

UK OFFSHORE ENERGY SEA (UK OESEA2)

Future Leasing/Licensing for Offshore Renewable Energy, Offshore Oil & Gas and Gas Storage and Associated Infrastructure

Scoping for Environmental Report

March 2010

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1 INTRODUCTION AND SCOPE

1.1 Scoping document purpose

This SEA Scoping Document has been prepared as part of the Department of Energy and Climate Change (DECC) UK Offshore Energy Strategic Environmental Assessment programme. The SEA process aims to help inform licensing and leasing decisions by considering the environmental implications of proposed plans/programmes and the potential activities which could result from implementation.

As part of this programme, an Environmental Report was issued in January 2009 (hereafter referred to as UK OESEA). UK OESEA considered the environmental implications of a draft plan/programme to enable: further seaward rounds of oil and gas licensing, including gas storage in UK waters; and further rounds of offshore wind farm leasing in the UK Renewable Energy Zone¹ and the territorial waters of England and Wales to a depth of 60m. The objective of the wind leasing was to achieve some 25GW of generation capacity, in addition to the 8GW already constructed or in planning. A Post Consultation Report on the UK OESEA was issued in June 2009, followed by government decisions; on the offshore wind element in the form of the policy document, “A Prevailing Wind: Advancing UK Offshore Wind Deployment”²; and on the hydrocarbon licensing with the announcement a 26th Seaward Round.

During 2010, DECC propose to undertake an exercise to update and extend the scope of the Environmental Report and issue it for consultation to enable further licensing/leasing for offshore energy (oil and gas, gas storage including carbon capture and storage (CCS) and marine renewables). To distinguish it from the 2009 Environmental Report, the updated and extended ER will be referred to as OESEA2.

During the preparation of OESEA2, new information on the natural environment, existing uses of the sea, and legislation and management initiatives will be incorporated and the assessment revised to integrate the elements listed in Section 1.2 below.

The purpose of this SEA scoping report is to set out sufficient information on OESEA2 to enable the Consultation Bodies and Authorities to form a view and give feedback on the scope and level of detail appropriate for the environmental report and proposed consultation. The report is also intended to provide a basis for scoping consultation with other interested parties.

The SEA is being conducted in accordance with *The Environmental Assessment of Plans and Programmes Regulations 2004*. These regulations apply to any plan or programme which relates either solely to the whole or any part of England³ or to England and any other part of the UK.

¹ this part of the plan/programme did not include the territorial waters of Scotland and Northern Ireland

² DECC (2009). A Prevailing Wind: Advancing UK Offshore Wind Deployment. (<http://www.berr.gov.uk/files/file51989.pdf>)

³ Including the territorial waters of the United Kingdom that are not part of Northern Ireland, Scotland or Wales, and waters in any area for the time being designated under Section 1(7) of the *Continental Shelf Act 1964*.

1.2 The draft plan/programme and scope of the SEA

The DECC draft plan/programme under consideration is broad ranging and covers the majority of energy related activities in the UK marine environment. The elements of the draft plan/programme are:

Renewable energy:

1. Wave – to enable future leasing in the UK Renewable Energy Zone and the territorial waters of England and Wales. The Scottish Renewable Energy Zone and Northern Irish waters within the 12 nautical mile territorial sea limit are not included in this part of the plan/programme. In view of the relatively early stage of technological development, a target generation capacity is not set in the draft plan/programme.
2. Tidal stream – to enable future leasing in the UK Renewable Energy Zone and the territorial waters of England and Wales. The Scottish Renewable Energy Zone and Northern Irish waters within the 12 nautical mile territorial sea limit are not included in this part of the plan/programme. In view of the relatively early stage of technological development, a target generation capacity is not set in the draft plan/programme. Similarly, a minimum average tidal current velocity threshold is not proposed.
3. Tidal range – to enable future leasing in the territorial waters of England and Wales. The Severn tidal power schemes are not included as they are part of a separate DECC SEA initiative. It is considered unlikely that there will be tidal range developments outside of territorial waters.
4. Offshore wind – To enable further rounds of offshore wind farm leasing in the UK Renewable Energy Zone (see Figure 1.1) and the territorial waters of England and Wales with the objective of achieving some 33GW of generation capacity. The Scottish Renewable Energy Zone and Northern Irish waters within the 12 nautical mile territorial sea limit are not included in this part of the plan/programme.

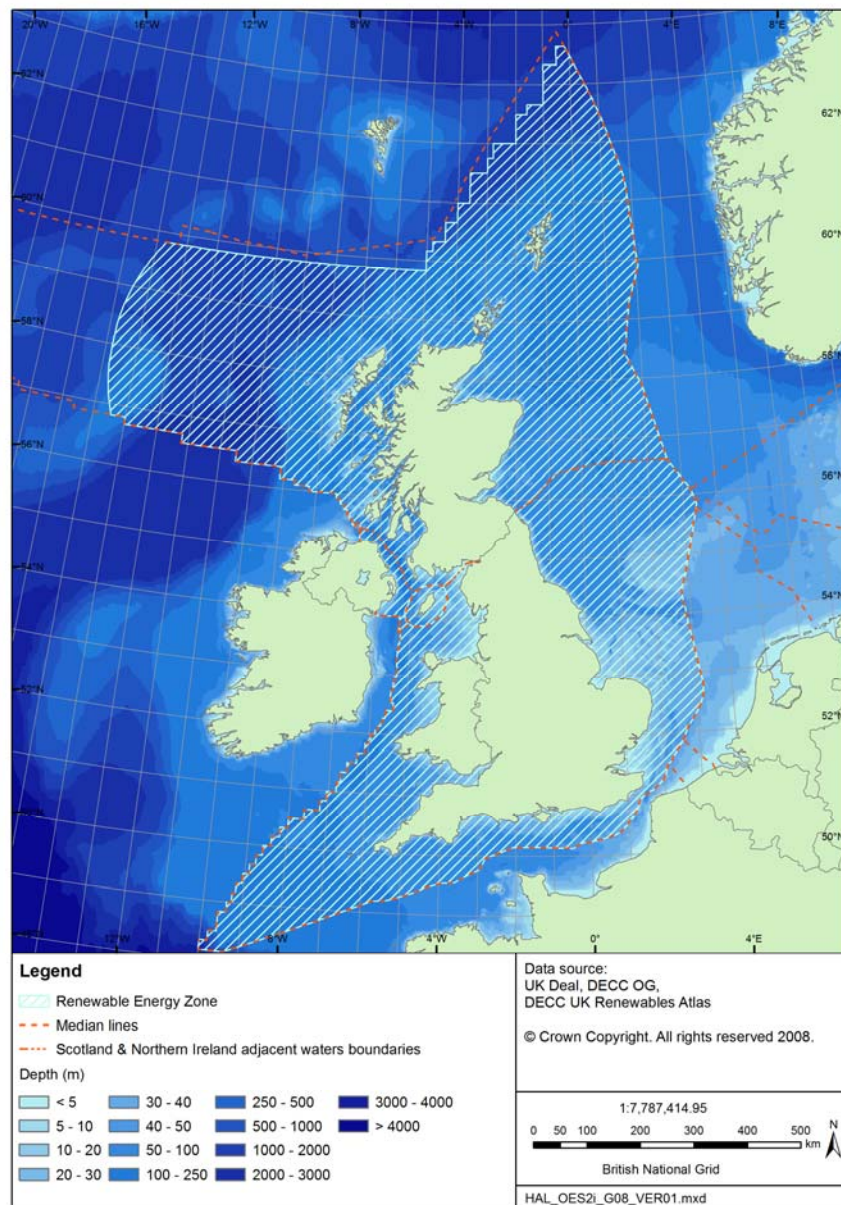
Oil and gas:

1. Exploration and production – to enable further Seaward Rounds of oil and gas licensing in UK waters.
2. Hydrocarbon gas importation and storage – to enable further licensing/leasing for unloading and underground storage of hydrocarbon gas in UK waters (territorial waters and the UK Gas Importation and Storage Zone). UK OESEA only covered gas storage in hydrocarbon reservoirs, OESEA2 would also consider hydrocarbon gas storage in other geological formations/structures including constructed salt caverns, and the offshore unloading of hydrocarbon gas.

Carbon dioxide:

1. Carbon dioxide transportation and storage – to enable licensing/leasing for underground storage of carbon dioxide gas in UK waters (territorial waters and the UK Gas Importation and Storage Zone). This SEA would consider CO₂ storage in geological formations/structures including depleted reservoirs, aquifers and constructed salt caverns, as well as the possibility of co-locating (clustering) of pipelines for CCS projects (see Section 1.4 below).

Figure 1.1 – UKCS median lines, Scotland and Northern Ireland adjacent waters and the Renewable Energy Zone



The indicative time horizon (i.e. period of currency) for this SEA is five years. Various legal and policy objectives and targets have long time scales (e.g. the 2008 Climate Change Act introduced legally binding 'carbon budgets', aiming to cut UK emissions on 1990 levels by 34% by 2020 and at least 80% by 2050). However, as several of the technologies covered in the draft plan/programme are likely to undergo rapid change, and various marine environmental management initiatives are underway, a five year time horizon for this SEA is considered appropriate. This indicative time horizon will be periodically reviewed by DECC (as the competent authority) in the context of new information on technologies, effects, or plan/programme status. For this SEA it is anticipated that renewable energy devices will not be deployed in water depths of more than 200m, with the majority of developments expected to be in water depths of less than 60m. No depth constraints are envisaged for hydrocarbon exploration and production, or hydrocarbon and other gas storage activities.

1.3 The requirement for SEA

Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment (commonly called the SEA Directive) was adopted to provide a strategic complement to the Council Directives (85/337/EEC and 97/11/EC) which require Environmental Impact Assessments of specific developments and activities.

The Directive's stated objective is

"to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development, by ensuring that, in accordance with this Directive, an environmental assessment is carried out of certain plans and programmes which are likely to have significant effects on the environment."

A series of regulations have been established across the United Kingdom to implement the requirements of the Directive.

The Environmental Assessment of Plans and Programmes Regulations 2004 (the SEA Regulations) apply to any plan or programme which relates either solely to the whole or any part of England⁴ or to England and any other part of the UK. The Regulations apply to plans/programmes whose first formal preparatory act was on or after 21 July 2004, and also, with retroactive effect, to those which have not been either adopted or submitted to a legislative procedure leading to adoption by 21 July 2006.

A required part of SEA is consultation with the consultation bodies and public, together with such neighbouring states as may be potentially affected.

1.4 Policy context

The 2007 Energy White Paper 'Meeting the Energy Challenge'⁵ outlined two serious long term challenges for the UK:

- Tackling climate change by reducing carbon dioxide emissions both within the UK and abroad; and
- Ensuring secure, clean and affordable energy as we become increasingly dependent on imported fuel.

The UK Government Low Carbon Transition Plan (2009)⁶ outlined how these challenges are to be met up to 2020 and in some cases beyond. The UK Government is committed to the reduction of greenhouse gas emissions by 80% on 1990 levels by 2050, with an

⁴ Including the territorial waters of the United Kingdom that are not part of Northern Ireland, Scotland or Wales, and waters in any area for the time being designated under Section 1(7) of the *Continental Shelf Act 1964*.

⁵ DTI (2007). Meeting the Energy Challenge: A White Paper on Energy. (<http://www.berr.gov.uk/files/file39387.pdf>)

⁶ ECC (2009). The Low Carbon Transition Plan. National Strategy for Climate and Energy. (http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx)

interim target of 34% by 2020. A key element in the delivery of these targets is to secure energy supplies by ensuring a supportive climate for the substantial new investment needed to bring forward low carbon infrastructure, and maximise the economic production of offshore oil and gas to help secure the continued fossil fuel supplies needed during the transition.

The UK has a legally binding target to generate 15% of energy from renewable sources by 2020, stemming from the EU Renewable Energy Directive, and scenarios for achieving this are outlined in the UK Government Renewable Energy Strategy (2009)⁷. The strategy recognises that offshore wind, wave and tidal energy will play an important role in achieving this target.

To help facilitate the offshore grid required to convey electricity from offshore renewable energy devices to the UK mainland, the draft plan/programme also covers the strategic consideration of the implications of major development of offshore electricity infrastructure. National Grid Electricity Transmission as NETSO has the duty of ensuring a coordinated and efficient electricity grid both onshore and offshore. As part of this function, NETSO published an initial Offshore Development Information Statement (ODIS)⁸ for consultation in December 2009. The ODIS provides different scenarios to 2025 for offshore generation and gives NETSO's best view of how and where this generation might best connect to the onshore grid, and what onshore reinforcements would be required to accommodate the new generation. NETSO anticipates consulting in March 2010 on the scenarios it uses in the ODIS with a view to publishing the ODIS in September 2010 following approval by the Gas and Electricity Markets Authority. The ODIS will be updated subsequently on an annual basis.

The development of Carbon Capture and Storage (CCS) is another important element of the Low Carbon Transition Plan and the Framework for the Development of Clean Coal (FDCC)⁹ initiates a programme of CCS demonstration with the ambition to see CCS ready for wider deployment from 2020. CCS involves capturing carbon dioxide and transporting it for permanent storage in underground geological formations, for example in depleted gas and oil fields, or in saline aquifers. It has the potential to reduce emissions from power stations and other industrial installations by around 90%, but is not yet ready for general deployment. As part of the FDCC, the Government wishes to promote the co-location of CCS demonstrator projects, possibly yielding some cost saving benefits to the demonstrator programme through shared transportation and storage infrastructure. The UK is already considered to be a global leader in CCS and is seeking to strengthen this position and further drive the development and deployment of this technology.

A key objective in the Low Carbon Transition Plan is to secure energy supplies by ensuring a supportive climate for the substantial new investment needed to bring forward low carbon infrastructure, and maximise the economic production of oil and gas from the North Sea to help secure the continued fossil fuel supplies needed during the transition. The UK is presently a net importer of energy including oil and gas, with imports of gas being a particular concern, constituting 20% of natural gas consumed in the UK in 2008. The UK Government projects that by 2020 this will be 45% assuming that renewables

⁷ DECC (2009). The UK Renewable Energy Strategy.

(http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx)

⁸ National Grid (2009). Offshore Development Information Statement.

(<http://www.nationalgrid.com/uk/Electricity/ODIS/>)

⁹ DECC (2009). A framework for the development of clean coal: consultation document

(http://www.decc.gov.uk/en/content/cms/consultations/clean_coal/clean_coal.aspx)

targets are met. A linked factor in enhancing security of supply is the need for more gas storage capacity, since until recently seasonal fluctuations in UK gas demand were met by varying production rates from UK fields. The UK Government seeks a substantial addition to currently available facilities.

The draft plan/programme to be covered by this SEA will help to significantly contribute to the Government targets outlined above by enabling future rounds of renewable leasing for offshore wind, wave and tidal devices and licensing for seaward oil and gas rounds and gas storage (including CCS).

1.5 SEA consultation

1.5.1 Consultation process

Scoping

In accordance with the requirements of the relevant SEA Regulations, the period of consultation for this SEA scoping report will be five weeks. A copy of the scoping report will be sent to the relevant statutory consultation bodies/authorities (Section 1.5.2) with a formal request for their input. Input from other stakeholders is also welcomed and during this period, the scoping report will also be available to view or freely download from the SEA website. Registered users of the SEA website will be informed and an email alert will also be issued via an emailing advertising service. All feedback from the scoping consultation will be reviewed and, where appropriate, addressed in the Environmental Report. A report will be prepared of scoping feedback and a summary will be included as an Appendix of the Environmental Report. The scoping feedback will be used to inform the SEA process.

Workshops

It is proposed to hold a number of Stakeholder workshops during the conduct of the SEA.

Environmental Report

OESEA2 and the draft plan/programme will be issued for formal public consultation for a period of 12 weeks, during the latter part of 2010. During this period, OESEA2 will be available to view or freely download from the SEA website¹⁰. The public will also be able to order¹¹ CD copies of OESEA2 if preferred, via the website, by email or by mail. An email alert will be sent to all registered users of the SEA website. Other stakeholders will be variously alerted by, for example, emailing advertising service. Notices will be inserted in national and regional newspapers to inform the wider public of the SEA consultation. Copies of OESEA2 will be sent to statutory consultation bodies and authorities in the UK and to neighbouring states as required by Regulations.

Post consultation

Following the consultation period, a post consultation report will be prepared which will present a summary of the issues raised and other comments received during the public consultation. Where appropriate, responses and clarifications to comments will be included which provide factual and technical clarifications.

¹⁰ Various Technical Reports and copies of Reports from earlier DECC SEAs are also available from the SEA website

¹¹ These will be provided free of charge.

There are many considerations which DECC will take into account in making decisions regarding the draft plan/programme; the responses to the public consultation and the Environmental Report are important inputs to this process. A post adoption statement will be issued, describing *inter alia* how environmental considerations have been integrated into the plan or programme and how the Environmental Report and opinions expressed in response to the consultation has been taken into account in line with the requirements of the SEA Regulations.

In July 2008 the Government published a third version of the Code of Practice on Consultations which provides seven criteria for consultations – see extract below.

CODE OF PRACTICE ON CONSULTATION THE SEVEN CONSULTATION CRITERIA Criterion 1 When to consult Formal consultation should take place at a stage when there is scope to influence the policy outcome. Criterion 2 Duration of consultation exercises Consultations should normally last for at least 12 weeks with consideration given to longer timescales where feasible and sensible. Criterion 3 Clarity of scope and impact Consultation documents should be clear about the consultation process, what is being proposed, the scope to influence and the expected costs and benefits of the proposals. Criterion 4 Accessibility of consultation exercises Consultation exercises should be designed to be accessible to, and clearly targeted at, those people the exercise is intended to reach. Criterion 5 The burden of consultation Keeping the burden of consultation to a minimum is essential if consultations are to be effective and if consultees' buy-in to the process is to be obtained. Criterion 6 Responsiveness of consultation exercises Consultation responses should be analysed carefully and clear feedback should be provided to participants following the consultation. Criterion 7 Capacity to consult Officials running consultations should seek guidance in how to run an effective consultation exercise and share what they have learned from the experience. <i>Extract from Code of Practice on Consultation issued July 2008</i>
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1.5.2 Consultation bodies

Since the 2004 Regulations were made, a number of the nominated consultation bodies/authorities have been subject to organisational/name change. The following are the current statutory consultation bodies/authorities for this SEA:

- English Heritage
- Natural England (previously English Nature and the Countryside Agency)
- Environment Agency
- Historic Scotland
- Scottish Natural Heritage
- Scottish Environment Protection Agency
- Cadw (Welsh Assembly Government's historic environment division)
- Countryside Council for Wales
- Environment Agency (Wales)
- Department of Environment (NI) (Northern Ireland Environment Agency)

In addition, the Joint Nature Conservation Committee is included as a consultation body for this SEA. It is also proposed to include the wide range of interested stakeholders and the general public in the scoping consultation exercise.

Consultation Question

1. Do you have any comments on the proposed approach to consultation?

1.6 Context to licensing and leasing

1.6.1 Oil and gas

The exclusive rights to search and bore for and get petroleum in Great Britain, the territorial sea adjacent to the United Kingdom and on the UK Continental Shelf (UKCS) are vested in the Crown and the *Petroleum Act 1998* (as amended) gives the Secretary of State the power to grant licences to explore for and exploit these resources. The main type of offshore Licence is the Seaward Production Licence. Offshore licensing for oil and gas exploration and production commenced in 1964 and has progressed through a series of Seaward Licensing Rounds. A Seaward Production Licence may cover the whole or part of a specified Block or a group of Blocks. A Licence grants exclusive rights to the holders “to search and bore for, and get, petroleum” in the area covered by the Licence. A Licence does not confer any exemption from other legal/regulatory/fiscal requirements.

There are three types of Seaward Production Licences:

- Traditional Production Licences are the standard type of Seaward Production Licences and run for three successive periods or Terms. Each Licence expires automatically at the end of each Term, unless the Licensee has made enough progress to earn the chance to move into the next Term. The Initial Term lasts for four years and the Licence will only continue into a Second Term of four years if the agreed Work Programme has been completed and if 50% of the acreage has been relinquished. The Licence will only continue into a Third Term of 18 years if a development plan has been approved, and all the acreage outside that development has been relinquished.
- Frontier Production Licences are a variation of the Traditional Production Licence with four Terms rather than three. A Frontier Production Licence has a longer exploration phase (six years as opposed to four) with the objective of allowing companies to screen larger areas, during a three year Initial Term so they can look for a wider range of prospects. At the end of the Initial Term, the Licensee must relinquish 75% of the licensed acreage. The Second Term lasts three years at the end of which (i.e. when the Licence is six years old), the exploration Work Programme must have been completed and the Licensee must relinquish, 50% of what is left (i.e. leaving one eighth of the original licensed area). In this sense, the end of a Frontier Licence's Second Term corresponds to the end of a Traditional Licence's Initial Term.
- In the 21st Round (2002) the Department introduced Promote Licences. The general concept of the Promote Licence is that the Licensee is given two years after award to attract the technical, environmental and financial capacity to complete an agreed Work Programme. In effect, DECC will defer (not waive) its financial, technical and environmental checks until the preset Check Point. Promote Licensees are not allowed to carry out field operations until they have

met the full competence criteria. The way this is implemented is that each Promote Licence carries a "Drill-or-Drop" Initial Term Work Programme. The Licence will therefore expire after two years if the Licensee has not made a firm commitment to DECC to complete the Work Programme (e.g. to drill a well). By the same point, it must also have satisfied DECC of its technical, environmental and financial capacity to do so.

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

1.6.2 Gas storage

The *Energy Act 2008* makes provision for the designation of Gas Importation and Storage Zones and creates a licensing framework for the unloading and storage of combustible gas offshore. The Act prohibits the carrying out of the activities below except in accordance with a licence:

- use of a controlled place for the unloading of gas to an installation or pipeline
- use of a controlled place for the storage of gas
- conversion of any natural feature in a controlled place for the purpose of storing gas
- recovery of gas stored in a controlled place
- exploration of a controlled place with a view to gas storage
- establishment or maintenance in a controlled place of an installation for the purposes of activities within this subsection

A "controlled place" is a place in, under or over waters within the UK territorial sea, or within any area extending beyond the territorial sea that has been designated as a Gas Importation and Storage Zone under the Act.

Carrying on such an activity without a licence, and in certain cases the breach of the conditions of a licence, is a criminal offence.

The Competent Authority for the issuance and regulation of licences is DECC.

Operators will also need to obtain a grant of the appropriate rights from The Crown Estate.

This Act also makes provision with respect to the interaction between activities regulated under the Petroleum Act and gas storage activities.

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

1.6.3 Carbon dioxide storage

The *Energy Act 2008* also provides for a similar licensing regime governing the offshore storage of carbon dioxide and makes it an offence to carry out storage activities without a licence. The regime applies to storage in the offshore area comprising both the UK territorial sea, and any area extending beyond the territorial sea that has been designated as a Gas Importation and Storage Zone under the Act.

The Secretary of State for DECC is the Licensing Authority for offshore storage except in the case of the territorial sea adjacent to Scotland for which Scottish Ministers are the

Licensing Authority. In order to carry on such developments the developer will also need to obtain a grant of the appropriate rights from The Crown Estate.

The licensing regime was recently the subject of a consultation exercise which closed on 30th December 2009¹².

1.6.4 Offshore pipelines

The activities listed above will usually require a subsea pipeline for the purpose of exporting oil and gas, and for the transfer of gas or carbon dioxide to underground storage. In order to place and use/modify a pipeline on the continental shelf a Pipeline Works Authorisation (PWA) or PWA variation is required (as per Part III of the *Petroleum Act 1998*) for both gas, carbon dioxide transport (see consultation indicated in section 1.6.3 above) and offshore petroleum production activities, the consent for which is granted by DECC's Pipeline Works Authorisation Unit. Where a pipeline falls within territorial waters (i.e. within 12nm of the coast) a lease will be required for that section of the pipeline from The Crown Estate.

1.6.5 Offshore wind farms

Under *The Crown Estate Act 1961*, The Crown Estate represents the Crown as landowner of the UK seabed and areas of foreshore (www.thecrownestate.co.uk), as well as the holder of certain sovereign rights in respect of areas beyond the territorial sea. Such sovereign rights vest in the Crown by the virtue of the designation of such areas as a Gas Importation and Storage Zone (see above) or as a Renewable Energy Zone (see below). The Crown Estate's permission, in the form of a site option Agreement and Lease is required for the placement of structures or cables on the seabed, this includes offshore wind farms and their ancillary cables and other marine facilities. Potential offshore wind farm developers also require statutory consents from a number of Government departments before development can take place; During Rounds 1 and 2 of UK offshore wind farm development, successful applicants were awarded an option for a Lease by The Crown Estate. When all necessary statutory consents are obtained by the developer, The Crown Estate can grant a site lease for a development.

The *Energy Act 2004*, provided for the designation of Renewable Energy Zones from 12nm (nautical miles) out to 200nm in which rights under Part V of the UN Convention on the Law of the Sea may be exercised to exploit water or wind energy.

For Round 3, The Crown Estate proposed that development would be undertaken within exclusive Zones and exclusivity agreements were recently signed for nine Round 3 zones. Similarly (outside of the remit of the R3 programme and this plan/programme), The Crown Estate offered exclusivity agreements to companies and consortia for 10 zones in Scottish territorial waters in 2009 totalling ≈6.5GW.

Under the *Planning Act 2008*, the Infrastructure Planning Commission (IPC) will assume responsibility for consent applications for offshore electricity generating stations with a capacity of more than 100MW from 1 March 2010. After that, developer applications to the IPC will be under the Planning Act (which replaces the provisions of the *Electricity Act 1989*).

¹² DECC (2009) Consultation on the proposed offshore carbon dioxide storage licensing regime. (http://www.decc.gov.uk/en/content/cms/consultations/co2_storage/co2_storage.aspx)

The *Marine and Coastal Access Act 2009* provides for the creation of a Marine Management Organisation (MMO) which from 1 April 2010 will take over responsibility for processing offshore renewable energy generating station applications under section 36 of the *Electricity Act 1989* (and associated safety zone applications) for developments >1MW but below 100MW in English and Welsh territorial waters and the UK renewable energy zone. The process for making an application to the MMO (which will assume the former responsibilities of the Marine and Fisheries Agency) is expected to be very similar to that for developers applying for FEPA licences. In the Scottish renewable energy zone, Scottish Ministers are responsible for *Electricity Act 1989* consent decisions.

