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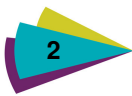
# Habitats Regulations Assessment: 14<sup>th</sup> Onshore Oil and Gas Licensing Round

Final Report



August 2015

Amec Foster Wheeler Environment  
& Infrastructure UK Limited



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## Report for

Oil and Gas Policy Unit  
Oil and Gas Authority  
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# Executive summary

## Purpose of this report

Under the Petroleum Act 1998, the Secretary of State for Energy and Climate Change may grant licences over a limited area and period of time that confer exclusive rights to "*search and bore for and get*" petroleum. The oil and gas licensing system is administered by the Oil and Gas Authority<sup>1</sup> (OGA), an executive agency of the Department of Energy and Climate Change (DECC), on behalf of the Secretary of State for Energy and Climate Change. Oil and gas licensing administration transferred from DECC to the OGA on 1<sup>st</sup> April 2015.

On the 28<sup>th</sup> of July 2014, DECC opened the 14<sup>th</sup> round for companies seeking licences to explore for onshore oil and gas, with the round closing on the 28<sup>th</sup> October 2014. In total, DECC received 95 applications covering 295 blocks<sup>2</sup> in England, Scotland and Wales. Following scrutiny of the operators' competency, financial viability, environmental awareness and geotechnical analysis, and following the decision not to award licences in Scotland and Wales, 159 blocks were taken forward for further consideration of award.

Each of these 159 blocks has been considered against the requirements of the Conservation of Habitats and Species Regulations 2010 (SI 2010 No. 490) (as amended), hereafter referred to as the "Habitats Regulations", which implement the Habitats Directive (92/43/EEC) and Birds Directive (2009/147/EC) within the UK. The Habitats Regulations provide for certain protections to be accorded to designated sites, including Special Areas of Conservation (SACs) and Sites of Community Importance (SCI), designated under the Habitats Directive, and Special Protection Areas (SPAs) designated under the Birds Directive; UK planning policy accords the same level of protection to sites listed or proposed under The Convention on Wetlands of International Importance, called the Ramsar Convention, and to possible/proposed SPAs and candidate SACs. Collectively, all of these sites are referred to in this report as "European sites". To meet the requirements of the Habitats Regulations requires an assessment of "plans or projects" that may have a "likely significant effect" on a European site. A plan or project must be made subject to an "Appropriate Assessment" (AA) if likely significant effects on a European site cannot be ruled out. The purpose of the AA is to allow the competent authority to decide whether the plan or project may have an adverse effect on the integrity of the site, alone or in combination with other plans or projects, which will, in turn, determine whether the plan or project can be approved.

It is the purpose of this strategic plan-level Habitats Regulations Assessment (HRA) to present the findings of AA of effects on European sites arising from the 132 of these 159 blocks for which licence applications have been received, which have been taken forward for consideration for award and for which it was assessed that significant effects on a European site cannot be ruled out.

The assessment has considered the specific nature of any designated sites and their interest features that are present within each licence block and within a 10 km search area around the block, against the potential for Likely Significant Effects (LSE) to occur as a result of licensable activities being undertaken at any location within the licence block. This assessment has determined that for those licence blocks that did not contain a European site and were more than 10 km from a European site, such a low likelihood of LSE was identified, as to rule out the requirement for a further detailed assessment.

For the remaining licence blocks where the initial assessments has found LSEs, AA has assessed whether there could be any adverse effects on integrity (AEOI) on any European sites in relation to the four key stages of exploration and production activities (non-intrusive exploration, exploration, production

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<sup>1</sup> The OGA was created as an executive agency of DECC on 1<sup>st</sup> April 2015. Oil and gas licensing administration transferred from DECC to the OGA on the same day.

<sup>2</sup> The licence block areas (pre-defined by DECC at the beginning of the 14<sup>th</sup> Licensing Round and based on Ordnance Survey National Grid 10km by 10km grid squares or part of) that were available for applications were published by DECC in 2014 and are available here [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/330774/14R\\_Offer.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330774/14R_Offer.pdf) (Accessed 28 May 2015).

development and production) that may occur following the licensing process<sup>3</sup>.

Given the strategic plan-level nature of the HRA, and the inherent uncertainties in seeking to assess the effects arising from future activities that follow licensing in the absence of knowledge such as to the precise nature, location, scale and duration of the activities, a number of assumptions have been used as part of the HRA in order to ensure the outcome of the assessment is consistent, transparent and appropriate. These include assumptions regarding operator compliance and good practice, the nature of activities and, based on available evidence, the likely effects.

Natural England and Natural Resources Wales<sup>4</sup> have been consulted on the HRA methodology and in consequence, they have confirmed that the approach to the assessment has been appropriate and proportionate, given the uncertainties associated with the licensable activities.

Each licence block has been assessed individually by an ecologist with the results recorded in an assessment proforma, accompanied by a site plan indicating the block area and the relevant European sites within the defined search area. For each designation highlighted within the licence block search area, a site-specific brief commentary has been provided summarising any locational information and the key issues that may be relevant for that site, such as primary sensitivities, receptors and effect pathways<sup>5</sup>. Where the AA has concluded that AEOI from specified future activities are unavoidable, it is recommended that the carrying out of that activity will be prohibited through the inclusion of a condition in the licence, when granted. In consequence any AEOI are avoided. For all European sites assessed, it has been concluded that Stage A, B, C and D activities undertaken at depth would not result in effects on ecological receptors at surface and as such, will not result in AEOI.

The results of the assessment are as follows:

- ▶ 27 blocks for which a licence application has been received have been assessed as having no LSEs;
- ▶ Each of the remaining 132 blocks for which a licence application has been received have been subject to an AA:
  - ▶ 73 blocks for which a licence application has been received are recommended for licence award but with conditions to ensure no AEOI.
  - ▶ 59 blocks for which a licence application has been received are recommended for licence award with no conditions.

In order to identify the European sites that could potentially be affected by “in-combination” effects, the assessment has identified all European sites that have more than one licence block within a 10 km radius, and of those, all that have more than one licence block within a 1 km radius. At this strategic plan level the licence conditions imposed (and advice notices given) will be sufficient to ensure that activities being undertaken within more than one licence block, and potentially by different licensees, will not have AEOI of European sites in the areas identified.

Given the strategic plan-level at which the AA of the licences has, by necessity, to be carried out, it should be noted that granting a licence does not imply any definitive or final clearance of Habitats Regulations considerations – any proposals for specific operations will be subject to further consideration of the Conservation of Habitats and Species Regulations 2010 (as amended) requirements by individual planning authorities and possibly other permitting authorities at the project level once more information is available as to the nature and location of the activities proposed.

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<sup>3</sup> For the purposes of assessment, the activities associated with the remaining stages of exploration and production (covering decommissioning and site relinquishment) are considered to be less intrusive and of a lesser scale than that in previous stages, are considered likely to be inherently beneficial (as they concern site restoration) and would occur sufficiently after licence award as to be too speculative to be meaningfully assessed.

<sup>4</sup> While only blocks in England are being considered for award in the 14<sup>th</sup> round, Natural Resources Wales was consulted because parts of Wales fall within the 10 km search area around some of the English blocks.

<sup>5</sup> In this instance, receptors can be defined as habitats and species of conservation value for which the site has been designated. Effect pathways are the route by which the receptor(s) can be impacted upon by proposed licensable activities.



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# 1 Introduction

## 1.1 Introduction

Under the Petroleum Act 1998, the Secretary of State for Energy and Climate Change may grant licences over a limited area and period of time that confer exclusive rights to "*search and bore for and get*" petroleum. The oil and gas licensing system is administered by the Oil and Gas Authority (OGA), an executive agency of the Department of Energy and Climate Change (DECC), on behalf of the Secretary of State for Energy and Climate Change<sup>6</sup>.

On the 28<sup>th</sup> of July 2014, the 14<sup>th</sup> round was opened by DECC for companies seeking licences to explore for onshore oil and gas, with the round closing on the 28<sup>th</sup> October 2014. In total, 95 applications were received covering 295 blocks<sup>7</sup> in England, Scotland and Wales. Following scrutiny of the operators' competency, financial viability, environmental awareness and geotechnical analysis, and following the decision not to award licences in Scotland and Wales this was reduced down to 159 blocks for further consideration of award.

Each of these 159 blocks has been considered against the requirements of the Conservation of Habitats and Species Regulations 2010 (SI 2010 No. 490) (as amended), hereafter referred to as the "Habitats Regulations", which implement the Habitats Directive (92/43/EEC) and Birds Directive (2009/147/EC) within the UK. The Habitats Regulations provide for certain protections to be accorded to designated sites, including Special Areas of Conservation (SACs) and Sites of Community Importance (SCI), designated under the Habitats Directive, and Special Protection Areas (SPAs) designated under the Birds Directive; UK planning policy accords the same level of protection to sites listed or proposed under The Convention on Wetlands of International Importance, called the Ramsar Convention, and to possible/proposed SPAs and candidate SACs. Collectively, all of these sites are referred to in this report as "European sites".

This report presents a summary of the assessment of the 159 blocks against the requirements of the Habitats Regulations.

## 1.2 Purpose of this Report

The Habitats Regulations require "*competent authorities*" to determine whether any plans or projects that they prepare are likely to have a significant (adverse)<sup>8</sup> effect on European Sites, either alone or in combination with other plans and projects. If significant effects upon a European Site are anticipated then the plan or project must be subject to an Appropriate Assessment (AA). In the light of the conclusions of an AA, the draft plan or project can only be adopted after the competent authority has ascertained that the plan or project will not result in an adverse effect on the integrity of any European Site or, if it could have an adverse effect on integrity, that it can pass further tests relating to there being no alternatives and to imperative reasons of overriding public interest for the proposed development to go ahead.

In this report, which is referred to as a Habitats Regulations Assessment (HRA), the Habitats Directive test (elucidated by the European Court of Justice in the case of *Waddenzee* (Case C-127/02)<sup>1</sup>) has been applied which is outlined in the following box<sup>9</sup>.

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<sup>6</sup> Oil and gas licensing administration transferred from DECC to the OGA on 1<sup>st</sup> April 2015 when the OGA was created as an executive agency of DECC.

<sup>7</sup> The licence block areas (pre-defined by DECC and based on Ordnance Survey National Grid 10km by 10km grid squares or part of) that were available for applications were published by DECC in 2014 and are available here [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/330774/14R\\_Offer.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330774/14R_Offer.pdf) [(Accessed 28 May 2015)].

<sup>8</sup> Though beneficial effects may arise, only adverse effects are considered to be of consequence in undertaking Habitats Regulations Assessment.

<sup>9</sup> Account has also been taken of the recent judgment in *R (Champion) v North Norfolk District Council and another* [2015] UKSC 52



Under Article 6(3) of the Habitats Directive: *“A plan or project not directly connected with or necessary to the management of a site must be subject to an AA 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’ (either alone or in combination with other plans or projects) 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.”*

When considering the requirements of the Habitats Regulations, Section 1.4 of the Environmental Report containing the Strategic Environmental Assessment for Further Onshore Oil and Gas Licensing<sup>10</sup> states:

*“To the extent that the [onshore] Licensing Plan is a “plan” within the scope of the Habitats Directive, DECC has therefore carried out screening of it and reached the conclusion that the early stage of inviting applications for licences and considering these applications will not have significant effects on sites.*

*So far as the licences which may then be issued are concerned, DECC notes that any effects on sites will be caused by activities, such as drilling, which are not authorised by the licences but instead are authorised separately under the planning system, and planning decisions will be subject to appropriate assessments wherever required by law and in the full environmental context of each proposal.*

*Nevertheless, DECC<sup>11</sup> has decided to carry out such assessments as are appropriate before any licence is issued. Once applications for licences have been received and their geographical proximity to any protected site can be established, the appropriate statutory bodies will be consulted on the form and scope of the assessments which should be performed before any decision is made on the award of a licence.”*

In consequence this report contains the resulting assessment of the blocks for which a licence application has been received, required prior to OGA making a decision to award licences. This includes Appropriate Assessment (AA) of the individual blocks for which a licence application has been received. It has been undertaken in accordance with the European Commission Guidance (EC 2000)<sup>12</sup> and with reference to other guidance and reports, including the Habitats Regulations Guidance Notes (EN 1997; SEERAD 2000), SNH (2010, 2012), Defra (2012), Tyldesley (2012), the National Planning Policy Framework (DCLG 2012<sup>13</sup>) and English Nature Research report, No. 704 (Hoskin & Tyldesley 2006).

The three potential outcomes from the application of the approach are outlined in **Table 1.1**.

<sup>10</sup> AMEC (2013) Strategic Environmental Assessment for Further Onshore Oil and Gas Licensing, Environmental Report, December 2013 <https://www.gov.uk/government/consultations/environmental-report-for-further-onshore-oil-and-gas-licensing>

<sup>11</sup> The responsibility to complete the HRA transferred from DECC to the OGA when oil and gas licensing administration transferred from DECC to the OGA on 1<sup>st</sup> April 2015.

<sup>12</sup> European Commission (2000) Managing Natura 2000 sites : The provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC [Online] Available at [http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision\\_of\\_art6\\_en.pdf](http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf) (Accessed 28 May 2015)

<sup>13</sup> This states that “listed or proposed Ramsar sites”, should receive the same protection as European sites.

Table 1.1 Plan-level HRA outcomes

Outcome	Rationale
<p><b>Licence to be granted but no or specific activities will be permitted at or near to the surface anywhere in the block</b> (through conditions attached to licence) because the block is totally comprised of European site(s)</p> <p>An advice notice may also be provided</p>	<p>The AA identified Adverse Effects on Integrity (AEOI) associated with one or more stages of the oil and gas exploration and production activities at or near to the surface within all of the European site(s). It is recommended that conditions are included in the licence to prevent activities associated with AEOI in the licensed area to ensure that there will be no AEOI. However, whilst all or specific activities would be prevented from taking place at or near to the surface in the whole licence block, the conditions would not prevent underground exploration and production activities from taking place because they will not have AEOI.</p> <p>Where some activities are permitted in at least some area(s) of the block, an advice notice will also be included with the licence if the area in which some activity is permitted also comprises a “buffer zone” (see below in this table and <b>Section 4.2.3</b>) of another European site. The advice notice will not be a formal licence condition.</p>
<p><b>Licence to be granted but certain activities will be prohibited at or near to the surface within the areas of the block that are European site(s)</b> (through conditions attached to the licence)</p> <p>An advice notice may also be provided</p>	<p>The AA identified AEOI associated with one or more of the oil and gas exploration and production activities. It is recommended that conditions are included in the licence to prevent such activities in the parts of the licence area that is comprised of European sites to ensure that there will be no AEOI.</p> <p>Where part of the block is within the “buffer zone” (see <b>Section 4.2.3</b>) of a European site, and therefore oil and gas exploration and production activities could be proposed within this buffer zone, an advice notice will also be included with the licence. This will only highlight the potential sensitivity of the buffer zone (due to its proximity or connectivity to the European site) and the fact that mitigation and/or alternative siting may therefore be required by planning authorities and possibly other permitting bodies further considering HRA issues for specific project-level operations. However, at this strategic plan level, our conclusion is that Stage A, B, C and D activities can be carried out outside the European site (including within the buffer zones) without causing AEOI. Accordingly, the advice notice will not be a formal licence condition.</p>
<p><b>Licence granted (no conditions attached)</b></p> <p>An advice notice may also be provided</p>	<p>Either the assessment found that there were no Likely Significant Effects (LSE) or the AA found that there were no AEOI because the block contains no European sites. In consequence, licence conditions are not required to achieve no AEOI.</p> <p>An advice notice may be included with the licence in relation to “buffer zones” (see above in this table and <b>Section 4.2.3</b>). The advice notice will not be a formal licence condition.</p>

It is assumed that any offer of a licence, whether or not subject to any HRA condition, should be accompanied by a statement that:

- ▶ the offer will not imply any definitive or final clearance on HRA considerations; and
- ▶ any proposals for specific activities will be subject to further consideration of HRA considerations by the relevant planning authority and possibly by other permitting authorities,

and that permission for such proposals may consequently be granted subject to conditions, or refused, in accordance with the requirements of the Habitats Regulations.

In consequence, these outcomes are considered appropriate for the purposes of plan-level HRA.

### 1.3 Consultation with the Appropriate Nature Conservations Body

Section 102(2) of the Conservation of Habitats and Species Regulations 2010 (SI 2010 No. 490) (as amended) requires the competent authority (OGA in this instance) '*must for the purposes of the assessment consult the appropriate nature conservation body and have regard to any representations made by that body within such reasonable time as the authority specify*'.

In consequence, a possible approach to undertaking the assessment was discussed with representatives of Natural England, Scottish Natural Heritage and Natural Resources Wales at a meeting on the 17<sup>th</sup> October 2014.

The approach was further discussed with representatives of Natural England at a meeting on the 18<sup>th</sup> June 2015. At the conclusion of this meeting, the representatives of Natural England confirmed that the approach to assessment was appropriate and proportionate for a strategic plan-level HRA, given the uncertainties associated with the licensable activities. Similarly, Natural Resources Wales was consulted on the project approach, to consider instances where the 10 km zone of influence (see **Section 3.2**) from activities in licensed areas in England might affect European sites in Wales, and confirmed that they were content with the approach.

Given that 14<sup>th</sup> round blocks will not be issued in Scotland and Wales, the scope of this HRA assessment has only considered blocks for which an application was received in England. However, as the Zone of Influence of some English blocks extends into Wales, we have continued to involve Natural Resources Wales, where relevant.

### 1.4 Contents of this Report

This report is organised as follows:

- ▶ **Section 2:** Summary of licensing and associated licensable activities;
- ▶ **Section 3:** Summary information about the relevant European sites considered within the assessment and their associated interest features;
- ▶ **Section 4:** Approach to assessment of likely significant effects of the licence blocks and the effects of the plan on the integrity of European sites;
- ▶ **Section 5:** Consideration of the effects associated with individual licence blocks including in-combination effects and details of incorporated mitigation measures;
- ▶ **Section 6:** Summary of findings and conclusions;
- ▶ **Section 7:** Glossary and Abbreviations;
- ▶ **Appendix A** – Figure indicating the distribution of blocks for which licence applications have been received and are under consideration (produced by the OGA);
- ▶ **Appendix B** – European site list and associated interest features information;
- ▶ **Appendix C** – In-combination Assessment Tables
- ▶ **Appendix D** – Completed assessments of blocks;
- ▶ **Appendix E** – Figures showing the location of each block for which a licence application has been received.



## 2 Licensing and Activity

### 2.1 Onshore Licensing Regulatory Context and Background

The Petroleum Act 1998, which consolidated a number of earlier pieces of primary legislation, vests, in the Crown, all rights to the petroleum<sup>14</sup> (oil and gas) resources of Great Britain. The Secretary of State (SoS) for Energy and Climate Change, on behalf of Her Majesty, may grant licences over a limited area and period of time that confer exclusive rights to "*search and bore for and get*" petroleum. The oil and gas licensing system is administered by the OGA, an executive agency of DECC, on behalf of the Secretary of State for Energy and Climate Change<sup>15</sup>. DECC is the competent authority for this HRA.

Current onshore oil and gas production licences are called Petroleum Exploration and Development Licences (PEDLs). PEDLs are generally offered in licensing rounds. PEDLs were first issued in 1996 as part of the 7<sup>th</sup> onshore oil and gas Licensing Round to improve the licensing process by removing the requirement for issuing separate licences for each stage of an onshore field's life – previously, separate Exploration, Appraisal, Development and Production Licences were issued.

Before a licence application goes forward for further consideration, the applicant must satisfy OGA of the competence of its proposed operator, and each member of the applicant group must satisfy OGA of its financial viability and environmental awareness. Applications which meet these requirements are then subject to assessment, on the basis of published criteria, of the geological understanding displayed, and the exploration effort proposed. Where two or more applications are for the same area, the application with the highest marks is selected – the Marking Scheme is published in technical guidance.

Following scrutiny of the operators' competency, financial viability, environmental awareness and geotechnical analysis, and following the decision not to award licences in Scotland and Wales, 159 blocks were taken forward for further consideration of award.

For the current Licensing Round, oil and gas licensing is based on Ordnance Survey National Grid 10 km by 10 km grid squares (or part thereof) that were available for applications and published by DECC in 2014<sup>16</sup>. A licence may cover a whole block, part of a block, or several blocks or part blocks. Further information on onshore licensing can be found on the government onshore oil and gas website via the following link:

<https://www.gov.uk/oil-and-gas-licensing-rounds>.

While the award of a PEDL gives exclusivity in respect of exploration or production in the licensed area, it does not waive any other statutory or legal requirements for these activities. In particular, the licensee has to obtain access rights from landowners (for example a wayleave) and operator activities are subject to statutory planning<sup>17</sup>, environmental<sup>18</sup> and other permitting regimes.

In addition, a licence provides that licensees may not conduct activities such as the drilling of wells, installation of facilities or production of hydrocarbons without the authorisation of the SoS. Licensees are required to provide proof to OGA that the relevant planning and other permissions and consent(s) have been obtained, before such consents are granted.

PEDLs are valid for a sequence of periods called Terms which are designed to follow the typical lifecycle of a field. These Terms cover exploration, appraisal, and production. Each licence expires automatically at the

<sup>14</sup> Petroleum is defined in Part I of the Petroleum Act as including "any mineral oil or relative hydrocarbon and natural gas existing in its natural condition in strata; but does not include coal or bituminous shales or other stratified deposits from which oil can be extracted by destructive distillation". However the Crown owns any oil and gas that "exists in its natural condition" in coal strata.

<sup>15</sup> Oil and gas licensing administration transferred from DECC to the OGA on 1<sup>st</sup> April 2015

<sup>16</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/330774/14R\\_Offier.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330774/14R_Offier.pdf)

<sup>17</sup> See, for example, Communities and Local Government (2013) Planning practice guidance for onshore oil and gas, available from [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/224238/Planning\\_practice\\_guidance\\_for\\_onshore\\_oil\\_and\\_gas.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/224238/Planning_practice_guidance_for_onshore_oil_and_gas.pdf). This document provides a relevant policy framework for the development of oil, gas, coalbed methane and underground gas storage facilities in England.

<sup>18</sup> See, for example, Environment Agency (2013) Onshore oil and gas exploratory operations: technical guidance Consultation Draft, August 2013 from <https://consult.environment-agency.gov.uk/portal/ho/climate/oil/gas?pointId=2582509#document-2582509>.

end of each Term, unless the licensee has made enough progress to qualify for review to potentially move into the next Term (see **Table 2.1**).

**Table 2.1 Terms of the 14<sup>th</sup> Round Petroleum Exploration and Development Licences**

Term	Length (years)	Phase	Expiry of Licence
Initial	5	Exploration	At the end of the Initial Term unless the Licensee has completed the agreed Work Programme.
Second	5	Appraisal and development	At the end of the Second Term unless Secretary of State (SoS) has received an approvable a Development Plan.
Third	20	Production	SoS has discretion to extend the Licence if production is likely to continue past 20 years.

In addition, once the commitments of each stage of the licence have been met, under the 14<sup>th</sup> round terms a licensee may propose to the OGA the creation of a Retention Area with firm indication of future work.

When an operator proposes to drill a well, the following factors will have to be addressed:

- ▶ access to the land (from the surface to a depth of up to 300m), by negotiating access with landowners;
- ▶ the need for planning permission from the relevant planning authority (in England, the Minerals Planning Authority);
- ▶ the need for permits and authorisations under environmental regulation implemented in England by the Environment Agency (EA);
- ▶ health and safety legislation implemented by the Health & Safety Executive (HSE);
- ▶ permission from the Coal Authority if the drilling entails encroachment on coal seams; and
- ▶ well consent from the OGA.

