UK Government

UK Offshore Energy Strategic Environmental Assessment

Future Leasing/Licensing for Offshore Renewable Energy; Offshore Gas, Carbon dioxide and Hydrogen Storage; future Transitional Energy Certificates for Oil & Gas and Associated Infrastructure

Scoping for Environmental Report

Department for Energy Security and Net Zero (January 2026)

Contents

1 General information

1.1 Why we are consulting

This Offshore Energy Strategic Environmental Assessment (OESEA5) Scoping Document has been prepared as part of the Department for Energy Security and Net Zero (the Department)'s Offshore Energy SEA programme. The SEA process aims to ensure that the environmental implications of a proposed plan/programme and the potential activities which could result from its implementation are considered and taken into account prior to adopting the draft plan/programme.

A key purpose of scoping is to identify issues of concern at an early stage so that they can be considered in the SEA. The purpose of this scoping report is to set out sufficient information to enable the Consultation Bodies and other interested parties to form a view and give feedback on the scope and level of detail of the information to be included in the SEA Environmental Report.

The scoping document contains four parts (1) outlining the draft plan/programme and its legislative and policy context, (2) its context within a wide array of international, regional, national and local initiatives (including other plans and programmes), (3) an overview of the environmental baseline and how it will be described in the Environmental Report and (4) the approach to assessment and consultation. Consultation questions follow each section.

All feedback from the scoping consultation will be reviewed and, where appropriate, addressed in the OESEA5 Environmental Report. A compilation of the scoping feedback and a response to these will be published at the end of the scoping stage on the OESEA pages of gov.uk.

1.2 Consultation details

Issued: 29/01/2026

Respond by: 5pm on 06/03/2026

Enquiries to:

Offshore Energy SEA5 Scoping
Department for Energy Security and Net Zero
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

Tel: 01224 254015

Email: OESEA@energysecurity.gov.uk

Consultation reference: OESEA5 Scoping

Audiences:

As required under regulation 12(5) of the *Environmental Assessment of Plans and Programmes Regulations 2004*, this scoping report is subject to consultation with the consultation bodies listed in Section 7.1.5 of this report. In addition, the Joint Nature Conservation Committee, the Marine Management Organisation, Scottish Government Marine Directorate, and all other interested stakeholders and the public are consulted.

Territorial extent:

The territorial and offshore waters England, Wales, Scotland and Northern Ireland, but excluding the territorial and offshore waters of Scotland and Northern Ireland for the leasing of offshore renewable energy, and the territorial waters of Scotland for the storage of carbon dioxide.

1.3 How to respond

Please send responses either electronically or in writing to the following:

By Email to: OESEA@energysecurity.gov.uk

Write to:

Offshore Energy SEA5 Scoping
Department for Energy Security and Net Zero
AB1 Building
Crimon Place
Aberdeen
AB10 1BJ

When responding, please state whether you are responding as an individual or representing the views of an organisation.

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

1.4 Confidentiality and data protection

Information you provide in response to this consultation, including personal information, may be disclosed in accordance with UK legislation (the *Freedom of Information Act 2000*, the *Data Protection Act 2018* and the *Environmental Information Regulations 2004*).

If you want the information that you provide to be treated as confidential, please tell us, but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

We will process your personal data in accordance with all applicable data protection laws. See our privacy policy.

A compilation of the scoping feedback and a response to these will be published at the end of the scoping stage on the OESEA pages of gov.uk. The compilation will include a list of names or organisations that responded, but not people's personal names, addresses or other contact details.

1.5 Quality assurance

This consultation has been carried out in accordance with the Government's consultation principles.

If you have any complaints about the way this consultation has been conducted, please email: bru@energysecurity.gov.uk.

2 Consultation questions

The consultation questions for this scoping exercise are listed below, and are also given at key stages throughout the document:

1. **Do you have any comments on the key marine energy resource areas and likely scale of aspects of the draft plan/programme to be considered in OESEA5?**
2. **Consultees are invited to highlight additional initiatives which they consider are relevant to the draft plan/programme.**
3. **Consultees are invited to draw attention to and provide (where relevant/possible) additional information and data sets which they consider of potential relevance to this SEA.**
4. **Do you agree with the choice of Regional Seas used to help describe the environmental baseline?**
5. **Are there any additional environmental problems you consider to be relevant to the SEA?**
6. **Are there any additional influences, and supporting data sources, on the likely evolution of the environmental baseline?**
7. **Are there any additional alternatives that you feel the SEA should reflect?**
8. **Are there any objectives that you feel should be included or removed?**
9. **Are the indicators for each objective suitable? If not, please suggest alternatives.**
10. **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?**
11. **Are there any additional information sources or existing monitoring arrangements which could be used to inform monitoring of the offshore energy draft plan/programme?**
12. **Do you have any comments on the proposed approach to consultation?**

3 Introduction, Purpose and Scope

3.1 Introduction

This UK Offshore Energy Strategic Environmental Assessment (OESEA5) Scoping Document has been prepared as part of the Department's Offshore Energy SEA programme. The SEA process aims to ensure that the environmental implications of a proposed plan/programme and the potential activities which could result from its implementation are considered and taken into account prior to adopting the draft plan/programme.

This SEA is being conducted in accordance with the *Environmental Assessment of Plans and Programmes Regulations 2004* (as amended) (the SEA Regulations), which apply to any relevant plan or programme which relates either solely to the whole or any part of England[1], or to England and any other part of the United Kingdom. The SEA Regulations require that the "responsible authority" undertake a SEA for certain plans and programmes, which includes those for energy, and which set the framework for future development consent of projects which would require Environmental Impact Assessment.

Since 1999, the Department has conducted seven regional SEAs of the implications of further licensing of offshore oil and gas exploration and production (SEAs 1-7), a SEA for a second round of wind leasing and since 2009, a series of OESEAs (OESEA, OESEA2, OESEA3 and OESEA4) covering a wider range of offshore energies (most recently offshore wind, wave and tidal energy, offshore oil and gas exploration and production, offshore gas storage, including of carbon dioxide, and hydrogen production and transport)[2]. The geographical coverage of the plan assessed in these previous SEAs has changed over time to reflect devolved arrangements, as the plan or programme relates only to reserved matters.

OESEA5 will consider the implications of a draft plan or programme covering further leasing/licensing in relation to offshore wind, wave and tidal energy, offshore gas storage, including of carbon dioxide and hydrogen, and offshore hydrogen production and transport. The OESEA5 will also cover the granting of Transitional Energy Certificates for offshore oil and gas exploitation to manage existing fields for their lifetime. The responsible authorities for the draft plan or programme covered in OESEA5 could include the Secretary of State, the Oil and Gas Authority (OGA)[3] and The Crown Estate (TCE) and Crown Estate Scotland (CES), however, the Department has undertaken the SEA as the plan and programme stem from the Government's energy policy (see Section 3.3), and also from a practical perspective as in most cases, the Secretary of State for Energy Security and Net Zero has a role at the project level consenting stage following the adoption of the plan or programme.

The Department has maintained an active SEA research programme; identifying information gaps (some of which were outlined in the last set of SEA Recommendations), commissioning new research where appropriate, and promoting its wider dissemination through a series of

[1] 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*.
[2] https://www.gov.uk/guidance/offshore-energy-strategic-environmental-assessment-sea-an-overview-of-the-sea-process#the-sea-process-and-legislative-context
[3] OGA, now operating as the North Sea Transition Authority (NSTA), a government company wholly owned by the Secretary of State.

research seminars[4] and publications. This has also involved continued engagement with the SEA Steering Group and review of the information base for the SEA, including the environmental baseline, other relevant plans and programmes, and policy and regulation.

The Department is conducting a new SEA (OESEA5) leading to the production of a new Environmental Report with a view to publication in 2026. A required part of SEA is consultation with the consultation bodies and the public, together with such neighbouring states, including Member States, as may be potentially significantly affected.

3.2 Purpose

A key purpose of scoping is to identify issues of concern at an early stage so that they can be considered in appropriate detail in the SEA. Scoping also aids in the identification of information sources and data gaps that may require to be filled by studies or surveys to underpin the assessment. The purpose of this scoping report is to set out sufficient information on OESEA5 to enable the Consultation Bodies/Authorities and other interested parties to form a view and give feedback on the scope and level of detail of the information which will be included in the SEA Environmental Report.

The scoping process aims to:

- Promote stakeholder awareness of the SEA initiative
- Ensure access to relevant environmental information
- Identify opportunities for potential collaboration and the avoidance of duplication of effort
- Identify information gaps so these could be evaluated and filled if necessary
- Identify stakeholder issues and concerns which should be considered in the SEA

The scoping document is in four main parts (1) outlining the nature of the draft plan/programme and its legislative and policy context, (2) its context within a wide array of international, national and local initiatives (including other plans and programmes), (3) an overview of the environmental baseline and how it will be described in the Environmental Report and (4) the approach to assessment and consultation. Consultation questions follow each section, and these are summarised at the end of the document. Maps are interspersed throughout the document.

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

3.3 The Draft Plan/Programme

3.3.1 Policy context

The current energy policy context is significantly influenced by the UK Government's commitment to achieving net zero greenhouse gas (GHG) emissions by 2050 relative to a 1990 baseline, a target made legally binding through the *Climate Change Act 2008 (2050 Target Amendment) Order 2019*. The Carbon Budget and Growth Delivery Plan[5] sets out how the Government intends to meet its statutory carbon budgets up to and including the sixth carbon budget, which covers the period 2033-2037, and includes a range of power sector policies of relevance to the draft plan/programme, relevant aspects of which are set out below. Additionally, interventions to help in the delivery of further deployment of clean energy, including offshore wind and Carbon Capture, Usage and Storage (CCUS), is a key aspect of the UK's Modern Industrial Strategy[6].

To help deliver decarbonisation in the energy sector, the National Energy System Operator (NESO) was commissioned by the Secretary of State for Energy Security & Net Zero to provide independent advice on the Government's ambition to achieve a decarbonised electricity system by 2030[7]. NESO developed two main pathways which could deliver this goal termed, *Further Flex and Renewables,* and *New Dispatch*. In the former, no new dispatchable power is installed, though 50GW of offshore wind would be required. The latter has no new unabated capacity but includes more natural gas with carbon capture and storage (CCS) or hydrogen production, with 43GW of offshore wind capacity required. Amongst the critical enablers for meeting the 2030 target, NESO noted that the planning and consenting timescales for energy infrastructure needed to be shorter, with improved coordination between developers and statutory consultees, and sufficient capacity within the planning system to enable accelerated timescales. NESO notes that power sector emissions in their pathways are 5MtCO_2eq. in 2030, which is less than a third of those in a counterfactual case of no further decarbonisation, and represent a 90% reduction on 1990 levels. As these exceed the level of reductions in the sector for 2030 under the Climate Change Committee's (CCC) pathways, NESO notes the reduction would help close policy gaps in meeting the carbon budget.

NESO's advice was accepted by Government, as set out in the *Clean Power 2030 Action Plan* (The *Action Plan*)[8], which includes the ambition to deploy 43-50GW of offshore wind by 2030, and the development of CCS and hydrogen, noting that 35GW of unabated gas reserve capacity would be maintained to 2030. The *Action Plan* does not specify targets but notes a range of installed capacity for various technologies that would meet its objective. Updates to the planning regime are being made through the National Policy Statements (NPS) for energy and further planning reform has been introduced in the *Planning and Infrastructure Act 2025*, with the aim of reducing the consenting timescales for projects. The *Action Plan* notes that consent for projects will all likely need to be in place by 2026 if they are to be operational by 2030 so that they can contribute to the Government's aim. The Government has established a legal framework for delivery of one or more Marine Recovery Funds[9] for offshore wind, with the Scottish Government working on its own scheme. Additionally, a number of changes to the "Contracts for Difference" (CfD) regime have taken place, including relaxing the rules on

[5] https://www.gov.uk/government/publications/carbon-budget-and-growth-delivery-plan-2025
[6] https://www.gov.uk/government/publications/industrial-strategy
[7] https://www.neso.energy/publications/clean-power-2030
[8] https://www.gov.uk/government/publications/clean-power-2030-action-plan
[9] The Marine Recovery Funds Regulations 2025

eligibility for fixed offshore wind farms to allow them to apply in advance of obtaining consent. The *Action Plan* is intended to reduce the carbon intensity of UK electricity production from 171gCO_2eq./kWh to well below 50gCO_2eq./kWh, which would also be well within the CCC's advice in relation to the sixth carbon budget.

While the capacity of the relevant technologies to meet the ranges in the *Action Plan* is already either consented or in planning, further leasing before 2030 is anticipated to maintain the required pipeline of projects to support the longer-term goal of net zero by 2050, which includes both new capacity, and eventually repowering due to decommissioning of early projects, which is covered by this plan. The UK Government has set out the UK's *Modern Industrial Strategy*, central to which is investment in renewable and clean (e.g. nuclear) energy production[10]. This recognises a number of relevant actions which will support the 2030 target for offshore wind deployment, and the broader 2035 target for clean energy production, including working with The Crown Estate on their *Future of Offshore Wind* plan for 20-30GW of additional leasing before 2030.

With regards to oil and gas, the Government published the *North Sea Future Plan*[11] in response to its consultation, *Building the North Sea's energy future*, which clarified that licences would no longer be issued to explore for new fields. The Plan introduced 'Transitional Energy Certificates', that would allow for some production in areas which are a part of, or adjacent to (linked by a tieback) an existing field, and which do not require exploration. This approach informs the draft plan/programme.

The Government recognises the role CCUS has in achieving its targets in relation to GHG emissions reductions and reducing the carbon intensity of the energy and industrial sectors. The proximity of emission sources to the geological storage sites provides the right opportunity for these industries to decarbonise through the CCUS cluster approach that the UK had established. The first two clusters, called Track-1, were selected in 2021 (HyNet, East Coast Cluster), and the UK Government has allocated up to £21.7 billion over 25 years to support Track-1. While carbon dioxide storage licences and storage permits are in place for Track-1 projects, further licensing for carbon dioxide storage may be required to support the future capacity required for further decarbonisation. The *Action Plan* includes an additional 2030 installed capacity for low carbon dispatchable power, which would include CCUS and hydrogen, of 2-7GW. While not forming Government policy, the CCC (2025) Balanced Pathway scenario for net zero by 2050 suggests a potential need for 8GW of low carbon dispatchable power in 2035, rising to 38GW by 2050.

The UK's gas storage provides flexibility in balancing fluctuations in gas supply and demand, with seven onshore sites, and one offshore site (Rough, see Sections 3.5.4 and 4.8.1), which is considered to be a seasonal/long-range storage site (i.e. tends to fill in summer and be used more in winter). Offshore gas storage can play a significant role in energy security as part of a wider set of gas supply options, including interconnectors and liquified natural gas (LNG) imports. The precise nature and capacity of natural gas storage required in the future will depend on the pathway chosen to reach net zero. The Government has set out three priorities to ensure the gas system and market can adapt to provide supply in a range of scenarios, which include maintaining sufficient infrastructure capacity and resilience, and is consulting on approaches to support gas supply during the transition, including in relation to LNG supply,

[10] As set out in the Clean Energy Industries Sector Plan: https://www.gov.uk/government/publications/clean-energy-industries-sector-plan

[11] https://www.gov.uk/government/consultations/building-the-north-seas-energy-future

interconnectors, and geological storage[12]. A number of recent marine planning related initiatives are relevant to the UK's energy policy context and OESEA5, including the Strategic Spatial Energy Plan (SSEP) which will consider different options to achieve a decarbonised energy sector over the period 2030-2050[13], The Department for Environment, Food and Rural Affairs (Defra's) Marine Spatial Prioritisation Programme (MSPri), and TCE's Marine Delivery Routemap[14]. This SEA will consider inputs from these other initiatives to ensure a coherent approach to assessment, particularly in relation to spatial considerations.

3.3.2 Elements of the Draft Plan/Programme

The draft plan/programme under consideration is broad ranging and variously covers the range of energy related activities in the relevant parts of UK waters. Although the geographic remit of OESEA5 does not cover the entirety of the UK Continental Shelf (UKCS) for certain activities, the Department maintain links with the relevant devolved administrations, including in the consultation exercises for this and previous SEAs. The geographical limits of areas mentioned below are shown in Figure 3.1 to Figure 3.3. The elements of the draft plan/programme are:

Renewable Energy:

Offshore Wind – The Clean Power 2030 *Action Plan* indicates a need for 43-50GW of offshore wind capacity across all UK waters by 2030 to meet decarbonisation targets. Current leases, agreements for lease and leasing through further rounds and extensions provides for a capacity of some ~95GW. However, to maintain the required capacity out to 2050 once potential decommissioning timescales are taken into account will require new projects in the 2030s. The Government is seeking to secure at least 12GW of offshore wind capacity across the next 2 to 3 allocation rounds, and TCE Future of Offshore Wind report indicates that 20-30GW of new seabed rights could be made available by 2030, with projects expected to be built by 2040. This draft plan/programme covers some of this additional capacity in the relevant parts of the UK Exclusive Economic Zone and the territorial waters of England and Wales (Figure 3.2).

Wave – future leasing in the relevant parts of the UK Exclusive Economic Zone and the territorial waters of England and Wales. The Scottish Renewable Energy Zone and the territorial sea limit of Scotland and Northern Ireland are not included in this part of the plan/programme. A target generation capacity is not set in the draft plan/programme.

Tidal Stream – future leasing in the relevant parts of the UK Exclusive Economic Zone and the territorial and internal waters of England and Wales. The Scottish Renewable Energy Zone and the territorial sea limit of Scotland and Northern Ireland are not included in this part of the plan/programme. A target generation capacity is not set in the draft plan/programme. Similarly, a minimum average tidal current velocity threshold is not proposed.

Tidal Range – future leasing in the internal and territorial waters of England and Wales. It is considered unlikely that there will be tidal range developments outside of territorial waters. The Scottish Renewable Energy Zone and the territorial sea limit of Scotland and Northern

[12] https://www.gov.uk/government/consultations/gas-system-in-transition-security-of-supply
[13] Note that the SSEP will identify a high level network needs and capacities. For the grid element, a further exercise, the Centralised Strategic Network Plan, will undertake a more detailed consideration and will be subject to its own SEA: https://www.neso.energy/what-we-do/strategic-planning/strategic-energy-planning-sep-publications-consultations-and-updates
[14] https://www.thecrownestate.co.uk/our-business/marine/Marine-Delivery-Routemap

Ireland are not included in this part of the plan/programme. For this SEA it is anticipated that renewable energy devices will not be deployed in water depths of more than 250m.

Oil & Gas:

The Government consulted on *Building the North Sea's energy future*[15] in March 2025 including not to issue new Seaward Petroleum Exploration and Seaward Petroleum Production licences and published the Government response *North Sea Future Plan*[16] in November 2025. It is recognised that oil and gas will continue to play an important part in the UK's energy mix for decades. The Government is introducing new 'Transitional Energy Certificates', which will give the holder exclusivity over a specific area of the seabed. Transitional Energy Certificates will be granted where the OGA is satisfied that any eventual development will not involve any exploration, will be for a block of acreage which is part of, or adjacent[17] to (linked by a tieback) an existing field, and that the activity is necessary for a managed, prosperous and orderly transition. Given that no exploration will be permitted, it is anticipated that these areas will already be well-understood. In addition, the scope of future Transitional Energy Certificates will also cover incidental production of oil and gas that could occur in the course of activities related to gas, carbon dioxide or hydrogen storage in relevant parts of the territorial sea and UK Exclusive Economic Zone.

Gas importation and storage:

Further licensing/leasing for unloading and underground storage of gas in UK waters (territorial sea and the relevant parts of the UK Exclusive Economic Zone), including gas storage in other geological formations/structures such as constructed salt caverns, and the offshore unloading of gas.

Carbon Dioxide:

Carbon dioxide (CO_2) transportation and storage – further licensing/leasing for underground storage of CO_2 gas in UK waters (the UK Exclusive Economic Zone and relevant territorial sea, excluding the territorial sea limit of Scotland). The Carbon Budget and Growth Delivery Plan notes the important role of technologies including CCUS, and hydrogen (see below), in reducing the emissions from dispatchable power and industry, which will contribute to achieving the fifth and sixth carbon budgets.

Hydrogen:

The offshore production, transport and storage of hydrogen. This includes any offshore aspect of "power to gas" which uses excess renewable electricity and electrolysers to produce hydrogen (green hydrogen), offshore storage in geological formations/structures and the offshore carbon dioxide transport and storage aspects of onshore hydrogen production from natural gas (blue hydrogen). The hydrogen to power business model (in development) and outcome of Hydrogen Allocation Rounds 1 and 2 will be reflected in the draft plan/programme as appropriate.