The *Energy Act 2004*, the *Energy Act 2008*, the *Planning Act 2008* and the *Marine and Coastal Access Act 2009*, together with Marine Bills brought forward by devolved administrations, provide a revised framework for the consenting of offshore wind farms.

1.6.6 Wave and tidal devices

The leasing and consenting processes for wave and tidal current renewable energy generating developments are as described above for offshore wind though tidal range developments consenting requirements may differ from those of offshore wind to reflect their potential to be land-connected. The Crown Estate has not, to date, carried out any wave or tidal energy leasing rounds for English and Welsh waters. In the absence of an SEA for these activities, The Crown Estate are limited to offering leases to projects wishing to test devices or small arrays; these are currently limited to projects of 10MW or 20 devices. In 2009 they launched a wave and tidal leasing round in the Pentland Firth strategic area on the basis of the work carried out by the Scottish Government towards an SEA for Scottish waters, and have also been working with Marine Scotland to identify future areas for potential wave and tidal exploitation. A Northern Ireland SEA for its territorial waters is due in March 2010, and The Crown Estate has been discussing potential opportunities and supporting actions for offshore renewable energy deployment with the Department of Energy, Trade and Industry (DETI). The carrying out of an SEA for wave and tidal devices in English and Welsh waters provides a basis for any future Crown Estate leasing rounds in England and Wales. It should be noted that the SEAs of the devolved administrations for renewable energy developments in their territorial waters are not part of this plan/programme.

1.7 Prospectivity

For commercial **hydrocarbon resources** to occur, a number of factors and features have to coincide, including:

- The presence of source rocks, with an appreciable organic matter content
- Adequate depth of burial to allow the conversion of the organic matter to oil or gas through the action of temperature and pressure
- The presence of rocks with sufficient porosity to allow the accumulation of oil or gas
- Cap or seal rocks to prevent the oil or gas from escaping from the reservoir rocks
- Migration pathways to permit oil and gas formed in the source rocks to move to reservoir formations

Such conditions typically occur in sedimentary basins, and not areas of igneous rock unless these overlay sedimentary rocks as in parts of the Faroe-Shetland Channel.

Offshore areas of the UK have been offered for oil and gas licensing in a series of rounds since 1964, with the 25th Round held in 2008. Areas with hydrocarbon prospectivity have

been extensively explored over this period and many fields brought into production, mainly in the North and Irish Seas, resulting in an extensive infrastructure which can be utilised by new developments, see Figure 1.2. There is a consensus view that the great majority of large fields in shelf depth waters (<200m) have been found, and deeper water areas are either not prospective or increasingly well explored and understood.

The UK has extensive **marine renewable energy** resources including wind, wave and tidal, all of which are variable over space and time (see Figures 1.3 - 1.6). In UK waters, offshore wind is the most developed of these technologies, see Figure 1.7. Rounds 1 and 2 of offshore wind leasing were held in 2000 and 2003 respectively and total generation capacity of all currently operational, in construction or consented wind farms is some 5.5 GW with a further 2.3 GW in planning. In January of this year, The Crown Estate announced that exclusivity zone agreements have been signed for nine Round 3 offshore wind zones: Moray Firth zone (1.3 GW); Firth of Forth zone, (3.5 GW); Dogger Bank zone, (9 GW); Hornsea zone (4 GW); East Anglia (Norfolk Bank zone), (7.2 GW); Southern Array (Hastings zone), (0.6 GW); West of Isle of Wight zone, (0.9 GW); Atlantic Array (Bristol Channel zone), (1.5 GW); Irish Sea zone (4.2 GW).

Away from the shelter of the coast, the total wind resource over a given year is relatively uniform across very large areas, although clearly the occurrence and strength of wind is dependant on a number of meteorological factors. At any point in time, while some areas of the UK may be calm, the wind is likely to be blowing elsewhere. Water depth, distance from areas of high electricity demand, and the availability of connection points to the onshore transmission grid are significant factors in the preferred location of offshore wind developments.

Exploitation of wave and tidal energy is not yet fully commercial in UK waters, although several test and demonstrator projects have been deployed or are in development. It is likely that over the coming years as devices reach commercial scale and their viability is demonstrated, larger scale deployment of wave and tidal energy will commence. Government work to characterise the wave and tidal resources of UK waters has shown wave resource is broadly concentrated on the Atlantic facing coastline of the UK – notably the Western Isles of Scotland and the South West peninsula (and SW Wales). Tidal stream resource is more geographically constrained – being localised around headlands and through straights between land masses. This produces a number of potential deployment sites within English and Welsh waters. Studies such as the Sustainable Development Commission's "Turning the Tide" have shown potential for extracting power from the tidal range of various estuaries and bays – such as the Severn, Mersey and Solway – for which Feasibility Studies are currently under way. An initial screening study has been carried out for the deployment of wave and tidal energy in English and Welsh waters and the results of this study will feed into the work carried out under the scoping report.

Prospective areas on the UKCS suitable for storage of CO₂ resulting from **Carbon Capture and Storage** operations include offshore oil and gas reservoirs, saline aquifers and constructed salt caverns. Hydrocarbon reservoirs have geological characteristics advantageous to trapping carbon over long timescales (e.g. a suitable porosity/permeability and cap rock), and the injection of CO₂ into hydrocarbon reservoirs can also enhance oil recovery. In the longer term the reservoir can be used exclusively for CCS. The location and size of these reservoirs is relatively well known, having a primarily eastern distribution extending from the northern North Sea and Faroe-Shetland Channel to the Southern North Sea, with some in the east Irish Sea basin.

Saline aquifers have similar characteristics to hydrocarbon reservoirs (i.e. suitably porous/permeable medium with geological constraints on migration) and may also be

suited to CO₂ storage. The capacity of saline aquifers is not yet well established for the UKCS, though they have a theoretically large volume. Salt caverns, unlike hydrocarbon reservoirs or aquifers, are created in thick rock salt (halite) formations through solution mining, where some of the salt is made soluble and discharged allowing space for the storage of hydrocarbon gas or CO₂. There are extensive halite deposits in the southern North Sea and eastern Irish Sea.

CCS demonstrator projects are likely to be located in areas of high CO₂ emissions (e.g. Thames Estuary, Humberside, Merseyside, the Firth of Forth, Teesside and Tyneside), and the UK Government plans to promote their co-location. It is therefore possible that one of these locations will contain two or potentially more CCS demonstrator plants transporting CO₂ to a suitable reservoir in the North Sea or East Irish Sea Basin.

Hydrocarbon gas storage in depleted and other hydrocarbon reservoirs and other geological structures is part of the current draft plan/programme, and can be expected to take place in the same areas as existing oil and gas production, or in areas of extensive halite deposits.

Figure 1.2 – Existing offshore oil and gas fields and infrastructure and onshore terminals

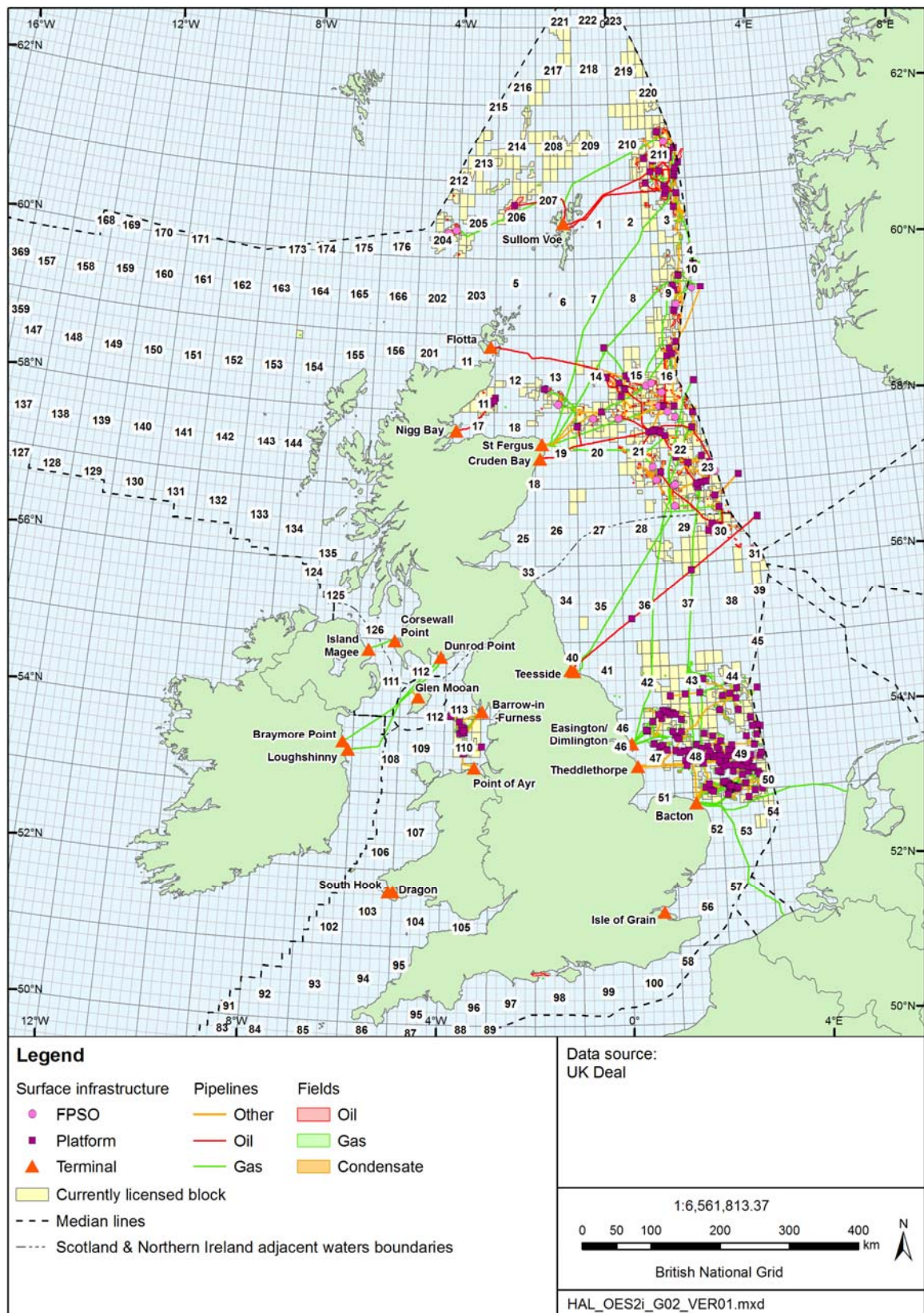


Figure 1.3 – Annual mean wind power density

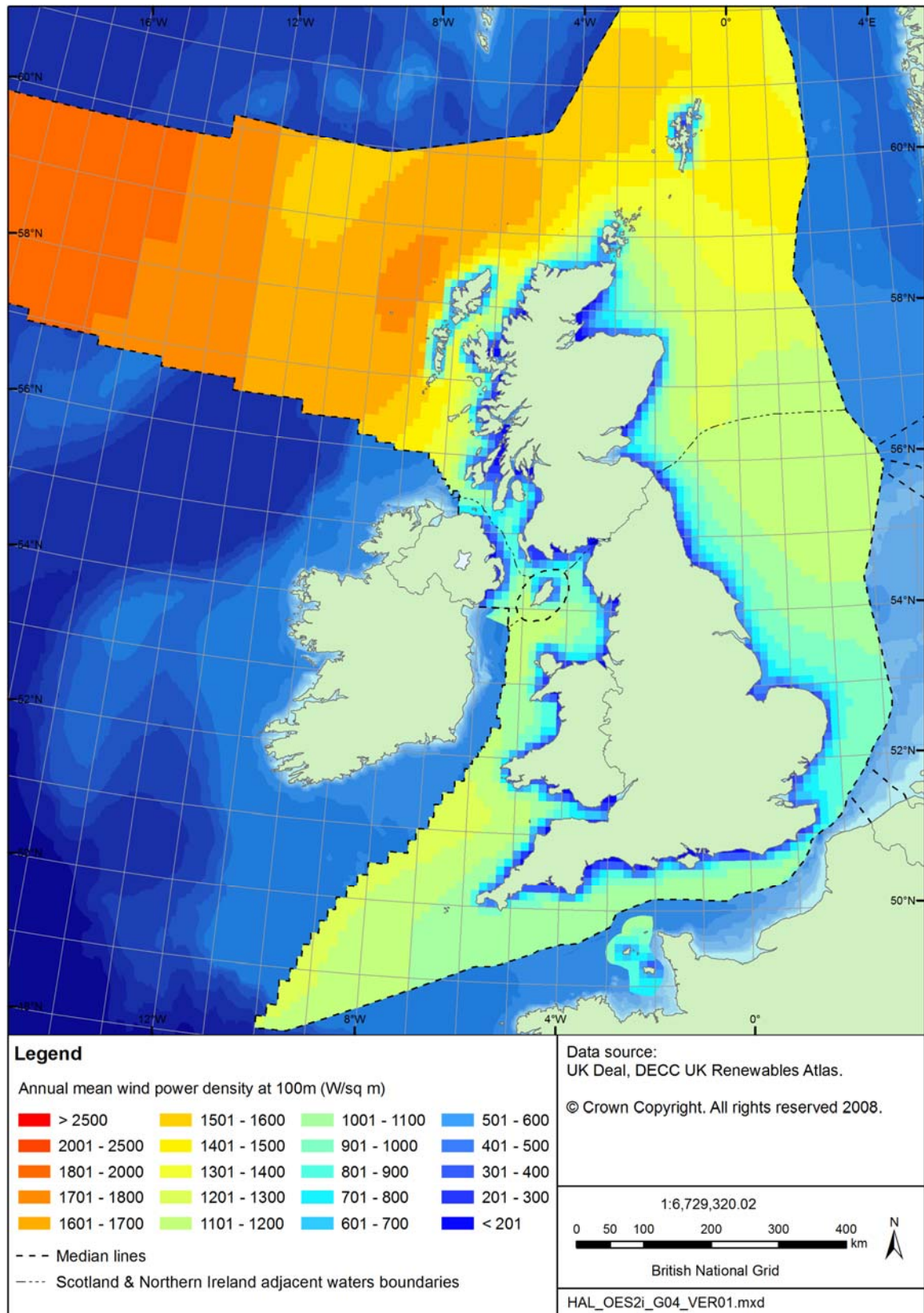


Figure 1.4 – Annual mean wave power

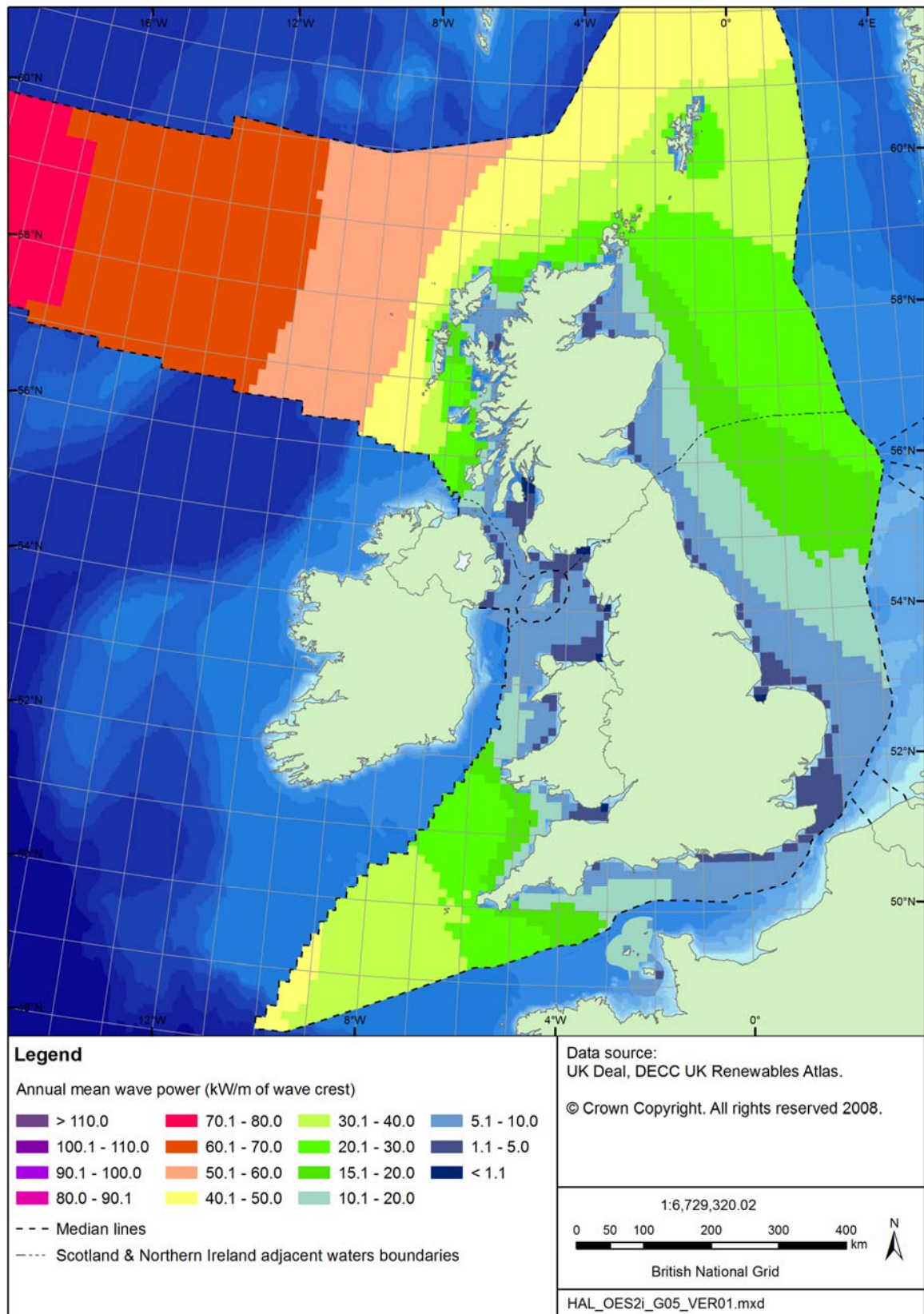


Figure 1.5 – Annual mean tidal power

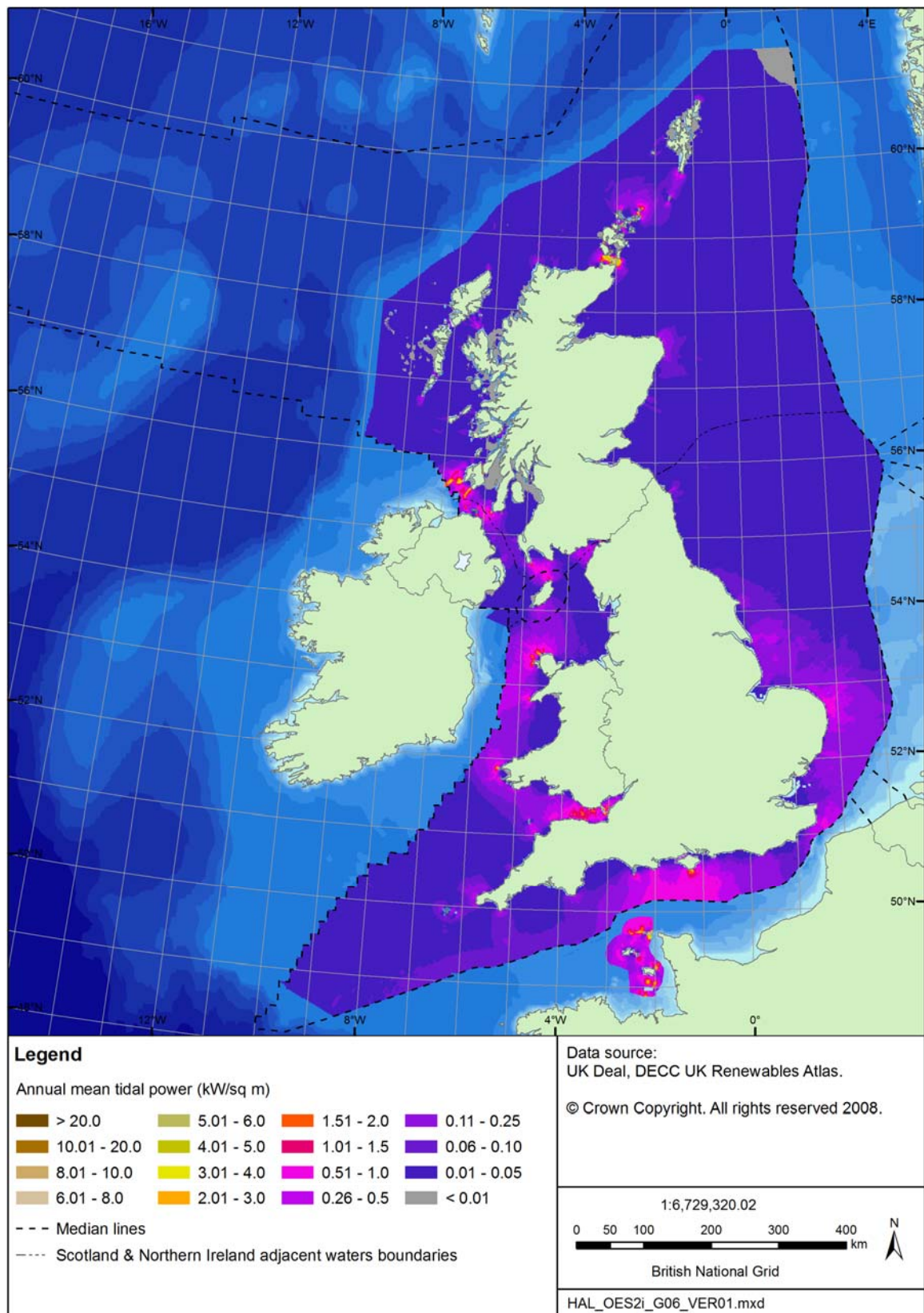


Figure 1.6 – Mean spring tidal range

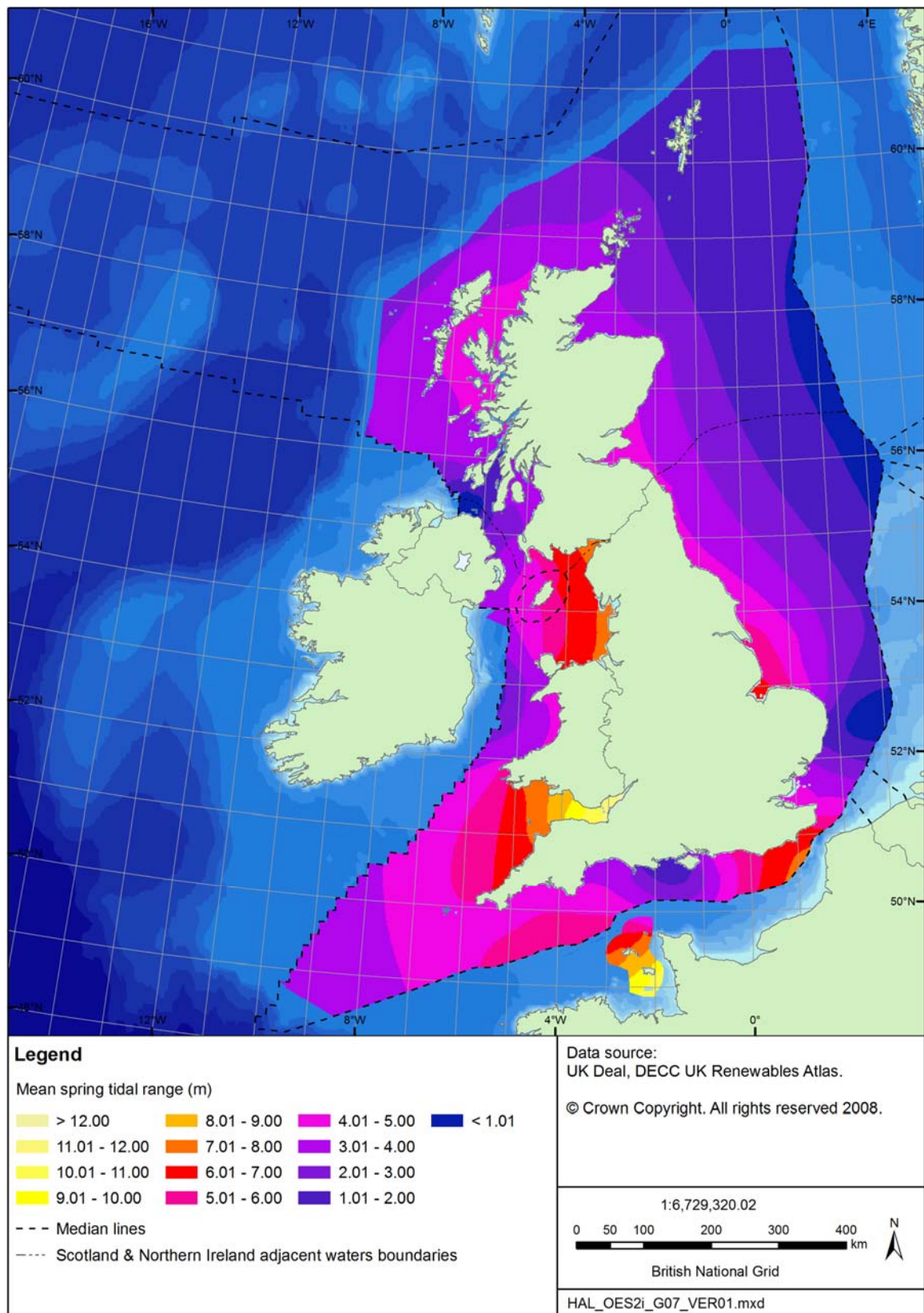
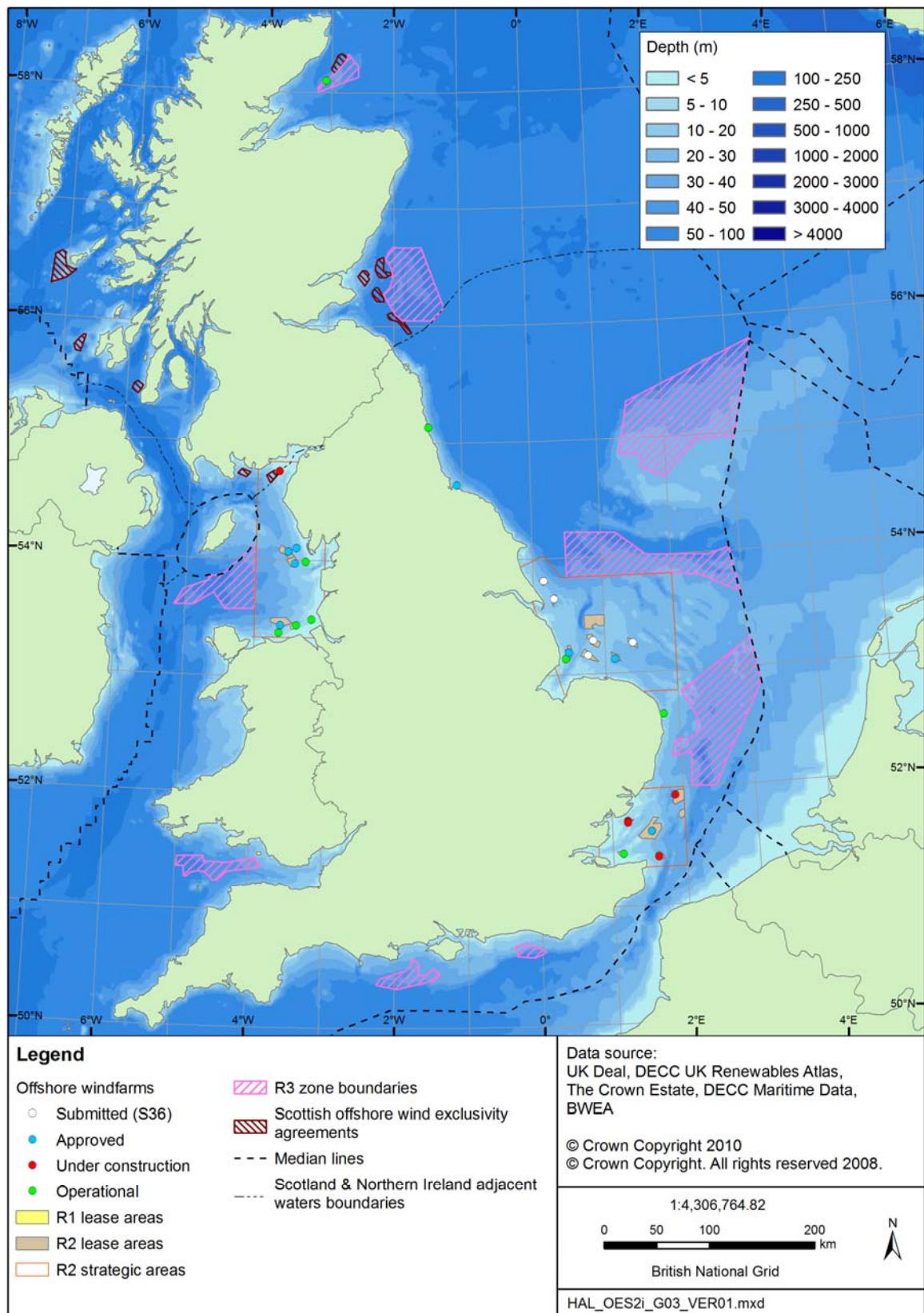