The key planning and environmental legislation affecting the onshore hydrocarbon industry is found at the following link:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/265988/Onshore\\_UK\\_oil\\_and\\_gas\\_exploration\\_England\\_Dec13\\_contents.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265988/Onshore_UK_oil_and_gas_exploration_England_Dec13_contents.pdf)

## 2.2 Licence Applications Received

The 14<sup>th</sup> round opened for companies seeking licences to explore for onshore oil and gas on the 28<sup>th</sup> July 2014, with the round closing on the 28<sup>th</sup> October 2014. In total, DECC received 95 applications covering 295 blocks in England, Wales and Scotland.

Each application has been assessed against DECC's (and subsequent to the transfer of responsibilities, OGA's) requirements for operator's competency, financial viability, environmental awareness and geotechnical analysis. Following these reviews and the decision not to award licences in Scotland and Wales, the number of blocks that have been considered further has been reduced to 159.

The 159 licence blocks applied for and under consideration in this HRA are presented in the OGA figure in **Appendix A**.

## 2.3 Potential Activities Following Licensing

### 2.3.1 Overview

Levels of exploration, development and production activity and their timing will depend on a range of factors such as the number of blocks licensed, work programme commitments by licensees, exploration success, and economic and commercial factors, in addition to the regulatory clearances already mentioned.

The project life cycle for exploration, development and production consists of differing stages. Each stage contains a variety of activities, many of which are common to both conventional and unconventional exploration, development and production. Whilst the number of stages described in the literature<sup>19</sup> varies, to permit a fuller description of activities and subsequently of the effects, the following six stages have been used. These are based on the stages used in the Strategic Environmental Assessment (SEA) of onshore oil and gas licensing<sup>20</sup>:

- A. Non-intrusive exploration;
- B. Exploration drilling and hydraulic fracturing;
- C. Production development;
- D. Production, operation and maintenance;
- E. Decommissioning of wells;
- F. Site restoration and relinquishment.

The activities for each stage for both conventional and unconventional oil and gas are summarised in **Table 2.2**.

Table 2.2 Oil and Gas Exploration, Development and Production Lifecycle and Key Activities

Stage	Activities: Conventional Oil and Gas	Activities: Unconventional Oil and Gas (Shale and Coalbed Methane)
A.	<b>Non-intrusive exploration</b> , including: <ul style="list-style-type: none"> <li>Site identification, selection, characterisation;</li> <li>Seismic surveys;</li> <li>Securing of necessary development and operation permits.</li> </ul>	No additional activities to those summarised for conventional oil and gas Stage A.
B.	<b>Exploration drilling</b> , including: <ul style="list-style-type: none"> <li>Well site and pad preparation, road connections and baseline monitoring;</li> <li>Seismic monitoring;</li> <li>Well design construction and completion;</li> <li>Well testing including flaring.</li> </ul>	No additional activities to those summarised for conventional oil and gas Stage B, except: <ul style="list-style-type: none"> <li>Hydraulic fracturing of some exploration wells.</li> </ul>
C.	<b>Production development</b> , including: <ul style="list-style-type: none"> <li>Well site and pad preparation, road connections and baseline monitoring;</li> </ul>	No additional activities to those summarised for conventional oil and gas Stage C, except: <ul style="list-style-type: none"> <li>Hydraulic fracturing;</li> </ul>

<sup>19</sup> Ricardo AEA (2014), Unconventional Gas in England: Description of infrastructure and future scenarios, Report for Environment Agency, Ricardo-AEA/R/ED58661 February 2014, Amec et al (2014), Technical support for assessing the need for a risk management framework for unconventional gas extraction: final report to European Commission and DG Environment, August 2014; AEA et al (2012) Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing, a report for the European Commission AEA/R/ED57281; Tyndall Centre for Climate Change (2011), Shale gas: a provisional assessment of climate change and environmental impacts, January 2011

<sup>20</sup> Amec (2013), Strategic Environmental Assessment for Further Onshore Oil and Gas Licensing: Environmental Report, report for DECC, December 2013



Stage	Activities: Conventional Oil and Gas	Activities: Unconventional Oil and Gas (Shale and Coalbed Methane)
	<ul style="list-style-type: none"> <li>Facility construction and installation;</li> <li>Well design construction and completion;</li> <li>Provision of pipeline connections;</li> <li>Well testing, possibly including flaring.</li> </ul>	<ul style="list-style-type: none"> <li>(Possibly) re-fracturing.</li> </ul>
D.	<b>Production/operation/maintenance</b> , including: <ul style="list-style-type: none"> <li>Gas/oil production;</li> <li>Production and disposal of wastes/emissions;</li> <li>Environmental monitoring and well integrity monitoring.</li> </ul>	No additional activities to those summarised for conventional oil and gas Stage D.
E.	<b>Decommissioning of wells</b> , including: <ul style="list-style-type: none"> <li>Well plugging and testing;</li> <li>Site equipment removal;</li> <li>Environmental monitoring and well integrity monitoring.</li> </ul>	No additional activities to those summarised for conventional oil and gas Stage E.
F.	<b>Site restoration and relinquishment</b> , including: <ul style="list-style-type: none"> <li>Pre-relinquishment survey and inspection;</li> <li>Site restoration and reclamation.</li> </ul>	No additional activities to those summarised for conventional oil and gas Stage F.

Note: exploration wells most usually move from Stage B to Stage E (without the intervening Stages C and D) though some may be used for long-term production testing (which would require new consents including planning permission) and some may be retained and their sites redeveloped as a production project (this would also require new consents including planning permission).

"Conventional" oil and natural gas production refers to crude oil and natural gas that is produced by a well drilled into a geologic formation in which the reservoir and fluid characteristics permit the oil and natural gas to readily flow to the wellbore<sup>21</sup>. After the depletion of maturing fields, the natural pressure of the wells may be too low to produce significant quantities of oil and gas. Different techniques may be used to boost production, mainly water and gas injection or depletion compression, but these oil and gas fields will still be classified as conventional resources.

Hydrocarbons are termed "unconventional" because of the nature of the geological strata in which they are found differs from that which has traditionally formed hydrocarbon reservoirs – typically the permeability is lower. For example, "unconventional gas" covers three main types of natural gas resources: shale gas, tight gas and coalbed methane (also known as coal seam gas). Shale gas and tight gas are reservoir rocks with low permeability (<0.1mD in shales versus >1mD in conventional reservoir sandstones) which means that hydrocarbons are effectively trapped and unable to flow at rates to be commercial without additional engineering intervention<sup>22</sup>. A combination of horizontal drilling and fracture stimulation technology is often required to enable economic extraction of oil or gas from shale and other rocks with low permeability. Coalbed methane reflects the fact that virtually all coals contain some methane as the result of coal formation which either adsorbs into coal micropores (<2nm) or is dispersed in pore spaces. When pressure is reduced, methane gas is released from the coal, which diffuses through the coal matrix and flows through the fracture system of the coal bed.

Hydraulic fracturing is the technique used to fracture rocks of low permeability which contain hydrocarbons (such as shale) by the injection of water at high pressure. Small particles (usually sand) are pumped into the fractures to keep them open when the pressure is released. This enables gas, previously trapped within the rock matrix to flow into the well. High-volume hydraulic fracturing is defined by the EC<sup>23</sup> as "*injecting 1,000m<sup>3</sup> or more of water per fracturing stage or 10 000m<sup>3</sup> or more of water during the entire fracturing*

<sup>21</sup> Wellbore refers to the drilled hole or borehole, including the openhole or uncased portion of the well. Borehole may also refer to the inside diameter of the wellbore wall.

<sup>22</sup> DECC and British Geological Survey (2013), The Carboniferous Bowland Shale gas study: geology and resource estimation

<sup>23</sup> European Union (2014), Commission Recommendation of 22 January 2014 on minimum principles for the exploration and production of hydrocarbons (such as shale gas) using high-volume hydraulic fracturing (2014/70/EU), <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014H0070&from=EN>



process into a well"<sup>24</sup>. The process is also known as "HVHF", "fracking," "fraccing" or "fracing," but is referred to as "hydraulic fracturing" or "fracturing" in this report. Within the scope of this assessment, hydraulic fracturing is to be understood as the cycle of operations from the upstream acquisition of water, to chemical mixing of the fracturing fluid, injection of the fluid into the formation, the production and management of flowback and produced water, and the ultimate treatment and disposal of hydraulic fracturing wastewater.

The activities and stages summarised in **Table 2.2** are described in more detail in the following subsections.

### 2.3.2 Stage A: Non-Intrusive Exploration

Stage A for either conventional or unconventional oil and gas lifecycle comprises of non-intrusive activities including site identification, site selection and the securing of regulatory consent. These activities would be largely desk based but could include the completion of geological mapping and sampling of geological exposures (if available) followed by geochemical, petrographic and geomechanical testing. They could also include monitoring of noise and air pollution as well as mapping of the hydrological connectivity of the proposed site and transport surveys to inform the modelling of any effects from vehicle movements as part of any planning application. Ecological surveys are also likely to be required to establish a baseline from which to measure any potential effects and to identify any species that require specific protection and/or management measures.

Seismic surveys would also be undertaken during this stage. These use artificially generated sound ('seismic') waves to image subsurface geology. An artificial source is used to generate seismic waves at, or near, the surface. The seismic sound wave source is typically produced by large vibrating plate attached to the base of a truck (vibroseis) or a buried small explosive device. Whilst there is a degree of localised excavation or minor intrusion associated with such surveys, they do not involve deep drilling activities, and so for the purposes of this assessment are categorised as 'non-intrusive'.

Vibroseis involves the employment of large truck-mounted vibrator units as well as support vehicles for data recording. The truck moves along slowly, stopping every six to 20 metres to lower the plate and produce a vibration. Alternatively, small diameter shot holes are drilled by a buggy mounted rig every 40-50 metres along a line at a depth of six to eight metres. A small charge is loaded into the shot holes, which are then backfilled above the charge with bentonite sticks which swell up to seal the hole.

Receiving devices, called 'geophones', are placed in a geometric array on the surface to detect the seismic signal that is partially reflected back from subsurface geological features, most usually changes in structure, rock type or faults.

Two-dimensional (2D) seismic exploration involves acquiring seismic data along a single line of geophones to detect the reflected seismic energy generated by the vibration source, providing a 2D vertical cross section. Three dimensional (3D) surveys use a grid of geophones and vibration source points to gather seismic data over an area, combining multiple cross sections, and from a range of different angles. This essentially provides a 3D picture of subsurface geology and structures. The geophones to record the seismic data for 2D or 3D surveys are shallowly buried along planned alignments to receive the seismic data, either for a few hours or days at most.

Construction of temporary tracks or roads may be required to facilitate site access for vibrator unit vehicles (should vibroseis be undertaken). These access routes can be made from materials such as high density polyethylene panels.

### 2.3.3 Stage B: Exploration Drilling and Hydraulic Fracturing

#### 2.3.3.1 Well Site and Pad Preparation, Road Connections and Baseline Monitoring

Once a site has been identified for drilling a well, site preparation activities will take place. Physical works will include the removal of vegetation, levelling the area, and preparing the surface to support the movement

<sup>24</sup> The EC definition is consistent with that in section 50 (Section 4A: supplementary provision (1)) of the Infrastructure Act 2015 which defines "associated hydraulic fracturing" as meaning hydraulic fracturing of shale or strata encased in shale...that involves, the injection of (i) more than 1,000 cubic metres of fluid at each stage, or expected stage, of the hydraulic fracturing, or (ii) more than 10,000 cubic metres of fluid in total.

of heavy equipment and heavy goods vehicles (HGVs) that deliver drilling equipment and transport fracturing fluids. Ground surface preparation would typically involve staking, grading, stripping and stockpiling of topsoil reserves.

A well pad would then be constructed on the levelled site using compacted aggregate laid on an impermeable membrane and geotextile layer. Erosion and sediment control structures would be constructed around the site, along with bunds for screening and noise attenuation and pits for the retention of drilling fluid and, possibly, freshwater. Surface water runoff would be collected and attenuated via perimeter ditches.

Groundwater monitoring wells would be constructed within the boundary of the site, to an approximate maximum depth of 30 metres using a small drilling rig. If hydraulic fracturing is planned, in order to fulfil the groundwater monitoring requirements of section 50 of the Infrastructure Act 2015, the level of methane in groundwater will have to be monitored for a period of 12 months before any associated hydraulic fracturing begins. Groundwater monitoring would then take place throughout drilling, fracturing, flow testing, subsequent production and for an agreed period after well abandonment.

The size of well pads varies but usually would be expected to occupy approximately one to two hectares of surface land area. Additionally, further land is required for supporting activities and facilities which can include: storage tanks, worker accommodation, pipeline infrastructure, road access, surface water collection ditches, landscaped bunds and fencing. Well pad equipment will include pits, impoundments, tanks, hydraulic fracturing equipment, reduced emission completion equipment, dehydrators and production equipment such as separators and brine tanks.

### 2.3.3.2 Seismic Monitoring

#### Surface Seismic Monitoring

Surface seismic monitoring arrays, comprising passive seismic monitoring devices, would be installed to collect seismic data to provide a baseline and to monitor any induced seismic effects from fluid injection, if the well is to be subject to hydraulic fracturing.

Surface arrays require shallow pits some 0.8m deep covered by a manhole cover, each with a small junction box (occupying 1m<sup>2</sup> and 0.5m deep) with an estimated time of construction of one to two days.

The arrays will then be used to measure the induced seismicity that could arise from the hydraulic fracturing with results compared, in England, to a “traffic light system” (TLS)<sup>25</sup>. The following thresholds are used:

- ▶ ‘Green’ would mean magnitude of 0  $M_L$  (Magnitude Local) which would mean injection could proceed as planned;
- ▶ ‘Amber’ would mean a magnitude of between 0 to 0.5  $M_L$  would mean that injection could proceed with caution, possibly at reduced rates, and that monitoring is intensified; and
- ▶ ‘Red’ is defined as a magnitude 0.5  $M_L$  or higher, where injection is suspended immediately and the pressure of fluid in the well is also reduced immediately.

The level of 0.5  $M_L$  is well below what could be felt at the surface. If the TLS records a 0.5  $M_L$  or greater event, fracture fluid injection into the well will stop, pressure released and then continuous TLS recording for the next 24 hours will be undertaken and examined. If there is further abnormal activity, OGA will expect an analysis of the cause of the activity before considering whether work can restart, or whether the activity needs to be modified in the light of what the analysis discloses.

#### Buried Arrays

If used, buried arrays will be located in drilled six-inch boreholes, of approximately 60-100 metres depth, located up to a few kilometres from the well site. The buried arrays are used to undertake the microseismic monitoring of the creation of the network of cracks and fractures surrounding the wellbore following fracture

<sup>25</sup> DECC (2013), Traffic light monitoring system (shale gas and fracking), <https://www.gov.uk/government/publications/traffic-light-monitoring-system-shale-gas-and-fracking>

fluid injection. The boreholes are drilled by a truck mounted rig, then capped with a concrete pad and an inspection collar, requiring around four days to install.

### 2.3.3.3 Well Design, Construction and Completion

Well construction will be designed to provide multiple barriers between the groundwater and deep underlying production zones and will be constructed in accordance with regulations<sup>26</sup> and guidance<sup>27</sup>. Well depths will vary, reflecting the underlying geology, but in the UK could be expected to range from 500 metres to more than 3,000 metres. Well bore lengths could extend up to five kilometres<sup>28</sup> or more.

Depending upon the target formation, wells can be designed to be vertical, inclined or a combination of vertical, inclined and horizontal. Horizontal sections of a well will be drilled for several purposes, including (but not limited to):

- ▶ increasing the exposed section length through the reservoir by drilling through the reservoir at an angle;
- ▶ drilling into the reservoir where vertical access is difficult or not possible; and
- ▶ allowing more wellheads to be grouped together on one well pad, which can allow fewer rig moves, less surface area disturbance, and make it easier and more efficient to complete and produce the wells.

Horizontal drilling is an important component of well design for unconventional oil and gas.

Wells for oil and gas exploration are drilled by rotary rigs. These are typically either 12-14 metre “singles” or 21-24 metre high “doubles”. These rigs can hold either one or two joined lengths of drill pipe. “Triple” rigs are over 30 metres high and their use may become more common in England as the shale gas industry develops and longer well length for horizontal drilling is necessary<sup>29</sup>.

Operators may use a single drilling rig to drill the entire wellbore or alternatively may make use of two or three rigs in sequence, but only one rig will drill at any one time. Typically, a rig used for the vertical portion of the wellbore is smaller than that used to drill the horizontal section – a triple rig may be used for this purpose.

Auxiliary drilling equipment can include tanks for water, fuel and drilling mud, as well as electricity generators, gas compressors, and drill pipe racks and an office space. Fuel storage tanks associated with larger rigs would need to be able to accommodate about 45,000 to 54,000 litres.

A wellbore will be of decreasing diameter with increasing depth, and is drilled and lined with steel casing sections joined together to form continuous ‘strings’ of casing<sup>30</sup>. The casing is cemented in place, providing multiple barriers between any groundwater bodies and the deep underlying production zones as well as preventing the wellbore from collapsing. Once installed and prior to further drilling, casings are pressure tested to ensure they have sufficient mechanical integrity and strength so that they can withstand pressures exerted during different phases of the well’s life. The presence, quality and integrity of the casing cementation is also tested through the completion of a cement bond log (CBL) to ensure that the cement completely surrounds casings to provide a continuous annular seal between casings and the rock formation, as well as between casings<sup>31</sup>.

<sup>26</sup> Offshore Installations and Wells (Design and Construction Etc) Regulations 1996, Borehole Sites & Operations Regulations 1995

<sup>27</sup> Oil and Gas UK (2012), Well Integrity Guidelines, <http://www.oilandgasuk.co.uk/publications/publications.cfm>

<sup>28</sup> Amec (2013), Strategic Environmental Assessment for Further Onshore Oil and Gas Licensing: Environmental Report, report for DECC, December 2013

<sup>29</sup> Ricardo-AEA (2014), Unconventional Gas in England: Description of infrastructure and future scenarios, Report for Environment Agency, Ricardo-AEA/R/ED58661

<sup>30</sup> Oil and Gas UK (2012), Well Integrity Guidelines, <http://www.oilandgasuk.co.uk/publications/publications.cfm>. Section 4.4 of the Oil and Gas UK Well Integrity Guidelines outlines the detailed requirements for casing design. API HF1 – Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines (<http://api.org/publications-standards-and-statistics.aspx>) sets out the specific casing and cementing requirements for hydraulic fracturing.

<sup>31</sup> The Royal Society and The Royal Academy of Engineering (2012), Shale gas extraction in the UK: a review of hydraulic fracturing, June 2012

A high pressure well head will be connected to the casing and a blow-out preventer (BOP) will be installed into the wellhead. During drilling, the BOP will automatically close off the wellbore should there be any sudden or unexpected loss of fluids.

#### 2.3.3.4 Hydraulic Fracturing

Any wellhead to be used for hydraulic fracturing will be designed and pressure-rated for the fracturing operation. Prior to the fracturing operation, the integrity of the wellhead system is verified by a series of pressure tests.

Where hydraulic fracturing is proposed, and in order to control where fracturing occurs within the horizontal component of the wellbore, the well casing must be perforated at target formation locations. These perforations can be created by small shaped charges or be set into the casing using 'frac sleeves' which can be mechanically opened.

In order to induce and maintain permeability, and generate productive fractures, materials are added to the water to create hydraulic fracturing fluid, the composition of which is dependent on site-specific conditions including the underlying geology. Typically, fracturing fluid includes<sup>32</sup>:

- ▶ Water: about 98-99% of total volume;
- ▶ Proppant: about 1-1.9% of total volume, usually sand or ceramic particles. The proppant is forced into the fractures by the pressured water, and holds the fractures open once the water pressure is released;
- ▶ Chemicals added to the fracture fluid account for the remaining <1%: to increase fracture efficiency, reduce friction, inhibit corrosion, and stop bacterial development.

Hydraulic fracturing of wells typically requires in the range of 10,000 m<sup>3</sup> to 28,000m<sup>3</sup> of fracture fluid per well during the lifetime of the well<sup>33</sup>.

In England, the environmental regulator, the Environment Agency will assess whether a substance proposed for use by the operator in well stimulation is hazardous as part of the environmental permitting process, by considering it against criteria for persistence, bioaccumulation and toxicity<sup>34</sup>. Operators will not be able to use chemicals for well stimulation unless the Environment Agency considers them acceptable for use.

In addition to Environment Agency regulation, through an initiative proposed by UK Onshore Oil and Gas, as part of best practice guidance<sup>35</sup>, operators will be required to disclose the chemical additives of fracturing fluids on a well-by-well basis.

Once the casing has been perforated and tested, fracturing fluid can be pumped into the well at high pressure causing fractures in the rock. Hydraulic fracturing will be performed over multiple stages over lengths of casing. Pressure testing and monitoring will take place in advance of, and during each fracture stage. The testing and monitoring will include:

- ▶ testing the integrity of all high pressure equipment (fracturing wellhead, flowlines, manifolds, piping and pump equipment);
- ▶ monitoring pressure on the production string and all well annuli during rig up and testing;
- ▶ continuously monitoring and recording the pressures in the annulus between the intermediate casing and the production casing;

<sup>32</sup> King (2012) Hydraulic Fracturing 101. Journal of Petroleum Technology, April 2012 p34-42

<sup>33</sup> Gandosi, L (2013) An overview of hydraulic fracturing and other formation stimulation technologies for shale gas production, A Joint Research Centre report (EUR 26347 EN), AEA et al (2012), Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing in Europe, report for the European Commission AEA/R/ED57281, <http://www.total.com/en/energies-savoir-faire/petrole-gaz/exploration-production/secteurs-strategiques/gaz-non-conventionnels/focus-gaz-de-schiste/environmental-challenges> and Cuadrilla Bowland Ltd (2014), Temporary Shale Gas Exploration, Preston New Road, Lancashire: Environmental Statement Appendix B – Scheme Parameters, page B8

<sup>34</sup> Joint Agencies Groundwater Directive Advisory Group (JAGDAG) (2012), Methodology for the determination of hazardous substances for the purposes of the Groundwater Daughter Directive (2006/118/EC)

<sup>35</sup> UKOOG (2015), UK Onshore Shale Gas Well Guidelines Issue 2 January 2015

- monitoring any adjacent or offset wells for pressure on the production string and other well annuli, as required.

The range of fluid pressures used in high volume hydraulic fracturing is typically 10,000 to 15,000 pound per square inch (psi) (700 – 1000 bar), and exceptionally up to 20,000 psi (1400 bar). This compares to a pressure of up to 10,000 psi (700 bar) for a conventional oil and gas well (without fracturing)<sup>36</sup>.

### Well Completion Following Hydraulic Fracturing

Following the release of pressure, some of the liquid that is injected returns to the surface through the drilled well. This fluid is known as ‘flowback water’ and is typically very saline and contains minerals dissolved from the rocks. The proportion of fracturing fluid that returns as flowback water varies between wells, with some US studies reporting flowback of between 10-40% of the fracturing fluid<sup>37</sup>, although other studies report that flowback can be as high as 75%.<sup>38</sup> The volume of flowback water returned depends on the properties of the rock formation (such as the geology of the host formation and mobility of naturally occurring compounds), fracturing design and the type of fracturing fluid used.<sup>39</sup>

Some of the water that flows to the surface may also include ‘produced water’ (i.e. water coming to the surface, under pressure, ‘produced’ from saturation of the host formation). Whilst flowback water typically returns to the surface within the first few days or weeks following injection of fracturing fluid, produced water, where it occurs, is generated from the rocks across the lifetime of the well.