[15] https://www.gov.uk/government/consultations/building-the-north-seas-energy-future
[16] North Sea Future Plan for fair, managed and prosperous transition - GOV.UK
[17] which is 'next to or very near something else'

Figure 3.1:The UKCS, UK EEZ, Scottish Renewable Energy Zone, Territorial waters and Median Lines

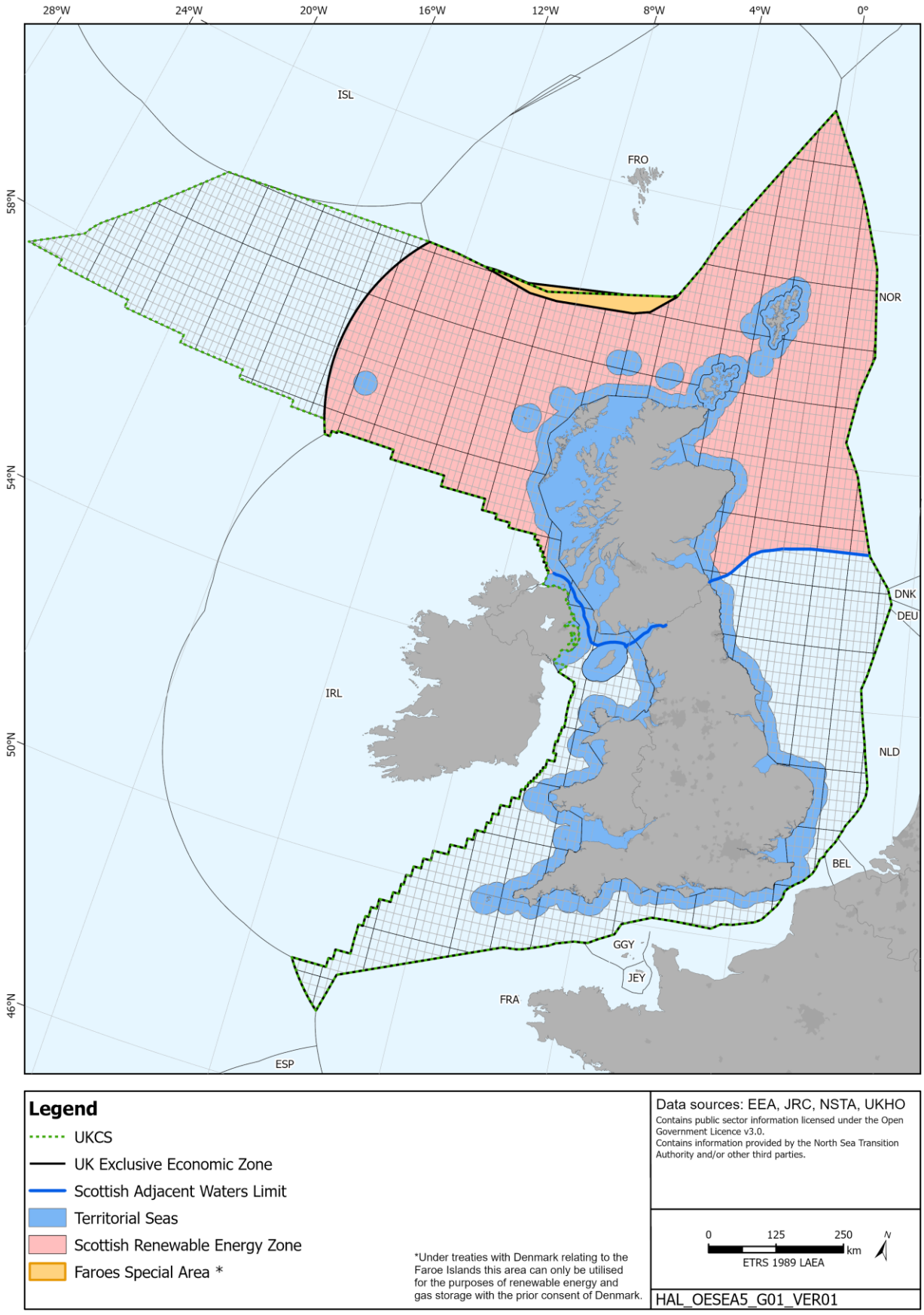


Figure 3.2: Geographical coverage of the draft plan/programme (Offshore Renewables)

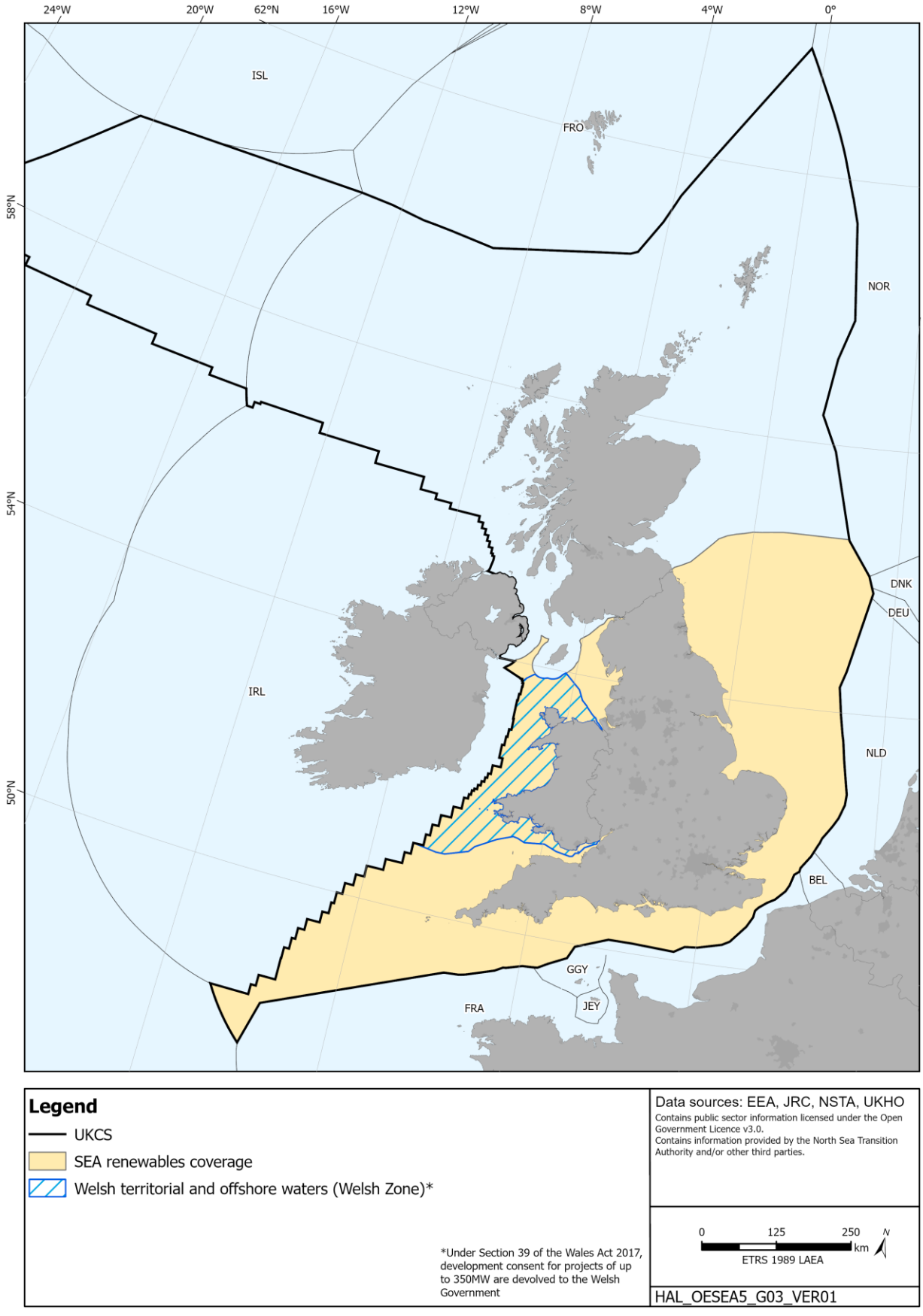
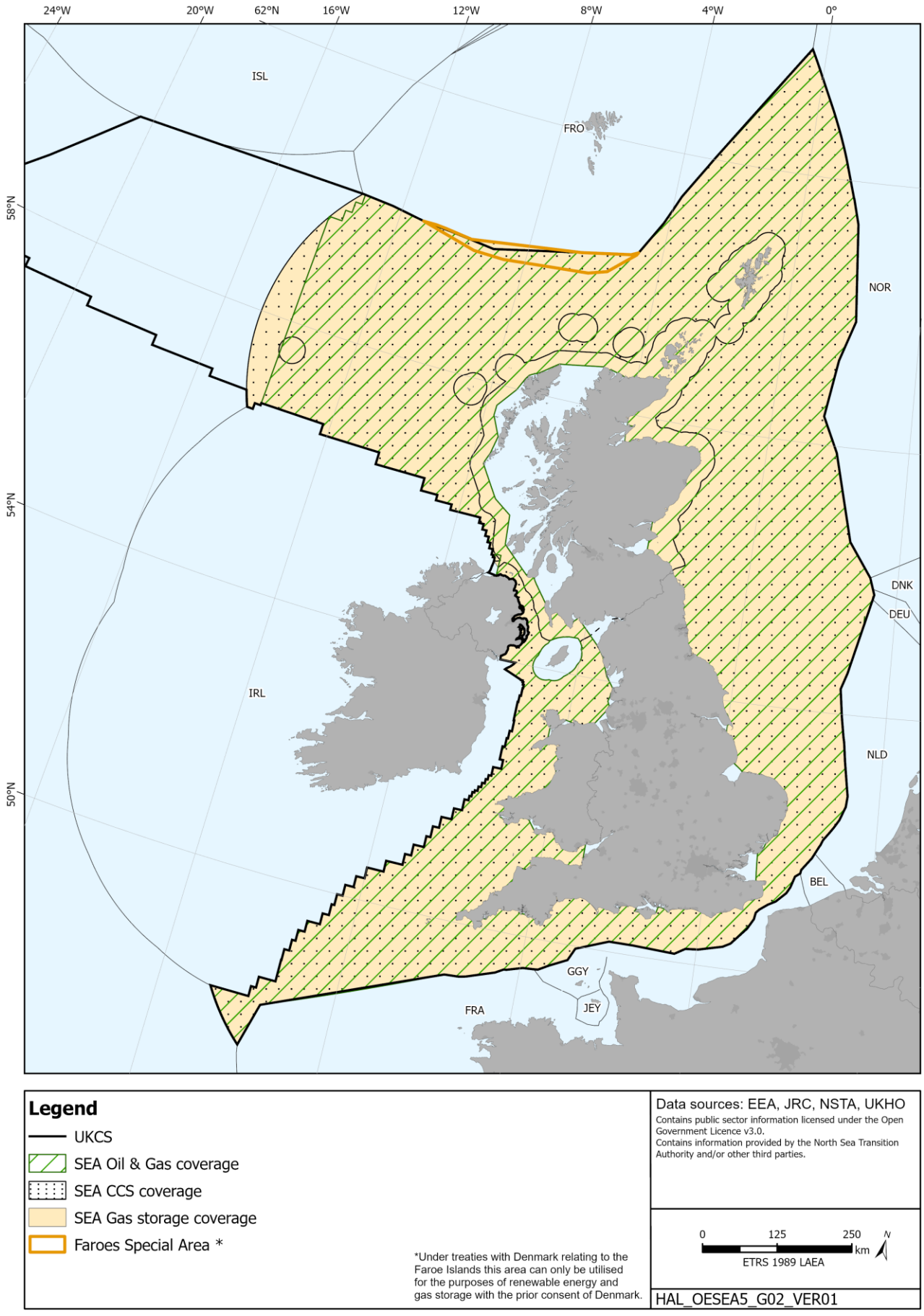


Figure 3.3: Geographical Coverage of the draft plan/programme (Oil and Gas, Gas Storage, Carbon Dioxide Storage)



3.3.3 Marine Spatial Planning

At its highest level, marine planning in the UK is captured in a series of national or regional plans made under the *Marine and Coastal Access Act 2009* and/or the *Marine (Scotland) Act 2010*. The geographic coverage of these plans is indicated in Figure 3.4. The current plans were adopted between 2014 and 2022. The process of refreshing the East marine plans, adopted in 2014, commenced in early 2024 with a revised statement of public participation[18], and a decision was made to update the Scottish National Marine Plan (SNMP) in October 2022, with an SEA scoping document published in September 2023[19]. The plans are proposed to be adopted later in 2026 and 2027 respectively, subject to the outcome of Sustainability Appraisal and Habitats Regulations Assessment (HRA) processes.

The SNMP provides the context for regional marine planning in Scotland, which are plans that can be developed in certain territorial waters of Scotland (Figure 3.4). Marine Planning Partnerships for Shetland, Orkney and Clyde were set up to help develop regional marine plans, and to date only Shetland has completed a regional plan, with Orkney and Clyde having drafts. The SNMP plan also provides the framework for sectoral marine plans, which includes a number of iterations of an offshore wind sectoral plan.

The Department of Agriculture, Environment and Rural Affairs (DAERA) continue to develop its plan for the waters of Northern Ireland. A consultation on the Marine Plan for Northern Ireland took place in 2018, with a revised statement of public participation published in 2022, however, a final plan is yet to be adopted.

In their current form, national and regional plans generally consolidate and clarify national legislative and policy positions across a number of marine sectors, in keeping with the Marine Policy Statement (MPS)[20], while taking account of individual circumstances in a particular region or area. The preparation of these plans has taken a similar approach, and while they identify potential resource and constraint (including through mapping), with policies that seek to balance environment, economic and social considerations in decision making and consent application, they stop short of prescriptive spatial planning. A separate Defra-led piece of work, Marine Spatial Prioritisation (MSPri), has sought to address this, and the proposed revisions to the East Marine Plans suggest that they will be the first in a new set of plans that will be better informed by a spatial assessment[21]. Planning policy in relation to offshore wind is further outlined in the National Policy Statements (NPS) for Energy (EN-1 and EN-3), which note that relevant marine plans should be taken account of by applicants for development consent orders and also in the decision-making process.

The adopted and draft plans all contain policies of relevance to the draft plan/programme and OESEA5, covering offshore oil and gas, renewable energy and carbon dioxide storage. The oil and gas policies of the marine plans (e.g. East, North East and West) seek to safeguard licensed areas and those with prospectivity, however, following the publication of the *North Sea Future Plan* new licences to explore new fields will not be issued, therefore this aspect of the marine plans no longer carries any practical effect. The policies relating to renewables take a similar approach, supporting further projects by safeguarding leased areas and promoting other projects in areas of higher potential. Policies relating to CCUS concentrate on the potential for re-use of oil and gas infrastructure, and deployment in relation to low carbon

[18] https://consult.defra.gov.uk/mmo/east-marine-plan-spp/
[19] https://www.gov.scot/publications/national-marine-plan-2-strategic-environmental-assessment-scoping-report/
[20] https://www.gov.uk/government/publications/uk-marine-policy-statement
[21] https://www.gov.uk/government/publications/east-marine-plan-spatial-assessment-mmo1274

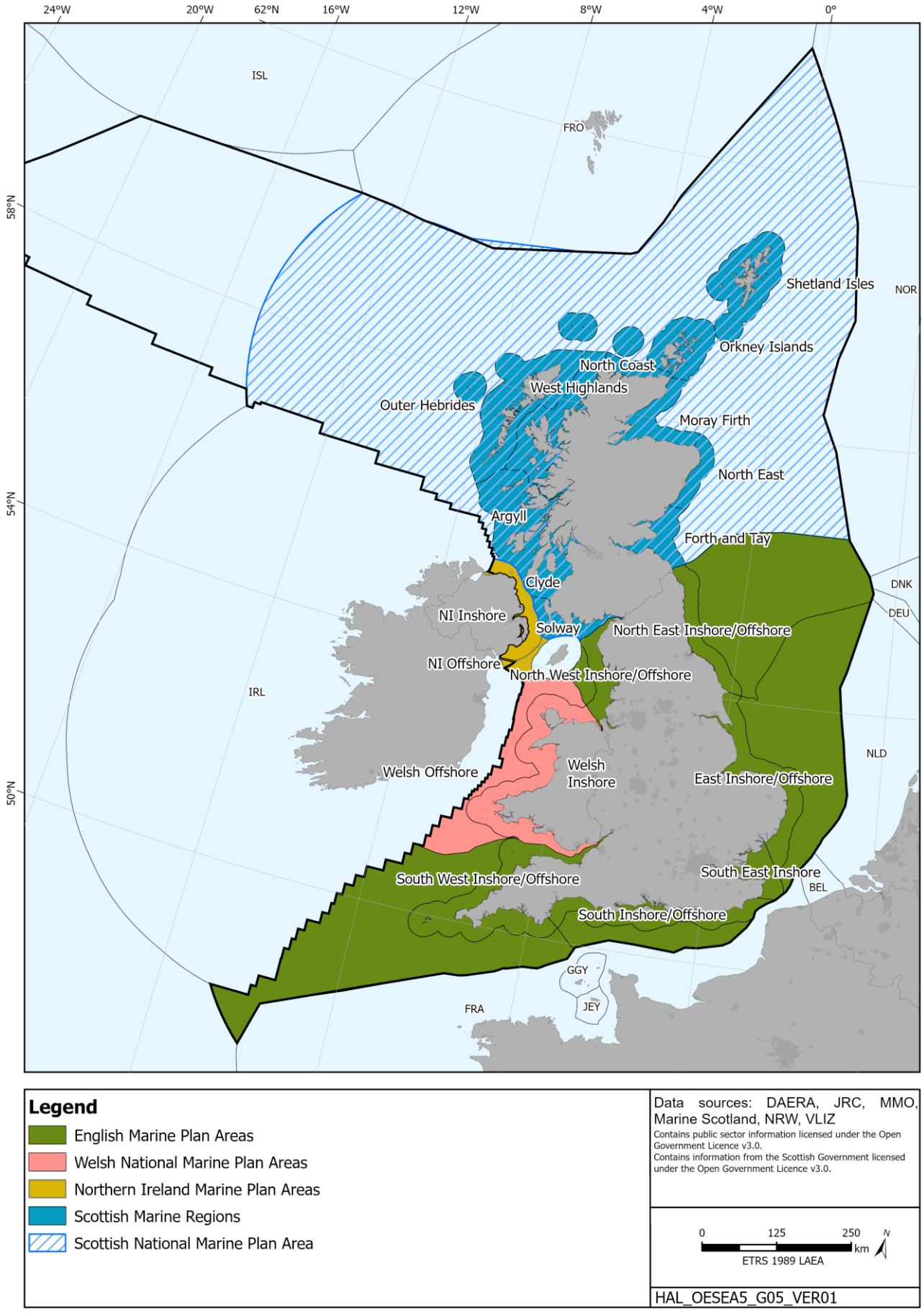
industrial clusters. None of the current marine plans acknowledge hydrogen production, transport or storage.

While not a marine plan, the SSEP will be supported by TCE's Whole of Seabed modelling to ensure coherence between the SSEP and offshore leasing activities[22], as well as other initiatives where this capability has been used, for example TCE's Marine Delivery Routemap (MDR) and Defra's Marine Spatial Prioritisation Programme (MSPri). The SSEP will not, however, identify or make recommendations for project areas, but will identify potential capacity in a number of regions of the UK. In producing the plan, different pathways to achieve a decarbonised energy sector over the period 2030-2050 will be considered[23]. As part of the pathway selection process, a SEA Pathway Options Report will be produced, informed by the SEA reasonable alternatives assessment. The options will be considered against the SEA Framework Objectives and SEA evidence base, including scoping input. The final pathway will be chosen by the Secretary of State ahead of adoption of the first SSEP expected in autumn 2027. The SSEP covers Great Britain, both onshore and offshore; this necessitates coordination with the devolved administrations on devolved matters. The SSEP will be iterative, with a three-year review period, and so a review of the SSEP SEA may be expected on a similar timeframe.

The SSEP does not consider transmission infrastructure, though provides a blueprint for more granular plans, one of which is the Centralised Strategic Network Plan (CSNP). The CSNP will consider the onshore and offshore transmission network including interconnectors, but will not cover gas transmission, in the context of moving towards a net zero energy system and will provide a long-term (25 year) approach to planning. Like the SSEP, the CSNP will have a three-year review cycle.

[22] SSEP methodology report: https://www.neso.energy/document/360501/download
[23] Note that the SSEP will identify a high level network needs and capacities. For the grid element, a further exercise, the Centralised Strategic Network Plan, will undertake a more detailed consideration and will be subject to its own SEA: https://www.neso.energy/what-we-do/strategic-planning/strategic-energy-planning-sep-publications-consultations-and-updates

Figure 3.4: Marine Spatial Planning Boundaries in UK waters



3.4 Context to Licensing, Leasing and granting of Transitional Energy Certificates

Decision making in relation to licensing/leasing/granting Transitional Energy Certificates and also subsequent activities which could take place as a result of the adoption of the draft plan/programme is split between a number of legislative and planning policy remits and related decision makers. The following summarises the current arrangements for offshore energy in UK waters, and for the purposes of this SEA, only those aspects applicable to the geographical coverage of each aspect of the plan (see Figure 3.1, Figure 3.2 and Figure 3.3) are relevant.