Figure 1.7 – Existing offshore wind farms and zones



2 RELATIONSHIP WITH OTHER RELEVANT INITIATIVES

The Environmental Assessment of Plans and Programmes Regulations 2004 require that within a SEA Environmental Report consideration is given to:

“an outline of the contents and main objectives of the plan or programme, and of its relationship with other relevant plans and programmes” and that consideration is given to the degree to which the “plan or programme influences other plans and programmes including those in a hierarchy”

“the environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation”.

The following sections outline the main objectives/requirements of a range of other initiatives (including plans and programmes) established at international, European Community, UK and UK constituent country level, which are relevant to this plan/programme. These initiatives are arranged by SEA topic as will be the environmental baseline for this SEA. Where legislation is listed, these are the most pertinent acts/bills/regulations etc. and should not be regarded as a part of a definitive list.

Consultation Question

2. Consultees are invited to highlight additional initiatives which they consider relevant to the draft plan/programme.

2.1 Biodiversity, Habitats, Flora & Fauna

Biodiversity, Habitats, Flora & Fauna, including Conservation	
International	Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973) Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat (1971, 1982) United Nations Convention on Biodiversity (the Rio Convention, 1992) Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention, 1979) The International Council for the Exploration of the Sea (ICES) Code of Practice for the Introduction and Transfer of Marine Organisms International Convention for the control of ships ballast water and sediments (adopted 2004, still to enter into force)
Regional	Convention for the Protection of the Marine Environment of the North East Atlantic (the OSPAR Convention, 1992) OSPAR Recommendation 2003/3 on a Network of Marine Protected Areas OSPAR Agreement 2005-6 on the Agreement on Background Concentrations for Contaminants in Seawater, Biota and Sediment Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention, 1979) Agreement on the Conservation of Small Cetaceans of the Baltic North East Atlantic, Irish and North Seas (1994) Convention for the Conservation of Salmon in the North Atlantic Ocean (1983)
EU	Directive 79/409/EEC, on the Conservation of Wild Birds Directive 92/43/EEC, on the Conservation of Natural Habitats and of Wild Fauna and Flora Directive 2004/35/EC, on environmental liability Marine Strategy Framework Directive 2008/56/EC Council of Europe Strategy on Invasive Alien Species (2003) EU Biodiversity Communication (2006) The Sixth Environment Action Programme of the European Community 2002-2012 Action Plan: Halting the loss of biodiversity by 2010 and beyond (2006)
UK	UK Marine and Coastal Access Act 2009 and Bills proposed by devolved administrations UK Government Sustainable Development Strategy: Securing the Future (2005) The Wildlife and Countryside Act (WCA) 1981 National Parks and Access to the Countryside Act 1949 The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended) Natural Environment and Rural Communities Act 2004 Biodiversity: UK Action Plan (1995, 2005) Our Seas - a shared resource. High level marine objectives (2009) Safeguarding our Seas: A strategy for the conservation and sustainable development of our marine environment Invasive non-native species framework strategy for Great Britain (2008)
Local	Working with the grain of nature: a biodiversity strategy for England (2002) Scotland's Biodiversity: It's In Your Hands (2004) A Follow up to Seas the Opportunity: A Strategy for the Long Term Sustainability of Scotland's Coasts and Seas 2007 Northern Ireland Biodiversity Strategy (2002) Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended) Countryside and Rights of Way (CROW) Act 2000 (England and Wales) Nature Conservation and Amenity Lands (Northern Ireland) Order 1985 Wildlife (Northern Ireland) Order 1985 Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended) Nature Conservation (Scotland) Act 2004 Planning Policy Statement 1: Delivering Sustainable Development (England) Planning Policy Statement 9: Biodiversity and Geological Conservation (England) Technical Advice Note 5: Nature Conservation and Planning (Wales) Scottish Planning Policy The National Planning Framework for Scotland 2 Planning Policy Statement 2: Planning and Nature Conservation (Northern Ireland)

2.1.1 Key Objectives and Targets

Article 3 of the Habitats Directive 92/43/EEC (as amended) provides for the creation of a coherent ecological network of European sites (Natura 2000) made up of Special Areas of Conservation (SACs), which are set up to conserve those species listed in Annex I and habitats listed in Annex II of the directive; and those sites designated as Special Protection Areas (SPAs) for bird species under Annex I (rare or vulnerable) and II (migratory) of the Wild Birds Directive 79/409/EEC (as amended).

The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) transpose the Habitats Directive into legislation in England, Wales and Scotland, including their territorial seas out to 12nm, as do, in Northern Ireland and its adjacent territorial seas, the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended). The Wild Birds Directive is implemented through the above regulations, and also through the Wildlife & Countryside Act 1981 (as amended), the Wildlife (Northern Ireland) Order 1985 and the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985. The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 apply the Habitats Directive and the Birds Directive beyond territorial waters (beyond 12nm). These Regulations together provide for the designation and protection of European sites and the protection of European Species in the UK and UK waters.

The Marine Strategy Framework Directive establishes a framework within which Member States must take measures to achieve or maintain good environmental status in the marine environment by the year 2020. These measures include the establishment of a cohesive network of Marine Protected Areas (MPAs) which is intended to build on the areas already protected as European marine sites under the Birds and Habitats Directives.

Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage (transposed through the Environmental Damage (Prevention and Remediation) Regulations 2009 – separate regulations apply in the devolved administrations) applies to environmental damage caused to *inter alia* species and habitats protected at the community level, i.e. those covered under the Birds and Habitats Directives.

The Marine and Coastal Access Act (and Bills of the devolved administrations) will aid the completion of an ecologically coherent and well-managed network of Marine Protected Areas, suggested as a contributory measure to achieving good environmental status in the Marine Strategy Framework Directive, and as required in similar commitments regarding MPAs under international conventions such as the Convention on Biological Diversity. These sites will be known as Marine Conservation Zones (MCZs) in England and Wales and Marine Protected Areas (MPAs) in Scotland, administered at the local level in each UK constituent country. The Marine Conservation Zone project in England and Wales is delivered through four regional projects covering the South-West, Irish Sea, North Sea and Eastern Channel. In UK offshore waters adjacent to Scotland, MPAs will be identified through a Scottish Marine Protected Area Project. Non-Natura MPAs will be established in Scottish Territorial Waters through the Marine (Scotland) Bill. In Welsh territorial waters, the Welsh Assembly Government in collaboration with CCW will manage MCZ selection. The Department of Environment (Northern Ireland) plan to consult on policy proposals by the end of April 2010, leading to a Northern Ireland Bill which should provide details of how they are to implement their part of the UK MPA network. More generally, the High Level Marine Objectives agreed by the UK Government and Devolved Administrations set out an approach to the sustainable use of UK seas, including the recognition that healthy marine habitats and ecosystems, species and biodiversity should be maintained and where appropriate recovered. The most

recent policy paper by Defra on the Marine and Coastal Access Act indicates that the forthcoming Marine Policy Statement will build on *inter alia* these principles, and so should help to confer a good degree of protection to European and national level designations and to the wider marine environment.

To date the vast majority of designated conservation sites in the UK have been terrestrial or terrestrial with marine components, with very few being entirely marine in nature. More recently a number of offshore SACs are in the process of being designated and work is underway to identify and extend a number of marine SPAs. These sites, and those sites to arise from the designation of MCZs, are a key step in extending the network of national and European sites into offshore waters and the creation of an ecologically coherent network in the marine environment.

The UK Biodiversity Action Plan provides a national strategy for the conservation of biological diversity and the sustainable use of biological resources as required under Article 6 of the Rio Convention. A number of species (1,150) and habitats (65) have been identified as being priorities for conservation action in the UK, and these include a number of marine components, for instance 28 BAP habitats are marine. Though the plans for these species and habitats have no statutory status, they are given some legal basis in the Countryside and Rights of Way Act 2000 and the Natural Environment and Rural Communities Act 2004.

In addition to threats posed from marine development and climate change, the marine environment has recently been subject to a number of introduced species which have led to a series of localised changes in community composition. The intentional and unintentional introduction of alien non-native species is considered the second biggest threat after habitat loss to biodiversity and may be accentuated by predicted climate change. A number of national and international initiatives exist aiming to recommend and introduce safeguards to limit the transport of invasive species, including the GloBallast Partnership Programme and the Invasive Non-native Species Strategy for Great Britain.

2.1.2 Implications for SEA

The SEA should consider the implications of the draft plan/programme and its alternatives in relation to the features of conservation sites of European and national importance, and on the wider marine environment. The SEA will need to draw attention to the current location of these sites and the species or habitats for which they are designated, and any sites which are currently being considered for designation, in addition to characterising the present baseline condition and issues relating more generally to the marine environment.

2.2 Geology, Substrates & Coastal Processes

Geology, Substrates & Coastal Processes	
Regional	OSPAR Recommendation 2003/3 on a Network of Marine Protected Areas OSPAR Agreement 2005-6 on the Agreement on Background Concentrations for Contaminants in Seawater, Biota and Sediment OSPAR Recommendation 2006/5 on a management regime for offshore cuttings piles OSPAR Decision 2007/2 on the Storage of Carbon Dioxide Streams in Geological Formations
EU	Directive 2007/60/EC on the assessment and management of flood risks (2007) EC Habitats Directive 92/43/EEC (1992) Water Framework Directive (2000/60/EC) Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide Communication from the Commission Report to the European Parliament and the Council: An evaluation of Integrated Coastal Zone Management (ICZM) in Europe 2007. COM(2007)308 final
UK	The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended) The Wildlife and Countryside Act 1981 Flood and Water Management Bill Marine and Coastal Access Act 2009 and Bills proposed by devolved administrations Marine Conservation Zones (and equivalent designations under the devolved administrations) Defra's Consultation on Coastal Change Policy (2009) Making Space for Water: National Coastal Erosion Risk Mapping Project Geological Conservation Review (GCR)
Local	Earth Science Conservation Review (Northern Ireland) Environment Agency Shoreline Management Plans - currently under review (SMP2) Local Coastal Partnerships and the Scottish Coastal Forum A Follow up to Seas the Opportunity: A Strategy for the Long Term Sustainability of Scotland's Coasts and Seas 2007 An Integrated Coastal Zone Management Strategy for Northern Ireland 2006-2026 Marine Strategy for Scotland's Coast and Marine Environment Making the Most of Wales' Coast. The Integrated Coastal Zone Management Strategy for Wales Cleaner Coasts Healthier Seas, Working for a better marine environment, Our strategy for 2005-2011 (Environment Agency) A Strategy for Promoting an Integrated Approach to the Management of Coastal Areas in England Making space for water: Taking forward a new Government strategy for flood and coastal erosion risk management in England Planning Policy Statement 9: Biodiversity and Geological Conservation (England) Planning Policy Statement 25: Development and Flood Risk (England) New Planning Policy on Development and Coastal Change (DCLG Consultation July-October 2009) is due in 2010 which will appear as a supplement to PPS 25 (England) Planning Policy Guidance 20: Coastal Planning (England) Minerals Policy Statement 1: Planning and Minerals (England) Marine Mineral Guidance Note 1: Guidance on the Extraction of Sand, Gravel and Other Minerals from the English Seabed Technical Advice Note 5: Nature Conservation and Planning (Wales) Technical Advice Note 14: Coastal Planning (Wales) Technical Advice Note 15: Development and Flood Risk (Wales) Interim Marine Aggregates Dredging Policy (Wales) Scottish Planning Policy Planning Policy Statement 15: Planning and Flood Risk (Northern Ireland)

2.2.1 Key Objectives and Targets

The Geological Conservation Review (GCR), launched in 1977, identifies the most important (nationally and internationally) terrestrial geological sites in Britain. GCR sites are chosen such that they satisfy the legal requirements of SSSI designations for geology

and physiography, and therefore they often geographically coincide with Earth Science-SSSIs. More important sites are locally recognised through the Regionally Important Geological and Geomorphological Sites (RIGS) programme, though only SSSI features have any form of statutory protection.

In the marine environment, many geological features are gaining protection through designations for which they are a qualifying habitat feature (e.g. SACs designated under the Conservation (Natural Habitats &c.) Regulations 1994 and Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007). The Marine and Coastal Access Act and Marine (Scotland) Bill provide a means for the conservation of specific “features of geological and geomorphological interest” through the designation of Marine Conservation Zones (MCZs) and Marine Protected Areas (MPAs) respectively. It may be reasonably anticipated that a similar designation may emerge from a Northern Ireland Bill. In addition, the Marine and Coastal Access Act amends the Wildlife and Countryside Act 1981 in such a way that SSSI notifications can be made in England and Wales below the Mean Low Water Mark (MLWM) under certain statutory conditions, set out in the Act (e.g. the flora, fauna or features leading to the notification of the SSSI are also present in the subtidal area to which SSSI protection is to extend). The Act also provides powers to remove SSSI notifications where they coincide with new MCZs in England and Wales.

At the coast, natural denudation processes are leading to shoreline retreat and increased flood risk in many cases, which may be accentuated by predicted climate and associated environmental change, which includes increased storminess and sea-level rise (e.g. Murphy *et al.* 2009). Integrated Coastal Zone Management and appropriate planning policy aims to help manage and mitigate the problems associated with *inter alia* coastal erosion and flood risk. The mapping of coastal erosion risk and flood risk, and the preclusion of non-essential development in risk areas will help mitigate the worst effects of future coastal change. Shoreline Management Plans (In England and Wales) are already taking a longer term view by identifying sustainable management approaches of relevance for up to the next 100 years. The Water Framework Directive (WFD) seeks to achieve good ecological status for coastal and estuarine water bodies, which includes morphological and hydrodynamic issues. These may be sometimes negatively represented at the coast by land claim, shoreline reinforcement, impoundments, flow manipulation, navigation dredging and placement of dredged material. River Basin Management Plans now implemented in Scotland, England and Wales are one of the principal means that the WFD has been implemented in the UK and will be used in combination with other plans including SMPs to achieve a fully integrated approach to coastal management.

2.2.2 Implications for SEA

The SEA should consider how activities resulting from the adoption of the draft plan/programme and its alternatives will interact with other initiatives designed to manage or protect the marine and coastal geology and geomorphology of the UK. In particular the SEA should consider the baseline conditions presented in the RBD Management Plans for coastal waters and the associated catchment flood management plans and shoreline management plans. SSSI sites are the only form of statutory protection for geology in the UK at present. The implementation of a new set of marine conservation sites with specific geological criteria could see a greater number of offshore sites being designated.

2.3 Landscape/Seascape



2.3.1 Key Objectives and Targets

The European Landscape Convention and associated initiatives are presently targeting a move away from focussing on aesthetically "outstanding" areas to adopt a general focus which looks at the quality and sustainability of all landscapes. This is reflected in the National Character Area network in England, more local Landscape/Historic Character Assessment, the analogous Landscape Character Map for Wales and that for Northern Ireland, and recent policy statements and guidance (e.g. the "All Landscapes Matter" Draft Policy, Welsh Technical Advice Note 12: Design).

Planning policies, for instance PPS 7 and more recently the Energy National Policy Statements (e.g. EN-1 and EN-3), exact the highest degree of protection to "most valued" sites (i.e. statutory designated areas such as AONBs), but do not propose that development should be precluded within them where project design would not conflict with the interests and features for which the sites are designated. More generally, they state that all developments should be well designed and in keeping with the scale and character (modern and historic) of the local area.

Where developments fall within the visual range of receptors (i.e. people of all sorts, resident and transient) on the coast, or are intervisible from other viewing locations at sea, for instance from recreational or commercial vessels, their character, form, aspect,

spatial extent and type of movement all influence how the seascape is experienced. In association with the 3rd round of Offshore Wind Farm (OWF) leasing and the likely use of turbines of greater size and in greater number than those used previously, a number of studies and guidance documents have emerged which relate to the assessment of seascapes in relation to OWFs, but which have findings that may be more widely applicable to other marine energy devices which have surface infrastructure.

2.3.2 Implications for SEA

The SEA should consider the strategic level visual implications the adoption of the draft plan/programme and its alternatives (i.e. the potential deployment of many more marine renewable energy devices of differing types within UK terrestrial and offshore waters), on the coastal landscape and seascape character of the UK coastline.

2.4 Air Quality



2.4.1 Key Objectives and Targets

MARPOL addresses the prevention of marine pollution from ships and in part from oil rigs and production platforms. It includes six annexes covering pollution by oil, noxious liquids carried in bulk, harmful substances in packaged form, sewage, garbage and air pollution. In 2008, The Marine Environment Protection Committee of the International Maritime Organization (IMO) agreed amendments to the Annex VI regulations of MARPOL to further reduce harmful emissions from ships, comprising a progressive reduction in sulphur oxide (SO_x) emissions. Progressive reductions in nitrogen oxide (NO_x) emissions were also agreed, with the most stringent controls being placed on those engines installed on ships constructed on or after 1st January 2016. Less specific to marine activities, the Convention on Long-Range Transboundary Air Pollution 1979 considers transboundary pollutants including persistent organic pollutants, heavy metals, sulphur, VOCs and nitrogen oxides.

The Government's revised Air Quality Strategy for England, Scotland, Wales and Northern Ireland has set national air quality standards with the objective of protecting human health, vegetation and ecosystems. In the longer term, these standards along with other strategies connected with climate change could significantly improve air quality and achieve meaningful reductions in CO₂ by 2050. Many of the standards set in the strategy are derived from EU obligations for the reduction or non-exceedance of a particular pollutant. The UK has an obligation to reduce or limit the emission of certain pollutants under the Air Quality Framework Directive (1996/62/EC) and "daughter" directives, given effect in the UK by the Air Quality Standards Regulations 2007 (and those equivalent regulations of the devolved administrations). This is further taken forward by the UK Air Quality Strategy which sets out the air quality standards and objectives to be achieved, and policy measures that could help attain some of these. In June 2008, a new directive (the Ambient Air Quality and Cleaner Air for Europe Directive (2008/50/EC)) came into force and is required to be transposed to UK law by June 2010. The new directive does not alter existing air quality objectives set out previously, though has a number of other key elements:

- Existing legislation¹³ has been merged into a single directive (with the exception of 2004/107/EC) with no changes to existing air quality objectives
- New objective for PM_{2.5} including a limit value and exposure related objectives
- The possibility to exclude natural sources of pollution in assessing compliance values where they can be reliably measured and where exceedances are due in whole or part to natural contributions
- Possible time extensions of three years for PM₁₀, or five years for NO₂ and benzene for compliance with limit values, based on conditions and assessment by the EC

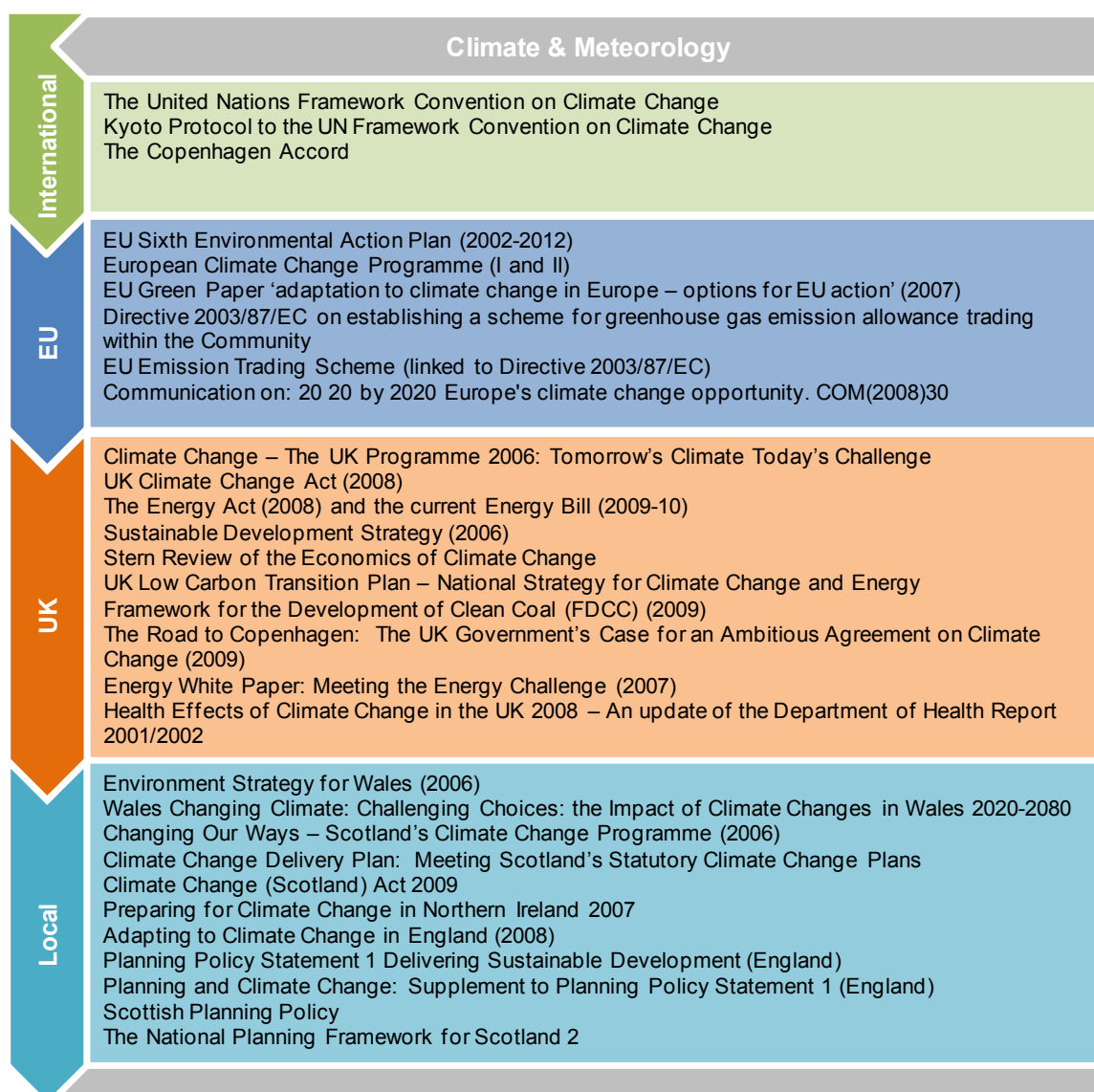
This is further taken forward by the UK Air Quality Strategy which sets out the standards and objectives to be achieved, and policy measures that could help achieve some of these. Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage applies to a number of areas including damage caused by "airborne elements as far as they cause damage to water, land or protected species or natural habitats".