Both flowback and produced water requires storage prior to any treatment or disposal. In contrast to the US, open storage and settlement is not permitted in the UK, with storage of flowback water taking place in tanks on site as part of a closed system prior to treatment or disposal<sup>40</sup>. Recovered fracturing fluid and produced waters from wet shale formations are collected and sent for treatment and disposal or re-use, after treatment, where possible.

#### 2.3.3.5 Well Testing (including Flaring)

Following the completion of the hydraulic fracturing injection period, the well will be opened at the surface to reverse the flow of the hydraulic fracturing fluid and, as noted above, some of the fracturing fluid will return to the surface as flowback water. The release of pressure should also enable natural gas to flow as well. At some point, the well will produce mainly natural gas and it is at this point that initial [gas] flow testing will be completed to establish an initial production rate for the well. Initial flow testing can run for up to 90 days, with the gas burnt in a flare system with consent from the OGA. Any such waste gas will also be considered as part of the environmental permit issued by the Environment Agency, and any operator must include the method of disposal within the accompanying Waste Management Plan which also considers the best environmental option for disposal of the waste gas.

If flow rates are favourable, an extended flow testing would be completed, for a period up to 24 months, with the resulting gas often piped into the gas grid.

### 2.3.4 Stage C: Production Development

Production development includes those additional activities necessary to take an initial exploration well site into pre-production for gas or oil. Whilst the range and type of activities associated with Stage C would be similar to those identified under Stage B, their scale, extent and duration would be more substantial.

<sup>36</sup> AEA et al (2012), Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing in Europe, report for the European Commission AEA/R/ED57281

<sup>37</sup> Halliburton (2014) Produced and Flowback Water Recycling and Reuse Economics, Limitations, and Technology, Oil and Gas Facilities

<sup>38</sup> AEA et al (2012) Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing. a report for the European Commission AEA/R/ED57281

<sup>39</sup> King GE (2012) Hydraulic Fracturing 101, Journal of Petroleum Technology, April 2012 p34 – 42, as cited in AEA (2012) Support to the Identification of Potential Risks for the Environment and Human Health arising from Hydrocarbons Operations involving Hydraulic Fracturing in Europe

<sup>40</sup> DECC (2014) Fracking UK Shale: Water

For example, the area of land required per well pad would be greater than that associated with the exploratory drilling stage, reflecting the need for additional infrastructure such as storage tanks and on-site pipelines and well pads of three hectares are common<sup>41</sup>. Multi-well pads are now widely used<sup>42</sup>, with a likely range of two to 24 wells being accommodated on a single pad, depending on whether the production is conventional or unconventional<sup>43</sup>.

As noted previously, further land will be required for supporting activities and facilities such as storage tanks, worker accommodation, pipeline infrastructure and road access. In particular, before production can commence, pipeline infrastructure must be developed to collect natural gas or oil for transfer to the existing pipeline infrastructure.

The total number of truck movements during well pad construction could be substantial, with estimates ranging from 16 – 51 HGVs per day<sup>44</sup> although any effects will depend on any existing site access routes, existing traffic flows and network capacity and the proposed timing and phasing of the additional construction traffic.

Changes will also be required at the wellhead. In addition to the assembly of pressure-controlled devices and valves at the top of the wellhead, production tree or “Christmas tree” equipment at the well pad during the production phase is likely to include:

- ▶ a two-phase gas/water separator;
- ▶ gas metering devices (each well or shared);
- ▶ water metering devices (each well or shared);
- ▶ brine storage tanks (shared by all wells).

A well head compressor may also be added during later years and a dehydrator may be present at some sites.

Regarding the potential for flaring, OGA is committed to eliminating all unnecessary or wasteful flaring and venting of gas and considers flaring and venting levels in consenting to production. Operators will be expected to continue to improve on this during the subsequent operational phase. For example, as an alternative to flaring, ‘green completion’ or ‘reduced emissions completions’ (REC) can be used which involve the capture of methane from the fracturing process for use or export off site.

## 2.3.5 Stage D: Production, Operation and Maintenance

### 2.3.5.1 Gas/Oil Production

Conventional oil well extraction has three phases of production: primary, secondary, and enhanced oil recovery (EOR). These techniques are not always sequentially used.

- ▶ **Primary Recovery:** In typical initial production or primary recovery, the natural pressure of the reservoir is adequate to produce or remove the original oil in place. Sometimes an operator will assist the natural pressure by using artificial or mechanical lift with a pump in the wellbore or on the surface. As the field ages and natural reservoir pressure drops, primary oil recovery ceases.
- ▶ **Secondary Recovery:** This phase involves injecting water or gas into the reservoir to increase the reservoir pressure and continue to drive the oil to the wellbore, and can increase the life of a field and improve the recovery to 20 to 40 percent of the original oil.

<sup>41</sup> Ricardo-AEA (2014), Unconventional Gas in England: Description of infrastructure and future scenarios, Report for Environment Agency, Ricardo-AEA/R/ED58661

<sup>42</sup> Broderick J., et al: (2011), “Shale gas: an updated assessment of environmental and climate change impacts.” A report commissioned by The Co-operative and undertaken by researchers at the Tyndall Centre, University of Manchester, available via [www.tyndall.ac.uk/shalegasreport](http://www.tyndall.ac.uk/shalegasreport)

<sup>43</sup> Amec (2013), Strategic Environmental Assessment for Further Onshore Oil and Gas Licensing: Environmental Report, report for DECC, December 2013

<sup>44</sup> Amec (2013), Strategic Environmental Assessment for Further Onshore Oil and Gas Licensing: Environmental Report, report for DECC, December 2013



- Improved or Enhanced Oil Recovery (EOR): These techniques increase the mobility of the oil and offer the potential ability to produce 30 to 60 percent or more of oil in place in a field. Reducing the viscosity (stickiness or cohesive properties) allows the oil to flow more readily to the wellbore. The difference between secondary recovery injection and EOR injection is that secondary occurs at ambient temperatures and EOR involves the addition of energy using mass and heat transfer. EOR utilizes three main categories of technology: miscible, chemical, and thermal.

The crude oil gathering system treatment typically consists of additional separation of solids and gases from the crude oil using emulsion treaters, gathering tanks, and heater treaters. Flow lines and the gathering system for crude oil production can become plugged from naturally occurring materials in the crude oil, such as paraffin, asphaltenes and scale.

Maintenance and equipment may be needed to ensure that the oil and gas keep flowing and to treat it before transfer into the gas and oil grid system. These include separators, scrubbers, heat exchangers, storage tanks, pumps or compressors, and other equipment.

Produced gas flows from the wellhead to the separator will pass through a flow line a few inches in diameter. At the separator, water will be removed from the gas stream via a valve and sent to brine storage tanks. The gas will then continue through a meter and then to the departing gathering line which will likely follow the route of the wellpad access road. From there, it will be transported to a compression facility.

The necessary compression to allow gas to flow into a large transmission line for sale would typically occur at a centralised site. Dehydration units would also be located at the centralised compression facilities. The gathering system from the well to the facility would comprise PVC or steel pipes, with the buried lines leaving the compression facility being made of coated steel.

During production, further hydraulic fracturing may be required in order to stimulate the flow of shale gas from unconventional wells. The frequency of refracturing in the UK is uncertain at this early stage of development; however in the US, the frequency of refracturing is estimated to be once per five to ten years on average<sup>45</sup>, although recent research suggests that this may be shortening<sup>46</sup>.

#### 2.3.5.2 Production and Disposal of Wastes

Depending on the characteristics of the host formation, produced water could be generated across the lifetime of the well which would require treatment prior to disposal.

Wastes can also arise from the various techniques employed to enhance oil recovery. These can include various chemicals and contaminated fluids that will require treatment prior to disposal.

Waste can also arise from the maintenance of equipment, which must be cleaned periodically to remove hydrocarbons, salts, scale, and other solids that have built up and reduce field production efficiency. Wastes from dehydration, removal of natural gas liquids, and sweetening may include iron sponge, spent glycol, spent amine, spent caustic and filters and filter media, depending upon the type of systems operated. The products resulting from the cleaning will need to be handled and disposed of as required by applicable regulations.

#### 2.3.5.3 Environmental Monitoring

Continued environmental monitoring of the site will be a requirement of the environmental permit issued by the Environment Agency in England. This could include ambient air monitoring, surface and ground water monitoring and noise monitoring. Well consent from the OGA could also include regular seismic monitoring and monitoring of fracture propagation, where hydraulic fracturing is employed. The latter will be designed to ensure early warning of unexpected leakages and to obtain emissions' estimates for regulators and government.

<sup>45</sup> Ricardo-AEA (2014), Unconventional Gas in England: Description of infrastructure and future scenarios, Report for Environment Agency, Ricardo-AEA/R/ED58661

<sup>46</sup> Jackson R. et al (2014) *The Environmental Costs and Benefits of Fracking* p.332 in: Annual Review of Environmental Resources 2014 39:327–62 <http://sites.biology.duke.edu/jackson/arer2014.pdf>

### 2.3.6 Stage E: Decommissioning of Wells

When the well is no longer economic to operate, it is taken out of service, either temporarily or permanently. Decommissioning ("well abandonment") takes place in accordance with established procedures in the oil and gas production industry<sup>47</sup> and wells must be properly closed to eliminate pathways to the surface or to freshwater sources. The final well abandonment design should be considered at the well planning stage to ensure good practice abandonment at the end of well life. The OGA requires operators to submit an abandonment plan and obtain consent before operations to abandon a well are commenced.

#### 2.3.6.1 Site Equipment Removal

Decommissioning will involve the removal of any surface pipeworks, site equipment as well as any other surface facilities, utility connections and access roads. Operators will need to remove or treat any remaining production waste or contamination from spills or releases consistent with the requirements of the regulators.

It will also require the removal of the well pad, any hard core and the impermeable liner.

It will require a number of vehicle movements to remove the materials during the process.

#### 2.3.6.2 Well Plugging and Testing

Production wells that can no longer be used must be plugged to prevent the oil and gas reservoir fluids from migrating up the wellbore over time and possibly contaminating other formations and or fresh water aquifers.

Plugging involves a cement plug being installed at the base of the lowest underground source of drinking water to isolate water resources from potential contamination by hydrocarbons or other substances migrating via the well bore. A cement plug would also be installed at the top of the oil or gas formation. Abandonment plugs need to cover the full diameter of the hole, with only casing (no cables) within the cement

Any boreholes constructed for use in seismic arrays should be backfilled with clean, uncontaminated materials so that the permeability of the selected materials is similar to the properties of the geological strata against which they are placed. The backfilled borehole would then mimic the surrounding natural strata and groundwater flow and quality will be protected.

The plugging process usually requires a workover rig and cement pumped into the wellbore. The plugging process can take two days to a week, depending on the number of plugs to be set in the well.

HSE are notified of the abandonment and receive weekly reports of the abandonment process.

### 2.3.7 Stage F: Site Restoration and Relinquishment

Following completion of the decommissioning of the well, the land used for a well pad and associated infrastructure can be returned to its prior use, or to other uses. Responsibility for the restoration and aftercare of drilling sites lies with the Licence Operator.

#### 2.3.7.1 Pre-relinquishment Survey

The Well Operators' well examination arrangements will include arrangements for the examinations of well abandonment designs and operations. Relinquishment information is also provided by the operator to the OGA.

#### 2.3.7.2 Site Restoration

Site reclamation and restoration will be completed to the specifications in the planning permission provided by the relevant minerals planning authority.

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<sup>47</sup> Oil and Gas UK (2012), "OP071 - Guidelines for the suspension and abandonment of wells" (Issue 4), and "Guidelines on qualification of materials for the suspension and abandonment of wells" (Issue 1), July 2012, available via: <http://www.oilandgasuk.co.uk>



Following removal of site equipment and well pad and after the plugging of the well(s), an operator is typically required to:

- ▶ Evenly redistribute stockpiled subsoil and topsoil over the site to provide a seedbed for revegetation. The stored topsoil and subsoil can be treated with a selected herbicide prior to movement;
- ▶ Re-grade and re-contour the well site and access roads to blend seamlessly with the surrounding environment;
- ▶ Perform compaction removal, restoration, and revegetation on well sites and access roads;
- ▶ Reinstate fences and gates and access points.

Revegetating a site requires proper topsoil management and invasive weed control to ensure that native vegetation has an opportunity to re-establish itself. Revegetation can be deemed successful when a self-sustaining, vigorous, diverse, native plant community is established on the site.

In some circumstances, well-established natural habitats cannot necessarily be fully restored following the use of the land for oil and gas extraction. Consequently, it may not be possible to fully restore a site, or to return the land to its previous status, although steps can be taken to provide complementary or alternative land use or habitats to the surrounding environs.

There is generally little difference between conventional and unconventional wells in the post-abandonment phase, with the exception of the presence of unrecovered hydraulic fracturing fluids in the shale formations in the case of hydraulically fractured wells.

Operators are responsible for wells once abandoned and monitoring arrangements should be developed to detect possible well failure post abandonment.

## 2.4 Stages Relevant to this Assessment

**Sections 2.3.2 to 2.3.7** provide an overview of the activities contained in each stage of the oil and gas exploration, development and production lifecycle.

Stages A (non-intrusive exploration) to D (production, operation and maintenance) could have a range of effects on the environment, some of which are relevant to the consideration of likely significant effects of the activities on European sites.

There are however uncertainties over the nature of future activities coming forward following licensing and these uncertainties increase through the exploration, development and production lifecycle. As set out in **Sections 2.3.6 and 2.3.7**, it is possible that there could be some temporary disturbance as structures and infrastructure are removed and wells sealed and plugged. However, the evidence reviewed and presented for Stages E (decommissioning) and F (site restoration) suggests that any associated effects from activities at these stages would be of scale and duration that would be less than in any of the preceding stages. Furthermore, given the purpose of the activities in Stages E (decommissioning) and F (site restoration), it is considered less likely that the associated activities would have long-term adverse effects on the environment.

Reflecting on the scope of the activities in Stages E and F and consistent with the conclusion that they would be less intrusive than the preceding stages, if Stages B, C and D could be assessed as having no LSEs or no AEOIs on any European Sites, it appears reasonable to conclude that Stages E and F would do so also. However, if LSEs, or subsequently AEOIs, were identified for Stages B, C and D, licence conditions would be used to ensure such effects would be avoided (by the prevention of such activities) and as such, any further consideration of the effects of Stages E and F would not be needed.

Therefore, for the purpose of this HRA, the stages of conventional and unconventional oil and gas exploration, development and production that have been considered relevant to the assessment are:

- A. Non-intrusive exploration (e.g. seismic survey activities);
- B. Exploration drilling;

- C. Production development; and
- D. Production, operation and maintenance.

These are considered further in **Section 4** and **Table 4.1** in this HRA.

It should however be noted that any proposals for specific operations, including Stages E and F, will be subject to further HRA considerations by the relevant planning authority and possibly by other permitting authorities, and that permission for such proposals may consequently be granted subject to conditions, or refused, in accordance with the requirements of the Habitats Regulations.



## 3 Identification of European Sites That Could Be Significantly Affected

### 3.1 European Sites Included Within Scope of the HRA

HRA is relevant to the following European sites:

- ▶ classified, proposed and possible Special Protection Areas (SPAs);
- ▶ classified and candidate Special Areas of Conservation (SACs), and Sites of Community Importance; (SCIs) and
- ▶ listed and proposed Ramsar sites.

Information for all categories of European sites has been included within this HRA.

### 3.2 Search Area for European Sites

A key question which this HRA has had to address is the extent to which European sites not within the block for which a licence application has been received should be included within the scope of the assessment.

Section D6.1 of 'The Habitats Regulations Assessment Handbook'<sup>48</sup>, states "*Zones of influence ...are potential useful tools in assisting particularly with screening, but with also later assessment....the use of zone of influence must be based on a site by site approach*". SNH guidance on the HRA of Local Plans<sup>49</sup> regarding proportionality, also states "*Identifying the relevant sites is not always a straightforward process. It is important to ensure all sites potentially affected are considered, but it is equally important to avoid excessive data gathering about sites that are not likely to be affected, and to keep the assessment proportional to the likelihood of significant effects.*"

The Zone of Influence (Zoi) of licensable activities is therefore considered a key tool for this assessment to ensure that all European sites that could be subject to LSE/AEOI are captured as part of the process and to ensure (consistent with the guidance) that the level of data gathering is proportionate to a strategic plan-level assessment.

In consequence, for this assessment, the Zoi has been set at 10 km from the boundary of a licence block and all European sites located within or within 10 km of a licence block have been included within the assessment process. The 10 km distance reflects the following factors:

- ▶ an understanding of the activities that are associated with the four stages of the oil and gas exploration and production process (see **Section 2.3**).
- ▶ a consideration of the evidence that exploration and production activities have effects on biodiversity<sup>50</sup> and the distance beyond which, due to tried and tested mitigation measures and causal pathways, that it is considered extremely unlikely that those effects could occur.
- ▶ the distance some highly mobile designated species (such as bats, birds or otters) travel outside a European site, in order to forage for food for example. It is recognised<sup>51</sup> that these

<sup>48</sup> David Tyldesley et al (2012), The Habitats Regulations Assessment Handbook, DTA publications

<sup>49</sup> Scottish Natural Heritage (2015), Habitats Regulations Appraisal Of Plans - Guidance For Plan-Making Bodies In Scotland, Version 3.0, January 2015

<sup>50</sup> AEA et al (2012) Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing. a report for the European Commission AEA/R/ED57281; Kiviat, R. (2013), Risks to biodiversity from hydraulic fracturing for natural gas in the Marcellus and Utica shales, in Ann. N.Y. Acad. Sci. 1286 (2013) 1–14 C; AMEC (2013), Strategic Environmental Assessment for further onshore oil and gas licensing: environmental report, Appendix B1 Biodiversity; Moore, V., Beresford, A., Gove, B. (2014), Hydraulic fracturing for shale gas in the UK: Examining the evidence for potential environmental impacts, RSPB et al.; Cuadrilla Eslwick Ltd (2014), Temporary Shale Gas Exploration Roseacre Wood, Lancashire, Shadow Habitat Regulations Assessment - Screening

undesigned areas of habitat can play an important role in supporting populations of bats, birds or otters that are interest features of European sites. The number of any of these mobile species utilising an area beyond 10 km is likely to represent a small proportion of the population with any activities representing only a very small proportion of the foraging range, such that there is not likely to be a significant effect.

- ▶ the heightened connectivity of non-designated habitats to designated habitats due to their proximity to water (e.g. wetland areas or coastal habitats). The ZOI can be extended in instances where habitats have hydrological and hydrogeological connectivity and as such, the effect pathway can occur over greater distances than would otherwise occur in the absence of these habitat characteristics.

The 10 km distance has been deemed an appropriately precautionary ZOI within which there could be Likely Significant Effects (LSEs)/AEOL on the interest features of relevant European sites. In reality, the ZOI for the majority of interest features will be much less than 10 km.

### 3.3 Procedure for plotting relevant European sites

The Amec Foster Wheeler Information Management team developed a geodatabase for this HRA. This database was based upon ESRI ArcGIS 10.2 technology and included datasets detailing the blocks applied for in the 14<sup>th</sup> onshore oil and gas licensing round and relevant UK protected sites. The latter included: 10 km potential zone of impact; 1 km buffer; and European sites.

The information held in the central GIS database was then used to publish a series of ESRI geospatial web mapping services which was then presented in an ESRI Javascript web based viewer. The template for this viewer was developed using a template called the “Configurable Map Viewer”. This is built with the ESRI JavaScript API and the Dojo Toolkit.

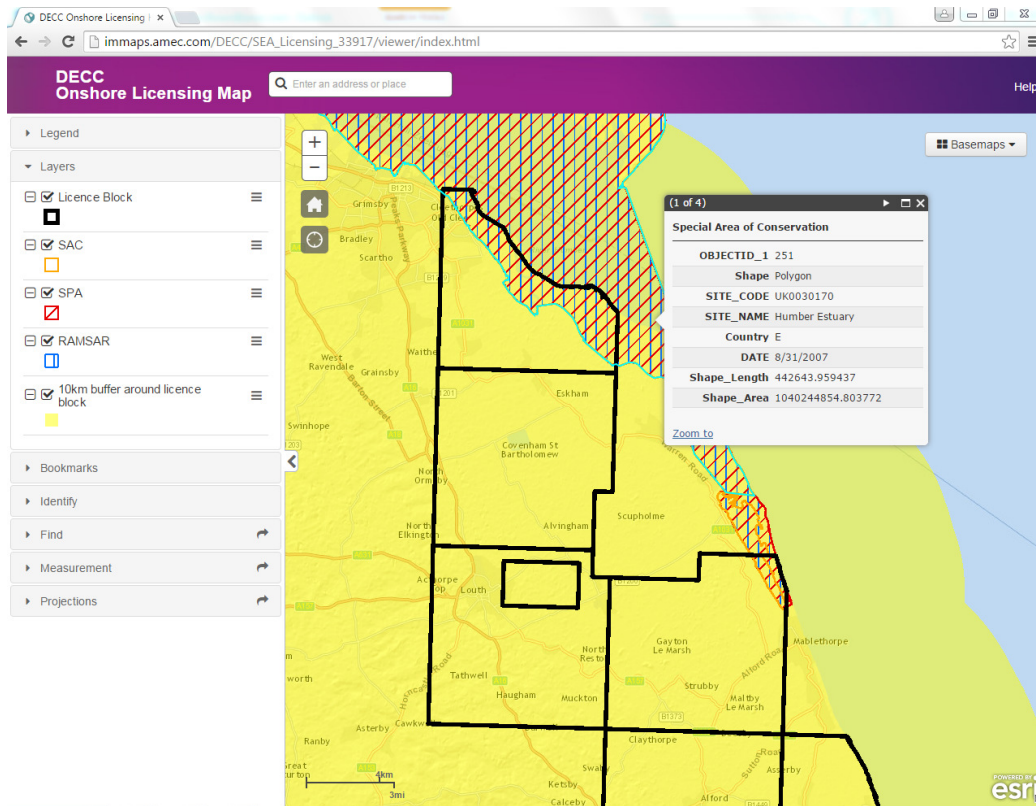
The key aim of this web viewer was to enable ecologists to access this spatial information quickly and efficiently. A number of functionalities were added to the web viewer to allow the user to view and interrogate the layers on display. This included the ability to identify the interest features of European sites, return attribute information such as site details, run sql queries on individual layers to quickly identify and view specific features and also to measure lengths and areas on the map.

An illustration of the OGA (formerly DECC) onshore licensing map is presented below in **Plate 3.1**.

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<sup>51</sup> Defra (2012), The Habitats and Wild Birds Directives in England and its seas: Core guidance for developers, regulators & land/marine managers, December 2012 (draft for public consultation)

Plate 3.1 Illustration of the OGA (formerly DECC) Onshore Licensing Mapping Tool



GIS data from the Joint Nature Conservancy Committee (JNCC) website<sup>52</sup> was utilised to provide all information related to the designated features of interest as well as the spatial data for each site. This information was then subject to spatial analysis in order to categorise each of the 159 licence blocks into four scenarios (see **Section 4** below). The list of sites and their associated interest features is provided in **Appendix B**.

<sup>52</sup> JNCC (2015) Spatial Summary Data [Online] Available at [http://jncc.defra.gov.uk/protectedsites/SACselection/gis\\_data/terms\\_conditions.asp](http://jncc.defra.gov.uk/protectedsites/SACselection/gis_data/terms_conditions.asp) (Accessed 24 February 2015)



## 4 Approach to Assessment

### 4.1 Habitats Regulations Assessment

The HRA requires the assessment of “plans or projects” that are likely to have a significant effect on any European site. If significant effects upon a European site are anticipated then the plan or projects must be subject to an Appropriate Assessment (AA). In the light of the conclusions of any AA, the draft plan or project can only be approved and adopted after the competent authority has ascertained that the plan or project will not adversely affect the integrity of any European site or, if it could have an adverse effect on integrity, that it can pass further tests relating to there being no alternatives and to imperative reasons of overriding public interest for the proposed development to go ahead.