3.4.1 Offshore Wind

Under the *Crown Estate Act 1961*, The Crown Estate is entrusted to manage assets on behalf of the Crown including most of the UK seabed out to 12nm, over half of the foreshore, as well as certain sovereign rights in respect of areas beyond the territorial sea. Such sovereign rights are vested in the Crown by the virtue of the designation of the EEZ, formerly covered by the Renewable Energy Zone (REZ) under the *Energy Act 2004*, which covered an area from 12nm (nautical miles) out to 200nm (now the UK EEZ and the Scottish Renewable Energy Zone) 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.

A lease from The Crown Estate 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. The Crown Estate grants rights in the form of an Agreement for Lease or Option Agreement. An Agreement for Lease generally grants a developer an option over an area of seabed. Exercise of the option by the developer will be conditional on it satisfying certain conditions. If the conditions are satisfied and the developer exercises the option, The Crown Estate will be obliged to grant a Lease of the seabed to the developer. The conditions to be satisfied before the developer may exercise the option will include the obtaining by the developer of all statutory consents for the proposed development. If the developer is unable to satisfy all the conditions within a certain time provided for in the Agreement for Lease, the option will lapse. During the option period the developer will be permitted to undertake surveys and deploy anemometry equipment etc. However, the developer is not permitted to commence construction of its development until and unless a Lease is granted. Potential offshore wind farm developers also require statutory consents from a number of regulatory authorities before development can take place.

Under the *Planning Act 2008*, the Planning Inspectorate (PINS) assumed responsibility for consent applications for offshore electricity generating stations with a capacity of more than 100MW (or 350MW in Wales[24]). Such applications to PINS will be under the Planning Act (which replaces the provisions of the Electricity Act 1989) for these developments. While PINS deals with the acceptance and examination of the application and provides a recommendation on whether consent should be granted, the ultimate decision maker in these cases is the Secretary of State.

The *Marine and Coastal Access Act 2009* provided for the creation of the Marine Management Organisation (MMO). The MMO took over the processing of offshore renewable energy

[24] Section 39 of the *Wales Act 2017*. Note that applications for developments of national significance in Wales are made to the Planning Inspectorate Wales, with the planning procedure being similar to that for projects in England.

generating station applications under section 36 of the *Electricity Act 1989* (i.e. those not considered to be nationally significant, with a capacity of more than 1MW but less than 100MW) in English territorial and offshore waters (i.e. that part of the UK EEZ relevant to this plan/programme). A single Marine Licence is required for activities formerly covered by the *Coast Protection Act 1949* and the *Food and Environment Protection Act 1985* (FEPA).

It should be noted that while the Secretary of State is responsible for consenting offshore wind farm projects of more than 100MW (England) or 350MW (Wales), the leasing of areas for offshore wind is the responsibility of The Crown Estate. OESEA5 is a connected but separate process to offshore wind leasing, however, the work undertaken by The Crown Estate to identify the further leasing areas, including as part of the Marine Delivery Routemap, will be considered as inputs to the SEA.

The main stages of offshore wind development are:

- Site prospecting/selection: including collection of site-specific resource and constraint data, and seabed information by geophysical and geotechnical survey.
- Development: includes selection and construction of foundations (which could be pile driven, gravity base, floating tethered) possibly scour protection, device installation, cable laying including shoreline and other cable/pipeline crossings and armouring, installation of gathering stations/substations and connection to the onshore national electricity transmission system.
- Generation operations, including maintenance.
- Decommissioning, including removal of facilities, for reuse, recycling or disposal.

Scenarios for the likely scale of future offshore wind deployment for OESEA5 will be generated through consultation with industry and The Crown Estate, and a number of other sources for the purposes of assessment.

3.4.2 Other renewables

The leasing and consenting processes for wave and tidal stream renewable energy generating developments are as described above for offshore wind, though tidal range development consenting requirements may differ from those of offshore wind to reflect the likelihood of them being land-connected and being more akin to large terrestrial infrastructure development. The Crown Estate has not, to date, carried out any wave or tidal stream energy leasing rounds for English and Welsh waters but has offered leases for test devices or small arrays. The vast majority of wave and tidal demonstration to date has taken place in Scottish waters which are not within the remit of this SEA. No leases for tidal range proposals have yet been granted.

3.4.3 Offshore Oil and Gas Exploitation

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 UKCS are vested in the Crown under the Petroleum Act 1998. The OGA has granted Seaward Production Licences under the Petroleum Act to explore for and exploit these resources, which covered the whole or part of a specified Block or a group of Blocks, which provided exclusive rights to the holders “to search and bore for, and get, petroleum”. Following the outcome of the *Building the North Sea’s energy future* consultation, the Government is introducing new Transitional Energy Certificates which will give exclusive rights to the holder over an area of seabed which is a part of, or

adjacent to (linked by a tieback) an existing field. The area made available will typically be smaller than the current acreage for initial-term licences, and they will cover well known areas subject to previous exploration or production.

For a Transitional Energy Certificate to be awarded, the OGA must be satisfied that any eventual development:

- Will not undertake any exploration, and
- is for a Block which is part of, or adjacent to (linked by a tieback), an existing field, and
- the activity is necessary for a managed, prosperous and orderly transition.

The Government will introduce legislation in due course to introduce the changes outlined above.

Existing arrangements for current licences will be maintained, for example, the OGA will continue to be able to grant licence extensions that extend the duration, term or phase[25] applicable to previously awarded licences. In addition, the scope of Transitional Energy Certificates will also cover incidental production of oil and gas that could occur in the course of activities related to gas, carbon dioxide or hydrogen storage in relevant parts of the territorial sea and UK EEZ.

3.4.4 Offshore Natural Gas Transportation and Storage

The *Energy Act 2008* made provision for the designation of Gas Importation and Storage Zones (now encapsulated and superseded by the Exclusive Economic Zone) and creates a licensing framework for the unloading and storage of combustible gas offshore. The *Energy Act 2008* prohibits the carrying out of the activities below except in accordance with an Energy Act 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 the above activities

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 within the Exclusive Economic Zone. The Licensing Authority for gas storage is the OGA. Operators would also need to obtain a grant of the appropriate rights (a lease) from The Crown Estate or Crown Estate Scotland. The Department’s Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) retain environmental and decommissioning regulatory functions for gas storage activities in relevant UK waters.

[25] https://www.nstauthority.co.uk/regulatory-information/licensing-and-consents/types-of-licence/

The *Energy Act 2008* also makes provision with respect to the interaction between activities regulated under the *Petroleum Act 1998* and gas storage activities (e.g. that operations to recover gas from a formation are not regarded to be the result of boring for and getting petroleum within the meaning of the *Petroleum Act*).

3.4.5 Offshore Carbon Dioxide Transport and Storage

The *Energy Act 2008* 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 within the Exclusive Economic Zone (EEZ). Licences specifically cover:

- Storage of carbon dioxide with a view to its permanent disposal
- Conversion of a natural feature (for example, a saline aquifer) for such storage
- Exploration for a carbon dioxide storage site
- Establishment or maintenance of an installation for any of those purposes

The licensing authority is the OGA, except in the case of the territorial sea adjacent to Scotland for which Scottish Ministers are the licensing authority. OPRED retain environmental and decommissioning regulatory functions for carbon dioxide transport and storage projects in relevant UK waters. The *Energy Act 2008* also indicates that the use of the seabed or areas under the seabed for these activities would also require a Crown lease.

3.4.6 Hydrogen: power-to-gas and offshore hydrogen production, transport and storage

Hydrogen is an energy carrier which could contribute to carbon dioxide emissions reductions by being generated, for example, using renewables via electrolysis of water ("green hydrogen"), or natural gas by Steam Methane Reforming (SMR) combined with CCS to remove and store the carbon dioxide generated as a by-product of the process ("blue hydrogen"). "Grey" hydrogen produced for example by SMR without CCS would not contribute to carbon emission reductions and is not considered likely to be transported or stored offshore.

Power-to-gas involves the use of excess electricity produced by renewables, which would otherwise be curtailed, to generate hydrogen. Hydrogen may be produced onshore or possibly offshore and could be used for storage (e.g. in fuel cells) to produce electricity at another time, or else be transported by pipeline (e.g. possibly making use of offshore oil and gas pipeline infrastructure where feasible[26]), or by vessel.

The OGA issue licences and permits for offshore storage of hydrogen[27], with OPRED retaining environmental and decommissioning regulatory functions. The decommissioning regime set out in Part IV of the *Petroleum Act 1998*, which also covers offshore carbon dioxide storage, has also been extended to cover relevant offshore hydrogen infrastructure. However, the Department is working with relevant regulators on identifying the optimal regulatory framework for offshore hydrogen production.

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[26] E.g. https://www.nstauthority.co.uk/the-move-to-net-zero/energy-integration/

[27] *Petroleum Act 1998 (Specified Pipelines) (Amendment) and Importation and Storage of Combustible Gas (Designation of Substance etc.) Order 2023*

3.4.7 Offshore Pipelines

The activities listed above may require a subsea pipeline for the purpose of exporting oil and gas, and for the transfer of gas, carbon dioxide or hydrogen for 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 and offshore petroleum production activities and hydrogen transport, the authorisation for which is granted by the OGA, with OPRED retaining environmental and decommissioning regulatory functions. Where a pipeline falls within territorial waters (i.e. within 12nm of the coast) a lease will also be required for that section of the pipeline from The Crown Estate, or in Crown Estate Scotland. Any onshore part of a pipeline (that landward of mean low spring tides) is subject to the terrestrial planning regime, including the *Planning Act 2008*, where appropriate, and is not a subject of this SEA.

3.5 Likely nature and scale of draft plan/programme related activity

Though activities for the whole UKCS (for reserved matters) will be considered in the Environmental Report, the potential for areas to be leased/licensed or granted Transitional Energy Certificates for plan level activities to take place in any given area is spatially controlled to some extent by prospectivity, whether it be the conditions in which hydrocarbons have accumulated over geological time, the presence of geological structures capable of trapping gas or carbon dioxide in the long term, or the location of the best wind, tidal or wave energy resource. The following sections outline the prospective conditions for each of the plan elements, which are followed by a series of maps illustrating prospectivity against existing or proposed projects.

It is likely that in the coming years there will be a greater level of energy integration both offshore and onshore, such that oil and gas production, renewable energy generation, electricity transmission and carbon dioxide storage cannot be considered in isolation. For example, offshore natural gas from the UKCS may be used with carbon capture and storage in an offshore storage site to generate hydrogen as a low carbon energy carrier. This integration will be required in order to meet the 2050 net zero commitment.

3.5.1 Offshore wind

In UK waters, offshore wind is the most developed renewable energy technology. Rounds 1 and 2 of offshore wind leasing were held in 2000 and 2003 respectively, with Round 3, held in 2009, being significantly larger in terms of the areas offered for leasing. The total offshore wind generation capacity of all currently operational wind farms in UK waters is approximately 16GW[28], and a further 32GW has been consented. The pipeline of further potential capacity considering the UK as a whole is in the order of 35GW, with a further 4.5GW of capacity from leasing rounds for which projects are yet to enter pre-planning (see Figure 3.5). 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 dependent 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

[28] Correct at January 2026

demand, and the availability of connection points to the onshore transmission grid are significant factors in the preferred location of offshore wind developments.

When restricted to projects in English and Welsh waters, the pipeline of projects is substantially less than that indicated above for the UK as a whole. It is entirely made up of projects associated with Celtic Sea leasing (Round 5) and the additional capacity TCE identified could be added to existing projects in development. This capacity is in the order of 9.2GW. While it might be suggested from Figure 3.5 that sufficient potential capacity at a UK level is in place to meet demands to 2040 or beyond, the decommissioning of some early projects may commence in the 2030s, with a likely continued need for leasing to ensure the capacity needed for net zero pathways to 2050 (Figure 3.6).

The CCC (2025) suggests the need for up to 125GW of offshore wind to be installed to meet the UK's net zero commitment by 2050 under their Balanced Net Zero Pathway, with a range of 96-104GW suggested in NESO's (2025) Future Energy Scenario which are consistent with Net Zero. These 2050 figures would require between a further 5 and 26GW of capacity to that already producing, in-planning and that envisaged to potentially be delivered as part of the most recent leasing rounds (Figure 3.6). In view of the typical operational life of an offshore wind farm (~25-35 years), a significant proportion of the current operational and consented capacity will also need to be delivered again by 2050, for example by repowering. The above assumption is also conservative given the potential for some projects to not progress.

While the overall potential offshore wind resource is large (Figure 3.8), the potential area available for further development is significantly less due to a range of spatial constraints, including existing offshore energy developments (see Section 3.3.3). It is highly likely that further leasing related to this draft plan/programme, will be in the area identified as part of TCE's *Future of Offshore Wind* plan (see Figure 3.7), with the possibility of some smaller projects in the wider waters of England and Wales. TCE's plan is for 20-30GW of additional leasing before 2030. The Department will liaise with TCE on progress on their plans for further leasing, including the first iteration of the Marine Delivery Routemap due to be published in early 2026.

Figure 3.5: Current, planned, potential and likely required offshore wind installed capacity

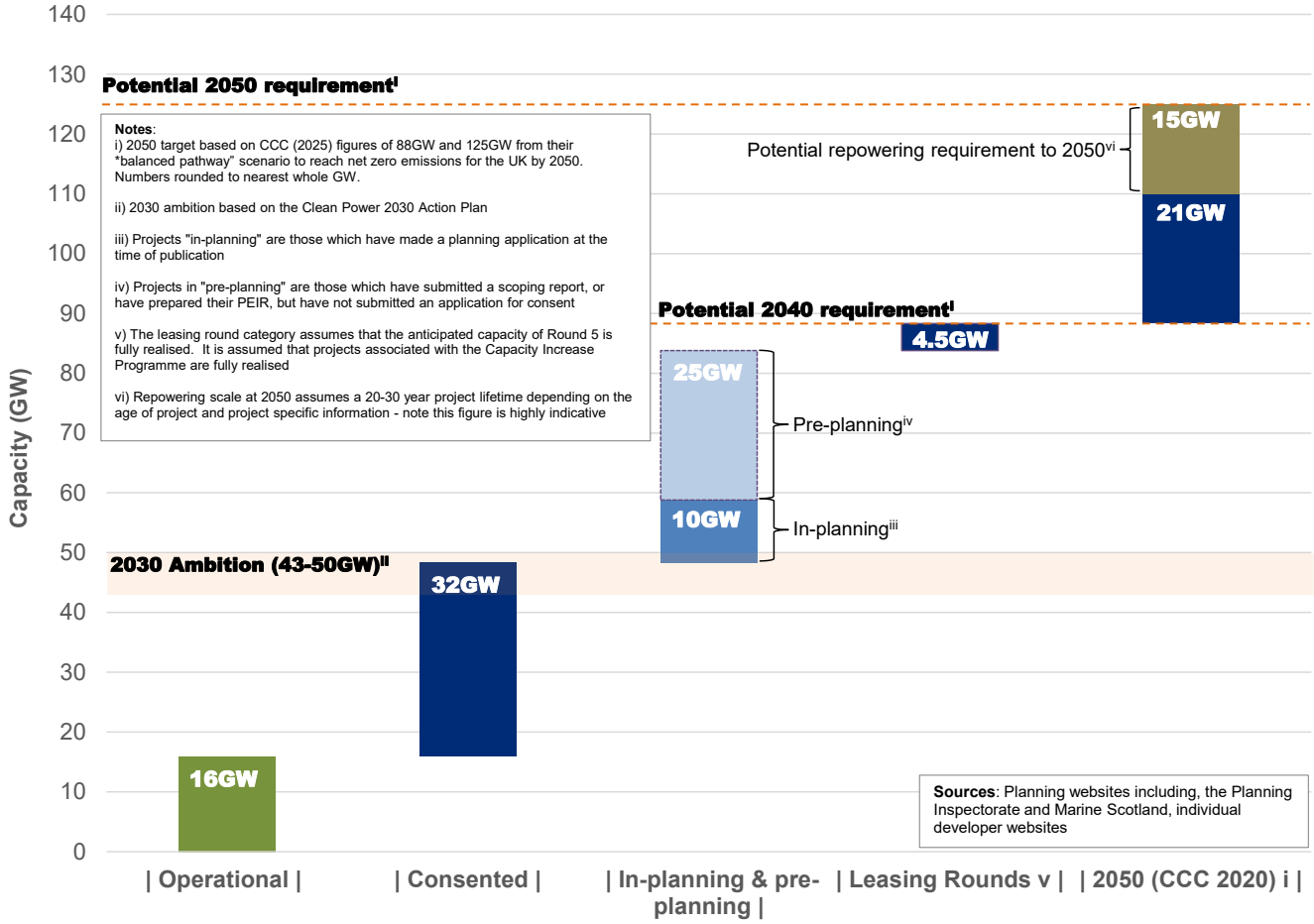


Figure 3.6: Historical and indicative projected trend in cumulative UK offshore wind installed capacity, decommissioning, and the potential scale of further capacity from leasing/repowering to 2050

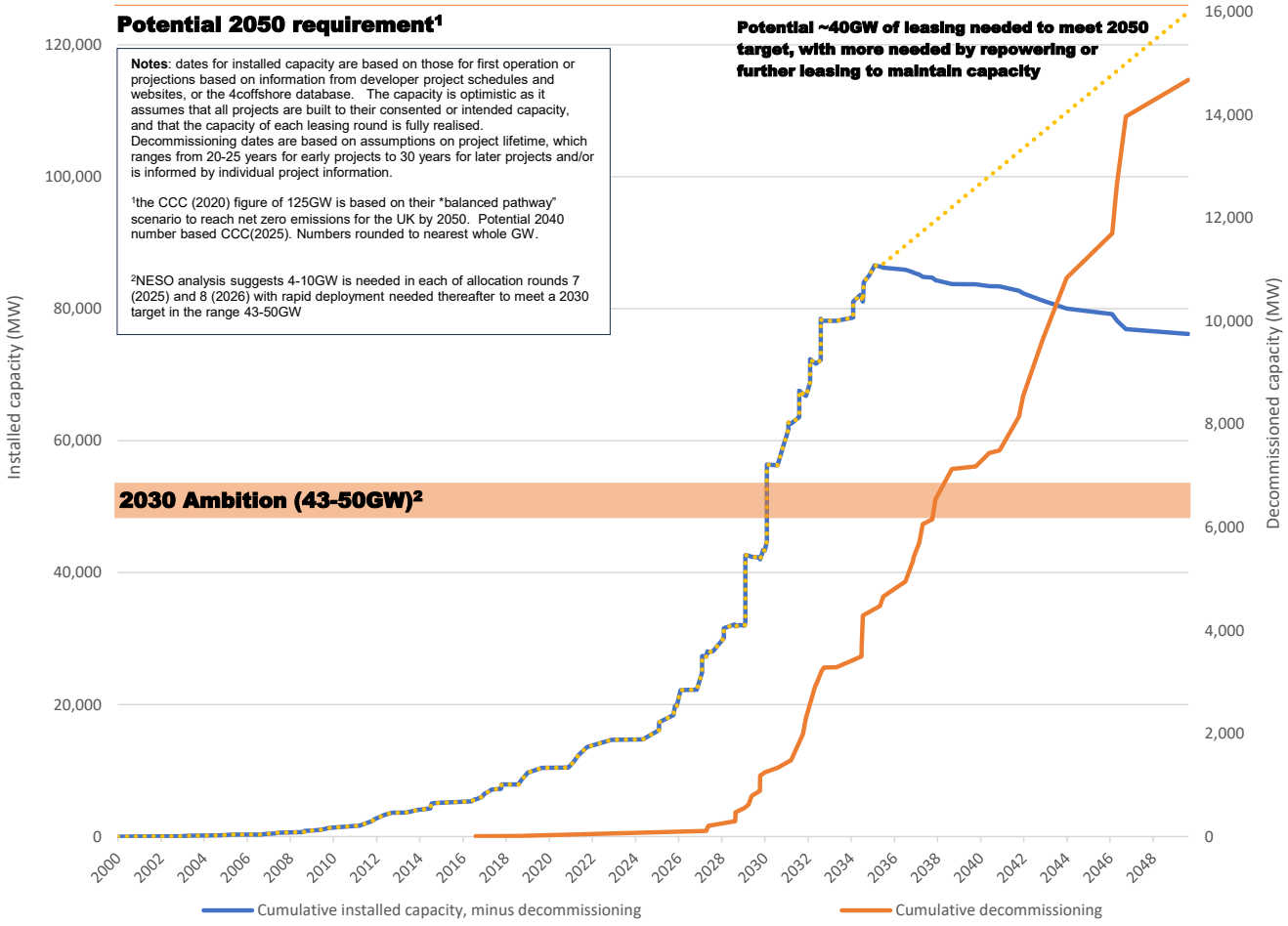


Figure 3.7: UK Wind farm historical and indicative deployment to 2030 and beyond, based on the pipeline of UK wide projects