¹³ Framework Directive 96/62/EC, daughter Directives 1999/30/EC, 2000/69/EC, 2002/3/EC, and Decision on Exchange of Information 97/101/EC

2.4.2 Implications for SEA

The SEA should consider any positive or negative contribution that the draft plan/programme and its alternatives may have on air quality. The SEA should consider the contribution that the draft plan/programme and its alternatives could make to the reduction in emissions which lead to poor air quality and associated detrimental health and environmental effects (e.g. respiratory problems, acidification and eutrophication). Any contribution to reductions in emissions should also be considered in the context of targets for the reduction in greenhouse gases associated with anthropogenic climate change.

2.5 Climate & Meteorology



2.5.1 Key Objectives and Targets

The United Nations Framework Convention on Climate Change entered into force in 1994, a precursor to the Kyoto Protocol which sets legally binding targets for the reduction of greenhouse gases which are associated with anthropogenically induced climate change. 184 parties have ratified the Kyoto Protocol to date, including the UK.

Most recently, the Copenhagen Accord recognises that countries must reduce emissions such that a 2°C rise in global temperature should not be exceeded such that the worst effects of climate change can be avoided. The Copenhagen Accord is not a legally binding document, but endorses the Kyoto Protocol and indicates that Annex I countries should further reduce their emissions reductions initiated under Kyoto.

In the UK, the Energy Act 2008 aims to not only help maintain energy supply reliability, promote competitive markets and ensure affordable heating, but also contribute to the reduction in greenhouse gas emissions (most notably CO₂) which have been linked to anthropogenically augmented climate change. A new Energy Bill introduced in November 2009 implements some of the key measures of the UK Low Carbon Transition Plan including provisions for a new CCS incentive to support the creation of the four CCS demonstrators outlined in the plan, the introduction of mandatory social price support to tackle fuel poverty and a number of measures to ensure fairness in the energy markets.

The Climate Change Act 2008 makes provisions for the reduction of CO₂ equivalent emissions (i.e. includes other notable greenhouse gases such as CH₄ and N₂O) through a number of measures, including the setting of a "carbon budget". The carbon budget set out in the Act in its original form targeted an 80% reduction in emissions on 1990 levels by 2050, with an interim reduction in emissions of 26% by 2020. The 2020 carbon budget has been subsequently altered under The Climate Change Act 2008 (2020 Target, Credit Limit and Definitions) Order 2009 to 34% below 1990 levels. The Act aims to meet this target through a range of measures, but principally through the establishment of a Committee on Climate Change, a system of carbon budgeting and trading, activities that reduce or remove greenhouse gases from the atmosphere and promotion through financial incentive, the production of less waste and more recycling.

2.5.2 Implications for SEA

Climate change, as predicted by the IPCC, and specifically for the UK by the UKCIP, present a number of possible environmental, societal and economic issues which interact with all of the topics covered under the SEA directive. At an international, national and UK constituent country level, programmes are increasingly considering climate change adaptation given the predicted changes (e.g. Part II of the European Climate Change Programme, the UK Government's: Adapting to Climate Change in England).

The draft plan/programme being assessed by the SEA should be considered in relation to the likely climate change scenarios for the marine and coastal environment, as outlined in Lowe *et al.* (2009) and other relevant public and peer reviewed literature, and in the context of European and UK regulations that seek to implement controls on greenhouse gas emissions linked with projected climate change. The assessment should also consider the contribution that it can make to attenuating global climate change through efficiency measures which reduce waste and carbon equivalent emissions.

2.6 Water Environment

Water Environment	
International	IMO International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78) International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted 2004, still to enter into force) International Convention on Oil Pollution Preparedness, Response and Co-operation (1990) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972, as amended) 1996 protocol - revision to convention (2006) and amendments to 1996 protocol
Regional	Convention for the Protection of the Marine Environment of the North East Atlantic (the OSPAR Convention 1992) OSPAR Recommendation 2003/1 on the Strategy for the Joint Assessment and Monitoring Programme OSPAR Decision 2000/3 on the use of organic-phase drilling fluids (OPF) and the discharge of OPF-contaminated cuttings OSPAR Decision 2000/2 on a harmonised mandatory control system for the use and reduction of the discharge of offshore chemicals (as amended by decision 2005/1) OSPAR Decision 2007/1 to Prohibit the Storage of Carbon Dioxide Streams in the Water Column or on the Sea-bed OSPAR Decision 2007/2 on the Storage of Carbon Dioxide Streams in Geological Formations OSPAR Recommendation 2000/5 on a Harmonised Offshore Chemical Notification Format (HOCNF), as amended by OSPAR Recommendation 2005/3 and 2008/2 OSPAR Recommendation 2005/2 on Environmental Goals for the Discharge by the Offshore Industry of Chemicals that are, or Contain Added Substances, Listed in the OSPAR 2004 List of Chemicals for Priority Action OSPAR Recommendation 2006/3 on Environmental Goals for the Discharge by the Offshore Industry of Chemicals that are, or which Contain Substances Identified as Candidates for Substitution OSPAR Recommendation 2001/1 for the Management of Produced Water from Offshore Installations as amended by Recommendation 2006/4 OSPAR Strategy to Combat Eutrophication OSPAR Biological Diversity and Ecosystems Strategy OSPAR Hazardous Substances Strategy OSPAR Offshore Oil and Gas Strategy OSPAR Radioactive Substances Strategy OSPAR Co-ordinated Environmental Monitoring Programme (CEMP)
EU	Water Framework Directive (2000/60/EC) and daughter directives: the Groundwater Directive (2006/118/EC) and Priority Substances Directive (2008/105/EC) Bathing Waters Directive (2006/7/EC) Shellfish Waters Directive (2006/44/EC) Urban Wastewater Treatment Directive (91/271/EC) Priority Substances Directive (2008/105/EC) Marine Strategy Framework Directive (June 2008) Nitrates Directive (91/676/EC) Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage
UK	UK Marine and Coastal Access Act 2009 and Bills proposed by devolved administrations Safeguarding our seas: A strategy for the conservation and sustainable development of our marine environment (Defra 2002) Our Seas – a shared resource. High level marine objectives (2009) Draft National Policy Statement for Ports (DfT, 2009) Draft Overarching National Policy Statement for Energy (EN-1) (DECC, 2009) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) (DECC, 2009)

A Strategy for the Long Term Sustainability of Scotland's Coasts and Seas (2007)
 An Integrated Coastal Zone Strategy for Northern Ireland 2006-2026
 Making the Most of Wales' Coast: Integrated Coastal Zone Management Strategy
 Cleaner Coasts Healthier Seas, Working for a better marine environment, Our strategy for 2005-2011
 (Environment Agency, England and Wales)
 A strategy for promoting an integrated approach to the management of coastal areas in England
 (2008)

2.6.1 Key Objectives and Targets

MARPOL (already mentioned in relation to air quality) addresses pollution from ships and in part from oil production platforms arising from oil, noxious liquids carried in bulk, harmful substances in packaged form, sewage and garbage (Annexes I-V) and in subsequent amendments. MARPOL covers pollution events arising from both operational and accidental causes.

At a regional level, the OSPAR Convention for the protection of the marine environment of the North East Atlantic has the aim of preventing pollution and to protect the marine environment from detrimental effects of human activity. The OSPAR Convention defines pollution as the introduction by man, directly or indirectly, of substances or energy into the maritime area which results, or is likely to result, in hazards to human health, harm to living resources and marine ecosystems, damage to amenities or interference with other legitimate uses of the sea. The 16 parties to this convention (which includes the UK) are asked to observe the *precautionary principle* and the *polluter pays principle* to meet their obligations. In 1998 Annex V was adopted, specifically aimed at biodiversity and ecosystem protection to cover non-polluting human activities that can adversely affect the sea. OSPAR has several long-term strategies aimed at improving the marine environment with regard to certain topics, these include:

- Biological Diversity and Ecosystems Strategy – concerned with non-polluting human activity that can have adverse effects on the marine environment. A key element of this strategy is the establishment of a network of Marine Protected Areas (see section 2.1).
- Eutrophication Strategy – sets the objective to combat eutrophication in the OSPAR maritime area, in order to achieve and maintain by 2010 a healthy marine environment where eutrophication does not occur.
- Hazardous Substances Strategy – sets the objective of preventing pollution of the maritime area by continuously reducing discharges, emissions and losses of hazardous substances, with the ultimate aim of achieving concentrations in the marine environment near background values for naturally occurring substances and close to zero for man-made synthetic substances, with the target of the cessation of discharges, emissions and losses of hazardous substances by the year 2020
- Offshore Oil and Gas Strategy – to prevent and eliminate pollution from offshore sources and to protect the OSPAR maritime area against the adverse effects of offshore activities so as to safeguard human health and conserve the marine ecosystems, and where practicable restore affected areas.
- Radioactive Substances Strategy – aims to reduce discharges, emissions and losses of material such that concentrations in the marine environment above historic levels are close to zero by 2020.

A number of European level directives have been implemented nationally which aim to protect the terrestrial and marine environments, and these include the Urban Wastewater Treatment Directive, the Nitrates Directive, the Water Framework Directive (WFD) and

Marine Strategy Framework Directive (MSFD). The WFD seeks to achieve “good environmental status” for a range of terrestrial and transitional and coastal waters out to 1nm (or 3nm in Scottish waters) by 2015. This includes good ecological and chemical status for surface waters. As much marine pollution is generated from terrestrial activities, the control of certain substances entering coastal waters from riverine sources and other direct discharges is important in the control of marine pollution. The Nitrates Directive and Urban Wastewater Treatment Directive seek to protect the environment from the adverse effects of nitrogen from agricultural sources and sewage discharges respectively in this regard, and the most hazardous other chemicals are covered under the Priority Substances Directive.

In a similar approach to the WFD, the MSFD seeks to achieve “good environmental status” in Europe’s seas by 2020. The Directive, which is to be transposed into UK law by July 2010, requires an assessment of the state of UK seas, the establishment of what good environmental status means for those seas, and the implementation of programme to achieve and monitor progress towards 2020. Some of these items will be delivered through existing programmes, for instance the state of UK seas is covered by the Charting Progress II and OSPAR QSR 2010 reports.

Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage (transposed through the Environmental Damage (Prevention and Remediation) Regulations 2009 – separate regulations apply in the devolved administrations) is applicable to *inter alia* the aquatic environment covered by the WFD. The Directive, based on the polluter pays principle, establishes a framework to prevent and remedy environmental damage at a reasonable cost to society. The directive applies strict liability to those operators of inherently hazardous activities listed in Annex III of the Directive which includes those subject to IPPC, and fault based liability for other activities.

2.6.2 Implications for SEA

The SEA must consider the above international and national scale measures to reduce operational and accidental discharges at sea and from the terrestrial environment in relation to the possible impacts of the draft plan/programme (e.g. operational and accidental discharges from oil and gas exploration and production and transportation and storage of CO₂). The SEA should have regard to the most recent monitoring and progress reports (e.g. Charting Progress II, OSPAR QSR 2010) in its baseline compilation and assessment.

2.7 Population & Human Health

Population & Human Health	
International	World Summit on Sustainable Development, Johannesburg, 2002 Aarhus Convention (Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters) (1998) Espoo Convention on Environmental impact Assessment in a Transboundary Context (1991) Commission on Social Determinants of Health (2008), 'Closing the gap in a generation: health equity through action on the social determinants of health.'
Regional	Children's Environment and Health Action Plan for Europe 2004
EU	Together for Health: A Strategic Approach for the EU 2008-2013 The European Environment and Health Action Plan 2004-2010 EU Sustainable Development Strategy (EU SDS) First issued 2001, Revised 2006
UK	UK Government Sustainable Development Strategy: Securing the Future (2005) and the UK's Shared Framework for Sustainable Development, One Future – Different Paths (2005) Saving Lives: Our Healthier Nation White Paper (July 1999) Tackling Health Inequalities: A programme for Action (2003) Securing Good Health for the Whole Population Report to the Treasury (Wanless, 2004) Choosing Health: Making Healthier Choices Easier (November 2004) Our Health, Our Care, Our Say White Paper (2006) Strong and Prosperous Communities Local Government White Paper (2006) Health Effects of Climate Change in the UK (2008) Strategy for Workplace Health and Safety in Great Britain to 2010 and Beyond
Local	Sustainable Communities: Building for the Future (2003) People, Places, Futures: Wales Spatial Plan 2004 (updated in 2008) Wales: A Better Country. The Strategic Agenda of the Welsh Assembly Government (2003) Starting To Live Differently: The Sustainable Development Scheme of the National Assembly for Wales (2004-2007) One Wales, One Planet: A New Sustainable Development Strategy for Wales 2009 Well Being in Wales (2002) Ministerial Interim Planning Policy Statement (Draft) – Planning, Health and Well Being. Choosing Our Future: Scotland's Sustainable Development Strategy (2005) Meeting the Needs... Priorities, Actions and Targets for Sustainable Development in Scotland (2002) Partnership for Care: Scotland's Health White Paper (2003) Scottish Executive (2003) Improving Health in Scotland: The Challenge The Northern Ireland Sustainable Development Strategy (2006) Investing in Health: A Public Health Strategy for Northern Ireland (2002). Reviewed in 2009. Planning Policy Statement 1: Delivering Sustainable Development (2005) Ministerial Interim Planning Policy Statement (Draft) – Planning, Health and Well Being (Wales) Planning Policy Guidance 17: Planning for Open Space, Sport and Recreation (England) Technical Advice Note 16: Sport, Recreation and Open Space (Wales) Scottish Planning Policy The National Planning Framework for Scotland 2 PPS 8: Open Space, Sport and Outdoor Recreation (Northern Ireland)

2.7.1 Key Objectives and Targets

The European Environment and Health Action Plan acknowledges that there are potential health implications from environmental impacts, and seeks to make the connection between health and environmental conditions. The plan also has the aim of maximising

the economic benefits of good health, recognising that these often outweigh the cost of remedial action. At the UK and UK constituent country level, health is considered in the context of sustainable development and initiatives attempt to address health inequalities, for instance the gap in infant mortality across social groups, and the difference in life expectancy in disadvantaged areas compared with those that are more prosperous.

2.7.2 Implications for SEA

The SEA should consider the implications of the draft plan/programme on regional and UK initiatives designed to improve general health and reduce inequalities brought about by social and environmental deprivation. The SEA should consider how the plan/programme contributes to government targets in relation to environmental degradation (e.g. air quality, landscape quality) which has associated potential physical and mental health implications.

2.8 Cultural Heritage

Cultural Heritage	
International	- UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (1972) - Convention on the Protection of Underwater Cultural Heritage (CNUCRM) - United Nations Convention on the Law of the Sea (UNCLOS)
Regional	- European Convention on the Protection of the Archaeological Heritage (1992) - European Landscape Convention (2000)
UK	- Draft Heritage Protection Bill (2008) - Treasure Act 1996 (does not extend to Scotland) - Protection of Wrecks Act 1973 - Protection of Military Remains Act 1986 - Ancient Monuments and Archaeological Areas Act 1979 - Planning (Listed Buildings and Conservation Areas) Act 1990
Local	- English Heritage: Climate Change and the Historic Environment (2008) - English Heritage: Conservation Principles, Policies and Guidance for Sustainable Management of the Historic Environment (2008) - Scottish Natural Heritage: Natural Heritage Futures Update 2009 - Scottish Historic Environment Policy (Historic Scotland 2009) - Planning Policy Statement 15: Planning for the Historic Environment (updates PPG15 and PPG16, is due for release in 2010) - Planning Policy Statement 6 – Planning, Archaeology and the Built Heritage (Northern Ireland) - Scottish Planning Policy - Planning Advice Note 42 (PAN42): Archaeology in the Planning Process and Scheduled Monument Procedures (Scotland)

2.8.1 Key Objectives and Targets

International protection of marine heritage features is provided by Articles 149 and 303 of UNCLOS, and more recently the CNUCRM. Though the UK is not a signatory of the latter, the convention received acceptance or ratification of the minimum number of 20 states on 2nd October 2008 and entered into force on 2nd January 2009. The CNUCRM includes those archaeological, historical or cultural items which have been, 'partly or completely

under water, periodically or continuously, for at least 100 years', which includes not only shipwrecks but buildings, artefacts, human remains, aircraft, cargo and prehistoric items.

At present, the only form of marine heritage protection in the UK is for that of shipwreck, provided by the Protection of Wrecks Act (PWA) 1973 and the Protection of Military Remains Act (1986). These seek to protect either wrecks or wreck sites that contribute to the understanding of the past on account of their historical, archaeological or artistic importance, or vessels or aircraft which appear to have become sunk or stranded while in military service.

The terrestrial regime provides statutory protection to historic buildings or notable monuments and their settings. In 2007, the white paper, 'Heritage Protection for the 21st Century', and associated consultation responses provided the impetus for the draft Heritage Protection Bill (DHPB), relevant to England and Wales. Due to be implemented in the parliamentary programme of 2009, the Bill has at present been dropped with the hope it will be introduced in 2009/10. The aims of the Bill were to reform the designation and consent procedure for terrestrial heritage assets in England and Wales. The Draft Heritage Protection Bill had the following main components:

- A single system of designation for England and Wales. This will incorporate those designations currently referred to as scheduled ancient monuments, listed buildings, battlefields or registered gardens or parks.
- Responsibilities of designating sites will pass from the DCMS to English Heritage (EH). In Wales, responsibilities will be maintained by Welsh ministers.
- EH and Welsh ministers will have to consult owners, local authorities and amenity societies on all cases being considered for designation.
- The relevant authority (EH, Welsh ministers) will have to maintain a publically accessible, online, Historic Environment Record (HER).
- "Provisional registration" will be afforded to sites being considered for designation. Sites will be protected from the time consultation begins until they are designated or rejected.
- There is a new category of site which can be registered, "a site comprising any "thing" or group of things that evidences previous human activity".
- Heritage Asset Consent (HAC) is required for works resulting in demolition, damage or disturbance to a registered heritage structure.
- Marine Heritage Licenses are required where 'prohibited marine activities' (see section 187[2] of the DHPB) are to be carried out.
- A new appeal procedure for designation and licensing decisions is to be implemented.
- A broadening in the range of marine sites that can be designated

Under the recent reform of heritage protection, the Scottish Government released a policy document in 2008 which consolidates the Scottish Heritage Protection Policy (SHEP) series of reports. The new SHEP document covers both statutory and non-statutory designations, and includes a number of annexes providing criteria and guidance on scheduling, listing and conservation areas, as well as information on listed building consent and associated planning permission process. Like the Heritage Protection Bill, the SHEP broadens the number of marine designation categories to include vessels, aircraft, built structures and archaeological sites.

2.8.2 Implications for SEA

The SEA should assess the potential effects of the draft plan/programme on coastal and marine heritage features, and highlight guidance and best practice in relation to the

historic environment and marine renewables. The SEA should also consider the likely implications of the draft Heritage Protection Bill on the draft plan/programme, assuming that it will be introduced in the coming year.

2.9 Other Users & Material Assets

Other Users & Material Assets	
International	United Nations Convention on the Law of the Sea (1982) The London Convention (1972) UN Fish Stocks Agreement (2001) FAO Code of Conduct for Responsible Fisheries IMO draft Convention for the Safe and Environmentally Sound Recycling of Ships (2009) Marine Pollution Convention, MARPOL 73/78 (the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978) Basel Convention of the control of transboundary movements of hazardous waste and their disposal (1992) Convention on International Civil Aviation (Chicago Convention) 1944
Regional	European Transport Policy for 2010: A Time to Decide (2001) Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) (1992) Convention on the Future Multilateral Cooperation in North-East Atlantic Fisheries (NEAFC) (1982) Freight logistics in Europe - the key to sustainable mobility (2006) OSPAR Decision 98/3 on the disposal of disused offshore installations OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development (2008)
EU	Sulphur Content of Marine Fuels Directive 2005/33/EC (2005) Directive on Waste (2006/12/EC) and Revised Directive on Waste 2008/98/EC (2008) EC Directive on Port Reception Facilities 2000/59/EC (2000) EC Maritime Policy EC Common Fisheries Policy EC Shellfish Waters Directive 2006/113/EC (2006) EC Roadmap on Maritime Spatial Planning: Achieving Common Principles in the EU A European Strategy for Sustainable, Competitive and Secure Energy. European Commission Green Paper, 2006. COM(2006)105 An Energy Policy for Europe. Communication from the Commission to the European Council and the European Parliament. COM(2007)1 EU Energy Security and Solidarity Action Plan: Second Strategic Energy Review - Securing our Energy Future Green Paper: Towards a Secure, Sustainable and Competitive European Energy Network. COM(2008)782 Communication on Offshore Wind Energy: Action needed to deliver on the Energy Policy Objectives for 2020 and beyond. COM(2008)768 Communication on the Directive 2004/67/EC concerning measures to safeguard security of natural gas supply. COM(2008)769 European Commission White Paper - European transport policy for 2010: time to decide (2001) Regulation (EC) No 1692/2006 of the European Parliament and of the Council of 24 October 2006 establishing the second Marco Polo programme for the granting of Community financial assistance to improve the environmental performance of the freight transport system (Marco Polo II) and repealing Regulation (EC) No 1382/2003

EU	Decision No 884/2004/EC amending Decision No 1692/96/EC on community guidelines for the development of the trans-European transport network European Council Directive 91/689/EEC (the Hazardous Waste Directive as amended) Council Directive 2001/77/EC on the Promotion of Electricity from Renewable Energy Sources in the Internal Electricity Market (Renewables Directive) (2001) Commission Regulation (EC) No 1013/2006 on shipments of waste Commission Regulation (EC) No 1418/2007 concerning the export for recovery of certain waste listed in Annex III or IIIA to Regulation (EC) No 1013/2006 to certain countries to which the OECD Decision on the control of transboundary movements of wastes does not apply Commission Regulation (EC) No 669/2008 on completing Annex 1C of Regulation (EC) No 1013/2006 on shipments of waste Commission Regulation (EC) No 740/2008 amending Regulation (EC) No 1418/2007 as regards the procedures to be followed for export of waste to certain countries Council Directive 99/31/EC of April 1999 on the landfill of waste (as amended) ("Landfill" Directive)
UK	National Fisheries Policy: Fisheries 2027 (Defra 2007) British Shipping: Charting a new course. (DfT, 1998) A project appraisal framework for ports (DfT, 2002) Delivering a Sustainable Transport System (DfT, 2008) UK Ship Recycling Strategy (2007) The UK Low Carbon Transition Plan (2009) The Energy White Paper: Meeting the Energy Challenge (2007) Framework for the Development of Clean Coal (FDCC) (2009) The Renewable Energy Strategy (RES) 2009 The Renewables Obligation (introduced 2002) Marine and Coastal Access Act 2009 Draft Overarching National Policy Statement for Energy (EN-1) Draft National Policy Statement for Renewable Energy Infrastructure (EN-3) Draft National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) Draft National Policy Statement for Electricity Networks Infrastructure (EN-5) Draft National Policy Statement on Ports
Local	Sea Fishery Committee bylaws (England & Wales) - these will transfer to the Inshore Fisheries and Conservation Authorities on 1st April 2011. Technical Advice Note 8: Renewable Energy (Wales) - does not cover offshore elements of a development, but makes mention of any associated infrastructure that takes place on land Coastal Tourism Strategy for Wales Strategic Framework for Inshore Fisheries in Scotland (2005) A Fresh Start: The Renewed Strategic Framework for Scottish Aquaculture (2009) Technical Advice Note 13: Tourism (Wales) The Wales Freight Strategy 2008 The Wales Transport Strategy 2008 National Transport Plan (for Wales, in development) Wales Fisheries Strategy 2008 Draft framework for the development and deployment of renewables in Scotland 2008 Renewable Energy Route Map for Wales 2008 A Draft Strategic Energy Framework for Northern Ireland. Consultation document 2009 Waste Strategy for England 2007 The National Waste Strategy and the National Waste Plan 2003 (Scotland) Wise about Waste, The National Waste Strategy for Wales 2006 The Northern Ireland Waste Management Strategy 2006-2020

2.9.1 Key Objectives and Targets

The marine licensing regime for a number of activities is to undergo changes resulting from the Marine and Coastal Access Act. The Act combines the regimes under FEPA, the Coast Protection Act 1949 and Telecommunications Act 1984 (Schedule 2 Electronic Communications Code). Activities (in England and Wales) will be regulated by the Marine Management Organisation (MMO) which will control the environmental, navigational, human health and other impacts of constructions, deposits and removals in the marine environment; an exception being major infrastructure projects (e.g. offshore

marine renewable energy projects of greater than 100MW capacity) which come under remit of the Infrastructure Planning Commission (IPC). In Scotland, Marine Scotland has been established as the relevant authority with marine planning and policy responsibilities, and it is yet to be established which organisation will take this role in relation to a Northern Ireland Bill. A significant fraction of renewable energy generation in the next 10 years will come from offshore wind and other marine renewables as they become technically and economically feasible. These will help deliver part of the government targets to reduce carbon dioxide equivalent emissions (34% on 1990 levels by 2020) and increase renewable energy deployment (30% of electricity by 2020) as outlined in the UK Low Carbon Transition Plan and 2007 Energy White Paper. The Framework for the Development of Clean Coal (FDCC) forms part of the wider plan to reduce carbon emissions connected with anthropogenically augmented climate change and other undesirable environmental effects including ocean acidification. The key elements of the FDCC are:

- all new coal-fired power stations must demonstrate CCS at commercial-scale (around 400MW of output)
- a programme of 4 commercial-scale demonstration projects on coal-fired power stations (funded by the proposed CCS incentive) and an expectation that these power stations will retrofit CCS to their full capacity by 2025
- a rolling review of progress in the development of CCS technology to culminate in a report, by 2018, that will consider the case for new regulatory and financial measures to drive the move to clean coal

Within the UK, sources of CO₂ are clustered around a relatively few centres of significant industrial activity; Thames Estuary, Humberside, Merseyside, the Firth of Forth and Teesside and Tyneside. It is possible that some of the capture projects within the demonstration programme will be co-located and share transport and/or storage infrastructure. This may represent a new, or modified, use of the coast and offshore environment.