**Box 4.1** outlines the possible stages within an HRA.

#### Box 4.1 Stages of HRA

##### Stage 1 – Initial Threshold Assessment:

This stage identifies the likely impacts upon a European site of a project or plan, either alone or ‘in combination’ with other projects or plans, and considers whether these impacts are likely to be significant.

##### Stage 2 – Appropriate Assessment:

Where there are likely significant effects, this stage considers the effects of the plan or project on the integrity of the relevant European sites, either alone or ‘in combination’ with other projects or plans, with respect to the sites’ structure and function and their conservation objectives. Where it cannot be concluded that there will be no adverse effects on sites’ integrity, it is necessary to consider potential mitigation for these effects.

##### Stage 3 – Assessment of Alternative Solutions:

Where adverse effects remain after the inclusion of mitigation, this stage examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of European sites.

##### Stage 4 – Assessment Where No Alternative Solutions Exist and Where Adverse Impacts Remain:

This stage assesses compensatory measures where it is deemed that the project or plan should proceed for imperative reasons of overriding public interest (IROPI).

A detailed assessment has been undertaken of the individual blocks for which a licence application has been received. The approach to AA is set out in **Section 4.3** and **4.4**.

In order to complete the AA, consideration has been given to the likely effects on European sites from activities that could follow licensing for Stages A to D of the oil and gas exploration, development and production lifecycle for each of the 159 blocks for which a licence has been applied and which was taken forward for consideration of a licence. Whilst the area and location of the block for which the licence has been applied for is known, the precise nature, scale, duration and location of any exploration, development and production activities within the block is not. The detailed project information that would address these uncertainties would only become available when the licensed operator submits a planning application for proposed activities to the relevant minerals planning authority. In consequence, undertaking the assessment of effects on European sites has not been possible without making assumptions regarding operator practice, the nature of activities and, based on available evidence, the likely effects. These are set out in **Section 4.2**.

Using the assumptions, the assessment has considered the specific nature of any designated sites and their interest features present within each licence block and within a 10 km search area around the block, against the potential for Likely Significant Effects (LSE) to occur as a result of licensable activities being undertaken at any location within the licence block. Where the potential for LSE could not be ruled out, an AA has been completed to assess whether there could be any adverse effects on integrity (AEOI) on any European sites in relation to the four key stages (A, B, C, D) of exploration, development and production activities that may occur following licensing.

As part of the AA, it has been found that there are AEOI associated with the carrying out of Stage B, C and D activities, and also sometimes with Stage A, within the boundaries of European sites. As a direct result of



this finding, it is recommended that a licence condition is imposed, where relevant, to prohibit the carrying out of specified activities, to ensure no AEOI. Accordingly, the assessment has not gone on to specifically discuss Stages 3 and 4 of the HRA process because the licence conditions that are recommended are considered sufficient to ensure, at this strategic plan level, that activities will not have AEOI on European sites.

Specific activities are not authorised by issue of the licences (the award of which does not imply prior consent of any actual activities) but are authorised separately under the planning system under which planning decisions will be subject to HRA assessment wherever required by law and, by the time of specific proposals for activity, in the full environmental context of each site.

## 4.2 Assumptions

In order to ensure a consistent, practical and appropriate approach to the assessment, a number of overarching assumptions have been made for the assessment of each block for which a licence application has been received. These are detailed below.

### 4.2.1 Compliance and Good Practice

For the purposes of this assessment, it is assumed that the developer will conform to standard good practice approaches to delivering the development and will comply with planning conditions and legal agreements, and also requirements associated with relevant environmental consents. It has been assumed that:

- ▶ the developer will comply with relevant Pollution Prevention Guidelines (PPG);
- ▶ the development will be designed, constructed, operated and maintained to a high standard;
- ▶ all necessary consents relating to water abstraction and discharge will be obtained and their requirements will be adhered to;
- ▶ measures that are integrated into the scheme proposals as part of the Habitats Regulations Assessment process 'down the line', at project level, (e.g. to avoid LSEs/AEOIs) will be implemented as part of the development;
- ▶ no licensable activities will be undertaken directly within wetland habitats or riparian corridors.

### 4.2.2 Activities and Effects

The following stages of exploration, development and production activities have been identified as being relevant to this HRA (**Section 2.4**):

- A. Non-intrusive exploration (e.g. seismic survey activities);
- B. Exploration drilling;
- C. Production development; and
- D. Production, operation and maintenance.

Drawing on research and evidence, for each of the stages and relevant activities outlined, it has been possible to identify the associated broad effects and pathways that could apply to European sites and their associated interest features. Sources of information have included:

- ▶ AEA et al (2012), Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing. A report for the European Commission AEA/R/ED57281;
- ▶ Kiviat, R. (2013), Risks to biodiversity from hydraulic fracturing for natural gas in the Marcellus and Utica shales, in Ann. N.Y. Acad. Sci. 1286 (2013) 1–14 C;
- ▶ AMEC (2013), Strategic Environmental Assessment for further onshore oil and gas licensing: environmental report, Appendix B1 Biodiversity;

- ▶ Moore, V., Beresford, A., Gove, B. (2014), Hydraulic fracturing for shale gas in the UK: Examining the evidence for potential environmental impacts, RSPB et al.;
- ▶ Cuadrilla Elswick Ltd (2014), Temporary Shale Gas Exploration Roseacre Wood, Lancashire, Shadow Habitat Regulations Assessment - Screening

For each stage/activity, the likely generic environmental changes, the effects and assumptions are summarised in **Table 4.1**.

**Table 4.1 Anticipated Likely Environmental Changes, Likely Effects and Assumptions**

Phase	Activity	Likely Environmental Changes	Likely Effects <sup>53</sup>	Assumptions
A	Non-intrusive exploration - seismic survey activities	Vibration arising from Vibrosis	Disturbance of vibration-sensitive species resulting in a decline in their population	No LSEs are expected beyond 1 km of the area where activities would take place
		Discharge of shallowly buried explosives used to generate seismic sound waves	Very localised loss of habitat and species from burial and discharge of explosive  Temporary disturbance from sound waves and disturbance to vibration sensitive species resulting in a decline in their population	No LSEs are expected beyond 1 km of the area where activities would take place
B	Exploration drilling (assumed up to 4 wells per pad)	Land take from construction of well pad (1-2ha) and access roads, pipelines and cabling	Loss of land cover and associated fauna; reductions in species populations caused by indirect effects	No LSEs are expected beyond 20m of any landtake or direct ground disturbance
		Increases in dust deposition, noise, vibration and visual disturbance	Severance/barrier effects	Dependent on scheme proposals and location
			Fragmentation effects	Dependent on scheme proposals and location
		Particulates (particulate pollution) from topsoil removal and storage, aggregates Emissions from diesel generators for drilling and HVHF Emissions from HGVs	Deterioration in air quality that could result in a decline in the health and vigour of certain habitat types	No LSEs are expected beyond 200m of the source of any new emissions
		Noise from construction of well pad and associated infrastructure Drilling operation HVHF operation	Increased noise would result in the disturbance of noise-sensitive species resulting in a decline in their population	No LSEs are expected to be significant beyond 1 km from the noise source

<sup>53</sup> Identified from a review of the following literature: AEA et al (2012) Support to the identification of potential risks for the environment and human health arising from hydrocarbons operations involving hydraulic fracturing. a report for the European Commission AEA/R/ED57281; Kiviat, R. (2013), Risks to biodiversity from hydraulic fracturing for natural gas in the Marcellus and Utica shales, in Ann. N.Y. Acad. Sci. 1286 (2013) 1–14 C; AMEC (2013), Strategic Environmental Assessment for further onshore oil and gas licensing: environmental report, Appendix B1 Biodiversity; Moore, V., Beresford, A., Gove, B. (2014), Hydraulic fracturing for shale gas in the UK: Examining the evidence for potential environmental impacts, RSPB et al.; Cuadrilla Elswick Ltd (2014), Temporary Shale Gas Exploration Roseacre Wood, Lancashire, Shadow Habitat Regulations Assessment - Screening

Phase	Activity	Likely Environmental Changes	Likely Effects <sup>53</sup>	Assumptions
		HGV movements		
		Vibration from HVHF operation HGV movements	Disturbance of vibration-sensitive species resulting in a decline in their population	No LSEs are expected to be significant beyond 1 km from the vibration source
		Presence of well pad and drill rig (up to 50m in height)	Disturbance of visually sensitive species resulting in a decline in the population	No LSEs are expected to be significant beyond 1 km from the visual source
B	Seismic array installation	Very localised land take from buried arrays	Loss of land cover and associated fauna; reductions in species populations caused by indirect effects	No LSEs are expected beyond 20m of any landtake or direct ground disturbance
C	Production development (assumed to be up to 24 wells per pad)	Land take from construction of well pad (2-3ha) and access roads, pipelines and cabling	Loss of land cover and associated fauna; reductions in species populations caused by indirect effects	No LSEs are expected beyond 20m of any landtake or direct ground disturbance
			Severance/barrier effects	Dependent on scheme proposals and location
			Fragmentation effects	Dependent on scheme proposals and location
		Particulates from topsoil removal and storage, aggregates Emissions from diesel generators for drilling and HVHF Emissions from HGVs	Deterioration in air quality that could result in a decline in the health and vigour of certain habitat types	No LSEs are expected beyond 200m of the source of any new emissions
		Noise from construction of well pad and associated infrastructure Drilling operation HVHF operation HGV movements	Increased noise would result in the disturbance of noise-sensitive species resulting in a decline in their population	No LSEs are expected to be significant beyond 1 km from the noise source
		Vibration from HVHF operation HGV movements	Disturbance of vibration sensitive species resulting in a decline in their population	No LSEs are expected to be significant beyond 1 km from the vibration source
		Presence of well pad and drill rig (up to 50m in height)	Disturbance of visually sensitive species resulting in a decline in the population	No LSEs are expected to be significant beyond 1 km from the visual source
D	Production, operation and maintenance (assumed refracking, 1 per well required)	Noise from HVHF operation HGV movements (water/waste water)	Increased noise would result in the disturbance of noise-sensitive species resulting in a decline in their population	No LSEs are expected to be significant beyond 1 km from the noise source
		Vibration from HVHF operation HGV movements	Disturbance of vibration-sensitive species resulting in a decline in their population	No LSEs are expected to be significant beyond 1 km from the vibration source

### 4.2.3 Buffer Zones

For the purpose of this HRA, buffer zones<sup>54</sup> are defined as areas that lie outside the designated area of a European site but which can play an important role in maintaining the conservation status of one or more of a site's qualifying interest features. A buffer zone, for example, could be land that is used for foraging by the European site's population of birds or bats – the birds or bats being its interest feature. Consequently, buffer zones are treated by this assessment as potentially sensitive areas of land because of their proximity or connectivity to European site(s) but, nevertheless, are areas of land within which we have concluded that Stage A, B, C or D activities may be carried out without AEOI on the adjacent European site.

The anticipated effects and pathways noted in **Table 4.1** have been used to inform the extent of a precautionary buffer zone around European sites to be applied within this assessment. For most of the effects listed in **Table 4.1**, a 1 km wide buffer zone captures the potentially sensitive area, and this area has been deemed an appropriate buffer zone given the characteristics of the European site. There are a small number of circumstances when a buffer zone of over 1 km may be required due to the characteristics of the European site, namely:

- ▶ where the licence block includes or is within 10 km of a European site that is designated for highly mobile species such as bats and otters, which can travel significant distances for foraging, commuting and shelter;
- ▶ coastal and riparian habitats that are ecologically, hydrologically and/or hydrogeologically continuous with European sites; and
- ▶ bird species/populations that are reliant on extensive habitats beyond a European site boundary to maintain the status of their population.

Each of these exceptions is explored further below.

#### 4.2.3.1 Highly Mobile Species

Where there is an SAC that has been designated for its bat populations, the buffer around the SAC will be extended to 10 km in order to incorporate the foraging and roosting area that is used by the bats. In some instances, some SACs designated for bat hibernation are known to support bat populations that have maternity roosts several km away from the SAC, which in turn will have their own extended foraging areas. The number of any bats utilising an area beyond 10 km is likely to represent a small proportion of the population, with any well pads (occupying 1-3ha) representing only a very small proportion of the foraging area at that distance, such that there is not likely to be a significant effect. This means that an SAC that has been designated for its bat populations and is up to 10 km from the licence block will need to be considered within the HRA to ensure that any potential for LSEs/AEOI are identified.

Some SACs have been designated for their otter population. As with bat species, otter is a highly mobile species and can travel large distances along water courses and their tributaries as well as intervening terrestrial habitats. For SACs with otter as an interest feature, the buffer will therefore be extended to cover all tributaries of the designated watercourse/water body that occur within 10 km of the SAC and the buffer will also extend 200m from the top of the banks of each watercourse within this 10 km zone in order to reflect otters' use of terrestrial habitats. It is recognised that otters sometimes travel further than 10 km. It would be reasonable to assume however, in the absence of detailed survey data at this strategic level, that habitats used by otters that are more than 10 km from the core area are not integral to the conservation status of the designated population. As such, at the strategic level, the 10 km buffer zone is considered robust and appropriate.

<sup>54</sup> The buffer zone is not the same as the Zone of Influence (Zoi). See **Section 3.2** for an explanation of the Zoi.

#### 4.2.3.2 Coastal and Riparian Habitats

Many riparian and coastal habitats across the UK have been designated at the European level for their nature conservation value. Such habitats (and species that are supported by them) can be ecologically and hydrologically/hydrogeologically contiguous across great distances. As such, there is the potential for LSE/AEOI to occur as a result of licensable activities that are undertaken within non-designated coastal and riparian habitats up or down stream, or, up or down the coastline from European sites. Where an SAC or Ramsar site has been designated for its riparian and coastal habitats, the buffer area will be extended to include all other riparian or coastal habitats within a 10 km radius that are deemed to be ecologically continuous.

#### 4.2.3.3 Remote Supporting Habitats for Bird Populations

Bird populations that are interest features of classified, proposed and possible SPAs and of Ramsar sites are often supported by habitats beyond the boundaries of these SPAs/Ramsar sites. Buffer zones will often be species specific, and where a European site supports a number of important bird populations, buffer zones can differ dependent on the species considered. As such, at this strategic plan level of assessment, in the absence of detailed survey information, it is not possible to define the precise extent of any buffer zones for individual species that may be needed for individual classified, proposed and possible SPAs/Ramsar sites. However, where there are European sites that support bird populations that could be reliant upon habitats outside its boundaries the buffer around the site has been extended to 10 km in order to incorporate the likely core non-designated area that could support these populations. For most species, the entire 10 km buffer area is not all likely to be important for the bird population but should be sufficiently precautionary to capture remote habitats that are important to the integrity of the site. The number of birds utilising an area beyond 10 km is likely to represent a small proportion of the population, with any well pads (occupying 1-3ha) representing only a very small proportion of the supporting habitats at that distance, such that there is not likely to be a significant effect. This means that designations for birds that are up to 10 km from the licence application will need to be considered within the HRA to ensure that any potential for LSEs/AEOI are identified.

### 4.3 Stage 1 HRA Initial Threshold Assessment

This initial stage of the assessment has involved identifying the scope for European sites to be affected by licensable activities being undertaken at any location within the licence block. This has been done with reference to a suite of typical environmental changes that could be associated with future oil and gas development and determining whether these changes have the potential to result in significant adverse effects on one or more of the European sites. This has included using the OGA (formerly DECC) onshore licensing mapping tool to:

- ▶ identify what (if any) European sites may be affected by the activities that could take place in the blocks for which a licence application has been received;
- ▶ identify the conservation objectives of any site that may be affected, and the condition of the site;
- ▶ identify the potential effects of the different stages of licensable activities on the European sites;
- ▶ identify how those effects may impact on the site's conservation objectives;
- ▶ make a strategic plan-level assessment of whether likely significant effects can be ruled out.

Where the land area within the licence block is not within either a European site or within 10 km of a European site, there is such a low likelihood of there being an LSE that it has been possible to conclude that there will be no adverse effects on the integrity of any European sites. In these instances, the blocks for which a licence application has been received have not been subjected to further detailed assessment, and it is recommended to the OGA that a licence should therefore be granted and no conditions regarding the restriction of activities need to be attached to the licence. However, the requirements of the Habitats Regulations would still apply at the project level so the conclusions of this initial assessment do not imply any definitive or final clearance of Habitats Regulations considerations – any proposals for specific operations will be subject to further consideration of the Conservation of Habitats and Species Regulations 2010 (as

amended) requirements by individual planning authorities and possibly other permitting authorities at the project level once more information is available as to the nature and location of the activities proposed.

Where it has been determined that the activities that can follow licensing could have an LSE on any European site, due to either the licence block containing a European site within its boundaries or it having a European site within 10 km of its edge, the licence block has been subjected to further AA.

## 4.4 Stage 2 Appropriate Assessment

For the remaining licence blocks where further assessment is required, an AA has been conducted in order to determine whether the carrying out of any of the four key stages of exploration and production activities that may occur following the licensing process, when carried out anywhere within the block, would have an adverse effect on the integrity of any European sites.

The principal purpose of the AA is to understand the implications of the proposal for the European site in view of the site's conservation objectives, in order to inform the AEOI decision. For each licence application, the assessment has used the OGA (formerly DECC) onshore licensing mapping tool to:

- ▶ identify what (if any) European sites may be affected by the activities that could take place in the blocks for which a licence application has been received. This will include European sites within the block as well as those up to 10 km from the boundary of the block;
- ▶ identify the conservation objectives, interest features and conservation status for each European site within the scope of the assessment;
- ▶ apply a 1 km buffer zone around all European sites;
- ▶ highlight any sites designated for their bat, otter, bird interest or riparian/coastal habitats for consideration of any interaction with the 10 km ZOI;
- ▶ identify the potential effects of the different stages of licensable activities on the European sites and what aspects of each activity could cause such effect, and consider any cumulative effects (see **Section 5**);
- ▶ identify how the potential effects could impact on each of the European site's conservation objectives including the interest features;
- ▶ assess the likelihood that the effects might occur;
- ▶ assess the degree of certainty which underpins the assessment of effects.

For all licence blocks, the results have been recorded in an assessment proforma, accompanied by a site plan indicating the block area and the relevant European sites within the defined search area. For all European sites assessed, it has been concluded that Stage A, B, C and D activities undertaken at depth would not have effects on ecological receptors at surface and as such will not result in AEOI on European site(s).

### 4.4.1. Outcome of the Appropriate Assessment

The outcome of the assessment of each licence has then been categorised into one of three outcomes:

- ▶ Category 1: **Recommendation that the licence is granted but no or specific activities are permitted at or near to the surface anywhere in the block, through licence conditions** – this is because the block is totally comprised of European site(s) and the AA identified AEOI associated with one or more stages of oil and gas exploration and production at or near to the surface in the European site(s). Conditions will be included in the licence to prevent all or specific activities in the licensed area and ensure that there are no AEOI.
- ▶ Category 2: **Recommendation that the licence is granted with conditions excluding specific activities at or near to the surface in parts of the licensed area that comprise a European site** – this is because the AA identified AEOI associated with one or more of the oil

and gas exploration and production activities at or near to the surface in the European site(s). Conditions will be included in the licence to prevent all or specific activities in the parts of the licensed area that are European sites to ensure that there are no AEOL.

- ▶ Category 3: **Recommendation of licence award without condition** – this is because the AA found that there are no AEOL and so no licence conditions are required to avoid any AEOL. These blocks will not contain any European sites.

Each assessment takes account of the use of a 1 km buffer that has been applied to all European sites (refer to **Section 4.2.3**). Where appropriate an advice notice will be included with the licence highlighting the potential sensitivity of the buffer zone (due to its proximity or connectivity to the European site) and, accordingly, the fact that mitigation and/or alternative siting may be required by planning authorities and possibly other permitting bodies further considering HRA issues for specific project-level operations. However, at this strategic plan level, our conclusion is that Stage A, B, C and D activities can be carried out outside the European site (including within the buffer zones) without causing AEOL. Accordingly, the advice notice will not be a formal licence condition.

#### 4.4.1.1 Category 1: Recommendation that licence granted but no or specific activities permitted at or near to the surface anywhere in the block and an advice notice may be provided

**Example circumstance for block in this category: 100% of a potential licence block is within a European site (or the extent of the land area that is not within the European site is too small to accommodate exploration and production activities without AEOL).**

Under this category, there is such a high likelihood of there being an AEOL on the relevant European site(s) arising from activities from one or more stages of exploration and production following licensing that it is recommended that **the licence should be granted but no or specific activities permitted** at or near to the surface to ensure no AEOL.

In these circumstances, it is recommended to the OGA that a **licence should be granted but be subject to condition(s)** so that:

- ▶ all or specific activities, at or near to the surface, are prohibited from taking place anywhere within the block.

However, whilst the condition would prevent all or specific activities from taking place in the licensed area, at or near to the surface, it would not prevent underground exploration and production activities from taking place, providing that they originate from a licence block with consented well sites located outside the licensed area.

Within this category, while all of the block will be subject to conditions that prohibit at least some activities, there may be parts of the block where Stage A activities are permitted. To the extent that any activities are allowed anywhere in European sites within the block and these areas also comprise of the buffer zone(s) of another European site, it is recommended that an advice notice (see **Section 4.4.1.2** below) is included with the licence highlighting the potential sensitivity of the buffer zone (due to its proximity or connectivity to the European site) and the fact that mitigation and/or alternative siting may therefore be required by planning authorities and possibly other permitting bodies further considering HRA issues for specific project-level operations. The advice notice will not be a formal licence condition.

It is also noted that any granting of a licence does not imply any definitive or final clearance of Habitats Regulations considerations and that any proposals for specific operations will be subject to further consideration of the Conservation of Habitats and Species Regulations 2010 (as amended) requirements by the local planning authority and possibly other permitting authorities at project level once more information is available as to the nature and location of the activities proposed.



#### 4.4.1.2 Category 2: Recommendation of licence award with conditions and an advice notice may be provided

**Example circumstance for block in this category: The potential licence block is partly made up of European site(s), partly land within a 1 km buffer zone and partly land outside the 1km buffer zone.**

Under this category, for those parts of the blocks that comprise European site(s), the same conclusions apply as in Category 1 – namely that **the licence should be granted but no or specific activities permitted** at or near to the surface, **within the European site(s)**, to ensure no AEOL.

In these circumstances, it is recommended to the OGA that a **licence should be granted but be subject to condition(s)** so that:

- ▶ all or specific activities are prohibited from taking place within the European site, so, for example, a condition that would not permit surface-based exploration, production development and production activities but which would permit non-intrusive surface investigations.

However, whilst the condition would prevent all or specific activities from taking place in the licensed area at or near to the surface, it would not prevent underground exploration and production activities from taking place, providing that they originate from a licence block with consented well sites located outside the licensed area.

For those parts of the block that are not comprised of European site(s), it is considered that all four key stages of activity may occur without having AEOL on any European site. However, in respect of those parts of the block that are comprised of buffer zones, it is recommended that an advice notice is included with the licence highlighting the potential sensitivity of the buffer zone (due to its proximity or connectivity to the European site) and the fact that mitigation and/or alternative siting may therefore be required by planning authorities and possibly other permitting bodies further considering HRA issues for specific project-level operations. The advice notice will not be a formal licence condition.

As discussed in **Section 4.2.3**, the extent of a buffer zone (whether 1 km or 10 km) will be determined by the characteristics and interest features of the European site(s) in question. If the interest features are bats, birds, otters or coastal or riparian habitats the buffer zone is extended to 10 km.