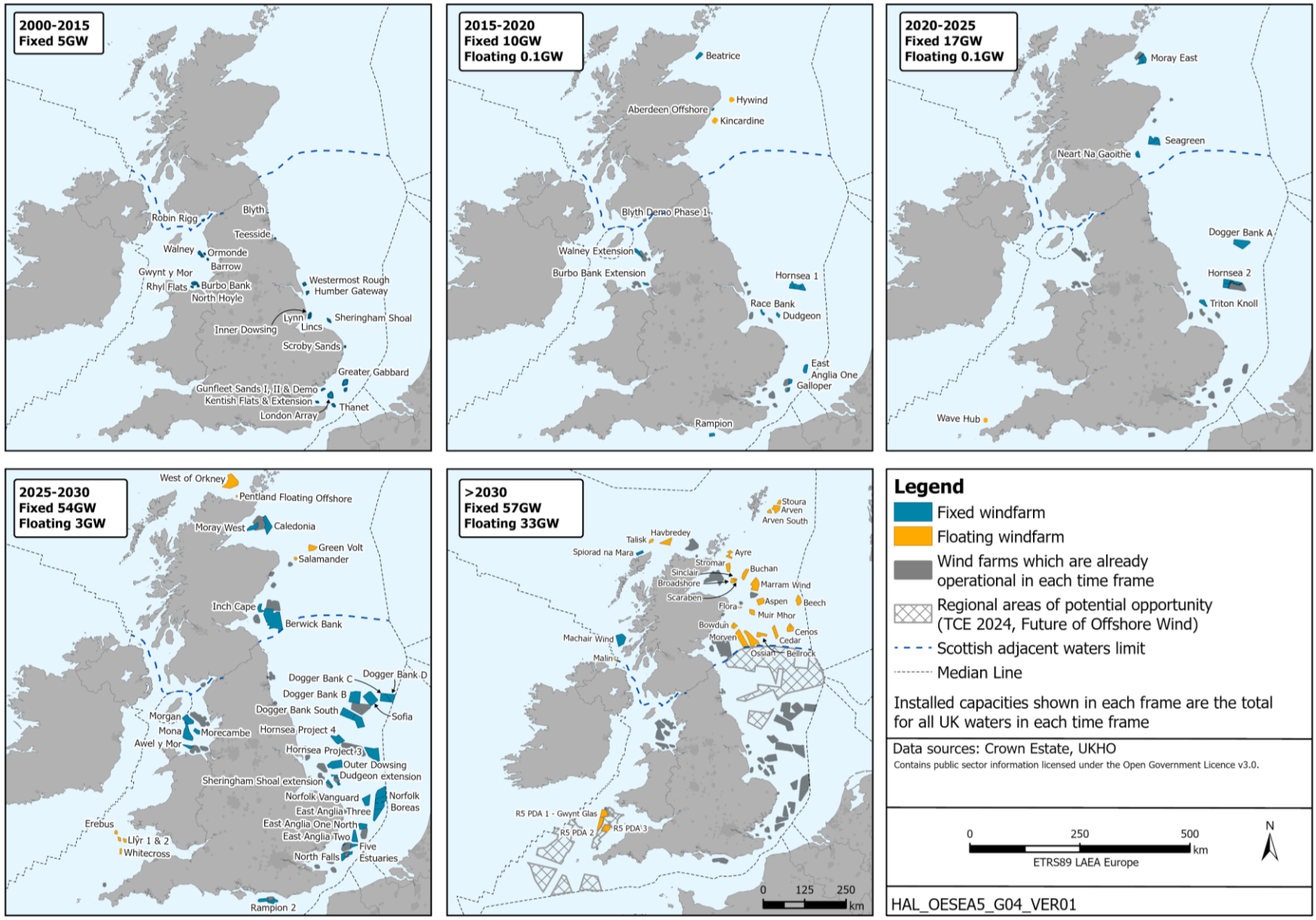
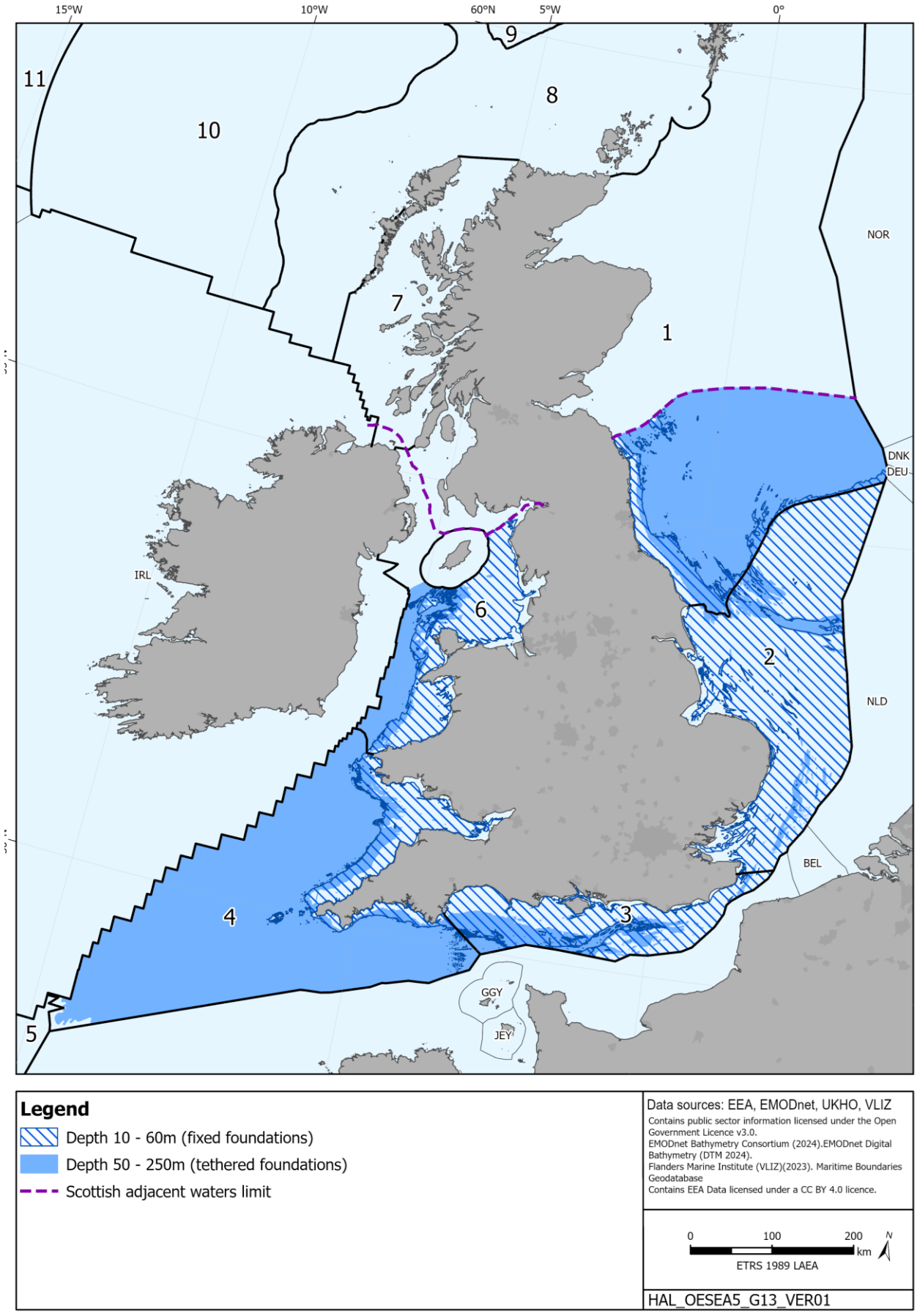


Figure 3.8: Primary indicative offshore wind resource areas



3.5.2 Wave and Tidal

Exploitation of wave and tidal energy is not yet commercial in UK waters, although several test and demonstrator projects have been deployed or are in development. It is possible that over the coming years as devices reach commercial scale, larger scale deployment of wave and tidal stream energy generation devices will commence. Tidal stream technologies were awarded CfDs for the first time in the fourth allocation round in 2022 and in the two subsequent rounds in 2023 and 2024 (results of AR7a will be announced in February 2026), with a total capacity of ~122MW, on track to be deployed by 2029. This is split between projects in Scottish and Welsh waters. In waters relevant to this SEA, the wave resource is broadly concentrated on the Atlantic facing coastline of the UK (Figure 3.13 and Figure 3.14), notably the South West peninsula and SW Wales. The tidal stream resource is more geographically constrained, being localised around headlands and through straits between land masses.

In English and Welsh waters, lease areas for wave and tidal demonstration have been issued almost exclusively on the west coast, for example off Anglesey (the West Anglesey Demonstration Zone), Pembrokeshire (South Pembrokeshire wave demonstration zone), an exception being the Perpetuus Tidal Energy Centre off the Isle of Wight. A number of areas in Scottish territorial waters have also been leased for wave and tidal stream development (Figure 3.13 and Figure 3.14).

3.5.3 Offshore Oil and Gas

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

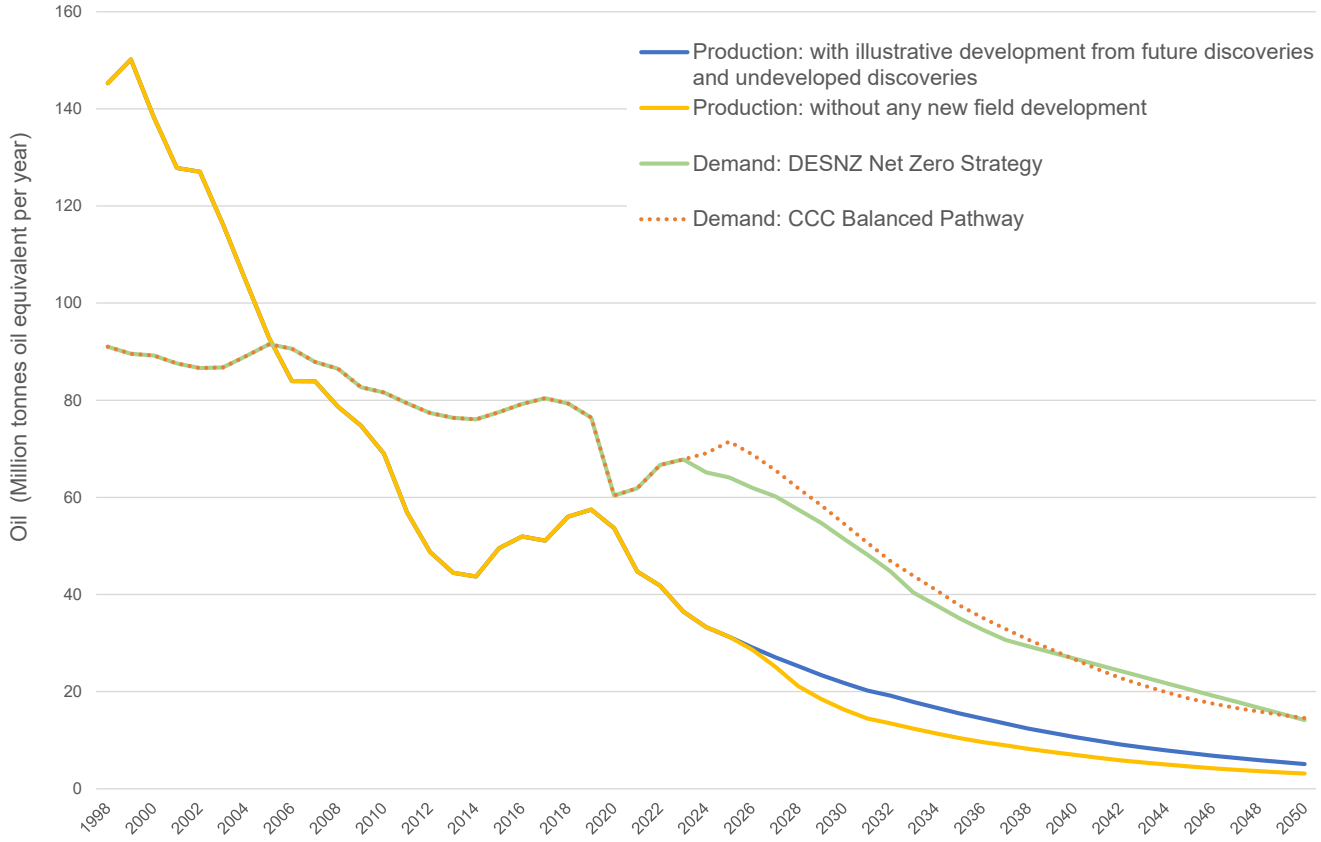
Such conditions typically occur in sedimentary basins and not areas of igneous rock unless these overlay sedimentary rocks as in parts of the Faroe-Shetland Channel. Offshore areas of the UK have been offered for oil and gas licensing in a series of rounds since 1964. Areas with hydrocarbon prospectivity 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 used by new developments (Figure 3.11). The southern North Sea and Irish Sea are largely gas provinces, with the central and northern North Sea, and West of Shetland areas being oil provinces.

Seaward Production Licences and Seaward Petroleum Exploration Licences will no longer be issued (Section 3.3.1). The Government is introducing new Transitional Energy Certificates which will give the holder exclusivity over a specific area of the seabed. These areas must be part of, or adjacent to (linked by a tieback) an existing field. Further exploration for new hydrocarbon reserves will not be permitted under Transitional Energy Certificates. Therefore, the main stages of oil and gas activity that could result following the adoption of the draft plan/programme are:

1. Development: includes the drilling of production and injector wells, installation of pipeline(s), which would be "tied back" to existing infrastructure.
2. Production and export operations: involves routine supply, return of wastes to shore, power generation, chemical use, flaring[29], produced water management/reinjection and reservoir monitoring and maintenance.
3. Decommissioning: including cleaning and removal of facilities, for reuse, recycling or disposal.

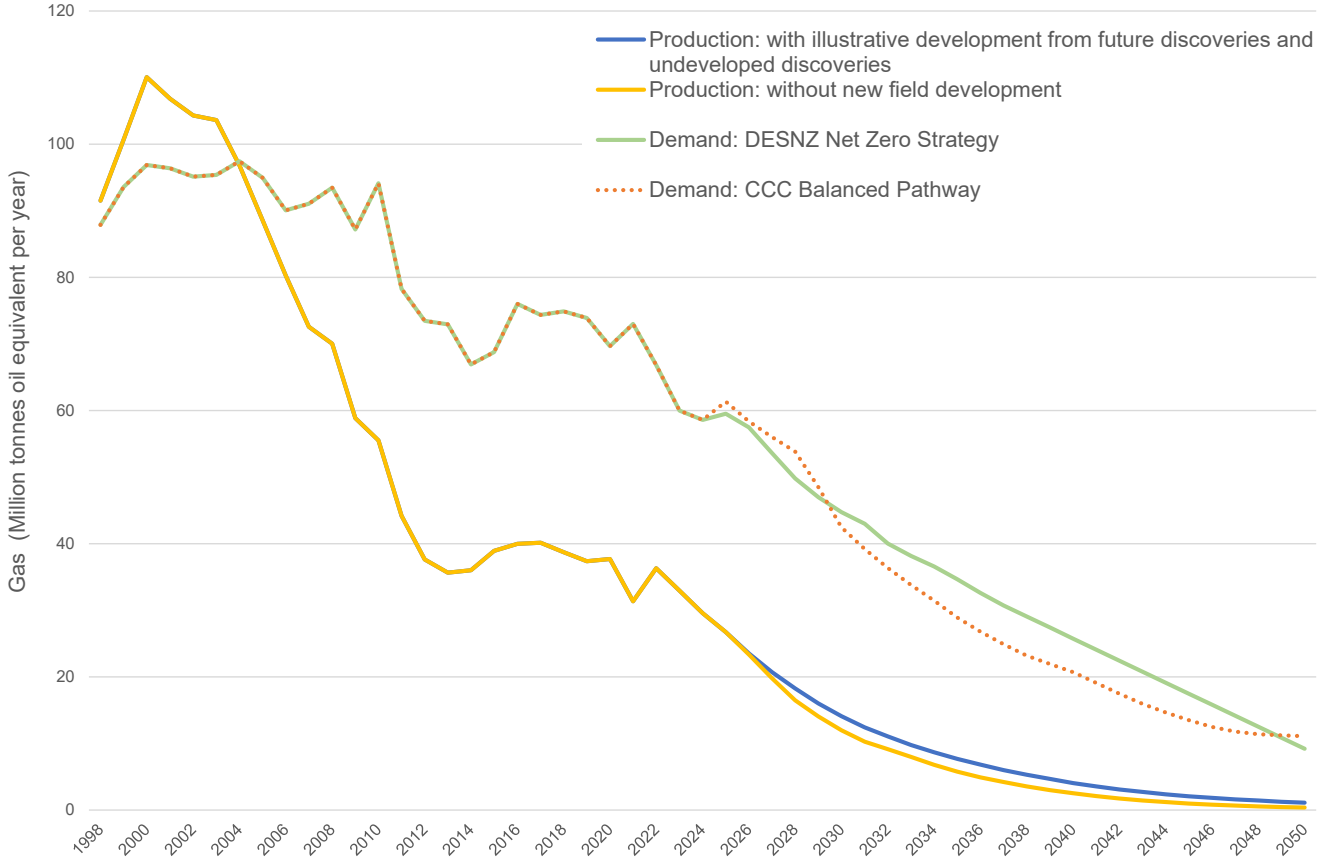
The number of exploration and development wells drilled on the UKCS has shown a general decline over time, aligned with a decline in domestic gas and oil production (Figure 3.9, Figure 3.10) and an increased proportion of hydrocarbon imports, consistent with the mature stage of production from the UKCS. Consultation with the OGA, industry and a number of other sources will inform the scale of activity, likely to emerge from Transitional Energy Certificates, to be considered in the assessment for OESEA5. The speed and scale of decommissioning planning have increased considerably in recent years, and there is an expectation that activities involving the removal of offshore assets will increase over the coming decades (see Figure 3.11).

Figure 3.9: Oil production and demand projections to 2050 across a number of scenarios



[29] Note that there is a target for zero routine flaring and venting by 2030

Figure 3.10: Gas production and demand history and projections to 2050 across a number of scenarios



Source: NSTA 2025 Production and expenditure projections: https://www.nstauthority.co.uk/data-and-insights/insights-and-analysis/production-and-expenditure-projections/ accessed November 2025

As noted in Section 3.4.5, the OGA Strategy and its legislative underpinnings, commit offshore operators to take steps towards reducing their upstream emissions consistent with the UK commitment to achieving net zero GHG emissions by 2050. Upstream emissions are dominated by the combustion of diesel and gas, and flaring. UK oil and gas production resulted in emissions of 11.8MtCO_2eq. in 2024, 81% of which (~9.6MtCO_2eq.) was from offshore facilities. Overall, these emissions were 34% lower than those in 2018, with approximately half of this reduction being from active emissions reduction measures, and the other half from fields reaching the end of their lives (NSTA 2025). Any further oil and gas activities will need to demonstrate how their upstream operations align with net zero, which may include electrification or some form of energy integration.

Previous OESEAs have not considered the effects of end use atmospheric emissions (scope 3 emissions), specifically GHGs, from oil and gas production as these were not considered to be likely significant effects of implementing the plan.

On 20 June 2024 the Supreme Court issued its judgment in relation to the appeal case *R (on the application of Finch on behalf of the Weald Action Group) (Appellant) v Surrey County Council and others (Respondents)* ('the Finch judgment')[30]. The Supreme Court upheld the

[30] R (on the application of Finch on behalf of the Weald Action Group) v Surrey County Council and Others [2024] UKSC 20. Retrieved from Supreme Court: https://www.supremecourt.uk/cases/uksc-2022-0064

appeal, concluding the Council's decision to grant planning permission for an onshore oil development project was unlawful because scope 3 emissions from burning the extracted oil were not assessed as part of the Environmental Impact Assessment. In light of the Finch judgment, the Department is considering assessing scope 3 emissions at a plan level for OESEA5, in relation to the potential production associated with Transitional Energy Certificates which could be issued within the expected lifetime of OESEA5.

3.5.4 Offshore Natural Gas Transportation and Storage

Gas storage has the potential to take place in depleted and other hydrocarbon reservoirs and other geological structures (e.g. saline aquifers) and can be expected to take place in the same areas as existing oil and gas production, or in areas of extensive halite (rock salt) deposits. Salt caverns, unlike hydrocarbon reservoirs or aquifers, are created in thick halite formations through solution mining, where some of the salt is made soluble and discharged allowing space for the storage of gas. There are extensive halite deposits in the southern North Sea and eastern Irish Sea, and the most prospective area for halites with gas storage potential is the Triassic Preesall formation in the East Irish Sea Basin, for which there have been previous development proposals both onshore and offshore. While large parts of the offshore Wessex Basin, Peel Basin, Solway Firth Basin, Cardigan Bay Basin and Forth Approaches Basin could, based on geological criteria, support gas storage sites, they are distant from existing infrastructure (Smith *et al.* 2005).

A gas storage licence was awarded in July 2022 covering parts of Blocks 47/3 and 47/8 in the southern North Sea which coincide with the Rough gas field (Figure 3.12). The award of the licence increased the UK's overall storage, with its operator, Centrica, announcing that capacity had been increased from 30 billion cubic feet (bcf) to 54bcf by June 2023, providing approximately 50% of current UK gas storage[31], and is the only operating offshore gas storage site. A gas storage licence (GS007) covering the former Bains field in the eastern Irish Sea was awarded in April 2023 with plans for an installation to be in place for the storage of natural gas by 2029[32]. A separate gas storage licence was awarded immediately adjacent to Bains in August 2025.