Shipping and port activity has expanded considerably in recent years, particularly since the introduction of the tonnage tax in 2000, and will remain the principal means by which the UK exchanges goods. Ships, though emitting less CO₂ per tonne of goods transported than other methods of bulk transport, represent a significant source of anthropogenic gaseous and particulate emissions. These emissions are presently unregulated, though a cap and trade scheme may soon emerge from an international agreement.

UK fisheries have declined in recent years in part due to declining fish stocks and resulting management techniques including catch and effort management. The UK National Fisheries Policy: Fisheries 2027 aims to help reach a balance between economic, social and environmental priorities and impacts, with a view to developing sustainable fisheries. The Marine and Coastal Access Act aims to strengthen fisheries and environmental management protection. Inshore fisheries management will be handled by new authorities, the Inshore Fisheries and Conservation Authorities (IFCAs), replacing the current Sea Fisheries Committees. IFCAs will be responsible for activities out to 6nm from the coast and in estuaries where they will be responsible for sea fisheries management. In Scotland, prior to the production of the Marine (Scotland) Bill the government organisation, Marine Scotland, was set up to take control of a number of a number of functions from existing bodies such as the Scottish Government Marine Directorate, Fisheries Research Services and the Scottish Fisheries Protection Agency, as well as the core marine policy and regulatory functions of the Scottish Government.

2.9.2 Implications for SEA

The assessment of the draft plan/programme should take into account the interaction of possible alternatives with the present and probable future use of the marine environment, and the various management regimes which control their activities. The SEA should also consider how the programme may contribute to government targets such as renewable energy generation, security of energy supply and reductions in greenhouse gases.

3 ENVIRONMENTAL INFORMATION BASELINE

3.1 Introduction

The provision of environmental information is required under Schedule 2 of *The Environmental Assessment of Plans and Programmes Regulations 2004* (Regulation 12(3)).

The UK OESEA environmental baseline will be updated as necessary for OESEA2 and provided in full as an Appendix to the environmental report. The baseline will be described under a series of headings which relate to topics identified by the SEA Regulations on which to judge the “...likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects...” These include:

- Biodiversity, habitats, flora and fauna
- Geology, substrates and coastal processes
- Landscape/seascape
- Water environment
- Air quality
- Climate and meteorology
- Population and human health
- Other users, material assets (infrastructure, other natural resources)
- Cultural heritage
- Conservation of sites and species

and the interrelationships of the above.

The environmental baseline will consider all the above topics in a UK context, before providing more detailed information on key features specific to UK Regional Seas. The regional sea boundaries are those defined by JNCC (2004).

An overview of the environmental baseline is given in Section 3.2 below (further information can be found in Appendix 3 of UK OESEA¹⁴); relevant existing environmental problems are identified in Section 3.3 for each Regional Sea, and Section 3.4 provides a summary of the likely evolution of the baseline.

¹⁴ which can be downloaded from www.offshore-sea.org.uk/site/scripts/book_info.php?consultationID=16&bookID=11

3.2 Overview of environmental baseline

3.2.1 UK context

Biodiversity, habitats, flora and fauna

The UK has a rich marine biodiversity reflecting both the range of habitats present in water depths from the shore to >2400m, and its position where several biogeographical provinces overlap (see for example Murray (1886), Longhurst (1998) and Spalding *et al.* (2007)). Some species and habitats are naturally rare, whilst others are endangered by human activities, and actions to protect and promote biodiversity are being taken at many levels.

In broad biogeographical terms, the planktonic flora and fauna of UK waters is part of the North-East Atlantic Shelves Province which extends from Brittany to mid-Norway. In addition, the deeper Faroe-Shetland Channel and areas to the north are within the Atlantic sub-Arctic Province. Each province can be subdivided according to hydrography and plankton composition. In general, the phytoplankton community is dominated by diatoms and dinoflagellates. Plankton blooms typically take place in spring, with a smaller bloom in late summer. The timing, composition and size of these blooms are dependent on a range of environmental factors. Some phytoplankton blooms may be toxic to marine life. The zooplankton community is dominated by copepods, including *Calanus finmarchicus* and *C. helgolandicus*. Jellyfish, krill and salps are also abundant, as are the larvae of fish, and many benthic animals (meroplankton). Further information is provided in Appendix 3a.1.

The composition of the seabed fauna of the UK reflects the intersection of four biogeographical zones:

- Boreal Province including the North and Irish Seas
- Lusitanian-Boreal Province comprising the Celtic Sea and west coasts of Ireland and Scotland
- Arctic Deep-Sea Province, a deep water zone centred on the Norwegian Sea but extending into the Faroe-Shetland and Faroe Bank Channels
- Atlantic Deep-Sea Province, a deep water zone to the west of northeast Europe

Within each Province it is possible to distinguish a series of faunal communities inhabiting specific sediment types. Often these communities extend over wide areas (e.g. the fine sands of the central North Sea and the sandy muds of the Fladen Ground in the northern North Sea). In addition, there are a number of highly localised habitats and communities, including reefs of long lived horse mussels and cold water corals, some of which are the subject of biodiversity action either at an OSPAR, EU or UK level. A large proportion of the seabed of the UK continental shelf and upper slope is physically disturbed by fishing activities.

Most cephalopods in UK waters are long-finned squids, short-finned squids, bobtail squids, octopuses or cuttlefish. The long-finned squids (including *Loligo forbesii*) tend to have a more coastal distribution and a northerly distribution. Short-finned squids are oceanic species and are recorded particularly to the west of the UK. Bobtail squids are abundant in shallow, coastal regions, while octopuses and cuttlefish are more common in southern areas. A number of deep-sea cephalopods are present in the deep waters of the Faroe-Shetland Channel and Rockall Trough.

A wide range of biogeographic distribution patterns are shown by the fish in UK waters. The majority of continental shelf species have a north-east Atlantic/northern Atlantic

distribution, although a proportion are found globally in the tropics/subtropics and others have a circum-polar pattern of occurrence. Widely distributed species often include local stocks with distinct breeding times and locations (e.g. herring). Widespread pelagic species include herring and mackerel, particularly around the western and northern parts of the UK. Demersal species include gadoids (e.g. cod, whiting) and flatfish (e.g. plaice, dab). Demersal communities tend to be more diverse in southern areas of the UK. Diadromous fish in UK waters include sea trout and Atlantic salmon. A number of sharks and rays are present in UK waters, including the basking shark. Deep water fish show different distribution patterns with major differences occurring north and south of the Wyville Thomson Ridge (ca. 60°N), and a distinct species group found in the cold waters of the Faroe-Shetland Channel and Norwegian Sea. Widespread commercial shellfish species include crustaceans (e.g. *Nephrops*, brown crab), bivalve molluscs (e.g. scallops, cockles) and gastropod molluscs (e.g. whelks). Many of these species, such as *Nephrops* and scallops, are closely tied to particular seabed sediments and so occupy distinct grounds. Virtually all commercially fished species are heavily exploited. .

Of the five reptile species recorded in UK waters, the vast majority of records are of the leatherback turtle (*Dermochelys coriacea*) which is the only species considered a regular member of the UK marine fauna. While turtles have been observed along the majority of UK and Irish coasts, records are concentrated on the west and south coasts of Ireland, southwest England, south and northwest Wales, the west coast of Scotland, Orkney and Shetland.

The bird fauna of the UK is western Palaearctic, that is the great majority of species are found widely over western Europe and extend to western Asia and northern Africa. There are 3 regular patterns of species occurrence: resident, summer visitors (to breed) and winter visitors. Some of the summer visitors undertake long migrations to overwinter in southern Africa or South America. A few species are found only or predominantly in the UK. For example, the three Pembrokeshire islands of Skomer, Skokholm and Middleholm are estimated to hold some 50%, and the Isle of Rum off western Scotland between a quarter and a third of the world's breeding population of Manx shearwaters.

Many of the species of cetaceans found in UK waters have a worldwide distribution, although a number have restricted ranges, typically temperate to sub-Arctic or Arctic waters of the North Atlantic. British whales and dolphins include resident species as well as migrants (regularly moving through the area to and from feeding and breeding grounds) and vagrants (accidental visitors from the tropics or polar seas). Two species of seal breed in the UK; the grey seal has a North Atlantic distribution with the UK holding over 40% of the world population; and the harbour seal, found along temperate, sub-Arctic and Arctic coasts of the northern hemisphere, with the UK population representing over 5% of the global total. Otters inhabit a variety of aquatic habitats, with some populations feeding in shallow, inshore marine areas. The most important otter populations utilising coastal habitats occur in western Scotland, Shetland, west Wales and the Wash and north Norfolk coast. Small numbers of the Nathusius' pipistrelle bat occur seasonally over UK waters on migrations between the UK and mainland Europe.

Geology substrates and coastal processes

The distribution of geological strata in the UKCS is determined by past geological and geomorphological processes. The distribution of sediments and certain topographic features is a function of the underlying geology, and millennia of aeolian, fluvial and glacial activity both in the marine and terrestrial environment. The distribution of sediments and deep geological structure of the UKCS, and the North Sea in particular, is quite well known, particularly in areas of mature oil and gas production which have been extensively explored since the 1960s. Oil and gas reserves are dependent on viable

source rocks and a suitable impermeable cap-rock, and these reservoirs are responsible for the distribution of much offshore activity. Certain topographic features are notable, primarily for the quality of habitat they provide, and these are bound by geology (e.g. Haig Fras) or sediment type (e.g. north Norfolk sandbanks).

Existing levels of contamination in the UK marine environment vary considerably on both regional and local scales, and in general have declined appreciably in recent decades. The majority of marine pollution comes from land-based activities; most pollutants enter the UK marine environment through direct discharges of effluents, land run-off (mainly via rivers) or indirectly via the atmosphere. The highest concentrations of contaminants, and hence the greatest effects, are therefore often in inshore areas. Water samples with the highest levels of chemical contamination are found at inshore estuary and coastal sites subject to high industrial usage. In offshore waters, contaminant levels (chiefly hydrocarbons) in water and sediments are generally expected to be at or near background concentrations. Levels are expected to be higher in close proximity to older oil and gas infrastructure, with concentrations decreasing with increasing distance from the source.

Landscape/seascape

Seascape is defined in DTI (2005) as 'a discrete area within which there is shared inter-visibility between land and sea', which can be separated into areas of sea, land and intervening coastline. The study of seascape is not only concerned with the physical changes in a given view but the interaction of that view with individuals and how it affects overall visual amenity. Seascapes and coastal environments (including the sea itself) are extensively used for recreation which generates significant tourist income from which many coastal communities are dependent, and this can strongly conflict with commercial and industrial activity (Hill *et al.* 2001). The 'value' of many of the UK's seascapes is reflected in the range of designations which relate in whole or in part to the scenic character of a particular area (e.g. Area of Outstanding Natural Beauty, Heritage Coast, National Scenic Area), though the implementation of the European Landscape Convention is encouraging the consideration of the wider value of landscapes beyond those considered to be the most 'outstanding'.

Water environment

The UK marine water environment is highly varied, ranging from entirely oceanic conditions to the north and west of the UK to complex estuarine systems widely distributed around the coast. It is also a dynamic environment, with a complex system of currents and varied oceanographic conditions including areas of considerable frontal activity and high-energy wave and tidal environments.

Air quality

Whilst air quality is not monitored routinely offshore, regular air quality monitoring is carried out by local authorities in coastal areas adjacent to each Regional Sea and by the OSPAR Comprehensive Atmospheric Monitoring Programme (CAMP) network. The air quality of all local authorities is generally within national standards set by the UK government's air quality strategy though several Air Quality Management Areas (AQMAs) have been declared to deal with problem areas. Industrialisation of the coast and certain inshore areas has led to increased levels of pollutants in these areas which decrease further offshore, though oil and gas platforms provide numerous fixed point sources of atmospheric emissions.

Climate and meteorology

The UK lies within temperate latitudes and the climate is generally mild. Numerous easterly moving depressions meet the UK in the west leading to a gradient of relatively high wind speeds and precipitation in the exposed west and relatively low wind speeds and precipitation in the sheltered south and east. The upland nature of much of the west coast also contributes to this west-east gradient, with topography-induced enhanced precipitation, particularly in the north-west. The UK has a strong maritime influence, which has the effect of reducing the diurnal and annual temperature ranges; such effects are most notable at the coast and on islands (e.g. Orkney, Shetland). The North Atlantic Oscillation (NAO) has also been linked with variations in UK sea surface temperatures, wind strength, direction and rainfall. It is very likely that climatic change is influenced and/or generated by the anthropogenic production of greenhouse gases, which are likely to generate a temperature increase of 0.2°C for the next few decades as well as an increase in sea-level. More changeable and extreme weather is also a possible outcome.

Population and human health

Population density is highest in England at 390 persons per km², comparably lower in Wales and Northern Ireland at 143 and 128 persons per km² respectively, and the lowest by a considerable margin in Scotland at 66 persons per km². In coastal areas, there are lower densities around much of the southwest of England, west and north Wales, the far north of England, and much of Scotland excluding the central belt. The highest coastal densities are around much of southeast England, part of northeast England, the Firths of Forth and Clyde, part of northwest England, south Wales and around the Severn Estuary. These areas are typically where conurbations are largest and most numerous, although more isolated areas of higher densities are dotted around much of the coast. Higher densities are also observed in several coastal areas of Northern Ireland.

For the UK as a whole, 9.3% of people described their health as “not good” in 2001. Values were lowest in England at 9.0%. Values for Scotland and Northern Ireland were similarly higher than the UK average at 10.2% and 10.7% respectively, with Wales the highest at 12.5%. The proportion of people with a limiting long term illness showed a similar pattern, with the lowest proportion in England and highest in Wales.

Other users, material assets (infrastructure, other natural resources)

UK waters are subject to a multitude of uses - particularly in coastal areas. The range and importance of existing and some potential uses of the sea are described in Appendix 3h, with key aspects summarised below. In advance of formal marine spatial planning, this SEA has obtained accurate and recent information on other current and likely uses of the sea in the foreseeable future.

The UK is heavily reliant on shipping for the import and export of goods, and will remain so for the foreseeable future. Over 95% of the goods entering or leaving the UK are transported by ship, with substantial numbers of vessels also transiting UK waters en route to European and more distant ports. In recognition of the vessel traffic densities and topographic constraints on various routes, the International Maritime Organisation (IMO) has established a number of traffic separation schemes and other vessel routing measures to reduce risks of ship collision and groundings. In addition, IMO regulations required that from 2005, an Automatic Identification System (AIS) transponder be fitted aboard all ships of >300 gross tonnage engaged on international voyages, all cargo ships of >500 gross tonnage and all passenger ships irrespective of size. AIS data allow

precise tracking of individual vessels, and provide accurate information on important areas for larger vessel navigation.

Fishing in the UK has a long history and is of major economic and cultural importance. In 2007, there were nearly 13,000 working fishermen in the UK (of which 79% were full time), operating over 6,700 vessels, many of which are smaller inshore boats. These vessels landed 610,000 tonnes of fin- and shellfish in 2007, with a total value of £645 million. On top of this, fish processing provides over 22,000 jobs in the UK. The livelihoods of individual fishermen depend on their ability to exploit traditional fishing grounds and to adapt to changing circumstances to maximise profit. Consequently, they are vulnerable to competition within the UK industry and with foreign vessels, and to being displaced from primary grounds. Various sources of information on fishing effort show that while the majority of UK waters are fished to some extent, certain areas receive considerably more effort than others. In general, the greatest density of fishing effort takes place in coastal waters, for both static (such as pots, traps or gillnets) and mobile (such as trawls and dredges) gears. Further offshore, the density of effort was greatest to the northeast of Scotland (particularly the Fladen Ground), around the Northern Isles and to the southwest of the UK.

Offshore wind farms have the potential to affect civilian aerodromes and radar systems. The UK air traffic control service for aircraft flying in UK airspace has made available mapped data indicating the likelihood of interference from offshore wind turbines on its radar network. Similarly, the Civil Aviation Authority (CAA) produces an Aerodrome Safeguarding Map and Local Planning Authorities are required to consult on relevant Planning Applications which fall within a 15km radius.

Military use of the coasts and seas of the UK is extensive, with all 3 Services having defined Practice and Exercise Areas, some of which are danger areas where live firing and testing may occur. Additionally, several military radars - Air Surveillance and Control Systems (ASACS) - are present around the coasts of the UK; these have been mapped along with corresponding buffers relating to potential conflict with wind farms.

Tourism and recreational use of UK coasts and coastal waters is of major importance in many areas. Annually, the British public take some 28 million days on seaside holidays in the UK spending £5.1 billion, split between England (£4 billion), Wales (£0.52 billion), Scotland (£0.44 billion) and Northern Ireland. Major recreational uses of the sea beyond beaches and coastal paths include yachting (for which the Royal Yachting Association has published charts of cruising and racing routes) and sea angling, which in England and Wales generates some £82m for charter boats and £278m for own boat activities. Many visitors to the coast cite unspoilt and beautiful natural scenery as the important factors influencing their selection of location to visit. The importance of such attributes are widely recognised and protected through designations such as National Parks, Areas of Outstanding Natural Beauty, and National Scenic Areas.

Various areas of sea are used or licensed/leased for marine aggregate extraction, telecommunications and other cables, disposal of capital and other dredging wastes, offshore wind farms, surface and subsea oil and gas production and export infrastructure. These have a combined turnover of some £34 billion, employing nearly 320,000 people. Potential future uses of the sea include gas storage (both natural gas and carbon dioxide) in geological formations, aquifers or constructed salt caverns, and the licensing/leasing of areas of the sea for wave and tidal devices.

Cultural Heritage

The collective inventory and knowledge of maritime sites in particular is quite poor and may be subject to recording biases. Archaeology associated with human and/or proto-human activities either on the current seafloor of the southern North Sea, in the coastal zone of the British Isles and further inland, has the potential to date back at least as far as 500,000 years BP. Relatively recent finds of flint artefacts from the Cromer Forest-bed Formation, Suffolk date to as early as 700,000 years. The current understanding of marine prehistoric archaeology is based on knowledge of the palaeolandscapes of the continental shelf between the UK and Europe during glacial phases and limited finds of archaeological materials, augmented with knowledge of analogous cultural and archaeological contexts from modern day terrestrial locations. The record for wreck sites is biased towards those from the post-Medieval and later periods, presumably a function of greater traffic and increased reporting associated with the introduction of marine insurance and the Lloyds of London list of shipping casualties in 1741. The strategic military importance of the sea, the importance of the North Sea as a fishing area, the importance of maritime trade routes and the treacherous nature of many near-shore waters, has lead to a large number of ship and aircraft wrecks in UK waters. A number of coastal sites have been designated as World Heritage Sites partly or entirely on cultural heritage grounds, for example St Kilda, the Dorset and East Devon Coast and the Heart of Neolithic Orkney. In addition to these, a significant number of scheduled monuments and other archaeological features are present along the coast, extending from prehistoric times through the entirety of the Holocene period.

Conservation of sites and species

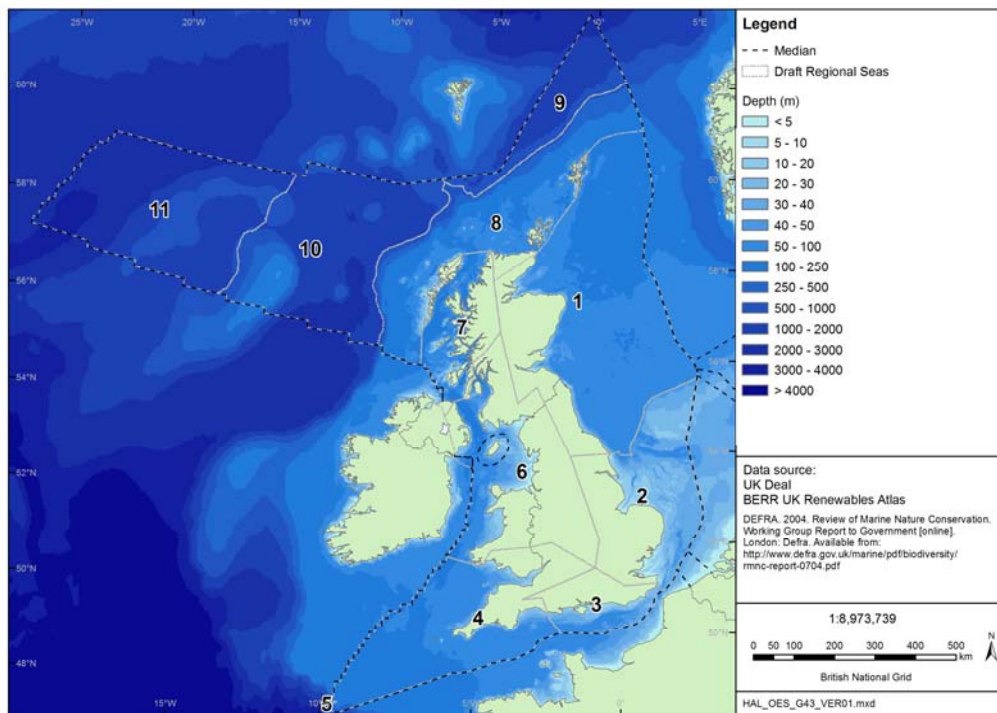
There are numerous designated conservation sites in all UK coast bounded regional sea areas. A range of designations exist from statutory international through European-level Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) (Natura 2000 sites) and the national-level Sites/Areas of Special Scientific Interest (SSSIs/ASSIs) to voluntary local, affording various levels of protection to habitats, species, and geological, cultural and landscape features. Most currently designated coastal sites are entirely terrestrial or terrestrial with marine components; and a few are exclusively marine. However, efforts to identify offshore sites are ongoing and a number of offshore SACs and SPAs are in the process of being designated or have their boundaries extended, for example a consultation by JNCC, NE and CCW on proposals for a further series of marine and offshore sites closed on 26th February 2010.

Additionally, the Marine Strategy Framework Directive through the Marine and Coastal Access Act (see also the Marine Bill proposals of the devolved administrations) introduce further requirements for identification and designation of a network of Marine Conservation Zones (known as Marine Protected Areas in Scotland).

3.2.2 Regional Seas

The Offshore Energy SEA uses draft Regional Sea boundaries identified by the JNCC (JNCC 2004) as an appropriate means of considering the broad scale biogeographical regions within UK waters. These boundaries are shown in Figure 4.1. The text below (largely drawn from JNCC 2004) describes the broad physical features of each Regional Sea, including the features upon which their boundaries are based. Detailed information on key features of each of the Regional Seas is provided by the various sub-appendices of the environmental baseline.

Figure 4.1 – Draft Regional Sea boundaries



Regional Sea 1

The *northern North Sea* is bounded by the Flamborough front to the south, marking the transition from the shallow mixed waters of the southern North Sea to the deeper waters (50-200m) in the north which stratify thermally in summer along with a transition from sands to muddier sediments. Waters are generally of coastal origin but with a strong influx of Atlantic water in the north; turbidity is moderate. The northern boundary marks the transition from water dominated by the continental shelf current to the North Sea waters of mixed origin.

Regional Sea 1 supports an increasing diversity of cetacean species from south-north, high densities of seals (particularly around the Northern Isles), and an important population of bottlenose dolphins along the Scottish east coast. The adjacent coastline represents an important migratory pathway for many Arctic-breeding species, while the widespread and often remote cliff habitats support vast numbers of breeding seabirds; seabird densities at sea are relatively high over much of the area. The deeper waters over the mud and muddy sand of the Fladen Ground support an abundance of fish and *Nephrops* - yielding one of the most valuable fishing grounds in UK waters; additionally, inshore waters are heavily fished throughout the area. Oil and gas development is extensive, particularly in the east. A number of Scottish offshore wind zones (Beatrice, Inch Cape, Bell Rock, Neart na Gaoithe, Forth Array) are present within territorial waters, as is the Pentland Firth wave and tidal strategic area.

Regional Sea 2

The *southern North Sea* extends from the Flamborough front in the north to the Dover Straits in the south, where a transition commences from North Sea water to Atlantic water. This region is shallow (generally 0-50m), with a predominantly sandy seabed, and mixed water experiencing large seasonal temperature variations. The influences of coastal water are particularly marked in this region, the water is turbid, and it exhibits a characteristic plankton composition.

Much of Regional Sea 2 is less than 50m water depth, with many extensive sandbank features; these include the Dogger Bank draft SAC and the North Norfolk Sandbanks possible SAC. The western flank of the Dogger Bank also supports high densities of seabirds. Harbour porpoise are widely distributed throughout much of the area, with apparently variable densities between 2 major surveys a decade apart. Large numbers of harbour seals breed on the coast adjacent to the Wash; these animals forage widely in adjacent waters. The region experiences high densities of shipping activity, particularly in the south, and major shipping lanes run approximately parallel to the entire length of the coast. Fishing effort is moderate overall, with vessels generally avoiding the shallowest of sandbank areas, although inshore effort is fairly high in the south with international effort high in the southeast. Gas development is extensive south of the Dogger Bank to approximately 53°N, while a number of existing, under construction and planned offshore wind farms are present in the greater Wash and Thames areas (e.g. Kentish Flats, Thanet, Gunfleet Sands, Sheringham Shoal, Lincs).

Regional Sea 3

The *eastern English Channel* is bounded by the Dover Straits to the east and extends to the west to a line drawn between Weymouth and Cherbourg on the north coast of France. Waters are generally shallow (0-100m) and mixed, with strong tidal streams. The seabed is variable; a general transition can be observed from coarser sediments in the west to sand in the east, although localised rock outcrops occur throughout the English Channel basin. Water temperatures vary considerably with season. The western boundary denotes a transition in benthic fauna from the eastern English Channel (Boreal fauna) to a different community in the western English Channel (Lusitanian fauna).

The majority of Regional Sea 3 receives high to very high densities of shipping traffic, and has a water depth of less than 60m. The coastline is one of the most densely populated in the UK, and adjacent waters are used by a great number of recreational vessels. Additionally, very high levels of fishing activity occur, particularly in inshore waters, with high levels of effort by non-UK vessels also observed in this area. Many dredging licence and application areas are present in the region. Two Round 3 offshore wind zones are present in Regional sea 3 (Southern Array [formerly Hastings] and West Isle of Wight) which have agreements for the development of 0.6 and 0.9GW respectively.