The advice notice that will be included with the licence, as appropriate, is set out below. The advice will only highlight the potentially sensitivity nature of the buffer zone (due to its proximity or connectivity to the European site) and the fact that mitigation and/or alternative siting may therefore be required by planning authorities and possibly other permitting bodies further considering HRA issues for specific project-level operations. However, at this strategic plan level, it is concluded that, Stage A, B, C and D activities can be carried out outside the European site (including within the buffer zones) without causing AEOL. Accordingly, the advice notice will not be a formal licence condition.

- ▶ In general, land within approximately 1 km of a European site is considered to be of a potentially sensitive nature (due to its proximity to the European site) such that mitigation and/or alternative siting may be required by authorities further considering HRA issues for specific project-level operations.
- ▶ Land within approximately 1 km of a European site supporting noise or vibration sensitive features is considered to be of a potentially sensitive nature (due to its proximity to the European site) such that mitigation and/or alternative siting may be required by authorities further considering HRA issues for specific project-level operations.
- ▶ Land within 10 km of an SPA, or a Ramsar site designated for its bird populations, is therefore considered to be of a potentially sensitive nature (due to its proximity to the European site) such that mitigation and/or alternative siting may be required by authorities further considering HRA issues for specific project-level operations.
- ▶ Land located along the coastline (i.e. within 1 km of the mean low water level), and which is also within 10 km of a European site with coastal habitats, is therefore considered to be of a potentially sensitive nature (due to its potential connectivity to the European site) such that



mitigation and/or alternative siting may be required by authorities further considering HRA issues for specific project-level operations.

- ▶ Land that is within 10 km of a riparian or estuarine European site, and which is also within 200 metres of a contributory watercourse to that site, is considered to be of a potentially sensitive nature (due to its potential connectivity to the European site) such that mitigation and/or alternative siting may be required by authorities further considering HRA issues for specific project-level operations.
- ▶ Land that is within 10 km of a site supporting otters, and which is also within 200 metres of a contributory watercourse to that site, is considered to be of a potentially sensitive nature (due to its potential to be used by otters) such that mitigation and/or alternative siting may be required by authorities further considering HRA issues for specific project-level operations.
- ▶ Land within the 10 km of an SAC designated for its bat populations is considered to be of a potentially sensitive nature (due to its proximity to the European site) such that mitigation and/or alternative siting may be required by authorities further considering HRA issues for specific project-level operations.

It is also noted that any granting of a licence does not imply any definitive or final clearance of Habitats Regulations considerations and that any proposals for specific operations will be subject to further consideration of the Conservation of Habitats and Species Regulations 2010 (as amended) requirements by the local planning authority and possibly other permitting authorities at project level once more information is available as to the nature and location of the activities proposed.

#### 4.4.1.3 Category 3: Recommendation of licence award without conditions but an advice notice may be provided

**Example circumstance for block in this category: There are no European sites and/or buffer zones within the block and assessment found that there were no AEOL on any European sites from Stage A, B, C or D activities.**

Under this category, no part of the block is comprised of European site(s). It is considered that all four key stages of activity may occur without having AEOL on any European site and therefore it is recommended that **the licence should be granted without conditions.**

Where there is no buffer zone within the block, an advice notice will not be issued with the licence. To the extent that part of the block is, however, comprised of any buffer zone(s), it is recommended that an advice notice is included with the licence highlighting the potential sensitivity of the buffer zone (due to its proximity or connectivity to the European site) and the fact that mitigation and/or alternative siting may therefore be required by planning authorities and possibly other permitting bodies further considering HRA issues for specific project-level operations. The advice notice will not be a formal licence condition.

It is also noted that any granting of a licence does not imply any definitive or final clearance of Habitats Regulations considerations and that any proposals for specific operations will be subject to further consideration of the Conservation of Habitats and Species Regulations 2010 (as amended) requirements by the local planning authority and possibly other permitting authorities at project level once more information is available as to the nature and location of the activities proposed.

### 4.4.1 Conclusion

The approach has been developed to be proportionate and appropriate to the level of information available at the licensing stage, and has been undertaken in manner that meets the requirements of the Habitats Regulations and that also informs decisions regarding licence award. Natural England and Natural Resources Wales confirmed that the approach was appropriate. It has utilised information for potentially affected European sites, and drawn from referenced evidence to ensure an appropriate understanding of likely future activities following licensing and their potential effects. To address the uncertainties within the

assessment, assumptions have been used and are clearly presented. The resulting outcomes of the AA are appropriate and proportionate for the purposes of strategic plan-level HRA.

It is recognised that there will be a need for 'down the line' project-level HRA when, for blocks that are licensed, a planning application is submitted to the relevant local planning authority<sup>55</sup>.

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<sup>55</sup> This project-level assessment should incorporate consideration of effects on sites that are in excess of 10km from the licence block, as well as those within the licence block and within 10km of the block.

## 5 In Combination Effects

Article 6(3) of the Habitats Directive states that, “any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually *or in combination with other plans or projects*, shall be subject to appropriate assessment of its implications for the site in view of the site’s conservation objectives” (emphasis added). The requirement to consider whether a plan has likely significant effects, either alone, or in combination with other plans or projects is repeated in regulation 102(1)(a) of the Conservation of Habitats and Species Regulations 2010 (as amended).

Accordingly, in order to comply with the requirements of the Habitats Directive and Regulations, consideration must be given to potential in-combination effects.

Given the strategic level of this assessment, there are considerable uncertainties at this stage regarding the nature of activities which may follow licensing. While the geographic location and extent of each individual licence block is ascertainable, further and particular details of the precise nature, scale, timing, duration and location of any exploration and production activities (whether Stage A, B, C or D) is at this stage wholly unknown. Furthermore, the granting of a licence does not, in its own right, grant any consent, authorisation or permission for any specific development activities – the carrying out of any proposed development activities within a licence block would necessarily and in all cases be subject to additional approval by planning authorities and environmental regulators, and indeed to further assessment under the Habitats Regulations where such activities would be likely to have significant effects on, and/or adverse effects on the integrity of, European sites.

Furthermore, because of the inherent uncertainties present at this strategic stage, it is not possible to identify specific plans or projects (including those outside oil and gas activities) which may interact with development activities that may follow the granting of a licence in the 14<sup>th</sup> round.

Nonetheless, there are a number of activities (namely Stages A, B, C and D) which could all potentially be associated with the granting of a licence, and this assessment has considered the potential effect(s) that each of those activities could have on European sites if carried out in licence blocks. To this extent, account can be taken at this stage of European sites that could potentially be affected by those activities being undertaken within more than one licence block – i.e. a determination of the “in-combination” effects of activities proceeding in more than one licence block, and possibly by more than one licensee.

In order to identify the European sites that could potentially be affected by such “in-combination” effects, the following methodology has been adopted:

- ▶ identify all European sites that have more than one licence block within a 1 km radius. A 1km study area has been adopted to reflect that the majority of effects (as outlined in **Table 4.1**) on most ecological receptors arising from licensable activities will likely occur within a 1 km radius (or less) of that activity (this is discussed in more detail in relation to ZoI in **Section 4.2.3**). As such, for example, a SAC designated for its woodland habitats could be at greater risk of LSE / AEOL should there be three licensed blocks within 1km of its boundaries compared with just a single block being present due to the cumulative effect of all licensed block activities.
- ▶ identify all European sites that have more than one licence block within a 10 km radius. The 10km study area has been adopted to reflect those exceptional ecological receptors that are susceptible to effects over a greater distance due to either their highly mobile nature (e.g. birds, bats and otters) or because of the increased ecological connectivity of some habitat types (e.g. estuaries, rivers and coastal habitats) (this is discussed in more detail in relation to ZoI in **Sections 3.2 and 4.2.3**). As such, for example, a SAC designated for bats could be at greater risk of LSE / AEOL should there be three licensed blocks within 10km of its boundaries compared with just a single block being present due to the cumulative effect of all licensed block activities. It should be noted however that a SAC designated for its woodland habitats would not necessarily be at greater risk of LSE / AEOL should there be more than one block within the 10km radius (and more than 1km away) because activities at this distance are not likely to have an effect on these interest features. This illustrates how the interest features of each European site need to be taken into account.

Using GIS mapping tools, this information has been identified and is illustrated in two tables in **Appendix C**.

By way of illustration, there are 95 European sites that occur within 1 km of more than one licence block and a total of 202 European sites that occur within 10 km of more than one licence block. For example, the River Derwent SAC occurs 20 times within 10 km of a licence block and 8 times within 1 km of a licence block.

This methodology has enabled the analysis of whether development activities undertaken (Stage A, B, C and/or D) in more than once licence block could result in AEOL of European sites. In carrying out this analysis, the detailed information and results of the individual licence block assessments has been used. As noted previously, this information has identified that certain development activities could have AEOL of European sites, and thus should be prohibited in certain areas in order to ensure that European sites are not adversely affected. The precise scope of such a prohibition will depend on the nature of the activity in question and the characteristics of the relevant European site(s), but, where considered appropriate and proportionate, it has been recommended that a condition is imposed in licences in order to prohibit any activities which at this strategic level have been assessed to cause AEOL of European sites. Such licences may also be accompanied by advice notices giving an indication to the licensee of the potentially sensitive nature of land within the licence block.

In relation to “in-combination” effects, it has been concluded that the licence conditions imposed (and advice notices given) will also be sufficient to ensure that activities being undertaken within more than one licence block, and potentially by different licensees, will not have AEOL of European sites in the areas identified above. This conclusion only applies at this strategic level and thus does not imply any definitive or final clearance on habitats issues – specific proposals for development activities will be subject to further consideration by planning authorities and regulators (including a consideration of “in-combination” effects at project-level), and such permission may be granted subject to conditions, or indeed refused, in accordance with the requirements of the Habitats Directive.

## 6 Summary of Findings and Conclusions

### 6.1 Summary of Findings

In total, 159 blocks for which a licence application has been received were assessed. The 159 assessment proformas, along with their associated plan indicating the location of European sites within the search area, are provided in **Appendix D** and **Appendix E** respectively.

#### 6.1.1 Results of Initial Threshold Assessment

In total, 27 blocks for which a licence application has been received have been assessed as having no foreseeable LSEs, and it is therefore recommended to OGA that they are approved for award without any conditions.

#### 6.1.2 Results of Appropriate Assessment

Table 6.1 below summarises the findings of these AA process. As set out in **Section 4.4.1**, the categories are as follows:

- Category 1 – grant of licence recommended but **no or specific activities will be permitted at or near to the surface anywhere in the block** through conditions attached to the licence and an advice notice may be provided;
- Category 2 – grant of licence recommended but **certain activities may be prohibited at or near to the surface within the European site(s) through conditions** attached to the licence and an advice notice may be provided;
- Category 3 – grant of licence recommended with **no conditions** attached though an advice notice may be provided, where relevant.

Table 6.1 Summary of Appropriate Assessment Findings

Scenario	Total number of licence blocks	Total Number Granted a Licence (no conditions)	Total Number Granted a Licence (with conditions)	Total Number Granted a Licence
Category 1	0	0	0	0
Category 2	73	0	73	73
Category 3	59	59	0	59
TOTALS	132	59	73	132

Given the strategic plan level at which the AA of the licences has, by necessity, to be carried out, it should be noted that issuing a licence does not imply any definitive or final clearance of Habitats Regulations considerations – any proposals for specific operations will be subject to further consideration of the Conservation of Habitats and Species Regulations 2010 (as amended) requirements by individual planning



authorities and possibly other permitting authorities at the project level once more information is available as to the nature and location of the activities proposed.





## 7 Glossary and Abbreviations

Term	Definition
AA	Appropriate Assessment
AEOI	Adverse effect on the integrity
BOP	Blow Out Preventer
CBL	Cement Bond Log
DECC	Department of Energy and Climate Change
ha	Hectare; a metric unit of area defined as 10,000m <sup>2</sup>
HGV	Heavy Goods Vehicle. Typically these vehicles are designed or adapted to have a maximum weight of 3,500 kg when in normal use.
HVHF	High Volume Hydraulic Fracturing or “fracking” is a technique that uses fluid, usually water, pumped at high pressure into the rock to create narrow fractures to create paths for the gas to flow into the well bore and to surface. The water normally contains small quantities of other substances to improve the efficiency of the process, e.g. to reduce friction. Once the fractures have been created, small particles, usually of sand, are pumped into them to keep the fractures open. ANP Resolution 21/2014 defines HVHF as in volumes above 3,000 m <sup>3</sup> whereas the Community Recommendation 2014/70/EU defines it as a process requiring the injection of 1,000 m <sup>3</sup> or more of water per fracturing stage or 10, 000 m <sup>3</sup> or more of water during the entire frac-turing process into a well.
HRA	Habitats Regulations Assessment
Induced seismicity	Earthquake and tremor activity caused by human activity
IROPI	Imperative Reasons of Overriding Public Interest
Km	Kilometre (1,000 metres)
LSE	Likely Significant Effects
M <sub>L</sub>	M <sub>L</sub> (Magnitude Local) from the Richter magnitude scale (often shortened to Richter scale) developed to quantify the energy released during an earthquake. The scale is a base-10 logarithmic scale. An earthquake that measures 5.0 on the Richter scale has a shaking amplitude 10 times larger than one that measures 4.0, and corresponds to a 31.6 times larger release of energy
m	Metre (100 centimetres)
NORM	Natural Occurring Radioactive Material. Material that contains radioactive elements of natural origin. NORM primarily contains uranium and thorium (elements that also release radium and radon gas once they begin to decay) and potassium.
OGA	Oil and Gas Authority

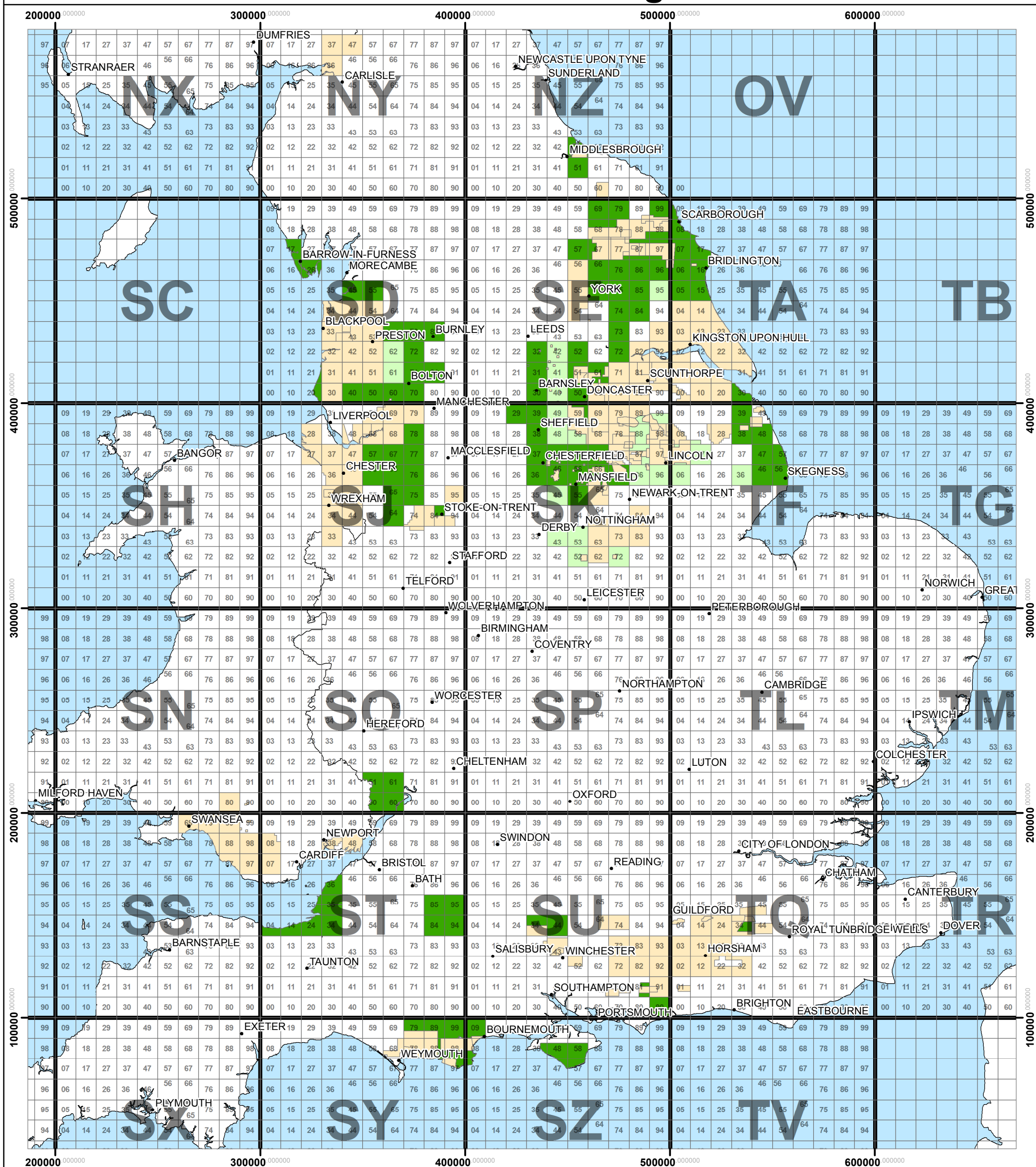
Term	Definition
<b>PEDL</b>	Petroleum Exploration and Development Licences
<b>Produced water</b>	Water that returns from the well along with the natural gas after fracturing has taken place. The water may be naturally occurring and may contain residual fracturing fluid.
<b>Proppant</b>	Solid material, typically treated sand or man-made ceramic materials, designed to keep an induced hydraulic fracture open.
<b>SAC</b>	Special Areas of Conservation
<b>SCI</b>	Sites of Community Importance
<b>SoS</b>	Secretary of State
<b>SPA</b>	Special Protection Areas
<b>TLS</b>	Traffic Light System
<b>Unconventional oil and gas</b>	Refers to hydrocarbons which are located in tight sands, shale or coal which are now the focus of unconventional exploration. However, the techniques used to extract hydrocarbons are essentially the same. What has changed are advancements in technology over the last decade (e.g. – hydraulic fracturing) which have made shale gas development economically viable.
<b>Interest feature</b>	A species, group of species or habitat type for which a European site has been specifically designated.
<b>European site</b>	A site that has been designated for its nature conservation value at the European level. This includes SACs that are designated under the EC Habitats Directive as well as SCIs (identified but not yet formally designated) and candidate SACs. This also includes SPAs and pSPAs (proposed) that are designated under the EC Birds Directive. For the purposes of HRA, Ramsar sites that are designated under the Ramsar convention as wetlands of international importance are also included within this definition of a European site.



# Appendix A

## Figure Indicating the Distribution of the 14<sup>th</sup> Onshore Licensing Round Blocks Under Consideration (Produced by the OGA)

# 14th Onshore Licensing Round



## Legend

- Major Cities & Towns

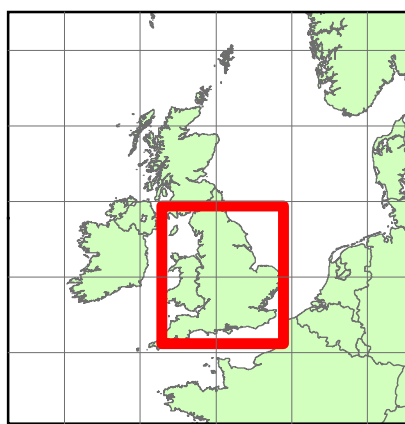
British National Grid (10k)

British National Grid (100k)

27 Blocks to be offered for award in first tranche

132 Blocks subject to Appropriate Assessment

Current Licensed Blocks



0 10 20 30 40 50 60 70 80 90 Miles

0 10 20 30 40 50 60 70 80 Kilometres

SCALE 1:1,800,000

OSGB36 - BNG

Updated: 17/08/2015

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Any enquiries regarding this publication should be sent to us at [oilandgaslicensing@oga.gsi.gov.uk](mailto:oilandgaslicensing@oga.gsi.gov.uk).



**Oil & Gas Authority**



## Appendix B

### European Sites List (including information on interest features)

SITE CODE		Interest Feature
UK0013010	Afon Tywi/ River Tywi SAC	Petromyzon marinus
UK0013010	Afon Tywi/ River Tywi SAC	Lampetra planeri
UK0013010	Afon Tywi/ River Tywi SAC	Lampetra fluviatilis
UK0013010	Afon Tywi/ River Tywi SAC	Alosa alosa
UK0013010	Afon Tywi/ River Tywi SAC	Alosa fallax
UK0013010	Afon Tywi/ River Tywi SAC	Cottus gobio
UK0013010	Afon Tywi/ River Tywi SAC	Lutra lutra
UK0030142	Arnecliff and Park Hole Woods SAC	Old sessile oak woods with Ilex and Blechnum in the British Isles
UK0030142	Arnecliff and Park Hole Woods SAC	Trichomanes speciosum
UK11004	Arun Valley Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK11004	Arun Valley Ramsar	3 - supports populations of plant/animal species important for maintaining regional biodiversity
UK11004	Arun Valley Ramsar	5 - regularly supports 20,000 or more waterbirds
UK0030366	Arun Valley SAC	Anisus vorticulus
UK9020281	Arun Valley SPA	Waterfowl assemblage
UK9020281	Arun Valley SPA	Tundra swan (W)
UK0030080	Ashdown Forest SAC	Northern Atlantic wet heaths with Erica tetralix
UK0030080	Ashdown Forest SAC	European dry heaths
UK0030080	Ashdown Forest SAC	Triturus cristatus
UK9012181	Ashdown Forest SPA	European nightjar (B)
UK9012181	Ashdown Forest SPA	Dartford warbler (B)
UK0030082	Aston Rowant SAC	Juniperus communis formations on heaths or calcareous grasslands
UK0030082	Aston Rowant SAC	Asperulo-Fagetum beech forests
UK0012734	Avon Gorge Woodlands SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0012734	Avon Gorge Woodlands SAC	Tilio-Acerion forests of slopes, scree and ravines
UK11005	Avon Valley Ramsar	1 - sites containing representative, rare or unique wetland types
UK11005	Avon Valley Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11005	Avon Valley Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK9011091	Avon Valley SPA	Tundra swan (W)
UK9011091	Avon Valley SPA	Gadwall (W)
UK9014091	Bae Caerfyrddin/ Carmarthen Bay SPA	Black (common) scoter (W)
UK0012584	Bath and Bradford-on-Avon Bats SAC	Rhinolophus hipposideros
UK0012584	Bath and Bradford-on-Avon Bats SAC	Rhinolophus ferrumequinum
UK0012584	Bath and Bradford-on-Avon Bats SAC	Myotis bechsteini
UK0030086	Beast Cliff – Whitby (Robin Hood's Bay) SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0030087	Bee's Nest and Green Clay Pits SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0030087	Bee's Nest and Green Clay Pits SAC	Triturus cristatus
UK0012740	Birklands and Bilhaugh SAC	Old acidophilous oak woods with Quercus robur on sandy plains
UK9005151	Bowland Fells SPA	Lesser black-backed gull (B)
UK9005151	Bowland Fells SPA	Merlin (B)
UK9005151	Bowland Fells SPA	Hen harrier (B)
UK0030328	Briddlesford Copses SAC	Myotis bechsteini
UK0030100	Brown Moss SAC	Luronium natans