3.5.5 Offshore Carbon Dioxide Transport and Storage

The aspects of CCUS of relevance to this draft plan/programme are any offshore storage site and related surface/subsurface infrastructure including connecting offshore pipelines. The capture and onshore transportation of carbon dioxide are not covered by this SEA.

Prospective areas on the EEZ suitable for storage of carbon dioxide primarily include depleted offshore oil and gas reservoirs and saline aquifers. Constructed salt caverns also have the potential to store gas. A theoretical P50[33] storage capacity of up to 78 billion tonnes (Gt) has been estimated collectively in depleted hydrocarbon fields and saline aquifers in the EEZ (Bentham *et al.* 2014), which is equivalent to over 200 years of UK carbon dioxide emissions at 2019 levels.

[31] https://www.ofgem.gov.uk/publications/gb-gas-storage-facilities-2025
[32] https://energypathfinder.nstauthority.co.uk/projects/3301?back-url=/projects
[33] P50 is a statistical confidence level for an estimate, where 50% of estimates (in this case of storage capacity) exceed the P50 estimate (and conversely 50% of estimates are less than the P50 value). It can be considered a good middle estimate

Information on over 500 potentially prospective storage structures is available through the CO_2Stored database[34], which makes available some of the information on the UK Storage Appraisal Project commissioned by the Energy Technologies Institute, and which is now being updated by The Crown Estate and the British Geological Survey (Bentham *et al.* 2014), with capacities of individual stores being modified as new information becomes available.

Saline aquifers provide the largest potential storage capacity on the EEZ, with the highest proportion of this capacity being in the central and southern North Sea. Potential storage areas include the Triassic Bunter Sandstone and Ormskirk Sandstone of the southern North Sea and East Irish Sea Basins respectively, the Captain Sandstone of the Moray Firth, and numerous overlapping formations of the central and northern North Seas having a similar distribution to that area where hydrocarbon production has taken place to date. Saline aquifers can have similar characteristics to hydrocarbon reservoirs (i.e. suitably porous/permeable medium with geological constraints on migration) and may also be suited to CO_2 storage. The capacity of saline aquifers is not yet well established for the EEZ, but they have a theoretically large volume – for instance the most prospective southern North Sea formation, the Bunter Sandstone, is estimated to have a capacity of between 2.2Gt and 14.25Gt CO_2 (Holloway *et al.* 2006, Smith *et al*. 2010, Heinemann *et al.* 2012), and more generally, saline aquifers provide the majority of the potential storage capacity on the EEZ (60 billion tonnes excluding chalk aquifers, Bentham *et al.* 2014).

The OGA launched the 1st carbon storage licensing round on 14th June 2022 and invited applications for a number of offshore areas in the northern North Sea, central North Sea, southern North Sea and eastern Irish Sea. The licensing round closed on 13th September 2022, with 26 applications covering all or part of the 13 areas offered. 20 licences were offered in May 2023, with a subsequent licence in the southern North Sea offered in June 2023. Currently, there are over 20 licences covering storage sites on the EEZ. Of these, four have a storage permit, with all the others being in their initial or appraisal terms (Figure 3.12). The 2nd carbon storage licensing round was launched by the OGA on 9th December 2025, offering 14 areas with an estimated storage capacity of 2GtCO_2. At present, there are no operating carbon dioxide storage projects, however, the HyNet project is expected to store up to 4.5MtCO_2 per year and the Northern Endurance Partnership project initially up to 4MtCO_2 per year from as early as 2028.

3.5.6 Hydrogen: power-to-gas and offshore hydrogen production, transport and storage

The CCC (2025) suggests that a combination of electricity supply using CCS and blue hydrogen could abate emissions in the order of 7MtCO2 by 2030, though suggests a small but important role for hydrogen. In terms of capacity, the CCC (2025) Balanced Pathway scenario for net zero by 2050 suggests a potential need for 8GW of low carbon dispatchable power in 2035, rising to 38GW by 2050. In addition to the storage of carbon dioxide in geological formations, there is the potential to store hydrogen for later use, including in geological formations (see: Stone et al. 2009, Henkel et al. 2013, 2014, Bauer et al. 2017).

[34] https://www.co2stored.co.uk

Figure 3.11: Current offshore oil and gas fields, infrastructure, onshore terminals, licensed Blocks, and facilities subject to decommissioning

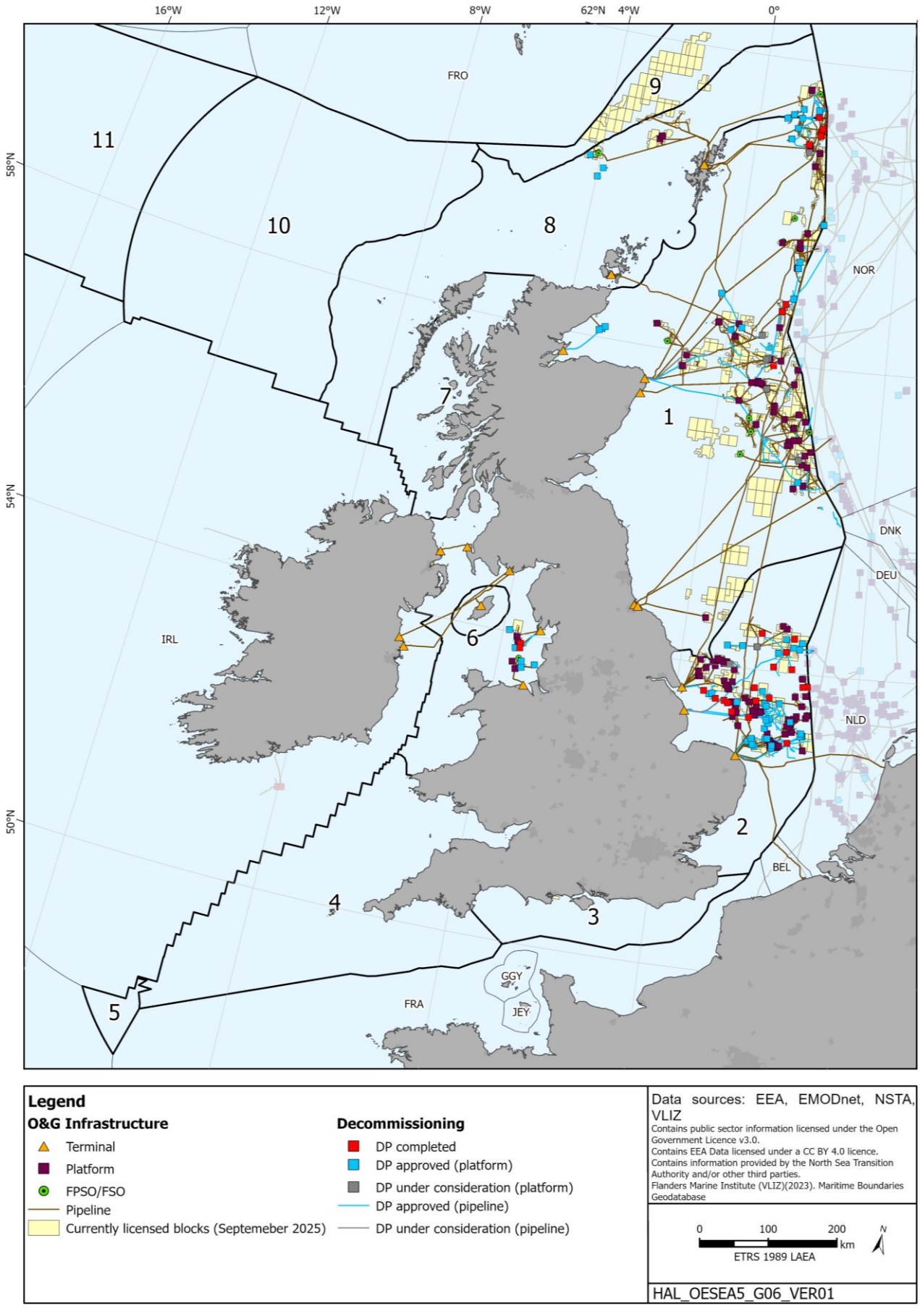


Figure 3.12: Offshore gas storage licence areas, including those for carbon dioxide

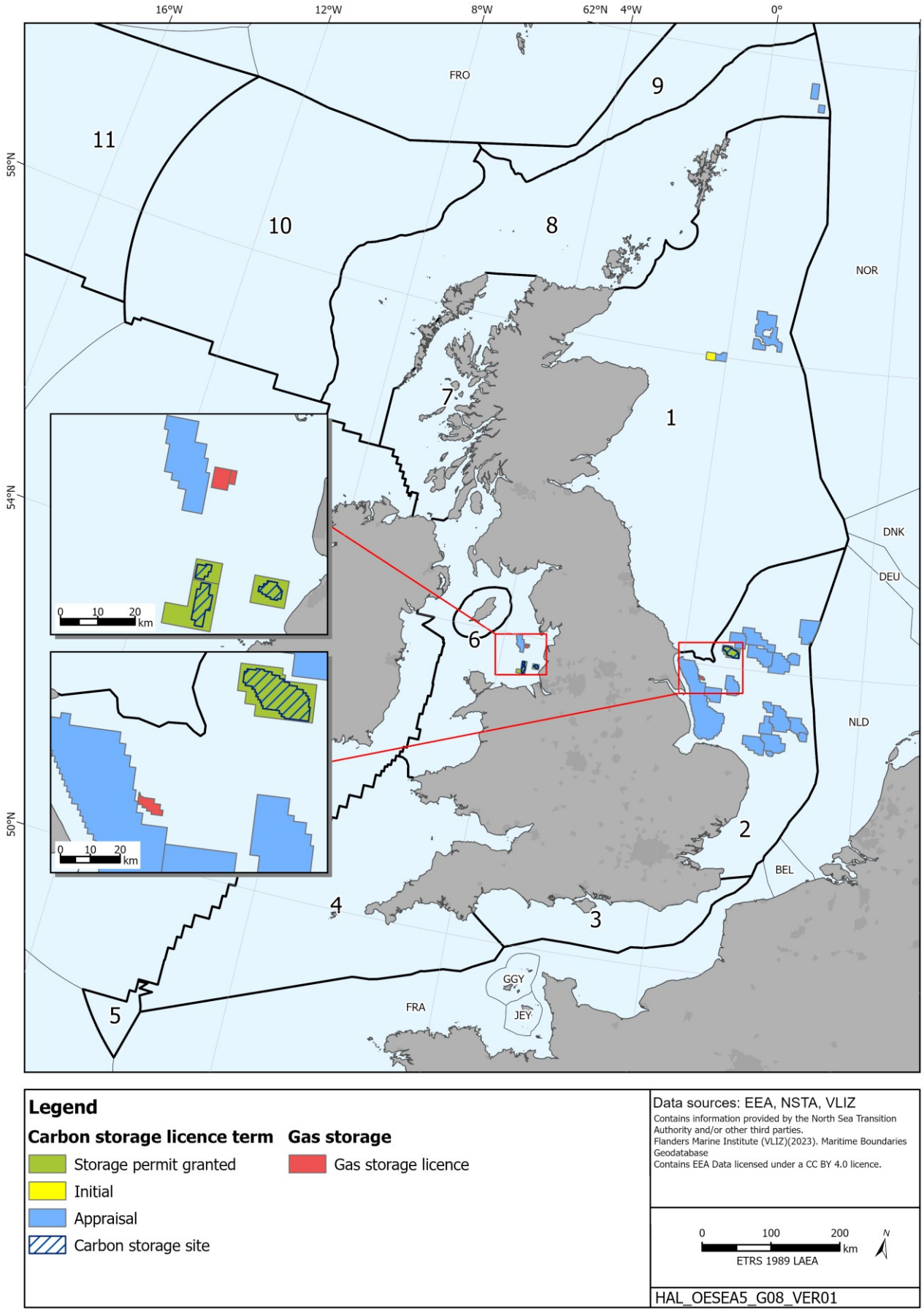


Figure 3.13: Annual mean wave power, current wave leasing areas and status, and potential resource areas

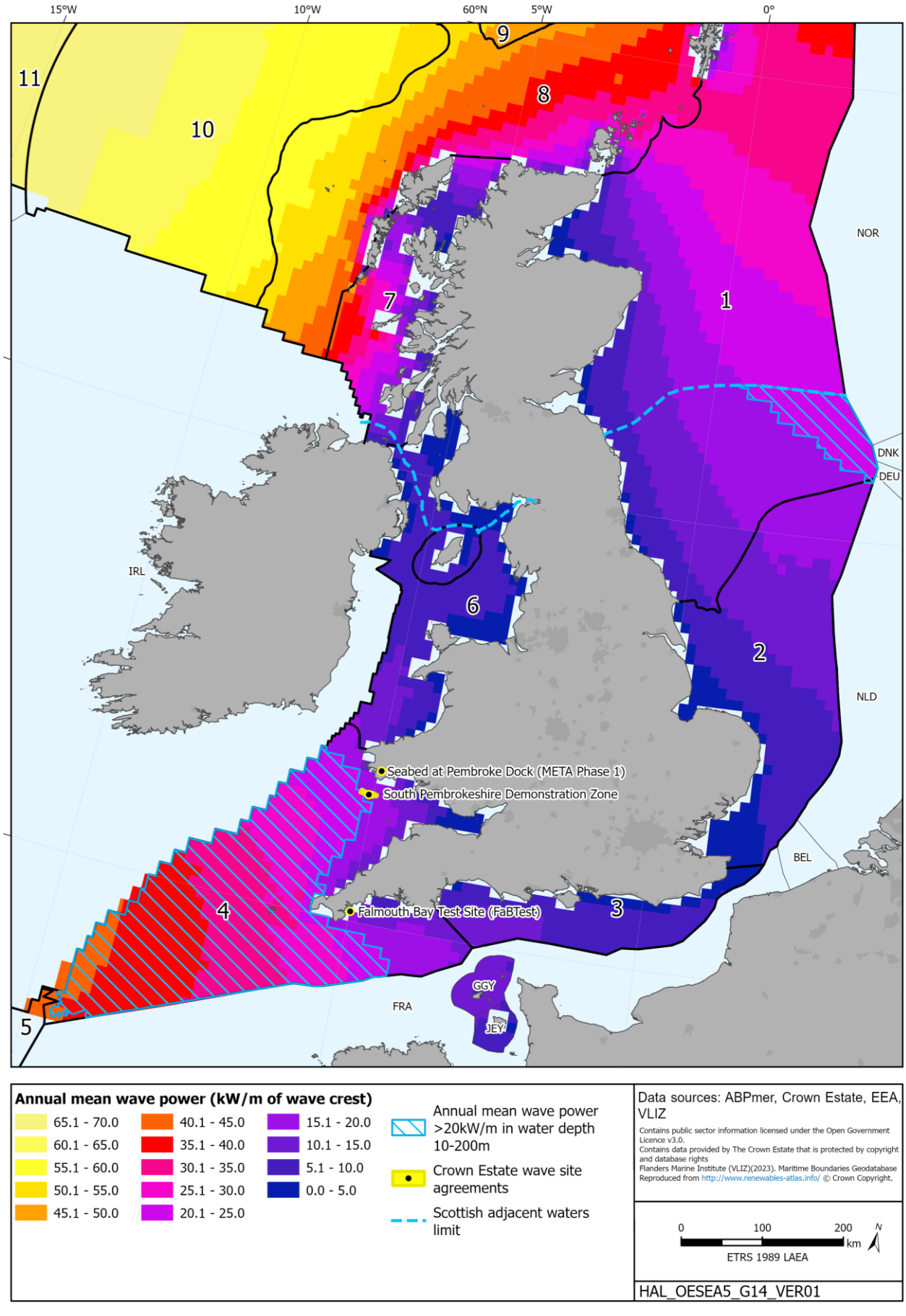


Figure 3.14: Annual mean tidal power, current tidal stream leasing areas and status, and potential resource areas

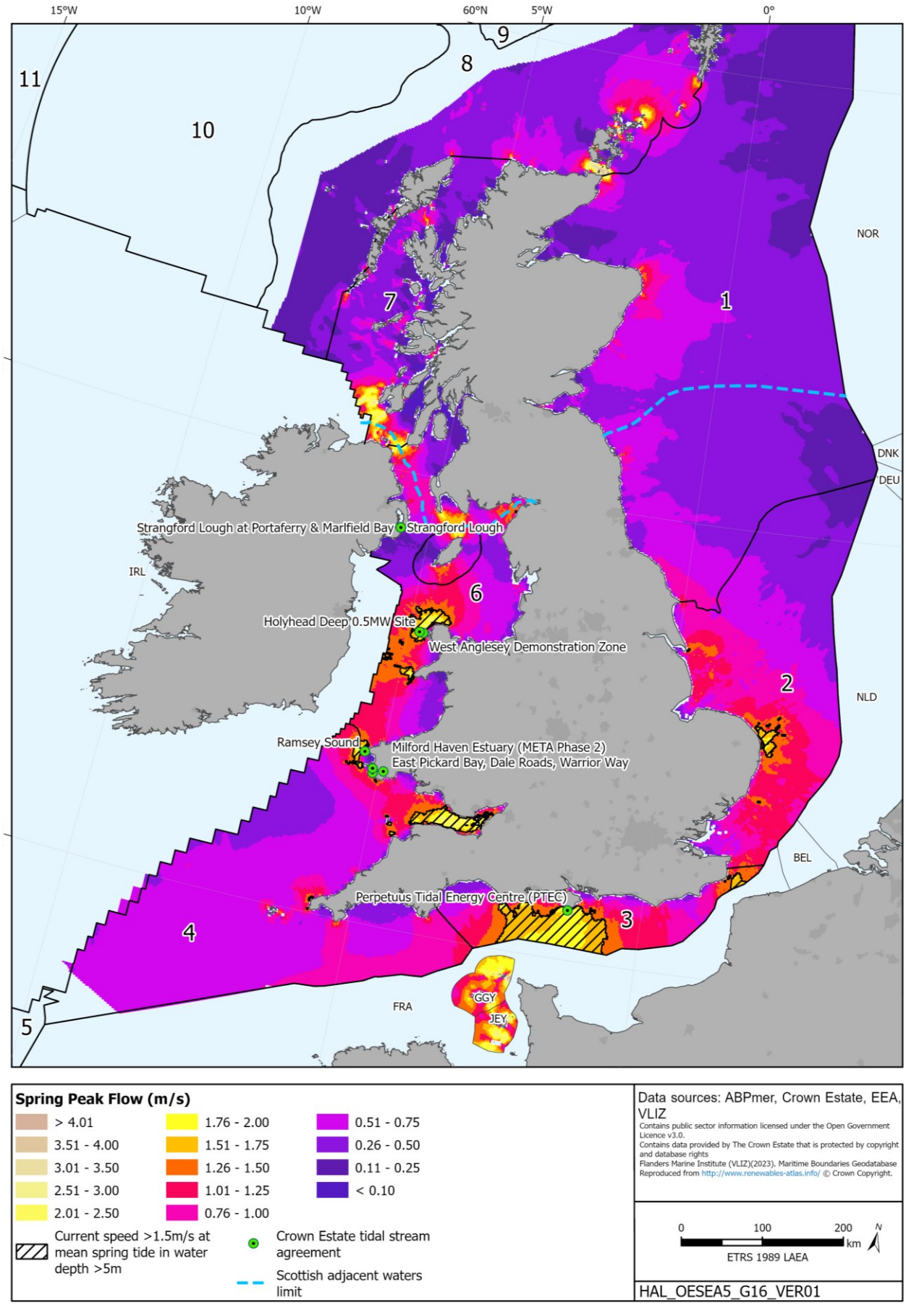
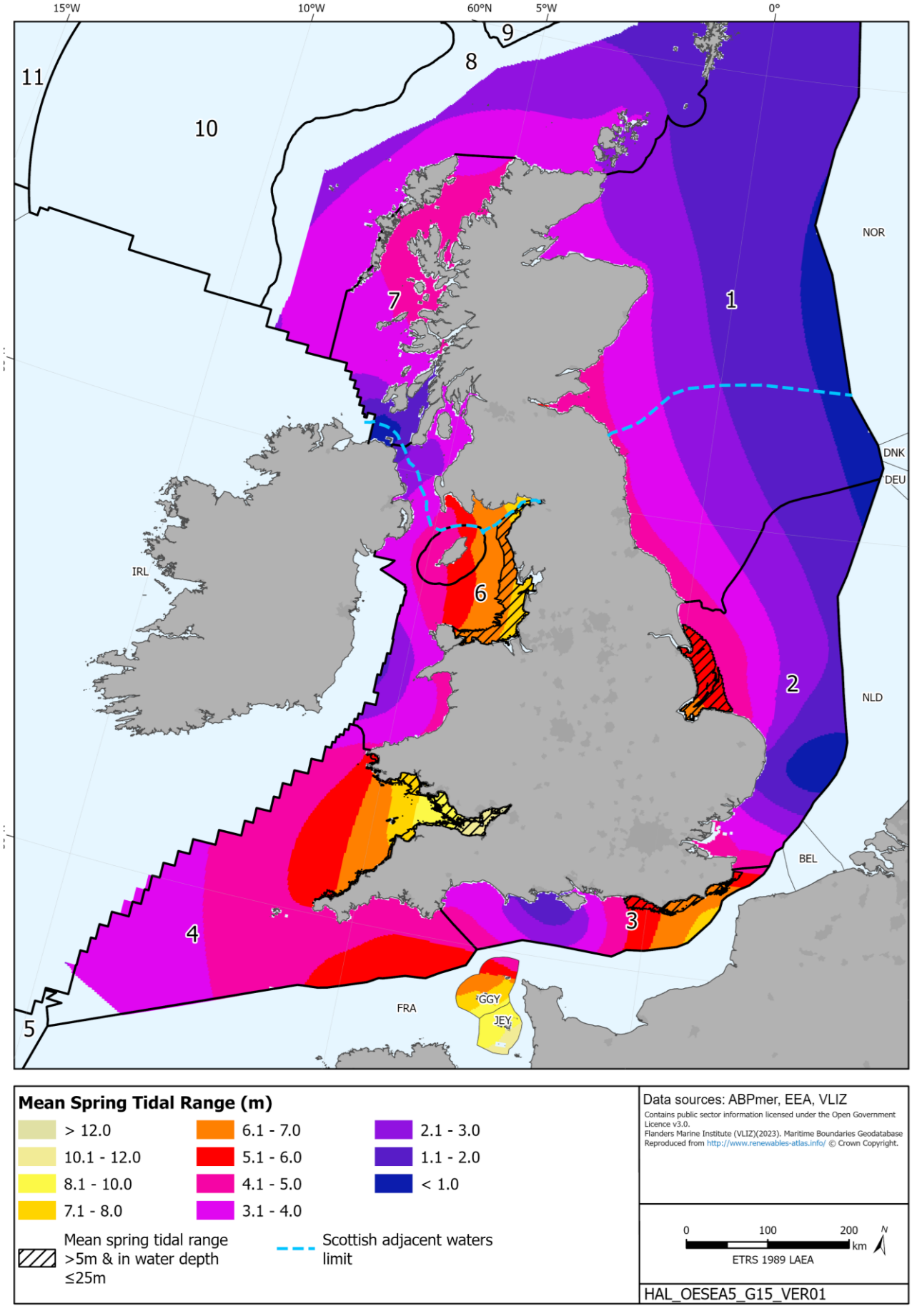


Figure 3.15: Mean spring tidal range and potential resource areas



Consultation Question

1. Do you have any comments on the key marine energy resource areas and likely scale of aspects of the draft plan/programme to be considered in OESEA5?