Regional Seas 4 and 5

The *western English Channel and Celtic Sea* (Regional Sea 4) is a large region west of a line drawn between Weymouth and Cherbourg and extending to approximately the 500m depth contour on the continental slope in the west. It is bounded to the northeast by the Celtic sea front - marking the transition from oceanic water to the coastally influenced waters of the Irish Sea. Depth in the region varies from 50-200m with a general trend of increasing depth towards the west. The seabed is largely composed of sand and gravels with isolated rocky outcrops. The waters are generally subject to seasonal stratification, although mixing and seasonal temperature variation is greater in the east. The southern boundary is marked by a transition to warmer water and a community containing a greater number of Lusitanian species. The region is heavily influenced by Atlantic water, with reduced coastal influences; turbidity is moderate.

The *Atlantic south west Approaches* (Regional Sea 5) is a region bounded to the east by the shelf break and extends westwards into the northeast Atlantic. Only a very small proportion of this region lies within UK waters, and it is therefore grouped with the adjacent Regional Sea 4 in the majority of Appendix 3. The seabed is generally composed of fine material. The water is oceanic in origin, with negligible coastal

influences, low turbidity and is stratified. While comparable to the other deep water Regional Seas 10 and 11, influences from the Mediterranean current are stronger in this region leading to Lusitanian species being present in the water column. The area is intersected by submarine canyons, characterised by the upwelling of nutrient-rich deep waters and with cold-water corals present.

A large area with a water depth less than 60m extends west from the Bristol Channel to approximately 5°W, and also to some distance off the coast of north Cornwall. Recent surveys have observed seasonally high densities of seabirds in coastal waters around southwest England, while densities are also seasonally high in the north of the area around southwest Wales. The Celtic Sea is an important area for cetaceans, particularly common dolphins which may be seasonally present in large numbers. A large proportion of UK's leatherback turtle sightings occur in this region. In offshore waters west of Land's End lies Haig Fras - an area of rocky reef currently designated as a candidate SAC. The inshore waters off the southwest coast of England receive some of the highest levels of fishing effort in UK waters. Fishing effort is also high across the majority of Regional Sea 4, while this area is also of considerable importance to recreational craft and commercial shipping. Several dredging licence and application areas are present in the inner Bristol Channel and off the south Wales coast. Offshore wind is not yet developed in Regional seas 4 and 5, though there is an agreement for the development of 1.5GW in the Bristol Channel zone (Atlantic Array). The Severn Estuary is also presently subject to a feasibility study for the deployment of tidal range energy.

Regional Sea 6

The *Irish Sea* is bounded to the south approximately by the Celtic Sea front, and extends north to a line from the Mull of Kintyre, Scotland, to Fair Head, Northern Ireland, and includes the North Channel. Movements of species suggest the North Channel to represent an area of gradual transition rather than sharp change. The seabed is variable in nature, although dominated by glacial deposits re-worked by tidal currents. Waters are strongly influenced by coastal processes and turbid with influxes of water from the Celtic Sea and north from the continental shelf current. Stratification occurs in deeper waters but not in the coastal margin or in the north east of the area.

UK waters within the Irish Sea are generally shallow, with the majority of the area less than 60m depth from the coast west to approximately 5°W. Seabird densities are seasonally high in the west, particularly in the far north and south Irish Sea. Concentrations of Manx shearwaters occur in the Irish Sea, with colonies on islands off Pembrokeshire and in the Inner Hebrides representing the majority of the world breeding population of this species. Bottlenose dolphins occur off the west and north Welsh coast, with sightings focussed in Cardigan Bay where the species is one of the qualifying features for a marine SAC. High densities of shipping are experienced in the central St. George's Channel, off north Wales leading to the Mersey, and in the North Channel. High levels of fishing effort occur in the north, particularly to the west of the Isle of Man and off the Cumbria coast. Considerable gas infrastructure is present in the eastern Irish Sea associated with producing gas fields and there are a limited number of producing oilfields. There are a number of existing and planned offshore wind farms (e.g. North Hoyle, Burbo Bank, Barrow, West of Duddon Sands, Rhyl Flats) and the Round 3 development zone, East Irish Sea, which has an agreement for 4.2GW of wind energy. Two of the Scottish offshore territorial zones (Solway Firth and Wigtown Bay) are also present in Regional Sea 6, which have agreements with companies wishing to develop 300MW and 280MW respectively.

Regional Sea 7

The *Minches and west Scotland* is bounded to the south by a line from the Mull of Kintyre to Fair Head, to the west by the Malin front, and to the north by a line from the Butt of Lewis to Cape Wrath. The region encompasses waters which are largely sheltered from Atlantic swells by Northern Ireland and the Outer Hebrides. The seabed is characterised by muddy sand and mud, although more gravel is present in the south of the region. The waters in the region largely comprise North Atlantic water as part of the continental shelf current but are modified by coastal influences. The majority of the waters in the region stratify in the summer months, and turbidity is moderate-low.

Regional Sea 7 is characterised by relatively deep waters considering its coastal nature. The complex, undulating coastline with many islands is predominantly rural with very low population density and remote from large conurbations. The region is of high environmental sensitivity for a range of features. A high diversity and abundance of marine mammals and seabirds are present, along with many coastal otter populations. This area supports some of the highest densities of harbour seals in UK waters. A very large number of designated conservation sites are present along the adjacent coast, including numerous habitat, species and landscape designations. Cold water corals occur in the area, and other reef features are present in many of the sheltered sea lochs. These lochs also support extensive mariculture activities. Fishing effort is very high throughout much of the area, and is dominated by small, inshore vessels. Three of the Scottish offshore wind zones are present in Regional Sea 7 (Kintyre, Islay and the Argyll Array) which have agreements with companies and consortia wishing to develop 378MW, 680MW and 1.5GW respectively. Though no leasing/licensing has taken place in Regional Sea 7 for wave and tidal devices, the area is highly prospective for these devices (see section 1.7).

Regional Sea 8

The *Scottish continental shelf* runs along the continental shelf to the north and northwest of the UK. It is bounded to the west, south of the Wyville Thomson Ridge, by the 1000m depth contour - reflecting the changes in community composition which has been observed in various studies on shelf slope fauna. To the north of the Wyville Thomson Ridge, the boundary lies along the 600m contour where the influence of cold Norwegian Sea/Arctic Intermediate water commences. The entire continental shelf is dominated by the warm (>8°C) North Atlantic waters of the continental shelf current until the Orkney and Shetland Isles. The boundary to the east reflects the division between Lusitanian and Boreal fauna in the channel between the Orkney and Shetland Islands, with Lusitanian fauna occurring in the Orkney Islands but not in the Shetland Islands. The seabed is characterised by sand and coarse sediment of glacial origin re-worked by tidal processes, and in deeper areas close to the shelf break sediments have been formed into iceberg ploughmarks - a complex matrix habitat of stony ridges and sandy troughs. Water in this region is subject to seasonal stratification, has low turbidity and there is a low level of material of terrestrial origin entering the sea.

Regional Sea 8 covers a large area and range of water depths, although waters shallower than 60m are generally restricted to those immediately west of the Outer Hebrides. The region supports a rich diversity and abundance of marine mammals, with all typical UK shelf species present in addition to many oceanic, deeper water species along the shelf edge to the north and west. Large numbers of grey seals breed on the several small remote islands present, including those around Orkney and Shetland. Seabird densities are high throughout coastal waters and to a considerable distance offshore. Of particular environmental sensitivity is the St. Kilda archipelago. Lying 66km west of the Outer Hebrides, these islands support very large populations of breeding seabirds and receive

numerous conservation designations, including dual World Heritage status for both its natural and cultural significance. Large numbers of breeding seabirds also occur on the adjacent coast of the Outer Hebrides, north mainland and Northern Isles. In the far south of the region lies Stanton Banks, recently designated a candidate SAC for reef features. Shipping density is particularly high along the north mainland and through the Pentland Firth, while fishing effort is moderately high throughout the majority of the region. A limited amount of oil and gas activity occurs to the west of Shetland. Population density along the adjacent coast is the lowest in the UK.

Regional Sea 9

The *Faroe-Shetland Channel* is characterised by the influx of dense cold water from the Arctic and Norwegian Sea into the channel at depths below 600m. The western boundary of the region is the Wyville Thomson Ridge which prevents the majority of the flow of cold water from entering the Rockall Trough, which instead exits to the northwest via the Faroe Bank Channel. The seabed of the channel is mainly composed of silt and clay at the base with more sand and some areas of gravel and cobbles/boulders on the flanks of the continental slope, particularly in areas sculpted in the past by icebergs; glacial dropstones occur throughout the area. Water temperatures vary considerably through the water column, from approximately 0°C at the seabed but above 600m depth, where North Atlantic water flows, between 6.5-8°C. Both waters in the region are oceanic in origin and turbidity is low. The cold waters at depth result in a different characteristic benthic community to that found at shallower depths in adjacent areas or in the Rockall Trough.

Regional Sea 9 supports a diverse and abundant cetacean community, including many poorly understood oceanic and deep-diving species such as sperm whales, beaked whales and large baleen whales. Evidence suggests that this area represents a migratory route for a number of cetacean species. Along the southwest boundary of the area lies the Wyville Thomson Ridge, a large area of full salinity stony and bedrock reef currently designated as a possible SAC.

Regional Seas 10 and 11

The *Rockall Trough and Bank* (10) and *Atlantic North West Approaches* (11) Regional Seas are deep-sea regions west of the Scottish continental shelf. Regional Sea 10 is bounded to the east by the 1000m depth contour and to the west by the 1000m depth contour on the western edge of the Rockall Bank, while Regional Sea 11 extends west of this beyond the UKCS. The seabed supports a different faunal community to that observed at depths less than 1000m, and is mainly composed of muddy sand and mud, with clay mud present in the deep waters to the west. In shallower water, on Rockall Bank and the seamounts, the fauna is likely to be similar to those found at the western edge of the Scottish continental shelf. The waters of these regions are totally oceanic in origin with negligible inputs of material of a terrestrial origin and little seasonal change in primary productivity. Turbidity is very low. Waters are cooler in Regional Sea 11 due to an influx of south flowing Arctic water.

Compared to UK shelf waters, information on the natural environment of Regional Seas 10 and 11, particularly the latter, is sparse. Known key features include a diversity and abundance of cetaceans, including several large baleen whales species and deep diving species. Evidence suggests that this area represents a migratory route for a number of cetacean species. Several seamounts are present which are known to contain extensive reef habitat, including cold-water corals. In the far northeast of the region lies the Wyville Thomson Ridge possible SAC, and the Darwin Mounds candidate SAC. In the far west of Regional Sea 10 lies the North West Rockall Bank draft SAC. Moderate levels of fishing

effort by UK vessels occur over topographical rises in the area, such as the Anton Dohrn seamount and Rockall Bank; these features are also fished extensively by non-UK vessels.

3.3 Relevant existing environmental problems

The SEA Directive requires consideration of any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Directives 79/409/EEC and 92/43/EEC (the Birds and Habitats Directives).

The environmental problems described in Table 4.1 were identified during preparation of the environmental baseline (Section 4.2 and Appendix 3). No judgement of importance should be inferred from the position of problems/issues in the table. The location of supporting data is signposted in Table 4.1.

Table 3.1 – Environmental problems relevant to offshore oil & gas licensing and wind leasing

Problem	Supporting data	Implications
Potential for earthquakes	In the North Sea as a whole the expected frequency of occurrence for a magnitude 4 or greater seismic event (sufficient to cause structural damage to developments tied to the seabed) is between 2 and 14 years, and highest peak ground acceleration hazard in UK offshore waters is attained in the northern North Sea. The English Channel is subject to moderate seismic activity with historically few large (>5.5ML) events. An earthquake of 5.2ML or greater may be expected once in 100 years. A number of earthquakes of 5.0-5.9ML magnitude have been experienced in and around the Irish Sea, primarily centred on the Llyn Peninsula and around Anglesey (Menai Straits fault zone). The most recent event here was recorded in 2005 (2.8ML), with a larger event (5.4ML) having taken place in 1984. Five earthquakes of sufficient magnitude to cause structural damage to developments tied to the seabed have been recorded in the nearshore of Regional Seas 7 and 8 since 1970. None recorded on the outer Hebrides Shelf or further to the west, and few of significant magnitude, are recorded in the wider Regional Sea 8 area. Further information: UK OESEA Appendix 3b. EQE International Ltd. (2002), Hitchen <i>et al.</i> (2003), Mallard <i>et al.</i> (2003), Holmes <i>et al.</i> (2006), Musson & Winter (1997), Jackson <i>et al.</i> (2004).	For all activities covered by the draft plan/programme (in particular oil and gas, gas storage and CCS), operators should be aware of possible seismic activity.
Instability of Continental Slopes	Steeply sloping areas of the Continental shelf pose geohazards to offshore operations. The eastern margin of Rockall Bank has a steep upper slope which is an area of heavily incised bedrock	Ensure awareness. Detailed environmental, oceanographic, and

Problem	Supporting data	Implications
	outcrop. There is evidence of landsliding on the mid-lower slope. The Faroe-Shetland Channel displays seabed features including landslides and debris flows. Further information: UK OESEA Appendix 3b. Long <i>et al.</i> (2004), Jacobs (2006)	geotechnical studies may be required.
Potential effects of climate change	Potential effects are still not fully understood, though there is some evidence of an increased incidence of stormy conditions. Sea-level rise in association with any increase in storminess may increase coastal erosion, flooding and loss of intertidal habitat. Large scale climatic and oceanographic processes such as those indicated by changes in the NAO index may affect wave heights and water temperatures. Climate change may also be associated with alterations in ecosystem community structure and could exacerbate the spread of some non-native species. Further information: UK OESEA Appendices 3a and 3f. UKCP09 (Murphy <i>et al.</i> 2009, Lowe <i>et al.</i> 2009), IPCC (2007a), MCCIP (2008)	Maintain awareness of research developments and encourage active participation in relevant research. Aim for any associated onshore infrastructure to be resilient to coastal changes linked with climate change projections.
Contamination of water and sediments	Existing contamination of sediments and sea water by hazardous substances are concentrated in areas close to industrial and population centres, with about 80% of marine pollution having its source from a variety of land-based activities. Persistent contaminants (e.g. PCBs, PCDD/Fs) and metals tend to accumulate in areas of fine-grained sediments. There is some concern over historical use of oil based drilling muds which are contaminated with hydrocarbons and other toxic compounds – these are largely restricted to the central and northern North Sea and generally in close proximity to drilling and production platforms. Hydrocarbons and other treatment chemicals are discharged to the water column through produced water, although concentrations are highly regulated, low (ca. 20mg/l) and continue to decline. Seabed disturbance (e.g. through installation of foundations/anchors, trawling and maintenance/aggregate dredging) causing re-suspension of contaminated fine-grain sediment has the potential for pollution to be redistributed over considerable distances in ocean currents. There may also be contamination associated with munitions dump sites although the scale of this potential problem is poorly defined. Further information: UK OESEA Appendix 3b.	Review areas to be licensed for activities outlined in the draft plan/programme and ensure awareness so that potential activities do not exacerbate problem. Detailed studies may be required to determine risk of pollutant transport.
Introduction of non-native species	Vessel fouling and sediments and water in ballast tanks are important vectors for the spread and	Ensure licensee awareness.

Problem	Supporting data	Implications
	introduction of invasive planktonic and benthic species. Facilities may provide stepping stones for species to establish. Further information: UK OESEA Appendix 3a.1. Edwards (2001), Lindley & Batten (2002), Kennington & Johns (2006)	Encourage good practice for vessel management of rigs/support vessels to minimise risk.
Potential climate induced changes to phyto- and zooplankton communities	Considerable increase in phytoplankton colour (production) over the last decade in certain areas of the north east Atlantic. Possible regime shift in all trophic levels of North Sea due to hydro-climatic variations in North Sea inflow. Large-scale reorganisation in zooplankton communities detected. Further information: UK OESEA Appendix 3a.1. Lindley & Batten (2002), Edwards <i>et al.</i> (2007)	Maintain awareness of research developments and encourage active participation in relevant research.
Damage to important benthic habitats	Widespread damage to sessile organisms (e.g. corals and sponges) caused by the trawls of commercial fishing vessels has been observed on the shelf edges of Ireland, the UK and Norway, and on the Darwin Mounds cSAC. Trawling may affect benthic communities through preferential destruction of certain types due to fishing methods (e.g. large, fragile, long-lived species over more robust types). Aggregate extraction removes habitat and destroys fauna, though areas are typically recolonised, often with communities different to that prior to disturbance. General diffuse contamination from large population centres, agriculture and industry may have had a wide range of ecological effects. Further information: UK OESEA Appendix 3a.2. Newell <i>et al.</i> (1998), OSPAR (2000), Dieter <i>et al.</i> (2003)	Review areas to be licensed for activities outlined in the draft plan/programme and ensure awareness so that potential activities do not exacerbate problem.
Fishing and changes to fish communities	The mixed nature of the demersal trawl fisheries in the North Sea leads to high numbers of unwanted, low-value or immature fish being caught – these fish will be discarded. Sufficient levels of fishing effort can lead to stock decline and a change in trophic status as large, predatory species are removed, favouring short-lived organisms from lower trophic levels such as small, planktivorous fish and invertebrates. Some marine mammal species, notably harbour porpoise and some dolphins, are susceptible to fishing bycatch, particularly by gill and tangle nets. Fishing activity (particularly beam trawling) causes damage to seabed habitats and benthic	Review areas to be licensed for activities outlined in the draft plan/programme and ensure awareness so that potential activities do not exacerbate problem.

Problem	Supporting data	Implications
	invertebrates. Further information: UK OESEA Appendix 3a.4. Pauly <i>et al.</i> (1998).	
Fish sensitivity to disturbance and contamination	Hydrocarbon contamination can influence the activity of certain enzymes in the liver of fish. Drill cuttings are a potential source of contamination. Biological responses to deleterious levels of contamination have been observed in sandeel and gadoid larvae. It has been observed that cod and haddock are not significantly affected by locally elevated PAH concentrations surrounding platforms in Norwegian waters. A more significant source of contamination in the southern North Sea is that of riverine discharge. There is evidence indicating seismic shooting has a significant effect of the distribution and local abundance of cod and haddock around the source of activity. Such noise has also been shown to cause physiological damage and has the potential to disrupt spawning events which may impact on recruitment to the stock. Further information: UK OESEA Appendix 3a.4. Stagg & McIntosh (1996), Engas <i>et al.</i> (1993).	Review areas to be licensed for activities outlined in the draft plan/programme and ensure awareness so that potential activities do not exacerbate problem.
Vulnerability of seabirds and coastal waterbirds to pollution and disturbance from shipping and industry	Significant populations of seabird and waterbird are found in colonies at the coast of each Regional Sea, often recognised as supporting populations of international importance, albeit in breeding or overwintering populations. Shelf and coastal waters around important seabird colonies, many of which are designated as SPAs, are very vulnerable to surface pollution and disturbance. Many shallow inshore areas contain important aggregations of diving waterbirds such as divers, ducks and grebes. These areas provide key feeding grounds for large numbers of birds during winter, and also during summer for birds breeding on neighbouring land masses, and are particularly vulnerable to surface pollution and disturbance. Further information: UK OESEA Appendix 3a.6. Barton & Pollock (2005), Pollock & Barton (2006).	Review areas to be licensed for activities outlined in the draft plan/programme and ensure awareness so that potential activities do not exacerbate problem.
Marine mammal sensitivity to disturbance, contaminants and disease.	Disturbance is related to existing and any future offshore development activities (e.g. shipping, oil and gas exploration and development, renewable energy development, sonar and explosions), the magnitude and frequency of which differs greatly. Activities are spatially variable, though noise will certainly be concentrated in areas of renewable energy development utilising pile driving, and oil and gas exploration activities using seismic survey methods, principally the North Sea, Irish Sea and west of Shetland. Marine mammals particularly vulnerable to disturbance include: small resident/semi-resident	Maintain awareness of research developments. Review potential blocks/areas of seabed to be offered and ensure licensee awareness so that potential activities do not exacerbate problems.

Problem	Supporting data	Implications
	populations with limited ranges; some populations of large whales not yet recovered from the effects of past commercial whaling; deep-diving species which are difficult to detect visually and of which little is known. Marine mammals are exposed to a variety of anthropogenic contaminants, primarily through the consumption of prey which may lead to the bio-accumulation of persistent organic pollutants and heavy metals in affected animals. Sufficient contaminant loads may lead to a variety of sub-lethal and lethal effects. A range of diseases and conditions have been reported in marine mammals, in addition to heavy parasite burdens. Harbour seals have suffered two viral epidemics (PDV), in 1988 and 2002, causing considerable mortality; most colonies have continued to show declines since 2002 despite the absence of PDV. Further information: UK OESEA Appendix 3a.7. Hammond <i>et al.</i> (2006, 2008).	
Effects of marine litter, fishing and boat strike on marine reptiles	Turtles may mistake plastic objects for gelatinous prey which, when swallowed, can affect further feeding, diving and reproduction, leading to increased mortality. Turtles may also become entangled in discarded fishing gear and ropes used for pot fisheries. Turtles regularly surface and may be prone to boat collision and propeller damage. Further information: UK OESEA Appendix 3a.5. Pierpoint (2000)	Review areas to be licensed for activities outlined in the draft plan/programme and ensure awareness so that potential activities do not exacerbate problem.
Unfavourable condition of conservation features and sites.	Over the period 1999-2005, the national conservation agencies carried out a programme of monitoring the designated features of A/SSSI, SACs, SPAs and Ramsar sites (http://www.jncc.gov.uk/page-3521). 57% of A/SSSI sites were reported as in favourable condition, with 37% of SACs, 86% of Ramsars and 73% of SPAs reported as favourable. 60.3% of UK marine and coastal habitats were reported as favourable. The features which are least favourable are often being impacted by factors which operate outside the sites on which they are designated (e.g. drainage conditions for some isolated wetlands, pollution) which require concerted effort by many agencies. Further information: UK OESEA Appendix 3j, Williams(2006)	Review areas to be licensed for activities outlined in the draft plan/programme and ensure awareness so that potential activities do not exacerbate problem.
Possible disruption of	Water depth restrictions of current offshore wind	Awareness of regional

Problem	Supporting data	Implications
landscape/seascape due to developments visible from the coast	technologies may make for the siting of some developments in areas visible from the coast a likely prospect, and the visual impacts from emergent wave and tidal devices are presently not well understood. Issues are likely to arise where advantageous siting of marine renewable devices or other surface infrastructure coincides with areas considered to have a low capacity to absorb the visual impact of a given development either due to the natural characteristics of that area, or the potential for cumulative effects. Further information: UK OESEA Appendix 3c. Hill <i>et al.</i> (2001), DTI (2005), Scott <i>et al.</i> (2005), CCW (2008a, b), White Consultants (2009), Swanwick & Land Use Consultants (2002)	seascape studies and areas of particularly high sensitivity to offshore developments visible from the coast. Aim for any associated onshore infrastructure to minimise adverse landscape effects
Changes to UK countryside	The structure of the flora of the open countryside of the UK shows a long-term (1978-2007) decrease in species richness of 9.2%, with an accompanying increase in competitive and stress resistant types. 'Managed' Hedgerows continue to decline in length and reduced by 6% between 1998 and 2007. Changes in the carbon content of soils may have some influence on greenhouse gas related climate change, and though there has been no net change in soil carbon content between 1978 and 2007, there was a decline between 1998 and 2007. Non-native plant species account for nearly 2% of the vegetation cover of the countryside. There are local impacts from road building and urban expansion which in some areas are changing the character of the countryside. Further information: Carey <i>et al.</i> (2008), The Countryside Survey (2007), UK Government Sustainable Development Indicators (2010)	Aim for any associated onshore infrastructure to minimise footprint and adverse effects
Impact of air quality on human health and the environment	Though the UK's terrestrial air quality is generally improving there are still areas which do not meet current exceedance levels for pollutants, primarily NO₂, SO₂ and PM_{10s}. SO₂ and NO₂ are known to be involved in acid deposition and the human health effects of particulates are still poorly understood. Acid deposition and oceanic uptake of CO₂ are linked with ocean acidification which reduces the viability of species dependant on calcareous skeletons. Further Information: UK OESEA Appendix 3e.	Ensure licensee awareness so that potential activities do not exacerbate problem.
Possible disturbance of features of submerged cultural heritage	There is an increasing awareness of submerged archaeological material located for example in the southern North Sea, though their distribution is speculative. These areas are vulnerable to offshore operations which disturb the seabed (e.g.	Ensure licensee aware of areas of potential heritage value and guidance relating to best

Problem	Supporting data	Implications
	drilling, piling, cabling, and trawling), though development-led studies have added considerably to knowledge in this area. Further information: UK OESEA Appendix 3i. Flemming (2004b), Gaffney <i>et al.</i> (2007), Gaffney <i>et al.</i> (2009)	practice.

3.4 Likely evolution of the baseline

Given the extent of the SEA area, and the difficulty in defining quantitative indicators of the likely evolution of the environmental baseline, a qualitative approach has been adopted.

Table 3.2 highlights how key aspects of the environment may evolve in the absence of the draft plan/programme. The location of relevant information in Appendix 3 of the UK OESEA is signposted as are relevant reports.