UK14001	Burry Inlet Ramsar	5 - regularly supports 20,000 or more waterbirds
UK14001	Burry Inlet Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9015011	Burry Inlet SPA	Eurasian oystercatcher (W)
UK9015011	Burry Inlet SPA	Common redshank (W)
UK9015011	Burry Inlet SPA	Grey plover (W)
UK9015011	Burry Inlet SPA	Red knot (W)
UK9015011	Burry Inlet SPA	Eurasian curlew (W)
UK9015011	Burry Inlet SPA	Waterfowl assemblage
UK9015011	Burry Inlet SPA	Common shelduck (W)
UK9015011	Burry Inlet SPA	Northern shoveler (W)
UK9015011	Burry Inlet SPA	Northern pintail (W)
UK9015011	Burry Inlet SPA	Eurasian teal (W)
UK9015011	Burry Inlet SPA	Eurasian wigeon (W)
UK9015011	Burry Inlet SPA	Dunlin (W)
UK0030103	Butser Hill SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0030103	Butser Hill SAC	Taxus baccata woods of the British Isles
UK0030105	Caeau Mynydd Mawr SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
UK0030105	Caeau Mynydd Mawr SAC	Euphydryas (Eurodryas, Hypodryas) aurinia
UK0030106	Calf Hill and Cragg Woods SAC	Old sessile oak woods with Ilex and Blechnum in the British Isles
UK0030106	Calf Hill and Cragg Woods SAC	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Sandbanks which are slightly covered by sea water all the time
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Estuaries
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Mudflats and sandflats not covered by seawater at low tide
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Large shallow inlets and bays
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Salicornia and other annuals colonizing mud and sand
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Petromyzon marinus
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Lampetra fluviatilis
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Alosa alosa
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Alosa fallax
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberdaron	Lutra lutra
UK0020019	Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	Embryonic shifting dunes
UK0020019	Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	"Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")"
UK0020019	Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	"Fixed coastal dunes with herbaceous vegetation ("grey dunes")"
UK0020019	Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	Dunes with Salix repens ssp. argentea (Salicion arenariae)
UK0020019	Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	Humid dune slacks
UK0020019	Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	Vertigo angustior
UK0020019	Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	Petalophyllum ralfsii
UK0020019	Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	Liparis loeselii
UK0030115	Cerne and Sydling Downs SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0030115	Cerne and Sydling Downs SAC	Euphydryas (Eurodryas, Hypodryas) aurinia
UK0030070	Cernydd Carmel SAC	Turloughs
UK0030070	Cernydd Carmel SAC	Northern Atlantic wet heaths with Erica tetralix



UK0030070	Cernydd Carmel SAC	European dry heaths
UK0030070	Cernydd Carmel SAC	Active raised bogs
UK0030070	Cernydd Carmel SAC	Tilio-Acerion forests of slopes, scree and ravines
UK9010041	Chew Valley Lake SPA	Northern shoveler (W)
UK11013	Chichester and Langstone Harbour Ramsar	1 - sites containing representative, rare or unique wetland types
UK11013	Chichester and Langstone Harbour Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11013	Chichester and Langstone Harbour Ramsar	5 - regularly supports 20,000 or more waterbirds
UK9011011	Chichester and Langstone Harbours SPA	Little tern (B)
UK9011011	Chichester and Langstone Harbours SPA	Common tern (B)
UK9011011	Chichester and Langstone Harbours SPA	Sandwich tern (B)
UK9011011	Chichester and Langstone Harbours SPA	Ruddy turnstone (W)
UK9011011	Chichester and Langstone Harbours SPA	Grey plover (W)
UK9011011	Chichester and Langstone Harbours SPA	Ringed plover (W)
UK9011011	Chichester and Langstone Harbours SPA	Dunlin (W)
UK9011011	Chichester and Langstone Harbours SPA	Bar-tailed godwit (W)
UK9011011	Chichester and Langstone Harbours SPA	Eurasian curlew (W)
UK9011011	Chichester and Langstone Harbours SPA	Common redshank (W)
UK9011011	Chichester and Langstone Harbours SPA	Sanderling (W)
UK9011011	Chichester and Langstone Harbours SPA	Northern shoveler (W)
UK9011011	Chichester and Langstone Harbours SPA	Waterfowl assemblage
UK9011011	Chichester and Langstone Harbours SPA	Red-breasted merganser (W)
UK9011011	Chichester and Langstone Harbours SPA	Dark-bellied brent goose (W)
UK9011011	Chichester and Langstone Harbours SPA	Northern pintail (W)
UK9011011	Chichester and Langstone Harbours SPA	Eurasian teal (W)
UK9011011	Chichester and Langstone Harbours SPA	Eurasian wigeon (W)
UK9011011	Chichester and Langstone Harbours SPA	Common shelduck (W)
UK0016373	Chilmark Quarries SAC	Rhinolophus hipposideros
UK0016373	Chilmark Quarries SAC	Rhinolophus ferrumequinum
UK0016373	Chilmark Quarries SAC	Barbastella barbastellus
UK0016373	Chilmark Quarries SAC	Myotis bechsteini
UK0012724	Chilterns Beechwoods SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0012724	Chilterns Beechwoods SAC	Asperulo-Fagetum beech forests
UK0012724	Chilterns Beechwoods SAC	Lucanus cervus
UK0030141	Coedydd Nedd a Mellt SAC	Tilio-Acerion forests of slopes, scree and ravines
UK0030141	Coedydd Nedd a Mellt SAC	Old sessile oak woods with Ilex and Blechnum in the British Isles
UK0012889	Cothill Fen SAC	Alkaline fens
UK0012889	Cothill Fen SAC	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
UK14006	Crymlyn Bog Ramsar	1 - sites containing representative, rare or unique wetland types
UK14006	Crymlyn Bog Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK14006	Crymlyn Bog Ramsar	3 - supports populations of plant/animal species important for maintaining regional biodiversity
UK0012885	Crymlyn Bog/ Cors Crymlyn SAC	Transition mires and quaking bogs
UK0012885	Crymlyn Bog/ Cors Crymlyn SAC	Calcareous fens with Cladium mariscus and species of the Caricion davallianae
UK0012885	Crymlyn Bog/ Cors Crymlyn SAC	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)

UK0030131	Dee Estuary/Aber Dyfrdwy SAC	Estuaries
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	Mudflats and sandflats not covered by seawater at low tide
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	Annual vegetation of drift lines
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	Salicornia and other annuals colonizing mud and sand
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	Embryonic shifting dunes
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	"Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (""white dunes"")"
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	"Fixed coastal dunes with herbaceous vegetation (""grey dunes"")"
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	Humid dune slacks
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	<i>Petromyzon marinus</i>
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	<i>Lampetra fluviatilis</i>
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	<i>Petalophyllum ralfsii</i>
UK0030036	Denby Grange Colliery Ponds SAC	<i>Triturus cristatus</i>
UK11021	Dorset Heathlands Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK11021	Dorset Heathlands Ramsar	1 - sites containing representative, rare or unique wetland types
UK11021	Dorset Heathlands Ramsar	3 - supports populations of plant/animal species important for maintaining regional biodiversity
UK9010101	Dorset Heathlands SPA	Hen harrier (W)
UK9010101	Dorset Heathlands SPA	Wood lark (B)
UK9010101	Dorset Heathlands SPA	European nightjar (B)
UK9010101	Dorset Heathlands SPA	Merlin (W)
UK9010101	Dorset Heathlands SPA	Dartford warbler (B)
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Embryonic shifting dunes
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	"Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (""white dunes"")"
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Atlantic decalcified fixed dunes ( <i>Calluno-Ulicetea</i> )
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Humid dune slacks
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> )
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Northern Atlantic wet heaths with <i>Erica tetralix</i>
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Temperate Atlantic wet heaths with <i>Erica ciliaris</i> and <i>Erica tetralix</i>
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	European dry heaths
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Depressions on peat substrates of the <i>Rhynchosporion</i>
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Alkaline fens
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	Bog woodland
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	<i>Coenagrion mercuriale</i>
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Du	<i>Triturus cristatus</i>
UK0019857	Dorset Heaths SAC	Northern Atlantic wet heaths with <i>Erica tetralix</i>
UK0019857	Dorset Heaths SAC	European dry heaths
UK0019857	Dorset Heaths SAC	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )
UK0019857	Dorset Heaths SAC	Depressions on peat substrates of the <i>Rhynchosporion</i>
UK0019857	Dorset Heaths SAC	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>

UK0019857	Dorset Heaths SAC	Alkaline fens
UK0019857	Dorset Heaths SAC	Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains
UK0019857	Dorset Heaths SAC	<i>Coenagrion mercuriale</i>
UK0019857	Dorset Heaths SAC	<i>Triturus cristatus</i>
UK11022	Duddon Estuary Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11022	Duddon Estuary Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11022	Duddon Estuary Ramsar	4 - supports plant/animal species at a critical stage in their life cycles, or provides refuge
UK11022	Duddon Estuary Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK9005031	Duddon Estuary SPA	Sandwich tern (B)
UK9005031	Duddon Estuary SPA	Common redshank (W)
UK9005031	Duddon Estuary SPA	Red knot (W)
UK9005031	Duddon Estuary SPA	Northern pintail (W)
UK9005031	Duddon Estuary SPA	Waterfowl assemblage
UK0019833	Duddon Mosses SAC	Active raised bogs
UK0019833	Duddon Mosses SAC	Degraded raised bogs still capable of natural regeneration
UK0030138	Duncton to Bignor Escarpment SAC	<i>Asperulo-Fagetum</i> beech forests
UK0030139	Dunraven Bay SAC	<i>Rumex rupestris</i>
UK0030140	Durham Coast SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0012723	East Hampshire Hangers SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)
UK0012723	East Hampshire Hangers SAC	<i>Asperulo-Fagetum</i> beech forests
UK0012723	East Hampshire Hangers SAC	<i>Tilio-Acerion</i> forests of slopes, screes and ravines
UK0012723	East Hampshire Hangers SAC	<i>Taxus baccata</i> woods of the British Isles
UK0012723	East Hampshire Hangers SAC	<i>Gentianella anglica</i>
UK0012715	Ebernoe Common SAC	Atlantic acidophilous beech forests with <i>Ilex</i> and sometimes also <i>Taxus</i> in the shrublayer ( <i>Quercion robori-petraeae</i> or <i>Ilici-Fagenion</i> )
UK0012715	Ebernoe Common SAC	<i>Barbastella barbastellus</i>
UK0012715	Ebernoe Common SAC	<i>Myotis bechsteini</i>
UK0030039	Eller's Wood and Sand Dale SAC	Petrifying springs with tufa formation ( <i>Cratoneurion</i> )
UK0030039	Eller's Wood and Sand Dale SAC	<i>Vertigo geyeri</i>
UK0012720	Epping Forest SAC	Northern Atlantic wet heaths with <i>Erica tetralix</i>
UK0012720	Epping Forest SAC	European dry heaths
UK0012720	Epping Forest SAC	Atlantic acidophilous beech forests with <i>Ilex</i> and sometimes also <i>Taxus</i> in the shrublayer ( <i>Quercion robori-petraeae</i> or <i>Ilici-Fagenion</i> )
UK0012720	Epping Forest SAC	<i>Lucanus cervus</i>
UK0030148	Exmoor and Quantock Oakwoods SAC	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles
UK0030148	Exmoor and Quantock Oakwoods SAC	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )
UK0030148	Exmoor and Quantock Oakwoods SAC	<i>Barbastella barbastellus</i>
UK0030148	Exmoor and Quantock Oakwoods SAC	<i>Myotis bechsteini</i>
UK0030148	Exmoor and Quantock Oakwoods SAC	<i>Lutra lutra</i>
UK0030040	Exmoor Heaths SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0030040	Exmoor Heaths SAC	Northern Atlantic wet heaths with <i>Erica tetralix</i>
UK0030040	Exmoor Heaths SAC	European dry heaths
UK0030040	Exmoor Heaths SAC	Blanket bogs (* if active bog)
UK0030040	Exmoor Heaths SAC	Alkaline fens
UK0030040	Exmoor Heaths SAC	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles

UK0030332	Fen Bog SAC	Transition mires and quaking bogs
UK0012912	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SA	Active raised bogs
UK0012912	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SA	Degraded raised bogs still capable of natural regeneration
UK9006101	Flamborough Head and Bempton Cliffs SPA	Black-legged kittiwake (B)
UK0013036	Flamborough Head SAC	Reefs
UK0013036	Flamborough Head SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0013036	Flamborough Head SAC	Submerged or partially submerged sea caves
UK0012817	Gang Mine SAC	Calaminarian grasslands of the Violetalia calaminariae
UK11027	Gibraltar Point Ramsar	1 - sites containing representative, rare or unique wetland types
UK11027	Gibraltar Point Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11027	Gibraltar Point Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11027	Gibraltar Point Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK9008022	Gibraltar Point SPA	Little tern (B)
UK9008022	Gibraltar Point SPA	Bar-tailed godwit (W)
UK9008022	Gibraltar Point SPA	Waterfowl assemblage
UK9008022	Gibraltar Point SPA	Sanderling (W)
UK9008022	Gibraltar Point SPA	Grey plover (W)
UK0030157	Gower Ash Woods/ Coedydd Ynn Gwyr SAC	Tilio-Acerion forests of slopes, scree and ravines
UK0030157	Gower Ash Woods/ Coedydd Ynn Gwyr SAC	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
UK0012685	Gower Commons/ Tiroedd Comin Gwyr SAC	Northern Atlantic wet heaths with Erica tetralix
UK0012685	Gower Commons/ Tiroedd Comin Gwyr SAC	European dry heaths
UK0012685	Gower Commons/ Tiroedd Comin Gwyr SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
UK0012685	Gower Commons/ Tiroedd Comin Gwyr SAC	Coenagrion mercuriale
UK0012685	Gower Commons/ Tiroedd Comin Gwyr SAC	Euphydryas (Eurodryas, Hypodryas) aurinia
UK0030162	Hackpen Hill SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0030162	Hackpen Hill SAC	Gentianella anglica
UK0030163	Halkyn Mountain/ Mynydd Helygain SAC	European dry heaths
UK0030163	Halkyn Mountain/ Mynydd Helygain SAC	Calaminarian grasslands of the Violetalia calaminariae
UK0030163	Halkyn Mountain/ Mynydd Helygain SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0030163	Halkyn Mountain/ Mynydd Helygain SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
UK0030163	Halkyn Mountain/ Mynydd Helygain SAC	Triturus cristatus
UK0030166	Hatfield Moor SAC	Degraded raised bogs still capable of natural regeneration
UK0030350	Holnest SAC	Triturus cristatus
UK9006171	Hornsea Mere SPA	Gadwall (W)
UK9006171	Hornsea Mere SPA	Mute swan (B)
UK11031	Humber Estuary Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11031	Humber Estuary Ramsar	1 - sites containing representative, rare or unique wetland types
UK11031	Humber Estuary Ramsar	3 - supports populations of plant/animal species important for maintaining regional biodiversity
UK11031	Humber Estuary Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11031	Humber Estuary Ramsar	8 - important source of food for fishes, spawning ground, nursery and/or migration path
UK0030170	Humber Estuary SAC	Sandbanks which are slightly covered by sea water all the time
UK0030170	Humber Estuary SAC	Estuaries
UK0030170	Humber Estuary SAC	Mudflats and sandflats not covered by seawater at low tide

UK0030170	Humber Estuary SAC	Coastal lagoons
UK0030170	Humber Estuary SAC	Salicornia and other annuals colonizing mud and sand
UK0030170	Humber Estuary SAC	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
UK0030170	Humber Estuary SAC	Embryonic shifting dunes
UK0030170	Humber Estuary SAC	"Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes")"
UK0030170	Humber Estuary SAC	"Fixed coastal dunes with herbaceous vegetation ("grey dunes")"
UK0030170	Humber Estuary SAC	Dunes with <i>Hippophthalmoides</i>
UK0030170	Humber Estuary SAC	<i>Petromyzon marinus</i>
UK0030170	Humber Estuary SAC	<i>Lampetra fluviatilis</i>
UK0030170	Humber Estuary SAC	<i>Halichoerus grypus</i>
UK9006111	Humber Estuary SPA	Great bittern (B)
UK9006111	Humber Estuary SPA	Great bittern (W)
UK9006111	Humber Estuary SPA	Greater scaup (W)
UK9006111	Humber Estuary SPA	Mallard (W)
UK9006111	Humber Estuary SPA	Grey plover (P)
UK9006111	Humber Estuary SPA	Northern lapwing (W)
UK9006111	Humber Estuary SPA	Red knot (W)
UK9006111	Humber Estuary SPA	Red knot (P)
UK9006111	Humber Estuary SPA	Sanderling (P)
UK9006111	Humber Estuary SPA	Sanderling (W)
UK9006111	Humber Estuary SPA	Dunlin (P)
UK9006111	Humber Estuary SPA	Dunlin (W)
UK9006111	Humber Estuary SPA	Ruff (P)
UK9006111	Humber Estuary SPA	Grey plover (W)
UK9006111	Humber Estuary SPA	Waterfowl assemblage
UK9006111	Humber Estuary SPA	Black-tailed godwit (W)
UK9006111	Humber Estuary SPA	Black-tailed godwit (P)
UK9006111	Humber Estuary SPA	Bar-tailed godwit (W)
UK9006111	Humber Estuary SPA	Whimbrel (P)
UK9006111	Humber Estuary SPA	Eurasian curlew (W)
UK9006111	Humber Estuary SPA	Common redshank (P)
UK9006111	Humber Estuary SPA	Common redshank (W)
UK9006111	Humber Estuary SPA	Common greenshank (P)
UK9006111	Humber Estuary SPA	Ruddy turnstone (W)
UK9006111	Humber Estuary SPA	Little tern (B)
UK9006111	Humber Estuary SPA	Dark-bellied brent goose (W)
UK9006111	Humber Estuary SPA	Common shelduck (W)
UK9006111	Humber Estuary SPA	European golden plover (W)
UK9006111	Humber Estuary SPA	Eurasian marsh harrier (B)
UK9006111	Humber Estuary SPA	Common goldeneye (W)
UK9006111	Humber Estuary SPA	Eurasian oystercatcher (W)
UK9006111	Humber Estuary SPA	Pied avocet (B)
UK9006111	Humber Estuary SPA	Eurasian wigeon (W)

UK9006111	Humber Estuary SPA	Eurasian teal (W)
UK9006111	Humber Estuary SPA	Common pochard (W)
UK9006111	Humber Estuary SPA	Pied avocet (W)
UK9006111	Humber Estuary SPA	Ringed plover (W)
UK9006111	Humber Estuary SPA	Ringed plover (P)
UK9006111	Humber Estuary SPA	Hen harrier (W)
UK0019861	Isle of Portland to Studland Cliffs SAC	Annual vegetation of drift lines
UK0019861	Isle of Portland to Studland Cliffs SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0019861	Isle of Portland to Studland Cliffs SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0019861	Isle of Portland to Studland Cliffs SAC	Gentianella anglica
UK0016254	Isle of Wight Downs SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0016254	Isle of Wight Downs SAC	European dry heaths
UK0016254	Isle of Wight Downs SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0016254	Isle of Wight Downs SAC	Gentianella anglica
UK0012566	Kenfig/ Cynffig SAC	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
UK0012566	Kenfig/ Cynffig SAC	"Fixed coastal dunes with herbaceous vegetation ("grey dunes")"
UK0012566	Kenfig/ Cynffig SAC	Dunes with Salix repens ssp. argentea (Salicion arenariae)
UK0012566	Kenfig/ Cynffig SAC	Humid dune slacks
UK0012566	Kenfig/ Cynffig SAC	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
UK0012566	Kenfig/ Cynffig SAC	Petalophyllum ralfsii
UK0012566	Kenfig/ Cynffig SAC	Liparis loeselii
UK0030044	Kenet and Lambourn Floodplain SAC	Vertigo moulinsiana
UK0012767	Kingley Vale SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0012767	Kingley Vale SAC	Taxus baccata woods of the British Isles
UK11034	Lee Valley Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK11034	Lee Valley Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9012111	Lee Valley SPA	Gadwall (W)
UK9012111	Lee Valley SPA	Northern shoveler (W)
UK9012111	Lee Valley SPA	Great bittern (W)
UK0014787	Limestone Coast of South West Wales/ Arfordir Calchfae	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0014787	Limestone Coast of South West Wales/ Arfordir Calchfae	"Fixed coastal dunes with herbaceous vegetation ("grey dunes")"
UK0014787	Limestone Coast of South West Wales/ Arfordir Calchfae	European dry heaths
UK0014787	Limestone Coast of South West Wales/ Arfordir Calchfae	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0014787	Limestone Coast of South West Wales/ Arfordir Calchfae	Caves not open to the public
UK0014787	Limestone Coast of South West Wales/ Arfordir Calchfae	Submerged or partially submerged sea caves
UK0014787	Limestone Coast of South West Wales/ Arfordir Calchfae	Rhinolophus ferrumequinum
UK0014787	Limestone Coast of South West Wales/ Arfordir Calchfae	Petalophyllum ralfsii
UK0014787	Limestone Coast of South West Wales/ Arfordir Calchfae	Gentianella anglica
UK0030184	Little Wittenham SAC	Triturus cristatus
UK9020294	Liverpool Bay / Bae Lerpwl SPA	Waterfowl assemblage
UK9020294	Liverpool Bay / Bae Lerpwl SPA	Black (common) scoter (W)
UK9020294	Liverpool Bay / Bae Lerpwl SPA	Red-throated diver (W)
UK11037	Lower Derwent Valley Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities

UK11037	Lower Derwent Valley Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11037	Lower Derwent Valley Ramsar	4 - supports plant/animal species at a critical stage in their life cycles, or provides refuge
UK11037	Lower Derwent Valley Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11037	Lower Derwent Valley Ramsar	1 - sites containing representative, rare or unique wetland types
UK0012844	Lower Derwent Valley SAC	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )
UK0012844	Lower Derwent Valley SAC	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )
UK0012844	Lower Derwent Valley SAC	Lutra lutra
UK9006092	Lower Derwent Valley SPA	Ruff (W)
UK9006092	Lower Derwent Valley SPA	Waterfowl assemblage
UK9006092	Lower Derwent Valley SPA	Tundra swan (W)
UK9006092	Lower Derwent Valley SPA	Eurasian wigeon (W)
UK9006092	Lower Derwent Valley SPA	Eurasian teal (W)
UK9006092	Lower Derwent Valley SPA	Northern shoveler (B)
UK9006092	Lower Derwent Valley SPA	European golden plover (W)
UK0030200	Manchester Mosses SAC	Degraded raised bogs still capable of natural regeneration
UK11039	Martin Mere Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11039	Martin Mere Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9005111	Martin Mere SPA	Waterfowl assemblage
UK9005111	Martin Mere SPA	Tundra swan (W)
UK9005111	Martin Mere SPA	Whooper swan (W)
UK9005111	Martin Mere SPA	Eurasian wigeon (W)
UK9005111	Martin Mere SPA	Pink-footed goose (W)
UK9005111	Martin Mere SPA	Northern pintail (W)
UK0012658	Mells Valley SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)
UK0012658	Mells Valley SAC	Caves not open to the public
UK0012658	Mells Valley SAC	<i>Rhinolophus ferrumequinum</i>
UK0030203	Mendip Limestone Grasslands SAC	European dry heaths
UK0030203	Mendip Limestone Grasslands SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)
UK0030203	Mendip Limestone Grasslands SAC	Caves not open to the public
UK0030203	Mendip Limestone Grasslands SAC	<i>Tilio-Acerion</i> forests of slopes, screes and ravines
UK0030203	Mendip Limestone Grasslands SAC	<i>Rhinolophus ferrumequinum</i>
UK0030048	Mendip Woodlands SAC	<i>Tilio-Acerion</i> forests of slopes, screes and ravines
UK11041	Mersey Estuary Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11041	Mersey Estuary Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9005131	Mersey Estuary SPA	Common shelduck (W)
UK9005131	Mersey Estuary SPA	Eurasian wigeon (W)
UK9005131	Mersey Estuary SPA	Eurasian teal (W)
UK9005131	Mersey Estuary SPA	Northern pintail (W)
UK9005131	Mersey Estuary SPA	Ringed plover (P)
UK9005131	Mersey Estuary SPA	European golden plover (W)
UK9005131	Mersey Estuary SPA	Grey plover (W)
UK9005131	Mersey Estuary SPA	Northern lapwing (W)
UK9005131	Mersey Estuary SPA	Dunlin (W)