4 Other Relevant Plans and Programmes

Schedule 1 and 2 of the SEA Regulations variously 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"*

and;

"the environmental protection objectives, established at international, Community or national 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 relevant initiatives (including plans and programmes, and environmental protection measures) and statutory measures established at international, UK and UK constituent country level, which are relevant to this plan/programme for those topics listed below. The initiatives are arranged by SEA topic area[35].

The outputs of a number of initiatives provide baseline information in terms of the status of certain areas within the SEA topics and their trajectory (e.g. monitoring and reporting outcomes). The SEA will account for the implications of the other plans and programmes set out below on the draft plan/programme.

Consultation Question

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

[35] As given in Schedule 2(6) of *The Environmental Assessment of Plans and Programmes Regulations 2004*

4.1 Biodiversity, habitats, flora and fauna

Biodiversity, Habitats, Flora & Fauna

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)
Agreement on the Conservation of African-Eurasian Migratory Waterbirds (1999)
United Nations Convention on Biodiversity (the Rio Convention, 1992)
Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention, 1979)
Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention, 1979)
The International Council for the Exploration of the Sea (ICES) Code of Practice for the Introduction and Transfer of Marine Organisms
The Kunming-Montreal Global Biodiversity Framework (2024)
International Convention for the control of ships ballast water and sediments (adopted 2004, entered into force September 2017)
United Nations Sustainable Development Goals
Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction 2023

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
OSPAR List of Threatened and/or Declining Species and Habitats
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)
Council of Europe Strategy on Invasive Alien Species (2003)
OSPAR Quality Status Reports 2000, 2010, 2023, and intermediate assessment 2017
OSPAR Recommendation 2024/02 on reducing bycatch of marine birds in the maritime area
OSPAR Recommendation 2021/05 on furthering the protection and conservation of kelp forest habitat in Region II, III and IV of the OSPAR maritime area
OSPAR Recommendation 2016/3 on furthering the protection and conservation of the Atlantic salmon (*Salmo salar*) in Regions I, II, III and IV of the OSPAR maritime area
OSPAR Recommendation 2016/02 on furthering the protection and conservation of intertidal mudflats in Regions I, II, III and IV of the OSPAR maritime area
OSPAR Recommendation 2016/01 on the reduction of marine litter through the implementation of fishing for litter initiatives, 2019/01 on the reduction of marine litter through the Implementation of Sustainability Education Programmes for Fishers

UK

Environment Act 2021
Levelling-up and Regeneration Act 2023
National Parks and Access to the Countryside Act 1949
The Wildlife and Countryside Act 1981
Natural Environment and Rural Communities Act 2006
The Conservation of Offshore Marine Habitats and Species Regulations 2017
The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001
Marine and Coastal Access Act 2009
The Marine Strategy Regulations 2010
Our Seas - a shared resource. High Level Marine Objectives (2009)
Marine Policy Statement (2011)
UK National Ecosystem Assessment (2011) and follow on (2014)

UK

Marine Strategy Part 1: UK Initial Assessment and Good Environmental Status (2012), and updates (2019, 2025)
Marine Strategy Part 2: UK Marine Monitoring Programmes (2022)
Marine Strategy Part 3: UK Programme of Measures (2015) and update (2025)
The Great Britain Invasive Non-native Species Strategy: 2022 to 2030 (2023)
UK Biodiversity Framework (2024)
National Biodiversity Strategy and Action Plan (2025)
A Green Future: Our 25 Year Plan to Improve the Environment (2018)
The Environmental Improvement Plan (2025)
The Environmental Principles Policy Statement (2023), insofar as it applies to reserved matters
Marine Science Co-ordination Committee (MSCC) (established 2008) and related working groups
The Natural Capital Committee (2012-2020)
Climate Change Committee (established 2008)
The Office for Environmental Protection (established 2021)

Local

Countryside and Rights of Way Act 2000 - England and Wales
The Eels (England and Wales) Regulations 2009
The Conservation of Seals Act 1970
The Conservation of Habitats and Species Regulations 2017 - England and Wales
The Environmental Targets (Marine Protected Areas) Regulations 2023
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015
National Policy Statements for Energy
Overarching National Policy Statement for Energy (EN-1)
National Policy Statement for Renewable Energy Infrastructure (EN-3)
National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)
The National Planning Policy Framework (2024) - England
Inshore and Offshore Marine Plans (North East, East, South East, South, South West, North West) - England - the East Marine Plans are being renewed with a view to being consulted on in 2026
Natural Capital and Ecosystem Assessment programme
Byelaws prohibiting bottom towed fishing gear in certain MPAs - MMO (2017-2024)
Prohibition of sandeel fisheries in English waters within ICES Area 4 (North Sea) (2024)

Environment (Wales) Act 2016 (including Section 7: Biodiversity lists and duty to take steps to maintain and enhance biodiversity)
he Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009
The Natural Resources Policy Statement (2017) - Wales
The Nature Recovery Action Plan for Wales (2015)
Technical Advice Note 5: Nature Conservation and Planning 2009 - Wales
Environment Strategy for Wales (2006)
State of Wales' Natural Resources report (2016, 2020, 2025)
The Natural Resources Policy Statement (2017) - Wales
Planning Policy Wales, Edition 12 (2024)
Welsh National Marine Plan (2019)
White Paper, Securing a Sustainable Future. Environmental Principles, Governance and Biodiversity targets for a Greener Wales, and Government Response (2024)

The Conservation (Natural Habitats, &c.) Regulations 1994 - Scotland
Nature Conservation (Scotland) Act 2004
The Freshwater Fish Conservation (Prohibition on Fishing for Eels) (Scotland) Regulations 2008
The Environmental Liability (Scotland) Regulations 2009
Marine (Scotland) Act 2010
The Sandeel (Prohibition Of Fishing) (Scotland) Order 2024
Offshore Fishing (Prohibition of Fishing Methods) (Scotland) Order 2025
Scottish Planning Policy (2014) and the National Planning Framework for Scotland 4 (2023)
Scotland's National Marine Plan (2015), 2021 review, and preparation of the National Marine Plan 2
Scotland's Marine Assessment 2020
Priority Marine Features in Scotland's Seas
Scottish Biodiversity Strategy to 2045 (2024)

Local	*Wildlife and Natural Environment Act (Northern Ireland) 2011* *The Environment (Northern Ireland) Order 2002* *Nature Conservation and Amenity Lands (Northern Ireland) Order 1985* *Wildlife (Northern Ireland) Order 1985* *Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995* *The Environmental Liability (Prevention and Remediation) Regulations (Northern Ireland) 2009* *Marine Act (Northern Ireland) 2013* *The Marine Protected Areas (Prohibited Methods of Fishing) Regulations (Northern Ireland) 2022* Planning Policy Statement 2: Natural Heritage (2013) - Northern Ireland Strategic Planning Policy Statement (2015) - subject to review in relation to cliamte change in 2024 Biodiversity Strategy for Northern Ireland to 2020 (2015) Strategy for Marine Protected Areas in the Northern Ireland inshore region (2014), subject to review and consultation for a strategy covering 2024-30 in 2024 The Marine Plan for Northern Ireland (consultation 2018, revised statement of public participation 2022, not yet adopted) Environment Strategy Northern Ireland (2022)

4.1.1 Key objectives and targets

The *Environment Act 2021* is intended to update and amend environmental protection, primarily in England, following the UK's withdrawal from the EU. This includes the creation of a new independent public body, the Office for Environmental Protection (OEP)[36], which is responsible for taking action in relation to breaches of environmental law, the setting of legally binding targets and environmental principles. These principles[37], must be considered when developing policy under the Environmental Principles Duty created by the Act. The 25 Year Environment Plan, a statutory document under the Act, was the first Environmental Improvement Plan (EIP), which was revised in 2023 (EIP23), and in 2025 (EIP25) following a rapid review of the EIP23 in 2024[38]. The EIP is subject to monitoring and annual reporting. Additionally, a framework setting long-term legally-binding targets has been established covering a range of areas, but at least air quality (with a specific duty on PM2.5 concentrations in ambient air), resource efficiency, waste production, water and biodiversity (with a specific duty to set a target to halt the decline in species abundance by 2030).

The provisions of the EU Habitats Directive, were implemented in the UK through a range of legislative provisions which are now assimilated law including, the *Conservation (Natural Habitats, &c.) Regulations 1994, the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995, the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001,* the *Conservation of Habitats and Species Regulations 2017,* and the *Conservation of Offshore Marine Habitats and Species Regulations 2017.* These variously cover site classification and provisions for site and feature protection. Part 2 of the *Conservation of Habitats and Species Regulations 2017* provides for the creation of a coherent ecological network of sites made up of Special Areas of Conservation (SACs), which are classified to conserve those species listed in Annex I of the Habitats Directive (92/43/EEC) and habitats listed in Annex II of the Directive; and those sites designated as Special Protection

[36] Note that while the Act largely applied to England, Part 2 allows for the OEP to exercise its functions in Northern Ireland, subject to the approval of the Northern Ireland Assembly.
[37] https://www.gov.uk/government/publications/environmental-principles-policy-statement/environmental-principles-policy-statement
[38] https://www.gov.uk/government/publications/environmental-improvement-plan-rapid-review/interim-statement-on-the-eip-rapid-review

Areas (SPAs) for bird species under Annex I (rare or vulnerable) and II (migratory) of the Wild Birds Directive 2009/147/EC, now termed, the National Site Network.

The *Conservation of Species and Habitats Regulations 2017* consolidates the *Conservation (Natural Habitats, &c.) Regulations 1994* in England and Wales and also implements certain aspects of the *Marine and Coastal Access Act 2009*. The devolved administrations of Scotland and Northern Ireland implement similar provisions through the *Conservation (Natural Habitats, &c.) Regulations 1994* in Scotland, and the *Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995* in Northern Ireland, however, the *Conservation of Species and Habitats Regulations 2017* may still apply for certain reserved matters, and the *Conservation of Offshore Marine Habitats and Species Regulations 2017* apply beyond territorial waters. The *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001* cover Habitats Regulations Assessment requirements for licence, consent or authorisation under Part III of the *Petroleum Act 1998* and Part 1 of the *Energy Act 2008*.

The *Wildlife and Countryside Act 1981* is one of the principal pieces of legislation relating to nature conservation in Great Britain. Although protection under the Act generally includes adjacent territorial waters (12nm), for certain species protection is limited to 6nm from coastal baselines[39], and for the designation of Marine Nature Reserves out to 3nm. The Act is supplemented by various other pieces of legislation including the *Countryside and Rights of Way Act 2000* (in England and Wales) and the *Nature Conservation (Scotland) Act 2004* (in Scotland). In Northern Ireland, the main legislation is contained in the *Wildlife (Northern Ireland) Order 1985* and the *Environment (Northern Ireland) Order 2002*. This legislation provides for the protection of species and the designation of nationally important sites known as Sites of Special Scientific Interest (SSSI) in England, Wales and Scotland and as Areas of Special Scientific Interest (ASSI) in Northern Ireland. SSSI sites have until present extended only to Mean Low Water (e.g. intertidal areas), though the *Marine and Coastal Access Act 2009* has allowed for all new SSSIs to extend below this line should features extend into the intertidal area.

The *Environment (Wales) Act 2016* covers a range of environmental issues including, most relevant to this SEA: sustainable management of natural resources, climate change, fisheries for shellfish and marine licensing, and flood and coastal erosion and land drainage. A number of reporting duties are placed on NRW including the preparation of a State of Natural Resources Report (SNRR) and Area Statements, which are to set out an assessment of natural resources and how well they are being managed, and the priorities, risks and opportunities for managing natural resources sustainably and what action they will take. The Welsh Government will produce a National Natural Resources Policy (NNRP) that sets out the priorities and opportunities for managing our natural resources sustainably, taking account of the SNRR and the extant Natural Resources Policy Statement.

The *Marine Strategy Regulations 2010* establishes a framework for measures to achieve or maintain good environmental status (GES) in the marine environment by the year 2020. The Regulations transposed the requirements of the Marine Strategy Framework Directive (MSFD, 2008/56/EC). Eleven qualitative descriptors indicate what Good Environmental Status (GES) is and since they are relevant to most of the SEA topic areas and are variously referred to in later sections, they are reproduced below:

[39] *The Territorial Sea (Baseline) Order 2014*

1. Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.
2. Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.
3. Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.
4. All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.
5. Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.
6. Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.
7. Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.
8. Concentrations of contaminants are at levels not giving rise to pollution effects.
9. Contaminants in fish and other seafood for human consumption do not exceed levels established by legislation or other relevant standards.
10. Properties and quantities of marine litter do not cause harm to the coastal and marine environment.
11. Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

As part of the implementation of the Marine Strategy Regulations, the UK Government released Marine Strategy Part 1: UK Initial Assessment and Good Environmental Status in 2012, which was updated in 2019 and with progress consulted on in 2025. The latest assessment indicates some progress towards meeting GES for a number of descriptors, which includes areas of marine litter, grey seal populations and in relation to fisheries, however, the overall assessment presents a set of mixed results, for example marine mammal bycatch continues to present a problem area, as does the size-structure of demersal fish communities, and a decline in non-breeding bird abundance and also breeding success. The Marine Strategy Part 2, first published in 2014, and updated in October 2022[40] provides a description of the UK's marine monitoring programmes to support the targets and indicators set out for each of the eleven GES descriptors, and Part 3: the UK's proposed programme of measures to

[40] https://www.gov.uk/government/publications/marine-strategy-part-two-uk-marine-monitoring-programmes

maintain or achieve GES, was published in December 2015 and subsequently updated in 2025[41].

Included in measures to achieve GES is the establishment of a cohesive network of Marine Protected Areas (MPAs) which is intended to build on the areas already protected in the UK by the Habitats Regulations. Sites established under the *Marine and Coastal Access Act 2009*, and Acts of the devolved administrations, will aid the completion of such a network of MPAs, which is also a requirement of other commitments regarding MPAs under international conventions such as the Convention on Biological Diversity, and regionally under the OSPAR Convention. These sites, which may be designated both within territorial and offshore waters, are known as Marine Conservation Zones (MCZs) in England, Wales and Northern Ireland, and Marine Protected Areas (MPAs) in Scotland, administered at the constituent country level.

The MCZ project in England and Wales was initially delivered through four regional projects administered by Natural England and the Joint Nature Conservation Committee (JNCC), covering the South-West (Finding Sanctuary), Irish Sea (Irish Sea Conservation Zones), North Sea (Net Gain) and Eastern Channel (Balanced Seas). The sites were selected based on representative habitat and species features (termed Features of Conservation Importance, FOCI), subject to consultation with a range of relevant stakeholders, and to several rounds of consideration by the Science Advisory Panel (SAP) prior to recommended sites being submitted in 2011. In total, 89 MCZs were designated across three tranches, with a further two in the offshore waters of Northern Ireland. A review into Highly Protected Marine Areas (HPMAs) was undertaken between 2019 and 2020 led by former Environment and Fisheries Minister Richard Benyon (the Benyon Review[42]) which made recommendations including that HPMAs should be introduced in conjunction with existing MPAs, setting objectives to allow full recovery of such sites and where extractive, destructive and depositional uses are prohibited; three pilot HPMAs were designated in 2023 in English waters, including sites in the central North Sea, the Channel, and Solway Firth.

Scottish territorial and offshore waters, and the territorial waters of Wales and Northern Ireland, are subject to their own programmes of MCZ/MPA identification and designation. In Wales, a consultation on 10 proposed sites was completed in 2012, however, none of the proposed sites have yet been put forward for designation. The only MCZ in Welsh waters is Skomer MCZ. In UK offshore waters adjacent to Scotland, MPAs were identified through a Scottish Marine Protected Area Project under the *Marine and Coastal Access Act 2009*, with those in Scottish Territorial Waters through the *Marine (Scotland) Act 2010*. 36 Nature Conservation MPAs (NCMPAs) and, one Demonstration & Research MPA (Fair Isle), have been designated to date.

The Department of Environment (Northern Ireland) published, a Strategy for Marine Protected Areas in the Northern Ireland Inshore Region in 2014. The strategy outlines the approach in Northern Ireland to the creation of MCZs in their territorial waters, which will be designated under the *Marine Act (Northern Ireland) 2013*. Strangford Lough was the first MCZ in Northern Ireland, replacing its former designation as a Marine Nature Reserve under the *Nature Conservation and Amenity Lands (Northern Ireland) Order 1985*. Four additional MCZs were designated in Northern Irish waters in 2016.

[41] https://www.gov.uk/government/publications/marine-strategy-part-three-2025-uk-programme-of-measures
[42] https://www.gov.uk/government/publications/highly-protected-marine-areas-hpmas-review-2019

The Habitats Regulations (in relation to SACs and SPAs), and the *Marine and Coastal Access Act 2009* or *Marine (Scotland) Act 2010*, require that the conservation bodies (e.g. Natural England, JNCC, Natural Resources Wales (NRW), NatureScot, Northern Ireland Environment Agency (NIEA)) produce advice on the conservation objectives for marine sites and activities likely to cause deterioration/disturbance to qualifying site habitats and/or species. Conservation advice packages have been produced, or are currently being reviewed or produced, for MPAs, which includes those which are offshore, or coastal and nearshore and which have marine components. The nature of this advice is influenced by the condition of site features, which for many sites is judged to be unfavourable. The *Environmental Targets (Marine Protected Areas) Regulations 2023*, extending to English and Welsh waters only, were made under the *Environment Act 2021* and have set the following targets for certain sites to be met before the end of 31st December 2042; that the number of protected features which are in favourable condition within all relevant MPAs is not less than 70% of the total number of all protected features within relevant MPAs, and that all other protected features within relevant MPAs are in recovering condition. An interim target of 48% of features to be in favourable condition by 31st January 2028 was noted in EIP23, with a commitment in EIP25 to make sure that at least 49% of MPA protected features are in favourable condition and at least 46% in recovering condition, by December 2030.

Byelaws prohibiting the use of bottom towed fishing gear in certain MPAs in English waters variously came into force between 2017 and 2022 (Stage 1)[43], and 2024 (Stage 2)[44], with further measures covering all seabed features of MPAs not covered in Stages 1 and 2 being consulted on in 2025[45]. Stage 4 includes proposals for species, including for example, harbour porpoise bycatch[46]. Scotland introduced measures which came into force in October 2025, which cover 20 MPAs for static and mobile demersal gears across parts of some sites and the full extent of others. In addition to these provisions, sandeel fisheries in UK waters have been effectively closed, with benefits noted to be for other fish species, marine mammals, and seabirds, particularly given the ongoing effects of avian influenza[47].

