Primary features: Marsh fritillary butterfly *Euphydryas (Eurodryas, Hypodryas) aurinia,* sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, Atlantic salmon *Salmo salar*, otter *Lutra lutra*, floating water-plantain *Luronium natans*
Secondary features: None

Conservation objectives:

The Conservation Objectives for this site are, subject to natural change, to maintain the following habitats and geological features in favourable condition (*), with particular reference to any dependent component special interest features (habitats, vegetation types, species, species assemblages etc.) for which the land is designated (SSSI, SAC, SPA, Ramsar).

Habitat Types represented (Biodiversity Action Plan categories)
Rivers and Streams
Standing Open Water (oligotrophic to mesotrophic)
Fen, marsh and swamp
Wet woodland

Species represented

- Floating water plantain *Luronium natans*
- Vascular plant assemblage
- Atlantic salmon *Salmo salar*
- River lamprey *Lampetra fluviatilis*
- Brook lamprey *Lampetra planeri*
- Sea lamprey *Petromyzon marinus*
- Vendace *Coregonus albula*
- Arctic charr *Salvelinus alpinus*
- Otter *Lutra lutra*
- Invertebrate assemblage of fast flowing water
- Invertebrate assemblage of mineral marsh and open water
- Invertebrate assemblage of litter-rich fluctuating wetlands

(*) or restored to favourable condition if features are judged to be unfavourable.

Site Name: River Ehen SAC	
Location	Grid Ref: NY031144 (central point) Latitude 54º30'55"N Longitude 03º29'51"W
Area (ha)	24.39
Summary	The River Ehen is on the western fringe of the Lake District. It forms the outfall from Ennerdale Water and flows some 20km before reaching the Irish Sea at Sellafield. For much of its upper length the River Ehen is classed as an oligotrophic, or nutrient-poor, river flowing over bryophyte-dominated substrates of shingle, pebbles and rock. Between Ennerdale Water and the confluence with the River Keekle at Cleator Moor the Ehen meanders across a narrow floodplain with extensive areas of riparian woodland and trees. This stretch of the river supports outstanding populations of the freshwater mussel *Margaritifera margaritifera*. Collectively, this is the largest known population of this species in England and the only one showing recent recruitment.

Qualifying features for which the site is designated

Annex I Habitat
Primary features: None
Secondary features: None

Annex II Species
Primary features: Freshwater pearl mussel *Margaritifera margaritifera*
Secondary features: Atlantic salmon *Salmo salar*

Conservation objectives:

The Conservation Objectives for this site are, subject to natural change, to maintain the following habitats and geological features in favourable condition (*), with particular reference to any dependent component special interest features (habitats, vegetation types, species, species assemblages etc.) for which the land is designated (SSSI, SAC, SPA, Ramsar).

Habitat types represented (Biodiversity Action Plan categories)
Rivers and streams (supporting fresh water pearl mussel)

Species represented
Freshwater pearl mussel *Margaritifera margaritifera*
Atlantic salmon *Salmo salar*

(*) or restored to favourable condition if features are judged to be unfavourable.

Republic of Ireland

Site Name: River Finn SAC	
Location	Latitude 54º48'00"N Longitude 07º46'00"W
Area (ha)	5,501.79
Summary	This site comprises almost the entire freshwater element of the Finn and its tributaries – the Corlacky, the Reelan sub-catchment, the Sruhamboy, Elatagh, Cummirk and Glashagh, and also includes Lough Finn, where the river rises. The spawning grounds at the headwaters of the Mourne and Derg Rivers, Loughs Derg and Belshade and the tidal stretch of the Foyle north of Lifford to the border are also part of the site. The Finn and Reelan, rising in the Bluestack Mountains, drain a catchment area of 195 square miles. All of the site is in Co. Donegal. The site is a SAC selected for active blanket bog, a priority habitat listed under Annex I of the E.U. Habitats Directive. The site is also listed for lowland oligotrophic lakes, wet heath and transition mires, also on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Atlantic salmon and Otter.
Qualifying features for which the site is designated	
Annex I Habitats Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), northern Atlantic wet heaths with *Erica tetralix,* blanket bogs (* if active only), transition mires and quaking bogs ***Annex II Species*** Atlantic salmon *Salmo salar* (only in fresh water), otter *Lutra lutra*	
Conservation objectives:	
To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected: • *Salmo salar* (only in fresh water) • *Lutra lutra* • Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) • Northern Atlantic wet heaths with *Erica tetralix* • Blanket bogs (* if active only) • Transition mires and quaking bogs	

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