UK9005131	Mersey Estuary SPA	Common redshank (W)
UK9005131	Mersey Estuary SPA	Eurasian curlew (W)
UK9005131	Mersey Estuary SPA	Common redshank (P)
UK9005131	Mersey Estuary SPA	Great crested grebe (W)
UK9005131	Mersey Estuary SPA	Black-tailed godwit (W)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Little gull (P)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Waterfowl assemblage
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Bar-tailed godwit (W)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	red knot (W)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Common tern (P)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Common redshank (W)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Dunlin (W)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Sanderling (W)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Grey plover (W)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Eurasian oystercatcher (W)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Great cormorant (W)
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	Common tern (B)
UK11043	Midland Meres and Mosses Phase 1 Ramsar	1 - sites containing representative, rare or unique wetland types
UK11043	Midland Meres and Mosses Phase 1 Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK11080	Midland Meres and Mosses Phase 2 Ramsar	1 - sites containing representative, rare or unique wetland types
UK11080	Midland Meres and Mosses Phase 2 Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK0012804	Mole Gap to Reigate Escarpment SAC	European dry heaths
UK0012804	Mole Gap to Reigate Escarpment SAC	Stable xerothermophilous formations with Buxus sempervirens on rock slopes (Berberidion p.p.)
UK0012804	Mole Gap to Reigate Escarpment SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0012804	Mole Gap to Reigate Escarpment SAC	Asperulo-Fagetum beech forests
UK0012804	Mole Gap to Reigate Escarpment SAC	Taxus baccata woods of the British Isles
UK0012804	Mole Gap to Reigate Escarpment SAC	Triturus cristatus
UK0012804	Mole Gap to Reigate Escarpment SAC	Myotis bechsteini
UK11045	Morecambe Bay Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11045	Morecambe Bay Ramsar	4 - supports plant/animal species at a critical stage in their life cycles, or provides refuge
UK11045	Morecambe Bay Ramsar	5 - regularly supports 20,000 or more waterbirds
UK0013027	Morecambe Bay SAC	Sandbanks which are slightly covered by sea water all the time
UK0013027	Morecambe Bay SAC	Estuaries
UK0013027	Morecambe Bay SAC	Mudflats and sandflats not covered by seawater at low tide
UK0013027	Morecambe Bay SAC	Coastal lagoons
UK0013027	Morecambe Bay SAC	Large shallow inlets and bays
UK0013027	Morecambe Bay SAC	Reefs
UK0013027	Morecambe Bay SAC	Perennial vegetation of stony banks
UK0013027	Morecambe Bay SAC	Salicornia and other annuals colonizing mud and sand
UK0013027	Morecambe Bay SAC	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
UK0013027	Morecambe Bay SAC	Embryonic shifting dunes
UK0013027	Morecambe Bay SAC	"Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")"
UK0013027	Morecambe Bay SAC	"Fixed coastal dunes with herbaceous vegetation ("grey dunes")"

UK0013027	Morecambe Bay SAC	Atlantic decalcified fixed dunes ( <i>Calluno-Ulicetea</i> )
UK0013027	Morecambe Bay SAC	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> ( <i>Salicion arenariae</i> )
UK0013027	Morecambe Bay SAC	Humid dune slacks
UK0013027	Morecambe Bay SAC	<i>Triturus cristatus</i>
UK9005081	Morecambe Bay SPA	Northern pintail (W)
UK9005081	Morecambe Bay SPA	Seabird assemblage
UK9005081	Morecambe Bay SPA	Waterfowl assemblage
UK9005081	Morecambe Bay SPA	Red knot (W)
UK9005081	Morecambe Bay SPA	Sandwich tern (B)
UK9005081	Morecambe Bay SPA	Ruddy turnstone (W)
UK9005081	Morecambe Bay SPA	Common redshank (W)
UK9005081	Morecambe Bay SPA	Eurasian curlew (W)
UK9005081	Morecambe Bay SPA	Pink-footed goose (W)
UK9005081	Morecambe Bay SPA	Dunlin (W)
UK9005081	Morecambe Bay SPA	Grey plover (W)
UK9005081	Morecambe Bay SPA	Ringed plover (P)
UK9005081	Morecambe Bay SPA	Eurasian oystercatcher (W)
UK9005081	Morecambe Bay SPA	Common shelduck (W)
UK9005081	Morecambe Bay SPA	Bar-tailed godwit (W)
UK11047	New Forest Ramsar	1 - sites containing representative, rare or unique wetland types
UK11047	New Forest Ramsar	3 - supports populations of plant/animal species important for maintaining regional biodiversity
UK11047	New Forest Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK9011031	New Forest SPA	Wood warbler (B)
UK9011031	New Forest SPA	Eurasian hobby (B)
UK9011031	New Forest SPA	Hen harrier (W)
UK9011031	New Forest SPA	European honey-buzzard (B)
UK9011031	New Forest SPA	European nightjar (B)
UK9011031	New Forest SPA	Dartford warbler (B)
UK9011031	New Forest SPA	Wood lark (B)
UK0016372	North Meadow and Clattinger Farm SAC	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )
UK0014775	North Pennine Dales Meadows SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )
UK0014775	North Pennine Dales Meadows SAC	Mountain hay meadows
UK0030052	North Somerset and Mendip Bats SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)
UK0030052	North Somerset and Mendip Bats SAC	Caves not open to the public
UK0030052	North Somerset and Mendip Bats SAC	Tilio-Acerion forests of slopes, screes and ravines
UK0030052	North Somerset and Mendip Bats SAC	<i>Rhinolophus hipposideros</i>
UK0030052	North Somerset and Mendip Bats SAC	<i>Rhinolophus ferrumequinum</i>
UK0030228	North York Moors SAC	Northern Atlantic wet heaths with <i>Erica tetralix</i>
UK0030228	North York Moors SAC	European dry heaths
UK0030228	North York Moors SAC	Blanket bogs (* if active bog)
UK9006161	North York Moors SPA	Merlin (B)
UK9006161	North York Moors SPA	European golden plover (B)
UK11049	Northumbria Coast Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds

UK9006131	Northumbria Coast SPA	Little tern (B)
UK9006131	Northumbria Coast SPA	Ruddy turnstone (W)
UK9006131	Northumbria Coast SPA	Purple sandpiper (W)
UK0012970	Oak Mere SAC	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
UK0012970	Oak Mere SAC	Transition mires and quaking bogs
UK0012845	Oxford Meadows SAC	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)
UK0012845	Oxford Meadows SAC	Apium repens
UK11052	Pagham Harbour Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9012041	Pagham Harbour SPA	Common tern (B)
UK9012041	Pagham Harbour SPA	Little tern (B)
UK9012041	Pagham Harbour SPA	Dark-bellied brent goose (W)
UK9012041	Pagham Harbour SPA	Ruff (W)
UK0019859	Peak District Dales SAC	European dry heaths
UK0019859	Peak District Dales SAC	Calaminarian grasslands of the Violetalia calaminariae
UK0019859	Peak District Dales SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0019859	Peak District Dales SAC	Alkaline fens
UK0019859	Peak District Dales SAC	Calcareous and calcshist scree of the montane to alpine levels (Thlaspietia rotundifolii)
UK0019859	Peak District Dales SAC	Calcareous rocky slopes with chasmophytic vegetation
UK0019859	Peak District Dales SAC	Tilio-Acerion forests of slopes, scree and ravines
UK0019859	Peak District Dales SAC	Austropotamobius pallipes
UK0019859	Peak District Dales SAC	Lampetra planeri
UK0019859	Peak District Dales SAC	Cottus gobio
UK9007021	Peak District Moors (South Pennine Moors Phase 1) SPA	Eurasian curlew (B)
UK9007021	Peak District Moors (South Pennine Moors Phase 1) SPA	Short-eared owl (B)
UK9007021	Peak District Moors (South Pennine Moors Phase 1) SPA	European golden plover (B)
UK9007021	Peak District Moors (South Pennine Moors Phase 1) SPA	Merlin (B)
UK11054	Poole Harbour Ramsar	3 - supports populations of plant/animal species important for maintaining regional biodiversity
UK11054	Poole Harbour Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK11054	Poole Harbour Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11054	Poole Harbour Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11054	Poole Harbour Ramsar	1 - sites containing representative, rare or unique wetland types
UK9010111	Poole Harbour SPA	Waterfowl assemblage
UK9010111	Poole Harbour SPA	Pied avocet (W)
UK9010111	Poole Harbour SPA	Mediterranean gull (B)
UK9010111	Poole Harbour SPA	Common tern (B)
UK9010111	Poole Harbour SPA	Common shelduck (W)
UK9010111	Poole Harbour SPA	Black-tailed godwit (W)
UK9011101	Porton Down SPA	Stone-curlew (B)
UK11055	Portsmouth Harbour Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11055	Portsmouth Harbour Ramsar	3 - supports populations of plant/animal species important for maintaining regional biodiversity
UK9011051	Portsmouth Harbour SPA	Black-tailed godwit (W)
UK9011051	Portsmouth Harbour SPA	Dunlin (W)
UK9011051	Portsmouth Harbour SPA	Red-breasted merganser (W)

UK9011051	Portsmouth Harbour SPA	Dark-bellied brent goose (W)
UK11057	Ribble & Alt Estuaries Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK11057	Ribble & Alt Estuaries Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11057	Ribble & Alt Estuaries Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9005103	Ribble and Alt Estuaries SPA	Dunlin (W)
UK9005103	Ribble and Alt Estuaries SPA	Seabird assemblage
UK9005103	Ribble and Alt Estuaries SPA	Eurasian teal (W)
UK9005103	Ribble and Alt Estuaries SPA	Red knot (W)
UK9005103	Ribble and Alt Estuaries SPA	Northern lapwing (W)
UK9005103	Ribble and Alt Estuaries SPA	European golden plover (W)
UK9005103	Ribble and Alt Estuaries SPA	Waterfowl assemblage
UK9005103	Ribble and Alt Estuaries SPA	Eurasian oystercatcher (W)
UK9005103	Ribble and Alt Estuaries SPA	Black (common) scoter (W)
UK9005103	Ribble and Alt Estuaries SPA	Sanderling (W)
UK9005103	Ribble and Alt Estuaries SPA	Northern pintail (W)
UK9005103	Ribble and Alt Estuaries SPA	Grey plover (W)
UK9005103	Ribble and Alt Estuaries SPA	Eurasian wigeon (W)
UK9005103	Ribble and Alt Estuaries SPA	Common shelduck (W)
UK9005103	Ribble and Alt Estuaries SPA	Pink-footed goose (W)
UK9005103	Ribble and Alt Estuaries SPA	Whooper swan (W)
UK9005103	Ribble and Alt Estuaries SPA	Tundra swan (W)
UK9005103	Ribble and Alt Estuaries SPA	Great cormorant (W)
UK9005103	Ribble and Alt Estuaries SPA	Greater scaup (W)
UK9005103	Ribble and Alt Estuaries SPA	Lesser black-backed gull (B)
UK9005103	Ribble and Alt Estuaries SPA	Sanderling (P)
UK9005103	Ribble and Alt Estuaries SPA	Ringed plover (P)
UK9005103	Ribble and Alt Estuaries SPA	Common tern (B)
UK9005103	Ribble and Alt Estuaries SPA	Black-headed gull (B)
UK9005103	Ribble and Alt Estuaries SPA	Common redshank (W)
UK9005103	Ribble and Alt Estuaries SPA	Common redshank (P)
UK9005103	Ribble and Alt Estuaries SPA	Eurasian curlew (W)
UK9005103	Ribble and Alt Estuaries SPA	Whimbrel (P)
UK9005103	Ribble and Alt Estuaries SPA	Black-tailed godwit (W)
UK9005103	Ribble and Alt Estuaries SPA	Ruff (B)
UK9005103	Ribble and Alt Estuaries SPA	Bar-tailed godwit (W)
UK0030246	Richmond Park SAC	Lucanus cervus
UK0013016	River Avon SAC	Water courses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation
UK0013016	River Avon SAC	Vertigo moulinsiana
UK0013016	River Avon SAC	Petromyzon marinus
UK0013016	River Avon SAC	Lampetra planeri
UK0013016	River Avon SAC	Salmo salar
UK0013016	River Avon SAC	Cottus gobio
UK0030252	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	Water courses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation

UK0030252	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	<i>Petromyzon marinus</i>
UK0030252	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	<i>Lampetra planeri</i>
UK0030252	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	<i>Lampetra fluviatilis</i>
UK0030252	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	<i>Salmo salar</i>
UK0030252	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	<i>Cottus gobio</i>
UK0030252	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	<i>Lutra lutra</i>
UK0030252	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	<i>Luronium natans</i>
UK0030253	River Derwent SAC	Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
UK0030253	River Derwent SAC	<i>Petromyzon marinus</i>
UK0030253	River Derwent SAC	<i>Lampetra fluviatilis</i>
UK0030253	River Derwent SAC	<i>Cottus gobio</i>
UK0030253	River Derwent SAC	<i>Lutra lutra</i>
UK0012599	River Itchen SAC	Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
UK0012599	River Itchen SAC	<i>Coenagrion mercuriale</i>
UK0012599	River Itchen SAC	<i>Austropotamobius pallipes</i>
UK0012599	River Itchen SAC	<i>Lampetra planeri</i>
UK0012599	River Itchen SAC	<i>Salmo salar</i>
UK0012599	River Itchen SAC	<i>Cottus gobio</i>
UK0012599	River Itchen SAC	<i>Lutra lutra</i>
UK0030257	River Lambourn SAC	Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
UK0030257	River Lambourn SAC	<i>Lampetra planeri</i>
UK0030257	River Lambourn SAC	<i>Cottus gobio</i>
UK0012642	River Wye/ Afon Gwy SAC	Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
UK0012642	River Wye/ Afon Gwy SAC	Transition mires and quaking bogs
UK0012642	River Wye/ Afon Gwy SAC	<i>Austropotamobius pallipes</i>
UK0012642	River Wye/ Afon Gwy SAC	<i>Petromyzon marinus</i>
UK0012642	River Wye/ Afon Gwy SAC	<i>Lampetra planeri</i>
UK0012642	River Wye/ Afon Gwy SAC	<i>Lampetra fluviatilis</i>
UK0012642	River Wye/ Afon Gwy SAC	<i>Alosa alosa</i>
UK0012642	River Wye/ Afon Gwy SAC	<i>Alosa fallax</i>
UK0012642	River Wye/ Afon Gwy SAC	<i>Salmo salar</i>
UK0012642	River Wye/ Afon Gwy SAC	<i>Cottus gobio</i>
UK0012642	River Wye/ Afon Gwy SAC	<i>Lutra lutra</i>
UK0030265	Rixton Clay Pits SAC	<i>Triturus cristatus</i>
UK0030266	Rochdale Canal SAC	<i>Luronium natans</i>
UK0030058	Rook Clift SAC	<i>Tilio-Acerion</i> forests of slopes, scree and ravines
UK11060	Rostherne Mere Ramsar	1 - sites containing representative, rare or unique wetland types
UK0019834	Roudsea Wood and Mosses SAC	Active raised bogs
UK0019834	Roudsea Wood and Mosses SAC	Degraded raised bogs still capable of natural regeneration
UK0019834	Roudsea Wood and Mosses SAC	<i>Tilio-Acerion</i> forests of slopes, scree and ravines
UK0019834	Roudsea Wood and Mosses SAC	<i>Taxus baccata</i> woods of the British Isles
UK0012683	Salisbury Plain SAC	<i>Juniperus communis</i> formations on heaths or calcareous grasslands
UK0012683	Salisbury Plain SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)

UK0012683	Salisbury Plain SAC	Euphydryas (Eurodryas, Hypodryas) aurinia
UK9011102	Salisbury Plain SPA	Eurasian hobby (B)
UK9011102	Salisbury Plain SPA	Common quail (B)
UK9011102	Salisbury Plain SPA	Stone-curlew (B)
UK9011102	Salisbury Plain SPA	Hen harrier (W)
UK0030270	Saltfleetby–Theddlethorpe Dunes and Gibraltar Point SA	Embryonic shifting dunes
UK0030270	Saltfleetby–Theddlethorpe Dunes and Gibraltar Point SA	"Shifting dunes along the shoreline with Ammophila arenaria (""white dunes"")"
UK0030270	Saltfleetby–Theddlethorpe Dunes and Gibraltar Point SA	"Fixed coastal dunes with herbaceous vegetation (""grey dunes"")"
UK0030270	Saltfleetby–Theddlethorpe Dunes and Gibraltar Point SA	Dunes with Hippophthalmoides
UK0030270	Saltfleetby–Theddlethorpe Dunes and Gibraltar Point SA	Humid dune slacks
UK0013076	Sefton Coast SAC	Embryonic shifting dunes
UK0013076	Sefton Coast SAC	"Shifting dunes along the shoreline with Ammophila arenaria (""white dunes"")"
UK0013076	Sefton Coast SAC	"Fixed coastal dunes with herbaceous vegetation (""grey dunes"")"
UK0013076	Sefton Coast SAC	Atlantic decalcified fixed dunes (Calluno-Ulicetea)
UK0013076	Sefton Coast SAC	Dunes with Salix repens ssp. argentea (Salicion arenariae)
UK0013076	Sefton Coast SAC	Humid dune slacks
UK0013076	Sefton Coast SAC	Triturus cristatus
UK0013076	Sefton Coast SAC	Petalophyllum ralfsii
UK11081	Severn Estuary Ramsar	3 - supports populations of plant/animal species important for maintaining regional biodiversity
UK11081	Severn Estuary Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11081	Severn Estuary Ramsar	1 - sites containing representative, rare or unique wetland types
UK11081	Severn Estuary Ramsar	4 - supports plant/animal species at a critical stage in their life cycles, or provides refuge
UK11081	Severn Estuary Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11081	Severn Estuary Ramsar	8 - important source of food for fishes, spawning ground, nursery and/or migration path
UK9015022	Severn Estuary SPA	Dunlin (W)
UK9015022	Severn Estuary SPA	Waterfowl assemblage
UK9015022	Severn Estuary SPA	Tundra swan (W)
UK9015022	Severn Estuary SPA	Gadwall (W)
UK9015022	Severn Estuary SPA	Common redshank (W)
UK9015022	Severn Estuary SPA	Greater white-fronted goose (W)
UK9015022	Severn Estuary SPA	Common shelduck (W)
UK0013030	Severn Estuary/Môr Hafren SAC	Sandbanks which are slightly covered by sea water all the time
UK0013030	Severn Estuary/Môr Hafren SAC	Estuaries
UK0013030	Severn Estuary/Môr Hafren SAC	Mudflats and sandflats not covered by seawater at low tide
UK0013030	Severn Estuary/Môr Hafren SAC	Reefs
UK0013030	Severn Estuary/Môr Hafren SAC	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
UK0013030	Severn Estuary/Môr Hafren SAC	Petromyzon marinus
UK0013030	Severn Estuary/Môr Hafren SAC	Lampetra fluviatilis
UK0013030	Severn Estuary/Môr Hafren SAC	Alosa fallax
UK0030376	Shell Flat and Lune Deep SAC	Sandbanks which are slightly covered by sea water all the time
UK0030376	Shell Flat and Lune Deep SAC	Reefs
UK0030337	Singleton and Cocking Tunnels SAC	Barbastella barbastellus
UK0030337	Singleton and Cocking Tunnels SAC	Myotis bechsteini

UK0030276	Skipwith Common SAC	Northern Atlantic wet heaths with <i>Erica tetralix</i>
UK0030276	Skipwith Common SAC	European dry heaths
UK11063	Solent & Southampton Water Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11063	Solent & Southampton Water Ramsar	1 - sites containing representative, rare or unique wetland types
UK11063	Solent & Southampton Water Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK11063	Solent & Southampton Water Ramsar	5 - regularly supports 20,000 or more waterbirds
UK0017073	Solent and Isle of Wight Lagoons SAC	Coastal lagoons
UK9011061	Solent and Southampton Water SPA	Sandwich tern (B)
UK9011061	Solent and Southampton Water SPA	Ringed plover (W)
UK9011061	Solent and Southampton Water SPA	Black-tailed godwit (W)
UK9011061	Solent and Southampton Water SPA	Mediterranean gull (B)
UK9011061	Solent and Southampton Water SPA	Dark-bellied brent goose (W)
UK9011061	Solent and Southampton Water SPA	Eurasian teal (W)
UK9011061	Solent and Southampton Water SPA	Little tern (B)
UK9011061	Solent and Southampton Water SPA	Common tern (B)
UK9011061	Solent and Southampton Water SPA	Roseate tern (B)
UK9011061	Solent and Southampton Water SPA	Waterfowl assemblage
UK0030059	Solent Maritime SAC	Sandbanks which are slightly covered by sea water all the time
UK0030059	Solent Maritime SAC	Estuaries
UK0030059	Solent Maritime SAC	Mudflats and sandflats not covered by seawater at low tide
UK0030059	Solent Maritime SAC	Coastal lagoons
UK0030059	Solent Maritime SAC	Annual vegetation of drift lines
UK0030059	Solent Maritime SAC	Perennial vegetation of stony banks
UK0030059	Solent Maritime SAC	Salicornia and other annuals colonizing mud and sand
UK0030059	Solent Maritime SAC	Spartina swards ( <i>Spartinion maritimae</i> )
UK0030059	Solent Maritime SAC	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
UK0030059	Solent Maritime SAC	"Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes")"
UK0030059	Solent Maritime SAC	<i>Vertigo moulinsiana</i>
UK11064	Somerset Levels & Moors Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11064	Somerset Levels & Moors Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK11064	Somerset Levels & Moors Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9010031	Somerset Levels and Moors SPA	Tundra swan (W)
UK9010031	Somerset Levels and Moors SPA	Northern lapwing (W)
UK9010031	Somerset Levels and Moors SPA	European golden plover (W)
UK9010031	Somerset Levels and Moors SPA	Eurasian teal (W)
UK9010031	Somerset Levels and Moors SPA	Waterfowl assemblage
UK9007022	South Pennine Moors Phase 2 SPA	Breeding bird assemblage
UK9007022	South Pennine Moors Phase 2 SPA	Short-eared owl (B)
UK9007022	South Pennine Moors Phase 2 SPA	European golden plover (B)
UK9007022	South Pennine Moors Phase 2 SPA	Merlin (B)
UK0030280	South Pennine Moors SAC	Northern Atlantic wet heaths with <i>Erica tetralix</i>
UK0030280	South Pennine Moors SAC	European dry heaths
UK0030280	South Pennine Moors SAC	Blanket bogs (* if active bog)