The High Level Marine Objectives[48] 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. These objectives underpin the MPS, and the next stage of marine planning has been completed other than for Northern Irish Waters. Plans were produced for Scotland (2015), Wales (2019) and England (2014-2021), with further regional planning taking place in Scotland. The East Marine Plans (adopted 2014) are currently being reviewed and revised inshore and offshore plans are due to be consulted on in 2026. Northern Ireland is presently developing their own National marine plan under the *Marine and Coastal Access Act 2009* for offshore waters, with inshore marine planning to be covered by the *Marine Act (Northern Ireland) 2013*. The plan was consulted on in 2018, with a

[43] https://www.gov.uk/guidance/marine-conservation-byelaws
[44] https://www.gov.uk/government/publications/marine-protected-areas-bottom-towed-fishing-gear-byelaw-2023
[45] https://www.gov.uk/government/collections/marine-protected-areas-stage-3-consultation
[46] https://www.gov.uk/government/publications/harbour-porpoise-bycatch-management-options
[47] https://consult.gov.scot/marine-scotland/consultation-on-proposals-to-close-fishing/, https://www.gov.uk/government/consultations/consultation-on-spatial-management-measures-for-industrial-sandeel-fishing/outcome/government-response
[48] https://webarchive.nationalarchives.gov.uk/ukgwa/20130402151656/http:/archive.defra.gov.uk/environment/marine/documents/ourseas-2009update.pdf

revised statement of public participation published in 2022, however, a final plan is yet to be adopted.

The UK Biodiversity Action Plan (BAP) provided 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) were identified as being priorities for conservation action in the UK, and these include a number of marine components, and 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 2006* (e.g. list of species of principal importance designated under Sections 41 and 42 of the Act). UK BAP was succeeded by the UK Post-2010 Biodiversity Framework in 2012, produced by JNCC and Defra on behalf of the UK and devolved administrations, and covering the period 2011-2020. The Framework was the Government's response to the Convention on Biological Diversity's Strategic Plan for Biodiversity 2011-2020 and its five strategic goals and 20 "Aichi Targets", and the EU Biodiversity Strategy.

National Policy Statements for energy were initially published in 2011 and aimed at providing a policy steer for Nationally Significant Infrastructure Projects (NSIPs) as detailed in the *Planning Act 2008*. Those which are of close relevance to OESEA5 are:

- Overarching National Policy Statement for Energy (EN-1)
- National Policy Statement for Renewable Energy Infrastructure (EN-3)
- National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

The NPSs were subject to review, with revisions being made in 2023, and following consultation in 2025, revised versions of EN-1 and EN-3 came into force on 6th January 2026. Each National Policy Statement was subject to an Appraisal of Sustainability (AoS) incorporating Strategic Environmental Assessment and Habitats Regulations Assessment (HRA). The Overarching National Policy Statement for Energy (EN-1) contains policy in relation to, amongst other considerations, generic biodiversity impacts; whereas the energy specific policy statements contain more detailed considerations, although still at a high policy level. Each National Policy Statement contains considerations relevant to potential impacts on the natural environment, including that within the remit of the plan/programme, such as birds, marine mammals, fish and intertidal habitats. Decisions made by the relevant authority with regards to NSIPs must also be taken with regard to the MPS and any relevant Marine Plan.

In addition to threats posed from marine development and climate change, the marine environment has been subject to a number of invasive species which have led to a series of localised changes in community composition. A number of national and international initiatives exist aiming to recommend and introduce safeguards to limit the transport of invasive species, including the International Convention for the Control and Management of Ships' Ballast Water and Sediments and the Great Britain Invasive Non-native Species Strategy.

4.2 Geology, substrates & coastal processes

Geology, Substrates & Coastal Processes

International

The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the London Convention) and 1996 Protocol Thereto (amendment on the storage of CO_2 in geological formations came into force 10 February 2007).
GEBCO Seabed 2030 (launched 2017)

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
OSPAR Recommendation 2016/02 on furthering the protection and conservation of intertidal mudflats in Regions I, II, III and IV of the OSPAR maritime area
OSPAR Quality Status Report 2023

UK

The Wildlife and Countryside Act 1981
The Conservation of Habitats and Species Regulations 2017
The Conservation of Offshore Marine Habitats and Species Regulations 2017
Marine and Coastal Access Act 2009
The Marine Strategy Regulations 2010
The Storage of Carbon Dioxide (Licensing etc.) Regulations 2010
The Energy Act 2008
The Energy Act 2011
The UK Marine Policy Statement (2011)
Geological Conservation Review (GCR)
Local Geological Sites, including Regionally important Geological and Geomorphological Sites (RIGS)
Flood and coastal erosion risk management: policy statement (2020)
National Coastal Erosion Risk Mapping Project (2018, ongoing)
Coastal monitoring and historical coastal change (2021)
The MCA Civil Hydrography Programme
NERC Marine Environmental Mapping Programme (MAREMAP)
Marine Strategy Part 1: UK Initial Assessment and Good Environmental Status (2012), and updates (2019, consultation 2025)
Marine Strategy Part 2: UK Marine Monitoring Programmes (2022)
Marine Strategy Part 3: UK Programme of Measures (2015) and update (2025)
River Basin Management Plans for respective administrations, including those which are cross-border
Flood Risk Management Plans in respective administrations

Local

Coast Protection Act 1949 - England and Wales
Countryside and Rights of Way Act 2000 - England and Wales
National Policy Statements for Energy - England and Wales
Overarching National Policy Statement for Energy (EN-1)
National Policy Statement for Renewable Energy Infrastructure (EN-3)
National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)
The National Planning Policy Framework (2024) - England
Inshore and Offshore Marine Plans (North East, East, South East, South, South West, North West) - England - the East Marine Plans are being renewed with a view

A Strategy for Promoting an Integrated Approach to the Management of Coastal Areas in England
National flood and coastal erosion risk management strategy for England (2021)
Flood and coastal erosion risk management: policy statement (2020)
Shoreline Management Plans - England and Wales
Marine Aggregate Levy Sustainability Fund (MALSF) Regional Environmental Characterisations including : South Coast, Thames, East Coast and the Humber areas.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
A Green Future: Our 25 Year Plan to Improve the Environment (2018)

Technical Advice Note 5: Nature Conservation and Planning (2009) - Wales
Technical Advice Note 14: Coastal Planning (1998) - Wales
Technical Advice Note 15: Development and Flood Risk (2004) - Wales
Marine Conservation Zone Task and Finish Group Wales (ongoing)
National Strategy for Flood and Coastal Erosion Risk Management in Wales (2020)
State of Wales' Natural Resources report (2020)
The Natural Resources Policy Statement (2017) - Wales
Planning Policy Wales, Edition 11 (2021)
Welsh National Marine Plan (2019)

Marine (Scotland) Act 2010
The Conservation (Natural Habitats, &c.) Regulations 1994 - Scotland
Water Environment and Water Services (Scotland) Act 2003
Flood Risk Management (Scotland) Act 2009
The Storage of Carbon Dioxide (Licensing etc.) (Scotland) Regulations 2011
The Scottish Coastal Forum and Local Coastal Partnerships (established 1996)
Scottish Planning Policy (2014) and the National Planning Framework for Scotland 4 (2023)
Scotland's National Marine Plan (2015), 2021 review, and preparation of the National Marine Plan 2
Scotland's Marine Assessment 2020

Marine (Northern Ireland) Act 2013
Earth Science Conservation Review (Northern Ireland)
An Integrated Coastal Zone Management Strategy for Northern Ireland 2006-2026 (2006)
Marine Conservation Zone project
Planning Policy Statement 15: Planning and Flood Risk (2014) - Northern Ireland
Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017 (as amended)
The Marine Plan for Northern Ireland (consultation, 2018)

4.2.1 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 notified Earth Science-SSSIs (e.g. in Scotland 77% of sites are designated in such a way) or those which are awaiting notification. The *Marine and Coastal Access Act 2009* also 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. Locally important sites are 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 as they are related to habitats which are qualifying interests of sites, for example SACs or MCZs. The *Marine and Coastal Access Act 2009*, the *Marine (Scotland) Act 2010* and the *Marine Act (Northern Ireland) 2013* provides means for the conservation of specific "features of geological and geomorphological interest" through the designation of MCZs or MPAs. A number of sites in Scottish waters have geological and geomorphological features as protected features, including features representative of the Marine Geomorphology of the Scottish Deep Ocean Seabed, Cenozoic Structures of the Atlantic Margin, the Quaternary of Scotland, Submarine Mass Movements and, large-scale features such as seamounts. The number of sites subject to consultation by the relevant conservation bodies have been summarised above in relation to Biodiversity, Habitats, Flora and Fauna. The location of these sites and features for which they are to be designated are mapped and will be discussed in the Environmental Report.

At the coast, natural denudation processes are leading to shoreline retreat and increased flood risk in many cases, which may be accentuated by projected climate and associated environmental change, which is projected to include sea-level rise, and potentially increased storminess (see Climate & Meteorology, below), and is recognised in national climate change adaptation programmes. 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 *Flood and Water Management Act 2010* (England and Wales), the *Flood Risk Management (Scotland) Act 2009* and the *Water Environment (Floods Directive) Regulations (Northern Ireland) 2009* make provisions for the creation of flood risk (and in the case of England and Wales, coastal erosion) management strategies/plans. In addition to these, terrestrial and marine planning policy for England (including in relation to NSIPs) and the devolved administrations provides policy and guidance for developers and authorities on how to manage development at the coast, incorporating aspects relating to climate change (such as increased sea-levels) and the prohibition of unnecessary or inappropriate development in areas subject to erosion and coastal flooding (e.g. the creation of Coastal Change Management Areas). 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. Each SMP provides policy recommendations for coastal areas which may advise Holding the Line (HTL), through the maintenance of present defences or where monitoring and assessment provide evidence that new defences would be beneficial; No Active Intervention (NAI), where defences are not maintained and Managed Realignment (MR) or Retreat (R), where defences are removed and/or moved inland to allow

for natural coastal denudation. Policies are provided in each SMP over three 'epochs', 2009-2025, 2025-2055 and 2055-2105.

The *Water Environment (Water Framework Directive) (England and Wales) Regulations 2017* (and those equivalent Regulations of the devolved administrations) seek to achieve good ecological and chemical status for coastal and estuarine water bodies. River Basin Management Plans (RBMPs) completed under the relevant Regulations will be used in combination with other plans including SMPs to achieve a fully integrated approach to coastal management. RBMPs identify relevant morphological and hydrodynamic issues and the measures to manage such issues. Similarly, the *Marine Strategy Regulations 2010* seek to achieve good environmental status in the marine environment, which incorporates geomorphological conditions.

Internationally, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the London Convention) and 1996 London Protocol provide a legal framework to regulate and enable the safe injection and permanent storage of carbon dioxide in geological formations. The amendments to Annex 1 to the London Protocol, which entered into force on 10th February 2007, state that, *"Carbon dioxide streams … may only be considered for dumping, if:*

- *disposal is into a sub-seabed geological formation; and*
- *they consist overwhelmingly of carbon dioxide. They may contain incidental associated substances derived from the source material and the capture and sequestration processes used; and*
- *no wastes or other matter are added for the purpose of disposing of those wastes or other matter."*

OSPAR Decision 2007/02 on the Storage of Carbon Dioxide Streams in Geological Formations, states that *"The storage in geological formations of carbon dioxide streams from carbon dioxide capture processes shall not be permitted by Contracting Parties without authorisation or regulation by their competent authorities".* The decision also indicates what any permit or approval should, at least, contain:

1. a description of the operation, including injection rates;
2. the planned types, amounts and sources of the CO_2 streams, including incidental associated substances, to be stored in the geological formation;
3. the location of the injection facility;
4. characteristics of the geological formations
5. the methods of transport of the CO_2 stream;
6. a risk management plan that includes:
    a. monitoring and reporting requirements;
    b. mitigation and remediation options including the pre-closure phases; and

c. a requirement for a site closure plan, including a description of post-closure monitoring and mitigation and remediation options; monitoring shall continue until there is confirmation that the probability of any future adverse environmental effects has been reduced to an insignificant level.

The *Energy Act 2008* provides a legislative basis for licensing and permitting carbon storage in a controlled place including areas within UK territorial seas, and in areas beyond those waters which have been designated as the EEZ. The OGA is the licensing authority responsible for granting licences and storage permits in the territorial sea adjacent to the UK and on the UK EEZ in accordance with the *Storage of Carbon Dioxide (Licensing etc.) Regulations 2010* with the exception of Scottish territorial seas where the Scottish Ministers are responsible for granting licences and storage permits in accordance with the *Storage of Carbon Dioxide (Licensing etc.) (Scotland) Regulations 2011*. Suitable formations may consist of saline aquifers, halite deposits or depleted hydrocarbon reservoirs.

4.3 Landscape/seascape

Landscape/Seascape

International

World Heritage Convention 1972
Council of Europe: European Landscape Convention 2000

UK

Marine and Coastal Access Act 2009
UK Marine Policy Statement (2011)
An approach to seascape character assessment (2012)
An approach to seascape sensitivity assessment (2019)
The Environmental Principles Policy Statement (2023), insofar as it applies to reserved matters

Local

National Parks and Access to the Countryside Act 1949 - England and Wales
Environment Act 1995 - England and Wales
Countryside and Rights of Way Act 2000 - England and Wales
Levelling-up and Regeneration Act 2023 - England
National Policy Statements for Energy - England and Wales
Overarching National Policy Statement for Energy (EN-1)
National Policy Statement for Renewable Energy Infrastructure (EN-3)
National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)
The National Planning Policy Framework (2024) - England
Inshore and Offshore Marine Plans - England
Seascape Character Assessments associated with Marine Plans
Landscapes review: National Parks and AONBs (2019)
The National Character Areas of England
King Charles III England Coast Path
English Heritage Historic Landscape and Seascape Characterisations
Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets, 2nd Edition (2017)
Commercial Renewable Energy Development and the Historic Environment (2021)
A Green Future: Our 25 Year Plan to Improve the Environment (2018)

Environment (Principles, Governance and Biodiversity Targets) (Wales) Bill
Local Seascape Character Assessment (Pembrokeshire Seascape Character Assessment, Landscape and seascapes of Eryri (Snowdonia), Anglesey seascape character assessment) - Wales (2013-onwards)
LANDMAP Wales
Cadw/ICOMOS Register of Landscapes of Outstanding Historic Interest or Special Historic Interest
National Landscape Character Areas - Wales (2015)
National Seascape Assessment for Wales (2015)
State of Wales' Natural Resources report (2020)
Technical Advice Note 12: Design (Wales) (2016)
Planning Policy Wales, Edition 11 (2020)
Welsh National Marine Plan (2019)
Welsh seascapes and their sensitivity to offshore developments (2019)

Local

Planning etc. (Scotland) Act 2006
Marine (Scotland) Act 2010
The Town and Country Planning (National Scenic Areas) (Scotland) Designation Directions 2010
SNH's Landscape policy framework (under review)
People, Place and Landscape: A position statement from NatureScot and Historic Environment Scotland, and Action Plan (2019)
Scottish Planning Policy (2014) and the National Planning Framework for Scotland 3 (2014)
Scotland's National Marine Plan (2015)
Landscape and the Historic Environment – A Common Statement (2016)

The Nature Conservation and Amenity Lands (Northern Ireland) Order 1985
Marine (Northern Ireland) Act 2013
The Marine Plan for Northern Ireland (consultation, 2018)
Strategic Planning Policy Statement for Northern Ireland (2015)
Landscape Character Areas of Northern Ireland (2006)
Planning Policy Statement 18: Renewable Energy and Wind Energy Development in Northern Ireland's Landscapes (2009), and supplementary guidance on Wind Energy (2010)
Northern Ireland's Landscape Charter (2014)
Northern Ireland Regional Seascape Character Assessment (2014)

4.3.1 Key objectives and targets

At the highest level, the European Landscape Convention (ELC) seeks to "promote landscape protection, management and planning, and to organise European co-operation on landscape issues." (Ch. 1 Art. 2) and encompasses "the entire territory of the Parties and covers natural, rural, urban and peri-urban areas. It includes land, inland water and marine areas. It concerns landscapes that might be considered outstanding as well as everyday or degraded landscapes" (Ch. 1 Art. 1), and therefore considers that all landscapes are important, not just the outstanding but also the everyday landscapes where most people live, work and spend much of their time. The perception of landscape and seascape can go beyond that which is purely visual, and be valued in different ways (e.g. as source of economic gain, or by providing a sense of identity or wellbeing), recognised in the ELC definition of landscape, "An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors."

The ELC requires, "landscape to be integrated into regional and town planning policies and in cultural, environmental, agricultural, social and economic policies, as well as any other policies with possible direct or indirect impacts on landscape (Article 5 (d)). The ELC has been acknowledged in policy including the MPS which states that all coastal landscapes should be considered when developing marine plans, not just those which are protected through designations. Consistent with the MPS, England's marine plans and Scotland's National Marine Plan both recognise that planners and developers generally take landscape and seascape into account, and as part of the process for English and Welsh plans, seascape studies have been undertaken to characterise marine areas. The seascape project for Welsh waters[49] is complemented by a number of local studies (the Pembrokeshire Seascape Character Assessment, Landscape and seascapes of Eryri (Snowdonia) and Anglesey seascape character assessment), and the sensitivity of Welsh seascapes to offshore developments has recently been assessed.

[49] https://naturalresources.wales/evidence-and-data/maps/marine-character-areas/?lang=en

The MPS states that all coastal landscapes should be considered in the preparation of Marine Plans, not just those which are protected through designations, which is broadly complementary to the tenets of the ELC (e.g. see the SCP-1 policies in the English Marine Plans, and SOC_07: Seascapes and Seascape in the Welsh and draft Northern Irish plans respectively). The East Inshore and Offshore marine planning process involved the commissioning of a methodological pilot study for seascape assessment, which was developed by Natural England and formalised in, An approach to Seascape Character Assessment, which underpinned a series of seascape characterisations developed for the marine plan areas. The MMO published guidance in 2019 on how to assess seascape sensitivity.

In addition to direct considerations of landscape, the MPS and the *Marine and Coastal Access Act 2009* provide a legal and policy framework for the construction of a new national coastal trail in England and amenity land associated with this route which the public is free to use, which is now called, the King Charles III England Coast Path National Trail. The scheme for the implementation of this part of the Act in England and its methodology was drafted by Natural England and approved in 2010. The path is largely complete, with a limited number of sections which are approved but not yet open, or for which proposals have been published but not approved[50], and completion of the entire trail is expected by 2026. The *Marine (Scotland) Act 2010* makes no similar provisions though both Scotland and Wales are planning their own equivalent trails. The Welsh route opened in 2012, with improvements and additional routes planned in the coming years. These coastal and national trails may not have a significant impact on seascape, but it is possible that they will encourage more people to visit the coast for recreation and hence enhance the number of receptors subject to views which could be altered by elements of the plan.

Planning policies, for instance The National Planning Policy Framework (NPPF) and the Energy National Policy Statements (e.g. EN-1 and EN-3), indicate seascape is especially important where it provides the setting for a Protected Landscape (the collective term for National Parks and Areas of Outstanding Natural Beauty (AONBs[51])), which have been confirmed by the Government as having the highest status of protection in relation to landscape and natural beauty. It is noted in EN-1 that, in relation to these locations, projects should be designed sensitively given the various siting, operational, and other relevant constraints. Additionally, with regards to the duty of the Secretary of State to further the purposes of nationally designated landscapes[52], they should be satisfied that measures which seek to further the purposes of the designation are sufficient, appropriate and proportionate to the type and scale of the development. More generally, it is indicated in EN-3 that developments should be designed sensitively. The Environmental Improvement Plan 2023 includes three goals (Thriving plants and wildlife, Mitigating and adapting to climate change and, Enhancing beauty, heritage and engagement with the natural environment) and related targets with a view to better delivery of the purposes of Protected Landscapes[53]. Linked to this topic is that of the historic environment (e.g. listed buildings, UNESCO world heritage sites,

[50] https://www.gov.uk/government/publications/england-coast-path-overview-of-progress
[51] While the legal term for these sites remains AONB, following the completion of the Glover Review, these sites are being rebranded as “National Landscapes”.
[52] The Protected Landscapes duty to “seek to further” the statutory purposes of Protected Landscapes, came into force in 2023 under the *Levelling-up and Regeneration Act 2023*
[53] https://www.gov.uk/government/publications/protected-landscapes-targets-and-outcomes-framework/protected-landscapes-targets-and-outcomes-framework

scheduled monuments), where their setting is considered to be relevant to their designation or appreciation[54].

Where developments fall within the visual range of receptors (i.e. resident and transient people) 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 view of the use of turbines of greater size and in greater number, studies and guidance documents have been produced on the assessment of seascapes in relation to offshore wind farms whose findings may be more widely applicable to other marine energy devices which have surface infrastructure[55].