Table 3.2 – Likely evolution of the baseline

Likely evolution of baseline
Biodiversity, habitats, flora and fauna
Plankton
Plankton ecology is closely coupled with environmental factors. Oceanic inflows and climatic conditions, both linked to the North Atlantic Oscillation (NAO), correlate with changes observed in plankton communities in the northeast Atlantic over recent decades. An increase in phytoplankton biomass recorded since the mid 1980s has been positively correlated with sea surface temperature (SST) and wind strength. North Atlantic inflows to the North Sea may affect plankton communities, and have been linked to the increase in the ratio of <i>Calanus helgolandicus</i> to <i>C. finmarchicus</i> over the last 20 years. There have been widespread changes in the zooplankton community and in the timing of phytoplankton blooms, with wider consequences throughout the ecosystem.
Further information: UK OESEA Appendix 3a.1, Beaugrand (2003), Edwards <i>et al.</i> (2002, 2007).
Benthos
Over the past ca. 11,000 years, seabed habitats around the UK have been subject to continuous processes of change associated with post-glacial trends in sea level, climate and sedimentation. In the shorter term, seasonal, inter-annual and decadal natural changes in benthic habitats, community structure and individual species population dynamics may result from physical environmental influences (e.g. episodic storm events; hydroclimatic variability and sustained trends) and/or ecological influences such as reproductive cycles, larval settlement, predation, parasitism and disease. Long-term changes in benthos composition have been linked to natural (e.g. hydrodynamic factors) and anthropogenic impacts (e.g. fishing, eutrophication), and analysis of North Sea benthos indicates an increase in biomass and opportunistic short-lived species, and a reduction in long-lived sessile organisms.
There is reasonable evidence of a regime change in the North Sea in the period 1982-88, indicated by phytoplankton, zooplankton, benthic biomass, fish spawning stock biomass and fish recruitment. The regime shift may have been brought about by a change in hydro-meteorological forcing, a displacement of oceanic biogeographical boundaries to the west of the European continental shelf and an increase in oceanic inflow to the North Sea. Climatic processes influence species composition of seabed communities which will alter the availability of food for certain fish (e.g. cod) and shellfish populations (e.g. <i>Nephrops</i>).
Further information: UK OESEA Appendix 3a.2, Kaiser & Spence (2002), Beaugrand (2004), Weijerman <i>et al.</i> (2005), van Nes <i>et al.</i> (2007).

Likely evolution of baseline
Cephalopods
Although the biology and ecology of many cephalopods is little known, temperature is thought to have an important influence on the recruitment, migration and distribution of some species. There is a trend of decreasing numbers of <i>Loligo forbesii</i> in the south of its range and increasing numbers in the north, associated with SST. This has also been linked to the winter abundances of <i>L. forbesii</i> in the North Sea and the distribution of <i>Alloteuthis subulata</i> in the Irish Sea.
Further information: UK OESEA Appendix 3a.3, Hastie <i>et al.</i> (2008).
Fish
As well as coming under severe pressure from anthropogenic factors, fish communities are likely to be affected by future climate change, which may influence the abundance, distribution, recruitment and migration of species. This could have a major effect on the community structure of the region.
Abundances of herring have been linked to cooler winters, with sardines more abundant following warmer winters. The distributions of two-thirds of North Sea fish species have shifted mean latitude in the past 25 years, with a typically northern shift in population boundaries. Species regarded as having a characteristically southerly distribution are increasing in abundance in UK waters. Cod stocks may have completely depleted in the Irish and Celtic Seas by 2100 due to temperature and hydrodynamic changes. SST is thought to influence the recruitment of cod, whiting and mackerel in the North Sea. A changing climate is also likely to affect migration routes of some species. There has been a northerly shift in the mackerel spawning grounds and a change in the timing of adult migration into these grounds. The navigation of salmon and other migratory fish back to home rivers may be severely affected as it relies on a range of environmental cues, potentially affecting recruitment success.
Shellfish populations are often tied to particular sediment types and so distributions of these species may be relatively stable. However, the settlement of many bivalve species is dependent on environmental factors and so changes in water temperature, wind strength and current direction may result in altered stock recruitment.
Certain fish stocks are subject to considerable fishing pressure in UK waters. The impact of fisheries has had a role in changing the species dominance by the removal of large fish and overfishing will tend to result in a decrease in the mean trophic level of the fish community, but an increase in diversity.
Further information: UK OESEA Appendix 3a.4, Perry <i>et al.</i> (2005), Beare <i>et al.</i> (2004).
Marine reptiles
The 15°C isotherm largely determines the range of leatherback turtles, and the average summer location of this isotherm in the northeast Atlantic has moved north by several hundred kilometres over the past two decades. Additionally, the distribution of jellyfish prey species, such as <i>Rhizostoma</i>, has been linked to leatherback sightings; as ocean temperatures continue to rise it is expected that gelatinous species will move further north. Warmer temperatures and greater occurrence of gelatinous species in UK waters is likely to result in an increasing and more widespread occurrence of leatherback turtles; however, no such trend is apparent from turtle sighting and stranding records over the past 10 years.
Further information: UK OESEA Appendix 3a.5, McMahon & Hays (2006), Purcell <i>et al.</i> (2007).
Birds
Seabird demography is heavily influenced by the availability, abundance and distribution of prey. Climate and fishing are two primary drivers behind the availability of seabird prey; with changes in the characteristics of either of these having considerable effects on seabird populations.
Recent years have seen a series of generally poor years for breeding seabirds. Throughout most of the UK, breeding seabirds were only slightly more successful in 2006 than they were in 2004 and 2005, which were the worst seasons on record. In 2004 widespread breeding failures occurred in the Northern Isles and in places down the east coast of Britain. The failures were thought to have been caused largely by low availability of sandeels; this was again the case in

Likely evolution of baseline

2005, with sandeels being less prevalent than usual in the diets of many species or, if still prevalent, of the less-preferred size-class. Observers at many seabird colonies throughout Britain reported a later than average breeding season in 2006; feeding conditions again appeared to be less than ideal, with most species probably affected by a shortage of food.

On longer-term trends, the Seabird 2000 project showed that since the mid-late 1980s contrasting trends have been evident in populations of seabirds breeding in Britain and Ireland. Within species, different trends have also been seen among regions. For the UK overall, species showing an increase in breeding numbers since the mid-late 1980s included: gannet, cormorant, great skua, common gull, lesser black-backed gull, guillemot, black guillemot (marginal), razorbill and puffin. Species showing a decrease in breeding numbers over the period included: fulmar (marginal), shag, Arctic skua, herring gull, great black-backed gull (marginal), kittiwake, sandwich tern, roseate tern, common tern, Arctic tern and little tern; no change was observed for black-headed gull.

Over the last three decades, many waterbird species have increased in numbers, however, declines are beginning to be detected in species such as dark-bellied Brent goose, shelducks, ringed plovers and turnstones. These species are regularly found in one or more of the Regional Sea areas, and with the exception of turnstone which occurs at sites in Britain in nationally important numbers, the remaining species occur at sites in internationally important numbers.

Further information: UK OESEA Appendix 3a.6, Mitchell *et al.* (2004), Austin *et al.* (2008).

Marine mammals

Data on cetaceans are typically few and often characterised by considerable uncertainty and both seasonal and spatial gaps, making the identification of trends very difficult. It is even more difficult to establish any causes of potential trends, although it is noted that most large whale populations are still recovering from the era of industrial whaling.

Responses of marine mammals, both at individual and population levels, to climate change are currently poorly understood; potential impacts which have been suggested to date include range shifts, changes in physical habitat, changes to food webs and increased susceptibility to contaminants. Increasing temperatures and greater presence of southern fish species in the central and northern North Sea may lead to an increasing occurrence of southern marine mammal species. This could also cause species with affinities for cooler waters to undergo a northward shift in distribution. Additionally, prey distribution and abundance can show considerable variation in response to fisheries exploitation; this is likely to have knock-on effects on marine mammals which predate on the exploited fish populations.

Abundance estimates of bottlenose dolphins off the east coast of Scotland based on data over the entire known range of the population show no clear trend over the period 1990-2002 (Thompson *et al.* 2004). Estimates of dolphins using the inner Moray Firth showed a slight decline over the period 1990-2000 (Wilson *et al.* 2004), and a slight increase from 2002-2004. The condition of bottlenose dolphins in the Moray Firth SAC is currently classified as 'unfavourable-recovering' - reflecting a decline in utilisation of the SAC due to the range expansion along the Scottish east coast since the early 1990s (JNCC 2007). Abundance estimates of bottlenose dolphins across a wide area of Cardigan Bay suggest that the population was stable or increasing over the period 2001-2007 (Pesante *et al.* 2008).

After many years of increases, evidence suggests that grey seal populations are generally stabilising. Declines in harbour seal populations have been experienced throughout most major colonies in Britain, with the exception of those on western Scotland. Outbreaks of PDV in 1988 and 2002 were responsible for considerable declines in harbour seals on the east coast of England. In most colonies, declines have continued since 2002, with some colonies showing evidence of decline prior to 2002; the reasons behind such significant and widespread declines are not clear.

Further information: UK OESEA Appendix 3a.7, Thompson *et al.* (2005), Lonergan *et al.* (2007), Evans *et al.* (2008), Murphy *et al.* (2008), MCCIP (2008), Pesante *et al.* (2008a,b).

Likely evolution of baseline**Sites and species of nature conservation importance**

The UK has an extensive suite of coastal conservation sites to protect and promote the conservation value of a variety of features; however, the potential exists for new sites (particularly those with marine components or which are entirely marine) to be identified and designated, along with opportunities for modification to the boundaries of existing sites. Such new sites and modifications occur in the light of new information, legislation or changes in the relative importance of features at international, national or local levels. Issues affecting the integrity of coastal sites, including SACs and SPAs, are considered on an individual site-by-site basis, with management plans in place to maintain or improve site integrity, typically carried out in association with conservation bodies, land owners and other stakeholders.

Five candidate SACs have been identified in UK waters, further UK consultations and submissions of offshore SACs to the EC are expected to take place from 2009-2010. Natural England, CCW and the JNCC have identified six potential SACs around the English and Welsh coast and further offshore for which consultation has just ended. Seaward extensions to existing seabird SPAs have been identified, which has so far resulted in 31 such sites being classified in Scotland. Public consultation on inshore and offshore aggregations and other types of SPA are expected to take place from 2010-11, with site designation in 2012. The Marine Strategy Framework Directive through the *Marine and Coastal Access Act* introduces further requirements for the identification and designation of Marine Conservation Zones (known as Marine Protected Areas in Scotland), which will afford protection to individual habitats and species, and also broader ecosystems.

Further information: UK OESEA Appendices 3i and 3a.1-7.

Geology and sediments

The large-scale geology of the UKCS is controlled by geological and geomorphological processes which operate over eons. At a local level, the distribution of sediments and sediment bedforms is largely a result of bottom currents and wave action which are tied into large scale oceanographic, geographic and climatic processes, and in some cases structures are part of relict bedforms dating back to the last glaciation, or are more recent structures formed by leaking gasses/fluids.

Therefore, the environmental baseline is likely to evolve slowly in the absence of anthropogenic influences. At present there are no anthropogenic activities which are likely to cause significant regional scale changes to geology and sediments, though trawling and dredging activities can generate localised scour and sediment plumes.

Historically, large quantities of a variety of contaminants have been discharged into the UK near-shore marine environment, primarily through riverine and other point-source discharges in the vicinity of urban and industrial centres. However, inputs have decreased dramatically in recent decades. Widespread monitoring of UK coastal waters and sediments show that for only a very limited number of contaminants do levels exceed those where harm to biota may occur, and these are restricted to a few inshore and estuarine areas (notably Liverpool Bay and the Thames estuary). Offshore areas and those remote from urban and industrial centres generally exhibit contamination levels at or close to background. While contamination in close proximity to some offshore platforms exists from the historical use of oil-based drilling muds, monitoring shows concentrations of organic components to be progressively reducing over time. Additionally, oil concentrations in produced water are at an all time low and are expected to continue to fall.

Further information: UK OESEA Appendix 3b, Balson *et al.* (2002), Holmes *et al.* (2003, 2005, 2006), Jacobs (2006), OSPAR (2000a, b, c), Connor *et al.* (2006)

Landscape/Seascape

Previous offshore developments in UK waters have primarily been in relation to North Sea oil and gas installations where the only representation of such developments at the coast or on land was in the form of cable and pipe landfall and associated infrastructure (with exceptions including Beatrice in the Moray Firth, exploration wells sites off Dorset and Cardigan Bay and structures in the east Irish sea). The number of offshore oil and gas facilities is likely to decline as hydrocarbon reserves are depleted, although CCS, currently being promoted in the UK as part of the Government's Framework for Clean Coal and Low Carbon Transition Plan, could see the continued use of offshore and nearshore infrastructure for some time.

Likely evolution of baseline

To date, offshore wind farms have generally been visible from land due to technical restrictions imposed by water depth and therefore distance from shore. There is a reasonable likelihood that due to government targets for renewables deployment (30% of electricity by 2020), an increased number of wind, wave and tidal developments will take place, some of which will contribute to landscape and seascape effects.

There is a reasonable likelihood of major landscape effects, including possible cumulative effects, from such projects as indicated above and continued industrial and urban expansion. The adoption and implementation of the European Landscape Convention may influence planning and design of developments such that the future visual impacts are more widely considered than previously.

Further information: UK OESEA Appendix 3c.

Water environment

The environmental baseline is likely to be affected by large scale climatic and oceanographic processes. Variations have been observed in North Atlantic and North Sea circulation patterns in the past few decades which are likely to influence sea surface temperatures. Increased wave heights have been observed in the western and northern UK waters and wave heights in the north-east Atlantic and northern North Sea are known to respond strongly and systematically to the North Atlantic Oscillation.

At a local level, topography often interacts with these principal forces, focusing currents and leading to the generation of amplified current flow or eddies. At present there are no local anthropogenic activities within the UKCS area that are likely to change significantly the physical properties of the water environment, though the pH of the world's oceans has been declining due to CO₂ uptake from anthropogenic sources. It can be expected that sea-level will rise (in absolute terms) by 12-76cm over the next 100 years (range derived from estimates based on the 5th percentile (low emissions scenario) and 95th percentile (high emissions scenario) provided in Lowe *et al.* 2009).

Further information: UK OESEA Appendix 3d, Cunningham (2007), Holliday *et al.* (2007), Turley (2007), Woodworth & Horsburgh (2007), Woolf & Coll (2007), Lowe *et al.* (2009)

Air quality

Air quality is spatially variable, with quality generally increasing to the north where industrial development is sparser and population centres smaller and more dispersed. Air quality is likely to improve as a corollary to a push in the reduction of emissions set out in the renewed Air Quality Framework Directive (2008/50/EC on ambient air quality and cleaner air for Europe) and its implementation in UK law. Increased renewable energy use and improved efficiency in conventional transport methods (e.g. diesel engines) are likely to make substantial contributions to key emissions associated with environmental and human health issues, and also make positive contributions to carbon emission reductions.

Further information: UK OESEA Appendix 3e, DEFRA (2007).

Climatic factors

At continental, regional, and ocean basin scales, numerous long-term changes in climate have been observed. These include changes in Arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones. Future trajectories are uncertain, but UK specific scenarios based on current information are presented in the most recent work by UKCIP (UKCP09).

Further information: UK OESEA Appendix 3f, IPCC (2007), MCCIP (2008), Murphy *et al.* (2008), Lowe *et al.* (2009)

Population and human health

The population density and human health of the UK is unlikely to change considerably in the near future. In the UK as a whole, population increased by 4.4% from 1996-2006 and is expected to increase by a further 7.3% in the years leading up to 2016, with growth being most significant in

Likely evolution of baseline
areas adjacent to Regional Seas 2 and 4, and least in Regional Sea 6.
Further information: UK OESEA Appendix 3g.
Material assets (infrastructure, other natural resources)
Existing marine activities include (in no particular order) shipping and port activities, military exercises, fishing, recreational sailing, oil and gas exploration and production, aviation and offshore wind farm construction and operation, and wave and tidal demonstration. Port activities have been continuously expanding, particularly in the last 5 years and associated with this expansion, shipping tonnage has also increased. The fishing industry is dynamic with frequent and sometimes unpredictable changes in fish abundance and distribution, climatic conditions, management regulations and fuel costs all affecting activity. Consequently the baseline is rapidly evolving. In general, the fishing industry has been in decline in recent years in terms of numbers employed, vessels at sea and catch, and in coming years technical developments, economics, changes in management strategy and changes in target species, abundance, composition and distribution are all likely to be important. Similarly there are a number of proposals under consideration for the development of barrages or lagoons to harness tidal power for renewable electricity generation (e.g. the Severn). There is the potential for use of offshore geological features for carbon capture and storage, a proportion of which may use some existing oil and gas infrastructure for CO₂ transport and geological injection, and this is promoted through the Government Framework for the Development of Clean Coal. The Marine and Coastal Access Act, and Bills of the devolved administrations, are likely to be important in determining future evolution in UK waters as they will put in place a system for delivering sustainable development of the marine and coastal environment through a Marine Policy Statement and a series of regional Marine Plans, and will address both the use and protection of marine resources. This new regime involves the establishment of a number of bodies under the Marine and Coastal Access Act and Planning Act including; Inshore Fisheries and Conservation Authorities, Marine Management Organisation, and Infrastructure Planning Commission.
Further information: UK OESEA Appendix 3h.
Cultural heritage, including architectural and archaeological heritage
The development of increasingly sophisticated detection methods, mapping, and underwater excavation means that the recovery of archaeological information is increasingly likely. Visitor pressure is potentially having a deleterious effect on many coastal heritage sites, for instance St Kilda World Heritage Site, and these are identified in management plans for this and other areas.
Further information: UK OESEA Appendix 3i, Flemming (2004b), Gaffney <i>et al.</i> (2007), Wessex Archaeology (2008c), Gaffney <i>et al.</i> (2009)
Onshore
The Countryside Survey 2007 (Carey <i>et al.</i> 2008) indicates general trends in the physical and ecological (flora) structure of 'broad habitats' (e.g. Broadleaved Woodland, Improved Grassland, Neutral Grassland) constituting the countryside of England, Scotland, Wales and Northern Ireland. Structural changes include a 6.2% reduction in hedgerow length (and a 1.7% reduction in the overall length of woody linear features) and a 9.1% reduction in arable land between 1998 and 2007. Much of the lost arable land has been given over to grassland, and agricultural set-aside has contributed to the increasing diversity (30% between 1998 and 2007) of arable land. Broadleaved woodland has increased by 6.9% between 1998 and 2007, though there has been no significant change in coniferous woods. Bracken habitat lost an area of 17.4% between 1998 and 2007, partly due to an increase in acid grassland. There was no significant change in dwarf shrub heath, bog, fen, marsh, swamp or calcareous grassland between 1998 and 2007. The acidity of soils was observed to fall between 1978 and 2007, probably in response to reduced emission and deposition of sulphur, but perhaps also due to the application of lime and organic fertilisers in enclosed farmland. The carbon content of soil was also observed to reduce by 6% which may contribute to greenhouse gas induced climate change. A link between climate change and the UK flora cannot be reliably established, but there has been an increase in plant species casting and preferring shade, and those adapted for wetter conditions.

Likely evolution of baseline

There was no apparent change in the level of urban development including new buildings, roads and trackways between 1998 and 2007 in contrast to between 1984 and 1998, though the random sampling regime employed by the Countryside Survey does not resolve local changes particularly well which may account for this result.

Further information: Carey *et al.* (2008), The Countryside Survey (2007).

Consultation Question

3. Consultees are invited draw attention to and provide (where relevant/possible) additional information and data sets which they consider of potential relevance to this SEA.

4 ASSESSMENT FRAMEWORK

4.1 SEA stages

The main steps proposed for the conduct of this SEA are:

1. Instigation of draft plan/programme and identification of alternatives and draft objectives
2. Information gathering and collation on:
 - a) Environmental baseline
 - b) Existing environmental problems
 - c) Potential effects of proposed plan/programme
 - d) Other relevant plans and programmes and their objectives
3. Consultation on the scope and level detail of the Environmental Report
4. Assessment of effects including consideration of alternatives
5. Production of Environmental Report
6. Public Consultation
7. Post consultation evaluation of feedback and input to decision on the plan/programme
8. Monitoring plan/programme implementation

This SEA is currently at Stage 3 although preparatory work has been undertaken for subsequent stages. It is currently proposed that the public consultation period on the Environmental Report will be 12 weeks. Public notices announcing the commencement of the public consultation period, along with details of how to respond, will be published in selected national and regional newspapers. The Environmental Report will be made available in a variety of media and will be available for download.

4.2 Draft SEA objectives

The development of SEA objectives is a recognised way in which environmental considerations can be described, analysed and compared in an assessment. The objectives and indicators for the DECC Offshore Energy SEA of 2009 were developed with a range of stakeholder inputs. Some minor modifications to these have been made based on further consideration, and consultation feedback on the Offshore Energy SEA Environmental Report. A list of draft objectives and indicators proposed for this SEA are given in Table 4.1.

Table 4.1 – SEA Topics, Objectives and Indicators

SEA Objective	Indicators
SEA Topic: Biodiversity, habitats, flora and fauna	
Contributes to conservation of the wildlife and wildlife habitats of the United Kingdom.	For selected 'valued ecosystem components' no loss of diversity or decline in population (measures as % of relevant biogeographic population) attributable to plan related marine activities and promotion of recovery wherever possible.
Avoids significant impact to conservation sites, including draft, possible, candidate and designated Natura 2000 sites, along with consideration of future Marine Conservation Zones.	Activities subsequent to licensing/leasing which are on, or potentially affecting, a Natura site are compliant with the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), the Conservation (Natural Habitats, etc.) (Northern Ireland) Regulations 1995 (as amended), the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended), and the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (as amended).
Avoids significant impact to, or disturbance of, protected species.	Every activity with the potential to impact upon or disturb a protected species is compliant with the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), the Conservation (Natural Habitats, etc.) (Northern Ireland) Regulations 1995 (as amended), the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended), and the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (as amended).
SEA Topic: Geology and soils	
Protects the quality of the seabed and sediments and avoids significant effects on seabed morphology and sediment transport.	No adverse change in quality of seabed sediments at a series of regional monitoring stations.
Avoids significant damage to geological conservation sites and protects important geological/geomorphological features.	No physical damage to designated geological conservation sites.
SEA Topic: Landscape/seascape	
To accord with, and contribute to the delivery of the aims and articles of the European Landscape Convention and minimises significant adverse impact on seascape/landscape including designated and non-designated areas.	No significant impact on nationally-designated areas (inclusive of related shore developments). Extent of the visual resource potentially affected by the particular developments. Number of areas of landscape sensitivity affected by proposed developments (e.g. offshore wind developments). Area of seascape/landscape restoration and enhancement associated with the proposed developments.
SEA Topic: Water resources	
Protects estuarine and marine surface waters	No adverse change in quality of surface water

SEA Objective	Indicators
and aquifer resources.	and aquifers. UKCS Exploration and Production (E&P) meets OSPAR discharge reduction targets. Number of spills and quantity of spilled oil.
SEA Topic: Air quality	
Avoids degradation of regional air quality from plan related activities.	Existing monitoring of local air quality shows no adverse impact.
SEA Topic: Climatic factors	
Minimises greenhouse gas emissions.	UKCS E&P greenhouse gas emissions. 2003 Energy White Paper "Reducing Carbon Emissions Indicator" (Greenhouse gas and carbon dioxide emissions).
SEA Topic: Population and human health	
Has no adverse impact on human health.	Progress in achieving OSPAR targets for continued reduction in harmfulness of offshore discharges.
Avoids disruption, disturbance and nuisance to communities.	Seascape and nuisance indicators.
SEA Topic: Other users of the sea, material assets (infrastructure, and natural resources)	
Balances other United Kingdom resources and activities of economic, safety, security and amenity value including defence, shipping, fishing, aviation, aggregate extraction, dredging, tourism and recreation against the need to develop offshore energy resources.	Spatial planning capable of addressing changes in technology, policy and prioritisation of site selection. Economic and social impact (both positive and negative).
Safety of Navigation.	Increased collision risks and restrictions on pollution-prevention methods or Search & Rescue options in the event of an emergency.
Reduces waste.	Progress in reducing volumes of waste to landfill.
SEA Topic: Cultural heritage	
Protects the historic environment and cultural heritage of the United Kingdom.	No adverse impact upon the condition of designated sites and features (including impact on their setting).

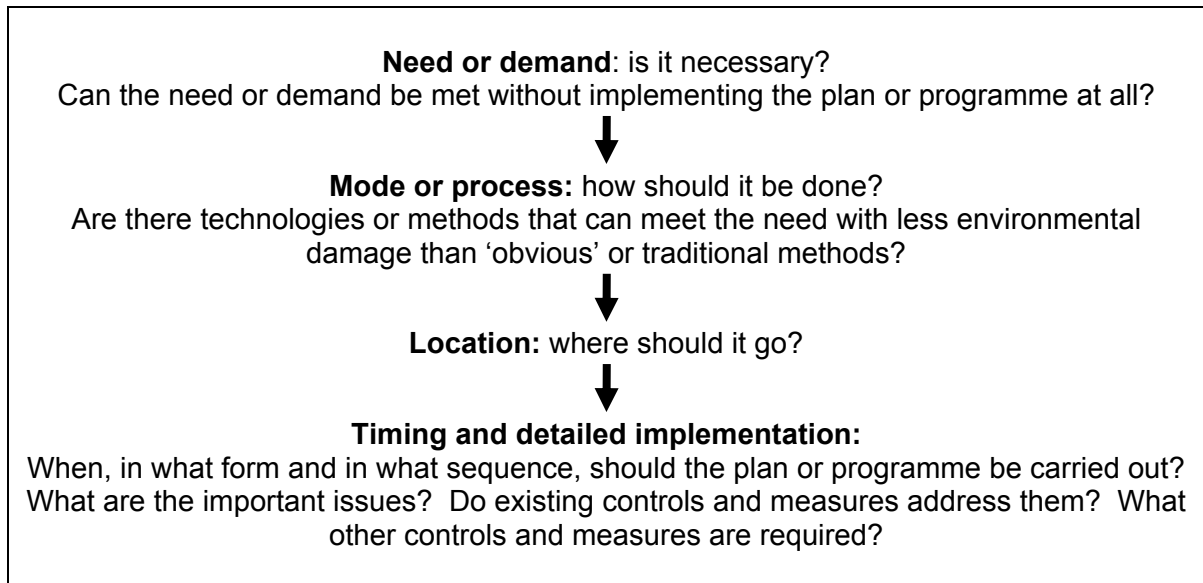
Consultation Questions

4. Are there any objectives that you feel should be included or removed?

5. Are the indicators for each objective suitable? If not please suggest alternatives.

4.3 Consideration of alternatives

It is intended to review the initial alternatives in the Environmental Report using the hierarchy of options shown overleaf:



Adapted from: Office of the Deputy Prime Minister (2005). A practical guide to the Strategic Environmental Assessment Directive. Practical guidance on applying European Directive 2001/42/EC "on the assessment of the effects of certain plans and programmes on the environment"

The following initial alternatives to the draft plan/programme have been identified as:

- Not to offer any blocks for licensing or lease/license any activities
- To proceed with the licensing/leasing programme as proposed
- To restrict the licensed/leased areas temporally or spatially

4.4 Assessment approach and methodology

This SEA will cover a very large marine area comprising all UK waters from the intertidal to depths of more than 2,400m. The draft plan/programme includes both hydrocarbon and renewable energy based elements and associated infrastructure. The assessment will therefore have to address complex issues and multiple interrelationships, where a simplistic score based matrix assessment would be inadequate. An evidence based consideration is therefore proposed for this SEA. Significant use will also be made of Geographical Information System (GIS) tools to collate, process, analyse and present spatial information.