UK0030280	South Pennine Moors SAC	Transition mires and quaking bogs
UK0030280	South Pennine Moors SAC	Old sessile oak woods with Ilex and Blechnum in the British Isles
UK11065	South West London Waterbodies Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9012171	South West London Waterbodies SPA	Northern shoveler (W)
UK9012171	South West London Waterbodies SPA	Gadwall (W)
UK0030061	South Wight Maritime SAC	Reefs
UK0030061	South Wight Maritime SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0030061	South Wight Maritime SAC	Submerged or partially submerged sea caves
UK0019863	St Albans Head to Durlston Head SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts
UK0019863	St Albans Head to Durlston Head SAC	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
UK0019863	St Albans Head to Durlston Head SAC	Rhinolophus ferrumequinum
UK0019863	St Albans Head to Durlston Head SAC	Gentianella anglica
UK0030284	Strensall Common SAC	Northern Atlantic wet heaths with Erica tetralix
UK0030284	Strensall Common SAC	European dry heaths
UK0030382	Studland to Portland SAC	Reefs
UK0030285	Subberthwaite, Blawith and Torver Low Commons SAC	Transition mires and quaking bogs
UK0030285	Subberthwaite, Blawith and Torver Low Commons SAC	Depressions on peat substrates of the Rhynchosporion
UK11068	Teesmouth & Cleveland Coast Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11068	Teesmouth & Cleveland Coast Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9006061	Teesmouth and Cleveland Coast SPA	Red knot (W)
UK9006061	Teesmouth and Cleveland Coast SPA	Waterfowl assemblage
UK9006061	Teesmouth and Cleveland Coast SPA	Great cormorant (W)
UK9006061	Teesmouth and Cleveland Coast SPA	Common shelduck (W)
UK9006061	Teesmouth and Cleveland Coast SPA	Eurasian teal (W)
UK9006061	Teesmouth and Cleveland Coast SPA	Northern shoveler (W)
UK9006061	Teesmouth and Cleveland Coast SPA	Common redshank (P)
UK9006061	Teesmouth and Cleveland Coast SPA	Sanderling (W)
UK9006061	Teesmouth and Cleveland Coast SPA	Sandwich tern (P)
UK9006061	Teesmouth and Cleveland Coast SPA	Little tern (B)
UK11082	The Dee Estuary Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11082	The Dee Estuary Ramsar	2 - supports vulnerable, endangered, or critically endangered species or threatened eco. communities
UK11082	The Dee Estuary Ramsar	5 - regularly supports 20,000 or more waterbirds
UK11082	The Dee Estuary Ramsar	1 - sites containing representative, rare or unique wetland types
UK9013011	The Dee Estuary SPA	Eurasian oystercatcher (W)
UK9013011	The Dee Estuary SPA	Waterfowl assemblage
UK9013011	The Dee Estuary SPA	Common shelduck (W)
UK9013011	The Dee Estuary SPA	Eurasian teal (W)
UK9013011	The Dee Estuary SPA	Northern pintail (W)
UK9013011	The Dee Estuary SPA	Red knot (W)
UK9013011	The Dee Estuary SPA	Dunlin (W)
UK9013011	The Dee Estuary SPA	Black-tailed godwit (W)
UK9013011	The Dee Estuary SPA	Common tern (B)
UK9013011	The Dee Estuary SPA	Sandwich tern (P)

UK9013011	The Dee Estuary SPA	Common redshank (P)
UK9013011	The Dee Estuary SPA	Bar-tailed godwit (W)
UK9013011	The Dee Estuary SPA	Little tern (B)
UK9013011	The Dee Estuary SPA	Eurasian curlew (W)
UK9013011	The Dee Estuary SPA	Common redshank (W)
UK9013011	The Dee Estuary SPA	Grey plover (W)
UK0012716	The Mens SAC	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)
UK0012716	The Mens SAC	Barbastella barbastellus
UK0012557	The New Forest SAC	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
UK0012557	The New Forest SAC	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
UK0012557	The New Forest SAC	Northern Atlantic wet heaths with Erica tetralix
UK0012557	The New Forest SAC	European dry heaths
UK0012557	The New Forest SAC	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
UK0012557	The New Forest SAC	Transition mires and quaking bogs
UK0012557	The New Forest SAC	Depressions on peat substrates of the Rhynchosporion
UK0012557	The New Forest SAC	Alkaline fens
UK0012557	The New Forest SAC	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)
UK0012557	The New Forest SAC	Asperulo-Fagetum beech forests
UK0012557	The New Forest SAC	Old acidophilous oak woods with Quercus robur on sandy plains
UK0012557	The New Forest SAC	Bog woodland
UK0012557	The New Forest SAC	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)
UK0012557	The New Forest SAC	Coenagrion mercuriale
UK0012557	The New Forest SAC	Lucanus cervus
UK0012557	The New Forest SAC	Triturus cristatus
UK0017075	The Wash and North Norfolk Coast SAC	Sandbanks which are slightly covered by sea water all the time
UK0017075	The Wash and North Norfolk Coast SAC	Mudflats and sandflats not covered by seawater at low tide
UK0017075	The Wash and North Norfolk Coast SAC	Coastal lagoons
UK0017075	The Wash and North Norfolk Coast SAC	Large shallow inlets and bays
UK0017075	The Wash and North Norfolk Coast SAC	Reefs
UK0017075	The Wash and North Norfolk Coast SAC	Salicornia and other annuals colonizing mud and sand
UK0017075	The Wash and North Norfolk Coast SAC	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
UK0017075	The Wash and North Norfolk Coast SAC	Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticosi)
UK0017075	The Wash and North Norfolk Coast SAC	Lutra lutra
UK0017075	The Wash and North Norfolk Coast SAC	Phoca vitulina
UK11072	The Wash Ramsar	1 - sites containing representative, rare or unique wetland types
UK11072	The Wash Ramsar	3 - supports populations of plant/animal species important for maintaining regional biodiversity
UK11072	The Wash Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK11072	The Wash Ramsar	5 - regularly supports 20,000 or more waterbirds
UK9008021	The Wash SPA	Ruddy turnstone (W)
UK9008021	The Wash SPA	Common redshank (W)
UK9008021	The Wash SPA	Common tern (B)
UK9008021	The Wash SPA	Little tern (B)
UK9008021	The Wash SPA	Bar-tailed godwit (W)

UK9008021	The Wash SPA	Grey plover (W)
UK9008021	The Wash SPA	Eurasian curlew (W)
UK9008021	The Wash SPA	Gadwall (W)
UK9008021	The Wash SPA	Waterfowl assemblage
UK9008021	The Wash SPA	Pink-footed goose (W)
UK9008021	The Wash SPA	Dark-bellied brent goose (W)
UK9008021	The Wash SPA	Sanderling (W)
UK9008021	The Wash SPA	Eurasian wigeon (W)
UK9008021	The Wash SPA	Black-tailed godwit (W)
UK9008021	The Wash SPA	Northern pintail (W)
UK9008021	The Wash SPA	Black (common) scoter (W)
UK9008021	The Wash SPA	Common goldeneye (W)
UK9008021	The Wash SPA	Eurasian oystercatcher (W)
UK9008021	The Wash SPA	Red knot (W)
UK9008021	The Wash SPA	Tundra swan (W)
UK9008021	The Wash SPA	Dunlin (W)
UK9008021	The Wash SPA	Common shelduck (W)
UK9005171	Thorne and Hatfield Moors SPA	European nightjar (B)
UK0012915	Thorne Moor SAC	Degraded raised bogs still capable of natural regeneration
UK11076	Walmore Common Ramsar	6 - regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
UK9007051	Walmore Common SPA	Tundra swan (W)
UK9012132	Wealden Heaths Phase 2 SPA	European nightjar (B)
UK9012132	Wealden Heaths Phase 2 SPA	Wood lark (B)
UK9012132	Wealden Heaths Phase 2 SPA	Dartford warbler (B)
UK0013595	West Midlands Mosses SAC	Natural dystrophic lakes and ponds
UK0013595	West Midlands Mosses SAC	Transition mires and quaking bogs
UK0030301	Wimbledon Common SAC	Northern Atlantic wet heaths with Erica tetralix
UK0030301	Wimbledon Common SAC	European dry heaths
UK0030301	Wimbledon Common SAC	Lucanus cervus
UK0014794	Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlu	Rhinolophus hipposideros
UK0014794	Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlu	Rhinolophus ferrumequinum
UK0012727	Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC	Asperulo-Fagetum beech forests
UK0012727	Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC	Tilio-Acerion forests of slopes, scree and ravines
UK0012727	Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC	Taxus baccata woods of the British Isles
UK0012727	Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC	Rhinolophus hipposideros



# Appendix C

## In Combination Assessment Tables

Site Code	Site Name	Count within 10km of a Licence Block
UK0012557	The New Forest SAC	5
UK0012577	Craigengar SAC	4
UK0012599	River Itchen SAC	2
UK0012642	River Wye/ Afon Gwy SAC	5
UK0012658	Mells Valley SAC	2
UK0012683	Salisbury Plain SAC	5
UK0012685	Gower Commons/ Tiroedd Comin Gwyr SAC	3
UK0012691	River Tweed SAC	4
UK0012715	Ebernoe Common SAC	2
UK0012716	The Mens SAC	2
UK0012720	Epping Forest SAC	3
UK0012723	East Hampshire Hangers SAC	3
UK0012727	Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC	5
UK0012734	Avon Gorge Woodlands SAC	3
UK0012740	Birklands and Bilhaugh SAC	7
UK0012767	Kingley Vale SAC	5
UK0012817	Gang Mine SAC	3
UK0012844	Lower Derwent Valley SAC	9
UK0012845	Oxford Meadows SAC	2
UK0012885	Crymlyn Bog/ Cors Crymlyn SAC	3
UK0012889	Cothill Fen SAC	3
UK0012915	Thorne Moor SAC	3
UK0012970	Oak Mere SAC	5
UK0013016	River Avon SAC	5
UK0013027	Morecambe Bay SAC	6
UK0013036	Flamborough Head SAC	7
UK0013076	Sefton Coast SAC	5
UK0013089	Clyde Valley Woods SAC	6
UK0013595	West Midlands Mosses SAC	9
UK0014775	North Pennine Dales Meadows SAC	2
UK0014794	Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena SAC	6
UK0016254	Isle of Wight Downs SAC	7
UK0016372	North Meadow and Clattinger Farm SAC	2
UK0016373	Chilmark Quarries SAC	2
UK0017073	Solent and Isle of Wight Lagoons SAC	8
UK0017075	The Wash and North Norfolk Coast SAC	3
UK0019757	Black Loch Moss SAC	6
UK0019758	Blawhorn Moss SAC	5
UK0019759	Braehead Moss SAC	5
UK0019762	Cranley Moss SAC	3
UK0019765	Waukenwae Moss SAC	4
UK0019768	North Shotts Moss SAC	6
UK0019857	Dorset Heaths SAC	9
UK0019859	Peak District Dales SAC	5
UK0019861	Isle of Portland to Studland Cliffs SAC	8
UK0019863	St Albans Head to Durlston Head SAC	5
UK0020019	Carmarthen Bay Dunes/ Twyni Bae Caerfyrddin SAC	2
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC	3
UK0030036	Denby Grange Colliery Ponds SAC	4
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC	8
UK0030039	Eller's Wood and Sand Dale SAC	6
UK0030048	Mendip Woodlands SAC	5
UK0030052	North Somerset and Mendip Bats SAC	6
UK0030058	Rook Clift SAC	4
UK0030059	Solent Maritime SAC	13
UK0030061	South Wight Maritime SAC	7
UK0030070	Cernydd Carmel SAC	2

UK0030086	Beast Cliff – Whitby (Robin Hood's Bay) SAC	4
UK0030087	Bee's Nest and Green Clay Pits SAC	3
UK0030103	Butser Hill SAC	4
UK0030105	Caeau Mynydd Mawr SAC	2
UK0030106	Calf Hill and Cragg Woods SAC	2
UK0030138	Duncton to Bignor Escarpment SAC	4
UK0030142	Arnecliff and Park Hole Woods SAC	2
UK0030148	Exmoor and Quantock Oakwoods SAC	3
UK0030157	Gower Ash Woods/ Coedydd Ynn Gwyr SAC	2
UK0030162	Hackpen Hill SAC	4
UK0030163	Halkyn Mountain/ Mynydd Helygain SAC	6
UK0030166	Hatfield Moor SAC	3
UK0030170	Humber Estuary SAC	7
UK0030184	Little Wittenham SAC	3
UK0030200	Manchester Mosses SAC	4
UK0030203	Mendip Limestone Grasslands SAC	5
UK0030215	Moorfoot Hills SAC	2
UK0030228	North York Moors SAC	15
UK0030246	Richmond Park SAC	5
UK0030252	River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC	3
UK0030253	River Derwent SAC	20
UK0030265	Rixton Clay Pits SAC	4
UK0030266	Rochdale Canal SAC	3
UK0030270	Saltfleetby–Theddlethorpe Dunes and Gibraltar Point SAC	8
UK0030276	Skipwith Common SAC	4
UK0030280	South Pennine Moors SAC	13
UK0030284	Strensall Common SAC	7
UK0030301	Wimbledon Common SAC	6
UK0030313	Peeswit Moss SAC	2
UK0030316	West Fannyside Moss SAC	2
UK0030328	Briddlesford Copses SAC	6
UK0030332	Fen Bog SAC	2
UK0030337	Singleton and Cocking Tunnels SAC	5
UK0030366	Arun Valley SAC	3
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	9
UK0013030	Severn Estuary/Môr Hafren SAC	17
UK0030382	Studland to Portland SAC	8
UK0013027	Morecambe Bay Marine SAC	6
UK0013030	Severn Estuary/ Môr Hafren Marine SAC	17
UK0013036	Flamborough Head Marine SAC	7
UK0017073	Solent and Isle of Wight Lagoons Marine SAC	8
UK0017075	The Wash and North Norfolk Coast Marine SAC	3
UK0019861	Isle of Portland to Studland Cliffs Marine SAC	8
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd Marine SAC	3
UK0030059	Solent Maritime Marine SAC	13
UK0030061	South Wight Maritime Marine SAC	7
UK0030131	Dee Estuary/ Aber Dyfrdwy Marine SAC	9
UK0030170	Humber Estuary Marine SAC	7
UK0030382	Studland to Portland Marine SAC	8
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	11
UK9004231	Gladhouse Reservoir SPA	2
UK9004251	Westwater SPA	2
UK9004411	Firth of Forth SPA	8
UK9004451	Imperial Dock Lock, Leith SPA	2
UK9005031	Duddon Estuary SPA	4
UK9005081	Morecambe Bay SPA	6
UK9005103	Ribble and Alt Estuaries SPA	5
UK9005111	Martin Mere SPA	2
UK9005131	Mersey Estuary SPA	6
UK9005151	Bowland Fells SPA	5
UK9005171	Thorne and Hatfield Moors SPA	4

UK9006061	Teesmouth and Cleveland Coast SPA	3
UK9006092	Lower Derwent Valley SPA	9
UK9006101	Flamborough Head and Bempton Cliffs SPA	6
UK9006111	Humber Estuary SPA	9
UK9006161	North York Moors SPA	15
UK9006171	Hornsea Mere SPA	2
UK9007021	Peak District Moors (South Pennine Moors Phase 1) SPA	9
UK9007022	South Pennine Moors Phase 2 SPA	4
UK9007051	Walmore Common SPA	3
UK9008021	The Wash SPA	2
UK9008022	Gibraltar Point SPA	3
UK9010031	Somerset Levels and Moors SPA	4
UK9010101	Dorset Heathlands SPA	9
UK9010111	Poole Harbour SPA	8
UK9011011	Chichester and Langstone Harbours SPA	7
UK9011031	New Forest SPA	5
UK9011051	Portsmouth Harbour SPA	4
UK9011061	Solent and Southampton Water SPA	8
UK9011102	Salisbury Plain SPA	5
UK9012041	Pagham Harbour SPA	2
UK9012111	Lee Valley SPA	4
UK9012132	Wealden Heaths Phase 2 SPA	2
UK9012171	South West London Waterbodies SPA	3
UK9015011	Burry Inlet SPA	3
UK9015022	Severn Estuary SPA	17
UK9020281	Arun Valley SPA	3
UK9014091	Bae Caerfyrddin/ Carmarthen Bay SPA	2
UK9004441	Slamannan Plateau SPA	5
UK9004171	Forth Islands SPA	2
UK9020294	Liverpool Bay / Bae Lerpwl SPA	11
UK9013011	The Dee Estuary SPA	7
UK9004411	Firth of Forth Marine SPA	8
UK9005031	Duddon Estuary Marine SPA	4
UK9005081	Morecambe Bay Marine SPA	6
UK9005103	Ribble and Alt Estuaries Marine SPA	5
UK9005131	Mersey Estuary Marine SPA	6
UK9006061	Teesmouth and Cleveland Coast Marine SPA	3
UK9006111	Humber Estuary Marine SPA	9
UK9008021	The Wash Marine SPA	2
UK9008022	Gibraltar Point Marine SPA	3
UK9010111	Poole Harbour Marine SPA	8
UK9011011	Chichester and Langstone Harbours Marine SPA	7
UK9011051	Portsmouth Harbour Marine SPA	4
UK9011061	Solent and Southampton Water Marine SPA	8
UK9012041	Pagham Harbour Marine SPA	2
UK9015011	Burry Inlet Marine SPA	3
UK9015022	Severn Estuary Marine SPA	17
UK9014091	Bae Caerfyrddin/ Carmarthen Bay Marine SPA	2
UK9004171	Forth Islands Marine SPA	2
UK9020294	Liverpool Bay / Bae Lerpwl Marine SPA	11
UK9013011	The Dee Estuary Marine SPA	7
UK9020287	Mersey Narrows and North Wirral Foreshore Marine SPA	11
UK11004	Arun Valley Ramsar	3
UK11013	Chichester and Langstone Harbour Ramsar	7
UK11021	Dorset Heathlands Ramsar	9
UK11022	Duddon Estuary Ramsar	4
UK11027	Gibraltar Point Ramsar	3
UK11031	Humber Estuary Ramsar	9
UK11034	Lee Valley Ramsar	4
UK11037	Lower Derwent Valley Ramsar	9
UK11039	Martin Mere Ramsar	2

UK11041	Mersey Estuary Ramsar	6
UK11043	Midland Meres and Mosses Phase 1 Ramsar	11
UK11045	Morecambe Bay Ramsar	6
UK11047	New Forest Ramsar	5
UK11052	Pagham Harbour Ramsar	2
UK11054	Poole Harbour Ramsar	8
UK11055	Portsmouth Harbour Ramsar	4
UK11057	Ribble & Alt Estuaries Ramsar	5
UK11060	Rostherne Mere Ramsar	3
UK11063	Solent & Southampton Water Ramsar	8
UK11064	Somerset Levels & Moors Ramsar	4
UK11065	South West London Waterbodies Ramsar	3
UK11068	Teesmouth & Cleveland Coast Ramsar	3
UK11072	The Wash Ramsar	2
UK11076	Walmore Common Ramsar	3
UK11080	Midland Meres and Mosses Phase 2 Ramsar	10
UK11081	Severn Estuary Ramsar	17
UK13017	Firth of Forth Ramsar	8
UK13021	Gladhouse Reservoir Ramsar	2
UK13060	Westwater Reservoir Ramsar	2
UK14001	Burry Inlet Ramsar	3
UK14006	Crymlyn Bog Ramsar	3
UK11082	The Dee Estuary Ramsar	7



Site Code	Site Name	Count within 1km of a Licence Block
UK0012642	River Wye/ Afon Gwy SAC	3
UK0012683	Salisbury Plain SAC	4
UK0012727	Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy SAC	2
UK0012740	Birklands and Bilhaugh SAC	3
UK0012767	Kingley Vale SAC	3
UK0012844	Lower Derwent Valley SAC	4
UK0012915	Thorne Moor SAC	2
UK0013016	River Avon SAC	2
UK0013027	Morecambe Bay SAC	5
UK0013036	Flamborough Head SAC	2
UK0013076	Sefton Coast SAC	2
UK0013595	West Midlands Mosses SAC	7
UK0014794	Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena SAC	4
UK0016254	Isle of Wight Downs SAC	3
UK0019857	Dorset Heaths SAC	6
UK0019861	Isle of Portland to Studland Cliffs SAC	5
UK0019863	St Albans Head to Durlston Head SAC	2
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd SAC	2
UK0030038	Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC	4
UK0030052	North Somerset and Mendip Bats SAC	2
UK0030059	Solent Maritime SAC	6
UK0030061	South Wight Maritime SAC	5
UK0030086	Beast Cliff – Whitby (Robin Hood's Bay) SAC	3
UK0030103	Butser Hill SAC	2
UK0030170	Humber Estuary SAC	3
UK0030203	Mendip Limestone Grasslands SAC	2
UK0030228	North York Moors SAC	6
UK0030246	Richmond Park SAC	2
UK0030253	River Derwent SAC	8
UK0030270	Saltfleetby–Theddlethorpe Dunes and Gibraltar Point SAC	2
UK0030280	South Pennine Moors SAC	5
UK0030284	Strensall Common SAC	2
UK0030301	Wimbledon Common SAC	2
UK0030328	Briddlesford Copses SAC	2
UK0030131	Dee Estuary/Aber Dyfrdwy SAC	6
UK0013030	Severn Estuary/Môr Hafren SAC	13
UK0030382	Studland to Portland SAC	4
UK0013027	Morecambe Bay Marine SAC	5
UK0013030	Severn Estuary/ Môr Hafren Marine SAC	13
UK0013036	Flamborough Head Marine SAC	2
UK0019861	Isle of Portland to Studland Cliffs Marine SAC	5
UK0020020	Carmarthen Bay and Estuaries/ Bae Caerfyrddin ac Aberoedd Marine SAC	2
UK0030059	Solent Maritime Marine SAC	6
UK0030061	South Wight Maritime Marine SAC	5
UK0030131	Dee Estuary/ Aber Dyfrdwy Marine SAC	6
UK0030170	Humber Estuary Marine SAC	3
UK0030382	Studland to Portland Marine SAC	4
UK9020287	Mersey Narrows and North Wirral Foreshore SPA	3
UK9005031	Duddon Estuary SPA	2
UK9005081	Morecambe Bay SPA	4
UK9005103	Ribble and Alt Estuaries SPA	2
UK9005131	Mersey Estuary SPA	4
UK9005151	Bowland Fells SPA	2
UK9005171	Thorne and Hatfield Moors SPA	2
UK9006061	Teesmouth and Cleveland Coast SPA	2
UK9006092	Lower Derwent Valley SPA	4
UK9006111	Humber Estuary SPA	4
UK9006161	North York Moors SPA	6

UK9007021	Peak District Moors (South Pennine Moors Phase 1) SPA	4
UK9010101	Dorset Heathlands SPA	6
UK9010111	Poole Harbour SPA	4
UK9011061	Solent and Southampton Water SPA	5
UK9011102	Salisbury Plain SPA	4
UK9015011	Burry Inlet SPA	2
UK9015022	Severn Estuary SPA	13
UK9020294	Liverpool Bay / Bae Lerpwl SPA	4
UK9013011	The Dee Estuary SPA	6
UK9005031	Duddon Estuary Marine SPA	2
UK9005081	Morecambe Bay Marine SPA	4
UK9005103	Ribble and Alt Estuaries Marine SPA	2
UK9005131	Mersey Estuary Marine SPA	4
UK9006061	Teesmouth and Cleveland Coast Marine SPA	2
UK9006111	Humber Estuary Marine SPA	4
UK9010111	Poole Harbour Marine SPA	4
UK9011061	Solent and Southampton Water Marine SPA	5
UK9015011	Burry Inlet Marine SPA	2
UK9015022	Severn Estuary Marine SPA	13
UK9020294	Liverpool Bay / Bae Lerpwl Marine SPA	4
UK9013011	The Dee Estuary Marine SPA	6
UK9020287	Mersey Narrows and North Wirral Foreshore Marine SPA	3
UK11021	Dorset Heathlands Ramsar	7
UK11022	Duddon Estuary Ramsar	2
UK11031	Humber Estuary Ramsar	4
UK11037	Lower Derwent Valley Ramsar	4
UK11041	Mersey Estuary Ramsar	4
UK11043	Midland Meres and Mosses Phase 1 Ramsar	7
UK11045	Morecambe Bay Ramsar	4
UK11054	Poole Harbour Ramsar	4
UK11057	Ribble & Alt Estuaries Ramsar	2
UK11063	Solent & Southampton Water Ramsar	5
UK11068	Teesmouth & Cleveland Coast Ramsar	2
UK11080	Midland Meres and Mosses Phase 2 Ramsar	5
UK11081	Severn Estuary Ramsar	13
UK14001	Burry Inlet Ramsar	2
UK11082	The Dee Estuary Ramsar	6



## Appendix D

# Completed Assessment Proformas



# Appendix E

## Completed Assessment Figures