The assessment for this SEA is a staged process (Figure 4.1) incorporating inputs from a variety of sources:

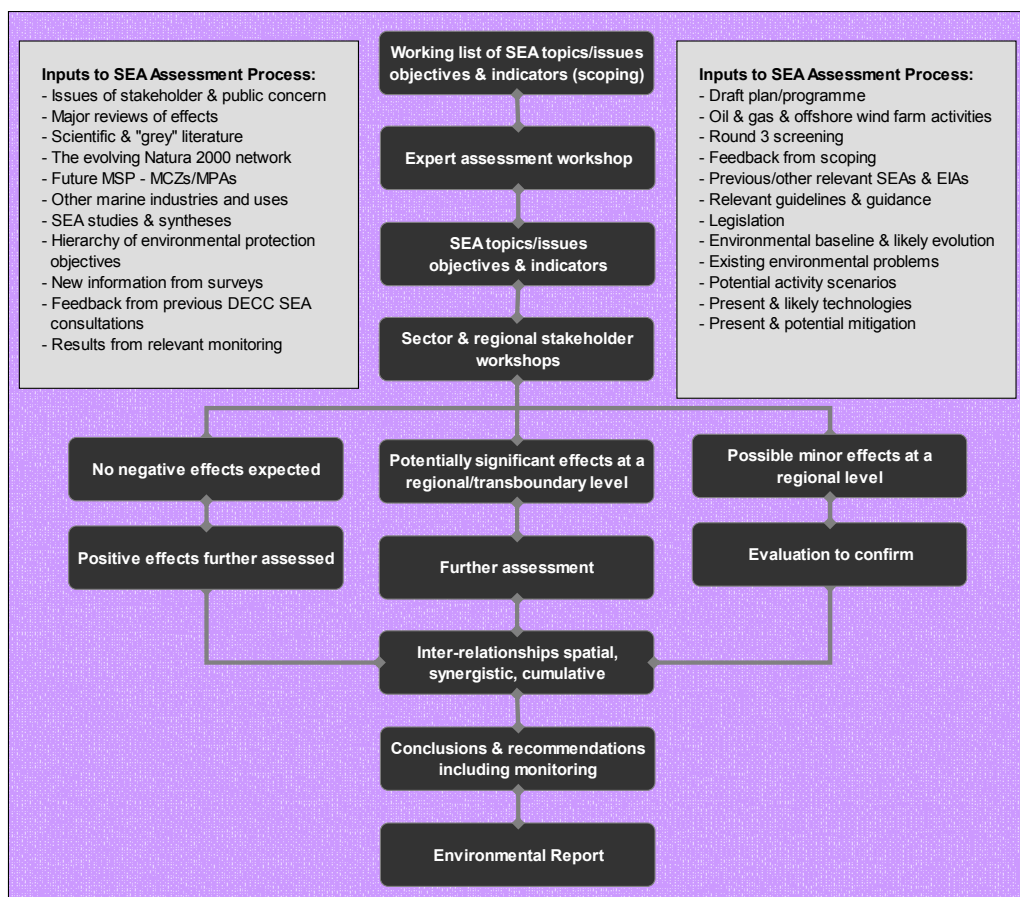
- Baseline understanding of the relevant receptors (including other users) grouped according to the SEA Directive together with existing environmental problems and the likely evolution of the baseline conditions.
- The likely activities, and potential sources of effect (see Box 4.1) and the existing mitigations, regulatory and other controls.
- The evolving regulatory framework
- The evolution of technology
- The SEA objectives (see Section 4.2).

- The evidence base regarding the relative risks and potential for significant effects from offshore wind farm, offshore oil and gas exploration and production and gas storage related activities
- Steering Group, statutory consultee and stakeholder perspectives on important issues, information sources and gaps, and potential areas to exclude from licensing/leasing derived from scoping, SEA stakeholder and assessment workshops, meetings and other communications.

At a strategic level, a distinction will be drawn for various effect mechanisms between impacts which may be significant in terms of conservation status of a species or population (and hence are significant in strategic terms), and impacts which may be significant to individual animals, but which will not influence sufficient numbers to have a significant effect on population viability or conservation status (and hence strategically significant).

Examples of this approach might include the consideration of acoustic effects on marine mammals, collision risk for birds and oil spill effects. This approach does not imply that mortality or sub-lethal effects on individual animals are unimportant (clearly there are welfare considerations, particularly for avian and mammalian species); but it is appropriate that strategic considerations are made at a biogeographic population or species level – as is done for example, in the selection of qualifying features for Natura 2000 sites.

Figure 4.1 – Assessment process



4.5 Potential sources of effect

4.5.1 Sources of potentially significant effect

An initial list of potential sources of significant effects on the environment, including on the SEA topics, from the activities covered in the draft plan/programme is given in Box 4.1 below. A question mark indicates uncertainty of potential for effect.

Box 4.1 Sources of potentially significant effect	Oil & Gas	Gas Storage	CCS	Offshore Wind farms	Tidal Stream	Tidal range	Wave
SEA Topic Biodiversity, habitats, flora and fauna							
Physical damage to biotopes from infrastructure construction, vessel/rig anchoring etc	X	X	X	X	X	X	X
Potential behavioural and physiological effects on marine mammals, birds and fish from seismic surveys	X	X	X				
Potential behavioural and physiological effects on marine mammals, birds and fish associated with construction noise	X	X	X	X	X	X	X
Potential behavioural and physiological effects on marine mammals, birds and fish associated with operational noise	X	X		X	X	X	X
Potential for non-native species introductions in ballast water discharges or spread through "stepping stone" effect	X	X	X	?	?	?	?
Behavioural disturbance to fish, birds and marine mammals etc from physical presence of infrastructure and support activities	X	X	X	X	X	X	X
Collision risks to birds				X			
Barriers to movement of birds (e.g. foraging, migration)				X			
Potential for effects on flora and fauna of produced water and drilling discharges	X	X	X				
EMF effects on fish				X	X	X	X
Major oil spill risks and associated damage to species, habitats and ecosystem function	X	? ¹	? ¹	? ¹	? ¹		? ¹
SEA Topic Geology and sediments							
Physical effects of anchoring and infrastructure construction (including pipelines and cables) on seabed sediments and geomorphological features (including scour)	X	X	X	X	X	X	X
Sediment modification and contamination by particulate discharges from drilling etc or resuspension of contaminated sediment	X	X	X	?	?	?	?
Effects of reinjection of produced water and cuttings	X						
Onshore disposal of returned wastes – requirement for landfill	X	X	X				
Post-decommissioning (legacy) effects – cuttings piles, footings, foundations etc	X	X	X	X	X	X	X
Risk of sediment contamination from oil spills	X	? ¹	? ¹	? ¹	? ¹	? ¹	? ¹
SEA Topic Landscape/seascape							
Potential visual impacts and seascape effects of development including change to character	X	X	X	X	X	X	X
SEA Topic Water environment							
Contamination by soluble and dispersed discharges	X	?	?	?	?	?	?

Box 4.1 Sources of potentially significant effect	Oil & Gas	Gas Storage	CCS	Offshore Wind farms	Tidal Stream	Tidal range	Wave
Risk of contamination of the water column by dissolved and dispersed hydrocarbons from oil spills	X	? ¹	? ¹	? ¹	? ¹	? ¹	? ¹
SEA Topic Air quality							
Local air quality effects resulting from exhaust emissions, flaring and venting	X	X	X				
Air quality effects of a major gas release or volatile oil spill	X	X	X				
SEA Topic Climatic factors							
Contributions to greenhouse gas emissions	X	X					
Reduction in greenhouse gas emissions			X	X	X	X	X
SEA Topic Population Human health							
Positive socio-economic effects of potential activities, in terms of security of supply, employment, expenditure and tax revenue ²	X	X	X	X	X	X	X
Positive socio-economic effects of reducing climate change ³			X	X	X	X	X
Potential for effects on human health associated with							
- effects on local air quality resulting from atmospheric emissions	X	X	?				
- discharges of naturally occurring radioactive material in produced water	X	X	?				
- potential food chain effects of major oil spills	X						
Interactions with fishing activities (exclusion, displacement, seismic, gear interactions, "sanctuary effects")	X	X	X	X	X	X	X
Other interactions with shipping, military, potential other marine renewables and other human uses of the offshore environment	X	X	X	X	X	X	X
Socio-economic consequences of oil spills	X	? ¹	? ¹	? ¹	? ¹	? ¹	? ¹
Physical damage to submerged heritage/archaeological contexts from infrastructure construction, vessel/rig anchoring etc	X	X	X	X	X	X	X

Notes: 1 Via shipping collision risks

2 Outline assessment only

Consultation Question

6. Do you have any comments on the sources of potentially significant effect for each of the activities covered by the draft plan/programme, including whether they should be scoped in or out of assessment in the Environmental Report?

5 DRAFT ENVIRONMENTAL REPORT CONTENTS

The Environmental Report will be subdivided both thematically and geographically. The assessment will consider the environmental effects (short, medium, long-term; temporary, permanent; positive and negative; and secondary, cumulative and synergistic) on the following receptors (At this stage no activities, potential effects or receptors have been scoped out):

- Biodiversity, habitats, flora and fauna
- Geology, substrates and coastal processes
- Landscape/seascape
- Water environment
- Air quality
- Climate and meteorology
- Population and human health
- Other users, material assets (infrastructure, other natural resources)
- Cultural heritage
- Conservation of sites and species

For reference, the final recommendations from OE SEA (as in the Post Consultation Report) are reproduced in Appendix 1.

5.1.1 Draft SEA Environmental Report Structure

Table 5.2, overleaf, indicates the draft document structure. It is proposed that the Environmental Report be divided into 7 sections not including a bibliography, glossary, non-technical summary and appendices.

Table 5.2 – Draft report section contents

Report Section	Summary	Environmental Report
Non-technical summary	A standalone summary of the Environmental Report, its findings and conclusions, written in non-technical language.	
Section 1: Introduction	Describes the background to the draft plan/programme and its regulatory context, along with that of the SEA and ER.	
Section 2: Overview of the draft plan/programme & Relationship to Other Initiatives	Will provide details of the background to the proposed plan/programme, the plan/programme itself, its objectives and relationships to other initiatives. Alternatives to the plan/programme will also be described.	
Section 3: SEA approach	Describes the SEA process, its scope, objectives and assessment approach.	
Section 4: Environmental Information	Describes the environmental characteristics of the areas relevant to the SEA. The section will identify existing environmental problems and the possible evolution of the environmental baseline. The information will be organised by SEA topic for each Regional Sea. Detailed supporting information will be presented in an Appendix. Where appropriate the information will be presented as/supported by GIS outputs/maps.	
Section 5: Assessment	Provides details of the assessment methodology and documents the assessment of the draft plan/programme and its alternatives. Considers spatial issues, cumulative and transboundary impacts and identifies mitigation and enhancement measures to prevent, reduce or counteract any significant adverse effects identified during the assessment process. Like its predecessor, OESEA2 will cover a very large marine area comprising all UK waters with water depth from the intertidal to more than 2,400m and the draft plan/programme includes both hydrocarbon and renewable energy based elements. The assessment therefore has to address complex issues and multiple interrelationships, where a simplistic score based matrix assessment would be inadequate, and an evidence based consideration is proposed. In addition, significant use will be made of GIS tools to collate, process, analyse and present spatial information.	
Section 6: Recommendations and Monitoring	Provides overall findings and conclusions regarding the likely implications of the proposed licensing/leasing and alternatives, together with recommendations for mitigation and monitoring and gaps in understanding relevant to the process. Describes the approach to SEA monitoring.	
Section 7: Next Steps	Describes the consultation phase for the Environmental Report and proposed plan/programme and the process by which the plan/programme would be adopted.	
	Bibliography	
	Glossary and Abbreviations	

Report Section	Summary	Appendix to Environmental Report
Appendix 1: Key issues and inputs to the SEA	Will include a matrix of key thematic issues to be addressed in the Environmental Report based on responses provided by consultation bodies/authorities and stakeholders to the initial scoping consultation as well as issues raised during assessment and stakeholder workshops	
Appendix 2: SEA Workshops	Will contain summaries of the SEA works which will be held to contribute to the SEA process and information base	
Appendix 3: Environmental Baseline	Underpins Section 4 and contains a series of 10 sub-appendices (A3a to A3j) describing the key characteristics in relation to biodiversity, habitats, flora and fauna; geology, substrates and coastal morphology; landscape/seascape; water environment; air quality; climate and meteorology; population and human health; other users, material assets (infrastructure, other natural resources); cultural heritage and conservation of sites and species in relation to UK waters as a whole and drawing important points for each of the draft regional seas	
Appendix 4: Other initiatives	Describes in a hierarchy other initiatives, plans and programmes of relevance to the proposed plan/programme, the implications of these for the proposed plan/programme and the implications of the proposed plan/programme on these other plans and programmes.	
Appendix 5: Regulatory and other controls	Summarises the key environmental legislation and controls in relation to the offshore renewable energy, oil and gas (including gas storage) and CCS industries.	

6 INPUT TO SCOPING

For convenience the consultation questions are listed again below.

Consultation Questions

- 1. Do you have any comments on the proposed approach to consultation?**
- 2. Consultees are invited to highlight additional initiatives which they consider relevant to the draft plan/programme.**
- 3. Consultees are invited draw attention to and provide (where possible) additional information and data sets which they consider of potential relevance to this SEA**
- 4. Are there any objectives that you feel should be included or removed?**
- 5. Are the indicators for each objective suitable? If not please suggest alternatives.**
- 6. Do you have any comments on the sources of potentially significant effect for each of the activities covered by the draft plan/programme, including whether they should be scoped in or out of assessment in the Environmental Report?**
- 7. Do you have any additional information or comments relevant to the SEA?**

Please return any scoping responses¹⁵ by close of business 15th April 2010, via e-mail or letter, clearly marked "Offshore Energy SEA 2 Scoping", and addressed to:

Email: Irene.Thomson@decc.gsi.gov.uk

Postal address:

Offshore Energy SEA 2 Scoping
The Department of Energy and Climate Change
4th Floor Atholl House
86-88 Guild Street
Aberdeen AB11 6AR

Fax: 01224 254019

¹⁵ **Confidentiality:** Your comments may be made public by DECC in relation to this consultation exercise. If you do not want your name or all or part of your response made public, please state this clearly in the response. Any confidentiality disclaimer that may be generated by your organisation's IT system or included as a general statement in your fax cover sheet will be taken to apply only to information in your response for which confidentiality has been requested. However, please also note that DECC may disclose information it holds pursuant to a statutory, legal or parliamentary obligation, including without limitation, requirements for disclosure under the Freedom of Information Act 2000 and/or the Environmental Information Regulations 2004. In considering any request for disclosure of such information under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004, DECC will consider and make use of relevant exemptions or exceptions where they properly apply and, where relevant, will consider whether the public interest in withholding the information outweighs the public interest in disclosing the information. It is DECC's normal practice to consult and consider the views of third parties where necessary although decisions on disclosure are ultimately taken by DECC. However, any decision by DECC against the release of information can be appealed to the Information Commissioner and ultimately the Information Tribunal. We will handle any personal data you provide appropriately in accordance with the Data Protection Act 1998 and the Freedom of Information Act 2000.

APPENDIX 1 – FINAL OESEA RECOMMENDATIONS

The final recommendations of the OE SEA as published in June 2009 are listed below under the five categories of: spatial considerations, managing environmental risk, improving the information base, best practice/mitigation and clarification of statutory process. Some of these recommendations have been revised where appropriate in light of consultation feedback, and appear in a different order to those in the OE SEA. The majority of recommendations apply to all elements of the previous plan/programme considered in the OE SEA, but numbers 1, 2, 4, 6, 8 and 18 relate to offshore wind farms, and numbers 7, 21, 22 and 23 apply just to the hydrocarbon industry.

Spatial considerations

1. The draft plan/programme for an additional 25GW of offshore wind farm (OWF) generation capacity will require wind farm development on a massive scale (cf. the spatial footprint of existing and potential offshore hydrocarbon installations). Formal marine spatial planning proposals are under consideration in Parliament, which would give coastal regulators and communities further opportunities to have a say in the way the marine environment is managed, in addition to the existing routes for consultation as part of the development consent process. In advance of such a system being in place for the UK, the leasing and consenting of OWFs must ensure the minimisation of disruption, economic loss and safety risks to other users of the sea and the UK as a whole. In particular, developments should not:
 - a) result in a significant deterioration in biodiversity status and the quality of habitats and landscape
 - b) impinge on major commercial navigation routes, significantly increase collision risk or cause appreciably longer transit times
 - c) occupy recognised important fishing grounds in coastal or offshore areas (where this would prevent or significantly impede sustainable fisheries)
 - d) interfere with civilian aviation operation necessary to ensure aviation safety, efficiency and capacity, including radar systems, unless the impacts from offshore wind farms can be mitigated, deemed acceptable, are temporary or can be reversed
 - e) jeopardise national security for example through interference with radar systems or unacceptable impact on training areas unless the impacts from offshore wind farms can be appropriately mitigated or are deemed acceptable
 - f) result in significant detriment to tourism, recreation and quality of life
2. Reflecting the relative sensitivity of multiple receptors in coastal waters, it is recommended that the bulk of this new generation capacity should be sited away from the coast, generally outside 12 nautical miles (some 22km). This recommendation is not intended to exclude OWF from this area, since there may be scope for further offshore wind development within this area. It is proposed as mitigation for the potential environmental effects of development of the scale and technological uncertainty which may result from this draft plan/programme. The environmental sensitivity of coastal areas is not uniform, and in certain cases new offshore wind farm projects may be acceptable closer to the coast. Conversely, siting beyond 12nm may be justified for some areas/developments. Detailed site-specific information gathering and stakeholder consultation is required before the acceptability of specific major Round 3 or subsequent wind farm projects close to the coast can be assessed.

3. In areas of prospective interest to multiple energy technologies (including renewable energies, petroleum production, gas storage and in future storage of carbon dioxide) DECC and TCE should seek to coordinate licensing and leasing decisions, taking account of the potential for some uses to coexist, so as to minimise potential conflicts of use.
4. Efforts are (or will be) underway to identify offshore Marine Conservation Zones/Marine Protected Areas e.g. under the Marine Strategy Framework Directive, OSPAR and the Marine and Coastal Access Bill (and the Marine Bills of Scotland and Northern Ireland). Where offshore wind developments are proposed and do not conflict with the conservation objectives of MCZs, preference should be given to locating wind farms in such areas to mitigate potential spatial conflict with other users.
5. Similarly, as part of the Natura 2000 initiative, further offshore SACs and extensions to SPAs are being identified. Such sites are not intended or treated as strict no-go areas for other activities. However, a number have been mooted in areas with significant potential for offshore wind farm development. Wind farm and other developers should be aware that SAC/SPA designation may, subject to the conclusions of any appropriate assessment, preclude development or necessitate suitable mitigation measures so as to avoid adverse effects on a designated site or species.
6. The potential for capacity extensions to existing wind farm leases requires careful site-specific evaluation since significant new information on sensitivities and uses of these areas is now available (see also recommendation 4 above). It is not anticipated that many Round 1 demonstrator sites would be considered for extension. As a general rule it is recommended that site extensions are to the seaward rather than the landward side.
7. For the area to the west of the Hebrides (covered in SEA 7) it is recommended that blocks west of 14 degrees west should continue to be withheld from oil and gas licensing for the present. This recommendation also applies to the deepest parts of the Southwest Approaches. This is in view of the paucity of information on many potentially vulnerable components of the marine environment, and other considerations. Once further information becomes available, the possible licensing in these areas can be revisited.

Managing environmental risk

8. The offshore wind industry is relatively young, with appreciable technological development expected in for example, turbine size, rotation speed, spacing and potentially rotational axis. A firm base of information is required to inform risk assessments and adaptive management, and consequently in respect of ecological receptors a precautionary approach to OWF siting is recommended. This precautionary approach dictates that unless suitable evidence indicates otherwise, avoidance (for the present) of areas known to be of key importance to waterbird and marine mammal populations, including breeding colonies, foraging areas and other areas essential to the survival of populations.
9. For areas (zones and blocks) which contain good examples of habitats/species on the Habitats Directive Annexes, developers should be made aware that a precautionary approach will be taken and some areas with relevant interests may either not be leased/licensed until adequate information is available, or be subject to strict controls on potential activities in the field. Similarly, developers should

- note that the relevant competent authority will conduct Appropriate Assessments/screenings to consider the potential of proposed leasing/licensing and subsequent activities to affect site integrity.
10. The effects of noise on marine mammals particularly from piling and seismic survey remain an issue of debate. A range of mitigation measures are available and their adoption is normally required through consenting. However, there is a need for cross-industry coordination of what noisy activities are planned, where and when, to facilitate the assessment of cumulative effects and implementation of temporal/spatial mitigation actions. The approach would require a mechanism to facilitate the exchange of information, for example through a web-based forum hosted by DECC, JNCC or the future MMO.
 11. It is recommended that in certain key areas of marine mammal sensitivity, operational criteria are established to limit the cumulative pulse noise “dose” (resulting from seismic survey and offshore pile-driving) to which these areas are subjected. This could be implemented within the existing regulatory framework for activity consenting, but will require a mechanism to facilitate information exchange, as proposed in recommendation 10, with suitable links to all parts of the UK and to adjacent states.

Improving the information base

12. Although there has recently been significant survey effort in coastal waters, the general lack of modern data on waterbirds in offshore areas is noted. Developers need to be aware that access to adequate data on waterbird distribution and abundance is a prerequisite to effective environmental management of activities, for example, in timing of operations and oil spill contingency planning.
13. The Offshore Vulnerability Index (OVI) to surface pollutants developed by the JNCC should be reviewed in the light of results from recent aerial and boat based bird survey data, and updated if necessary. Consideration should also be given to whether the development of UK-specific individual waterbird species sensitivity indices and mapping of a Wind Farm Sensitivity Index (WSI) in UK waters would be useful in support of site selection and consenting.
14. The existing initiatives to develop waterbird Population Viability Analysis for sensitive species should be progressed, including, if necessary, research to improve the accuracy of inputs to the models.
15. The information collected by offshore renewables and oil industry site surveys and studies is valuable in increasing the understanding of UK waters. The initiatives such as the UKDEAL, COWRIE and UKBenthos databases to ensure that such information is archived for potential future use should be continued and actively promoted during the consenting processes. Similarly, there should be encouragement for the analysis of this information to a credible standard and its wider dissemination.
16. There remain a number of subject areas for which the information base is limited and will need to be enhanced to support future marine spatial planning as well as project-specific consenting. These information gaps include aspects of the natural world and human uses, with regional context and long-term trend data notably lacking. These gaps include:

- Seabed topography and texture. For some areas there is excellent data for example from multibeam mapping undertaken variously including by the MCA, BGS and the SEA programme, but the UK lacks a coordinated programme to marshal such data, to identify priority gaps and to find ways to fill them
- Recent information on the distribution of fish eggs and larvae, and variability in space and time
- Detail of bird migration patterns, and variability in space and time including flight heights in different weather conditions
- An understanding of the marine areas routinely used by breeding birds for foraging, in particular those adjacent to SPAs
- Ecology of most marine mammal species and in particular important areas for breeding, foraging and resting
- Finer scale distribution of fishing effort, gears and catches for smaller vessels (<15m)
- Precision on the offshore distribution of navigation (AIS data coverage typically only extends 50km from shore)
- Effects on fishing activity in and immediately adjacent to constructed wind farms
- The ecological significance of field responses of fish to electromagnetic fields associated with cables

Best practice/mitigation

17. To minimise habitat change and to ensure areas developed as a result of the current draft plan/programme are left fit for previous or other uses after decommissioning, the volumes of rock used in cable armouring, foundation scour protection and pipeline protection must be minimised and there should be active promotion of alternative protection methods through the consenting process.
18. Siting and consenting processes for offshore wind farms must remain flexible to allow for technological innovation, including in mitigation measures.
19. To assist developers and the achievement of conservation objectives, DECC and others in Government should encourage the adoption of consistent guidance across the UK on the implementation Habitats Directive requirements, for example disturbance of European Protected Species (Annex IV species).
20. In areas of cold water coral reefs and other vulnerable habitats and species, physically damaging activities such as rig anchoring and discharges of drilling wastes (from hydrocarbon or renewable energy related activities) should, prior to decisions on activity consenting, be subject to detailed assessment so that appropriate mitigation can be identified and agreed for example no anchoring and zero discharge. See also recommendation 9.
21. The Department has a central role in UK energy and climate change response policies; in recognition of the national and international focus on climate change and curbing fossil fuel emissions, DECC should seek and give consideration at both the oil and gas licensing and project consenting stages to CO₂ emission reduction proposals e.g. capture and storage (rather than venting) of CO₂ from gas treatment offshore.
22. Potential applicants for licences in the 26th and subsequent oil and gas licensing rounds should be reminded that the expectation for facilities design will be for zero discharge of oil in produced water.

Clarification of statutory process

23. Offshore gas storage projects need an EIA under the requirements of the EIA Directive. However, it is unclear at present under which UK regulations EIA for such projects would be undertaken, and early resolution is desirable in light of the drivers for increased UK gas storage capacity.