[54] See: https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/, also, “essential setting” and “”significant views” are identified in Wales in relation to registered Historic Parks and Gardens.
[55] For example, see White *et al.* (2019) Seascape and visual sensitivity to offshore wind farms in Wales: Strategic assessment and guidance, and White Consultants (2020) Review and Update of Seascape and Visual Buffer study for Offshore Wind farms.

4.4 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 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 prootocol - revision to convention (2006) and amendments to 1996 protocol
International Convention for the control of ships ballast water and sedimenta (adopted 2004, entered into force September 2017)
International Convention for the control and management of ships' ballast water and sediments (adopted 2004, entered into force September 2017)

Regional

Convention for the Protection of the Marine Environment of the North East Atlantic (the OSPAR Convention 1992)
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
OSPAR Recommendation 2001/1 for the Management of Produced Water from Offshore Installations
OSPAR Recommendation 2003/1 on the Strategy for the Joint Assessment and Monitoring Programme
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 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 2012/5 for a risk-based approach to the Management of Produced Water Discharges from Offshore Installations
OSPAR Recommendation 2010/3 on a Harmonised Offshore Chemical Notification Format (HOCNF)
OSPAR North-East Atlantic Environment Strategy
OSPAR Co-ordinated Environmental Monitoring Programme (ongoing)
OSPAR Quality Status Reports (QSRs) of the North Atlantic and its sub-regions (2000, 2010 and 2023)
OSPAR Intermediate Assessment 2017
OSPAR Recommendation 2017/1 on a harmonised pre-screening scheme for offshore, and guidance on the toxicity of substances used and discharged under the scheme in Agreement 2021/07
OSPAR Agreement 2021/01 North East Atlantic Environment Strategy 2030
OSPAR Agreement 2025/01 Revision of the Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic 2030
MoU between the IMO and OSPAR on the promotion of the London Convention and London Protocol
Agreement 2021-04 Memorandum of Understanding (MoU) between the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic and the Bonn Agreement Contracting Parties

UK

Water Resources Act 1991
The Offshore Chemicals Regulations 2002
UK Marine and Coastal Access Act 2009
The Marine Strategy Regulations 2010
The Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation Convention) Regulations 1998
Environment Act 2021
Marine Policy Statement (2011)
River Basin Management Plans for respective administrations, including those which are cross-border
Our Seas – a shared resource. High level marine objectives (2009)
Marine Strategy Part 1: Updated Assessment and Good Environmental Status (2019) and consultation (2025)
Marine Strategy Part 2: UK Marine Monitoring Programmes (2021)
Marine Strategy Part 3: UK Programme of Measures (2015, 2021, 2025)
UK Climate Change Risk Assessment (2017), third Climate Change Risk Assessment (2022)
The UK National Contingency Plan for responding to marine pollution incidents (2024)
A new Chemicals Strategy (as noted in the 25 Year Environment Plan) but not yet published
UK REACH (2020) - maintains the EU REACH's aims and principles, made by amendment under the *The REACH etc. (Amendment etc.) (EU Exit) Regulations 2020*

Local

The Flood Risk Regulations 2009 - England and Wales
Flood and Water Management Act 2010 - England and Wales
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017
Environmental Targets (Water) (England) Regulations 2023
Environmental Damage (Prevention and Remediation) Regulations 2015 - England
Environmental Improvement Plan 2023 - England
National assessment of flood and coastal erosion risk in England (2024)
National flood and coastal erosion risk management strategy for England (2020)
Flood risk management plans 2021 to 2027: national overview (part a) and local plans (part b, covering Solway Tweed, Northumbria, North West, Humber, Dee, Severn, Anglian, South West, Thames, South East)
Overarching National Policy Statement for Energy (EN-1)
National Policy Statement for Renewable Energy Infrastructure (EN-3)
National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)
National Policy Statement for Ports (2012) - England, consultation on amendment (2025)
Inshore and Offshore Marine Plans - England
Marine Pollution Contingency Plan (2020) - England and Wales, revised (2023)
A Green Future: Our 25 Year Plan to Improve the Environment (2018), revised by Environmental Improvement Plan (2023)
Environmental Improvement Plan 2025
Shoreline Management Plans - England and Wales

The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009
Technical Advice Note 15: Development and Flood Risk (2004, updated advice maps 2015 and consultation 2019) - Wales
Technical Advice Note 15 guidance on climate change allowances for planning purposes (2016) and technical evaluation of the advice note (2017)
Guidance on The Town and Country Planning (Flood Risk Area Development) (Notification) (Wales) Direction 2025
National Strategy for Flood and Coastal Erosion Risk Management (2020) - Wales
Welsh National Marine Plan (2020)
Planning Policy Wales, Edition 12 (2024)
State of Wales' Natural Resources report (2020) and State of Natural Resources Report 2025 - interim report summary (2024)
The Natural Resources Policy Statement (2017) - Wales

Local

The Water Environment (Floods Directive) Regulations (Northern Ireland) 2009
The Environmental Liability (Prevention and Remediation) Regulations (Northern Ireland) 2009
Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017
Marine Act (Northern Ireland) 2013
An Integrated Coastal Zone Strategy for Northern Ireland 2006-2026 (2006)
PPS 15 Planning and Flood Risk (2014) - Northern Ireland
The Marine Plan for Northern Ireland (consultation, 2018)
Fisheries and Water Environment Bill (policy consultation, 2025)

4.4.1 Key objectives and targets

The International Convention for the Prevention of Pollution from Ships (MARPOL) addresses the prevention of pollution of the marine environment from ships from operational or accidental causes (and in part from offshore installations) by oil; by noxious liquid substances carried in bulk; harmful substances in packaged form; sewage, garbage and the prevention of air pollution from ships (Annexes I-VI). 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 places a general obligation that Contracting parties take all possible steps to prevent and eliminate pollution and take the necessary measures to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected. 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 Convention requires the Contracting Parties to apply 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. The North-East Atlantic Environment Strategy (NEAES) 2030 was adopted on 1st October 2021 and following review was amended by OSPAR Agreement 2025-01. The strategy implements the OSPAR Convention until 2030 and sets out the collective objectives[56] of Contracting Parties that will tackle issues of biodiversity loss, pollution (including litter) and climate change. The amended strategy includes adopting a “source to sea” approach to increase collaboration and coherence across the entire hydrosphere, as well as amending or adding a number of strategic objectives; including reviewing the categories of disused offshore installations where derogations may be considered and developing an updated approach on decommissioning of offshore renewable energy installations.

The culmination of a number of information gathering and assessment initiatives are presented in the OSPAR Quality Status Reports (QSR) (2001, 2010), which were updated in the Intermediate Assessment (2017), and the most recent QSR 2023[57]. The assessment reports provide significant information on the current state of the UK and neighbouring seas, and the activities which affect them. Key aspects of the QSR cover biodiversity, eutrophication, hazardous substances, offshore oil and gas industry, radioactive substances and other human

[56] See: https://www.ospar.org/documents?d=63635
[57] https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/

activities[58]. At a national level, Charting Progress 2, was a Defra initiative published in July 2010 which provided an updated assessment of the state of UK seas since Charting Progress was first published in 2005. Supporting technical reports on healthy and biologically diverse seas, ocean processes, clean and safe seas, and productive seas provide relevant information on the UK's water environment baseline and issues affecting the water environment and provided the basis of Marine Strategy Part One: UK Initial Assessment and Good Environmental Status (2012). This was updated in 2019 as part of the UK's Updated Assessment and Good Environmental Status[59], with the UK Government recently consulting (August 2025) on the third scheduled update[60].

A number of European 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). These have been transposed in the UK through a number of Regulations including: The *Urban Waste Water Treatment (England and Wales) Regulations 1994*, the *Nitrate Pollution Prevention Regulations 2015, the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017* (and those of other devolved administrations) and the *Marine Strategy Regulations 2010*; these are part of assimilated law.

The *Water Environment (Water Framework Directive) (England and Wales) Regulations 2017* implement the intention to achieve good ecological and chemical status/potential for a range of terrestrial, transitional (i.e. estuarine) and coastal waters out to 1nm (or 3nm under the *Water Environment and Water Services (Scotland) Act 2003*). 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 to prevent marine pollution. The Nitrate Pollution Prevention Regulations and Urban Waste Water Treatment Regulations seek to protect the environment from the adverse effects of nitrogen from agricultural sources and sewage discharges respectively in this regard.

The *Environmental Targets (Water) (England) Regulations 2023* set targets to be met by 31st December 2038, including; to reduce by 40% (compared to 2018 baseline) the levels of total nitrogen, total phosphorus and sediment entering freshwaters in, and coastal waters around, England from agricultural land, and to reduce by 80% (2020 baseline), the levels of total phosphorus discharged into freshwaters from relevant discharges from sewerage systems of sewerage undertakers. These targets form part of the Environmental Improvement Plan 2023 with respect to Goal 3 Clean and plentiful water.

UK "assimilated law" includes Regulations implementing Directive 2004/35/EC on environmental liability (and amendments through 2006/21/EC, 2009/31/EC and 2013/30/EU) with regard to the prevention and remedying of environmental damage (primarily transposed through the *Environmental Damage (Prevention and Remediation) Regulations 2015* – separate Regulations apply in the devolved administrations). The regulations, based on the polluter pays principle, establishes a framework to prevent and remedy environmental damage

[58] https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/synthesis-report/key-messages/
[59] https://www.gov.uk/government/publications/marine-strategy-part-one-uk-updated-assessment-and-good-environmental-status
[60] https://consult.defra.gov.uk/uk-marine-strategy-1/uk-marine-strategy-part-one-update-2025/supporting_documents/UK%20Marine%20Strategy%20Part%20One%20Update%20consultation%20June%202025.pdf

at a reasonable cost to society and applies strict liability to those operators of inherently hazardous activities listed in Schedule 2.

The *Marine Strategy Regulations 2010* require the development of the five elements of the marine strategy: (1) the assessment of marine waters; (2) the determination of the characteristics of good environmental status for those waters; (3) the establishment of environmental targets and indicators; (4) the establishment of a monitoring programme; (5) the publication of a programme of measures, the most recent of which was published in 2025[61]. The latest overarching targets (characteristics) for determining good environmental status are listed in the UK Marine Strategy part one update 2025 subject of recent consultation, those of relevance to the water environment include:

- Human-induced eutrophication in UK seas is minimised.
- Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.
- The UK concentrations of contaminants in water, sediment, or biota are kept within agreed levels and these concentrations are not increasing; and the effects of contaminants on selected biological processes and taxonomic groups, where a cause/effect relationship has been established, are kept within agreed levels.
- The amount of litter and its degradation products on coastlines and in the marine environment is reducing and levels do not pose a significant risk to the environment and marine life.
- Loud, low- and mid-frequency impulsive sounds and continuous low frequency sounds generated by human activities are reduced to the extent that they do not have adverse effects on marine ecosystems and animals at the population level.

The MPS underpins UK marine spatial planning which is being implemented under the *Marine and Coastal Access Act 2009*. The first regional marine plans for English waters were adopted in 2014 (East Inshore and Offshore) and 2018 (South Inshore and Offshore), followed by all the remaining plans in 2021. Three-Year Reports assessing the legislative and regulatory changes that may affect the relevance of the North East, North West, South East, South West and South Marine Plans were published by the MMO in June 2025[62]. The Three-Year Reports also evaluated if, and how, the Plans and their policies are being used, and the effects and effectiveness of the policies within each Plan. Following consideration, DEFRA agreed with the MMO's recommendation that the aforementioned Marine Plans be retained and not amended at this time. Scotland's first National Marine Plan (NMP) was adopted and published in March 2015, setting out the vision for clean, healthy, safe, productive and diverse seas, managed to meet the long-term needs of nature and people. Following reviews in 2018 and 2021, a new National Marine Plan 2 (NMP2) is in development[63]. The first Welsh National Marine Plan was published in 2019 with an independent review of marine planning approaches

[61] https://assets.publishing.service.gov.uk/media/67990f039a6dc0352ab341e1/Marine_strategy_part_three_-_2025_UK_programme_of_measures.pdf
[62] https://www.gov.uk/guidance/marine-plans-three-year-reports
[63] https://www.gov.scot/policies/marine-planning/national-marine-planning/

concluded in Spring 2025[64]. Public consultation on a draft Marine Plan for Northern Ireland took place in 2018 and a revised Statement of Public Participation dated October 2022[65] provides the latest update on ongoing plan preparation. These plan policies, though regionally specific, are to be consistent with national scale policy included in the MPS. With regards to water environment, the MPS indicates that marine plan authorities (e.g. the MMO, Scottish Ministers, Welsh Ministers, DAERA) must contribute to or align with delivery of the policies and objectives of relevant River Basin Management Plans (RBMP) and the *Marine Strategy Regulations 2010*.

Climate change is likely to have a pervasive effect on all aspects of the coastal and marine environment including flooding, coastal erosion, water quality and resources. The UK Climate Projections (UKCP18) (updated March 2019)[66] significantly enhanced its consideration of marine parameters from previous assessments, including of future sea-level rise, storm surge and wave climate, which complement the ongoing work of the Marine Climate Change Impacts Partnership (MCCIP) in summarising current understanding and potential future changes to the marine environment.

The Intergovernmental Panel on Climate Change (IPCC) published the Synthesis Report of the Sixth Assessment Report (AR6) in 2023 which provided an overview of the state of knowledge on the science of climate change. It was informed by the reports of the three Working Groups of the IPCC (WG I – The Physical Science Basis, WG II – Impacts, Adaptation, and Vulnerability, Working Group III – Mitigation of Climate Change). The Synthesis Report of the Seventh Assessment Report (AR7) is due to be released late 2029[67].

64 https://business.senedd.wales/documents/s162525/Independent%20Review%20of%20Marine%20Planning%20Approaches%20for%20Wales%20-%20Summary%20Report.pdf

65 https://www.daera-ni.gov.uk/sites/default/files/publications/daera/Annex.pdf

66 https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/using-ukcp/guidance

67 https://www.ipcc.ch/assessment-report/ar7/

4.5 Air Quality

Air Quality

International

Marine Pollution Convention, MARPOL 73/78 (the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978)
MARPOL Annex VI framework to enhance the energy efficiency of ships (2011)
Geneva Convention on Long Range Transboundary Air Pollution (1979)
Vienna Convention for the protection of the ozone layer (1985)
Montreal Protocol on substances that deplete the ozone layer (1987) and subsequent updates and adjustments, including the Kigali Amendment (2019)
Stockholm Convention on Persistent Organic Pollutants (2001)
UNEP Global Mercury Partnership and Minamata Convention on Mercury (2017)
Consolidated text of the amended Protocol (the Gothenburg Protocol) to Abate Acidification, Eutrophication and Ground-level Ozone (2012)
Initial IMO strategy on the reduction of GHG emissions from ships (2018)

Regional

The Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR) 1992

UK

Clean Air Act 1993
Environment Act 1995
Pollution Prevention and Control Act 1999
The Offshore Combustion Installations (Pollution Prevention and Control) Regulations 2013
The Merchant Shipping (Prevention of air pollution from ships) Regulations 2008
The Fluorinated Greenhouse Gas Regulations 2015
The National Emission Ceilings Regulations 2018
The Greenhouse Gas Emissions Trading Scheme Order 2020
Environment Act 2021
UK National Air Pollution Control Programme (2019), revised (2023)
Air quality plan for nitrogen dioxide (NO_2) (2019)
Clean Air Strategy (2019)

Local

Air Quality (England) Regulations 2000
Air Quality Standards Regulations 2010 - England
Pollution Prevention and Control (Designation of Directives) (England and Wales) Order 2013
The Environmental Damage (Prevention and Remediation) (England) Regulations 2015
The Environmental Permitting (England and Wales) Regulations 2016
The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023
A Green Future: Our 25 Year Plan to Improve the Environment (2018), revised by Environmental Improvement Plan (2023)
Environmental Improvement Plan 2025

The Air Quality Standards (Wales) Regulations 2010
The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009
Well-being of Future Generations (Wales) Act 2015
State of Wales' Natural Resources report (2016, 2020), interim report (2024)
Clean Air Plan for Wales (2020), update report on progress against actions (2024)
Environment (Air Quality and Soundscapes) (Wales) Act 2024

Local

Air Quality (Scotland) Regulations 2000
The Air Quality Standards (Scotland) Regulations 2010
The Environmental Liability (Scotland) Regulations 2009
Pollution Prevention and Control (Designation of Industrial Emissions Directive) (Scotland) Order 2011
Cleaner air for Scotland 2: Towards a Better Place for Everyone (2021), progress report (2022)

The Air Quality Standards Regulations (Northern Ireland) 2010
Environment (Northern Ireland) Order 2002
The Environmental Liability (Prevention and Remediation) Regulations (Northern Ireland) 2009
The Large Combustion Plants Regulations (Northern Ireland) 2003
A Clean Air Strategy for Northern Ireland – Public Discussion Document (consultation 2021)

4.5.1 Key objectives and targets

MARPOL addresses the prevention of marine pollution from ships and in part, from offshore installations. It includes six annexes covering pollution by oil, noxious liquids carried in bulk, harmful substances in packaged form, sewage, garbage and air pollution. 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 UK Government's Clean Air Strategy (2019) outlines how the UK and devolved administrations are to tackle issues related to air quality including those relevant to human health, the environment, clean growth, transport, household and farming emissions. Actions include a new long-term target for the reduction of exposure to PM2.5, a new target for nitrogen deposition, future policies to target air pollution and climate change in the areas of electricity, heat and industry, to work to reduce emissions from non-exhaust particulates and public transport, to prohibit the use of the most polluting fuels for use in the home, targeting the reduction of ammonia emissions from farming and tighter controls on medium industrial combustion plant. The strategy should be read in the context of the *Environment Act (2021)*, relevant legally binding targets (as defined by *The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023),* and a number of other recent UK Government strategies and plans. Of most direct relevance are the air quality plan for nitrogen dioxide (NO_2), the UK National Air Pollution Control Programme (revised 2023), and the Environmental Improvement Plan (2023), all of which in part address emissions to air of pollutants. The Net Zero Strategy (2021) and Clean Power 2030 Action Plan (2024) note that as climate change and air pollution have many of the same contributing emission sources, the decarbonisation of the UK economy offers major opportunities to significantly reduce air pollution and therefore improve human health and reduce the impact of some air pollutants on ecosystems.

The devolved administrations of Scotland and Wales have their own plans set out in the Cleaner air for Scotland Strategy 2 (2021) and the Clean Air Plan for Wales (2020), with the strategy for Northern Ireland in development.

4.6 Climate and meteorology

Climate & Meteorology

International

The United Nations Framework Convention on Climate Change
Kyoto Protocol to the UN Framework Convention on Climate Change
The Copenhagen Accord (2009)
Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (2021-2023) and the Seventh reporting cycle, commencing in 2024 and expected to conclude in 2029
The Paris Agreement (2015)
The Glasgow Climate Pact (2021)
Initial IMO strategy on the reduction of GHG emissions from ships (2023)
The Global Methane Pledge

UK

Climate Change Act 2008 (and related orders)
The Energy Act 2008
The Energy Act 2013
The Energy Act 2023
The Climate Change Act 2008 (2050 Target Amendment) Order 2019
Greenhouse Gas Emissions Trading Scheme Order 2020 (establishing the UK ETS)
The Emissions Performance Standard Regulations 2015
Marine Policy Statement (2011)
UK Climate Impacts Programme (UKCIP) (update 2018, UKCP18)
Marine Climate Change Impacts Partnership (MCCIP)
The National adaptation programme three (2023)
Clean Energy Industries Sector Plan (2025)
Clean Power by 2030 Action Plan (2024)
The OGA Plan (2024)
Climate Change Committee and related work (e.g. annual progress reports, carbon budget reports, special reports)
Carbon Budget and Growth Delivery plan (2025)
The UK's Methane Action Plan (2025)

Local

Inshore and Offshore Marine Plans - England
Clean Air Strategy - England (2019)
A Green Future: Our 25 Year Plan to Improve the Environment (2018)
Environmental Improvement Plan 2025

Well-being of Future Generations (Wales) Act 2015
Environment (Wales) Act 2016
The Climate Change (Net Welsh Emissions Account Credit Limit) (Wales) Regulations 2018
Energy Wales: a low carbon delivery plan (2019)
State of Wales' Natural Resources report (2025)
Climate Adaptation Strategy for Wales (2024)
Welsh National Marine Plan (2019)

The Climate Change (Scotland) Act 2009
Climate Change (Emissions Reduction Targets) (Scotland) Act 2019
Climate Change (Emissions Reduction Targets) (Scotland) Act 2024
Climate change: Scottish National Adaptation Plan 2024-2029 (2024)
Draft Energy Strategy and Just Transition Plan (2023)
Securing a Green Recovery on a Path to Net Zero: Climate Change Plan 2018–2032 - update (2020); due to be replaced by a plan covering 2026-2040 - Scotland
Offshore wind policy statement (2020); consultation on update (2025) - Scotland
Scotland's National Marine Plan (2015), 2021 review, and preparation of the National Marine Plan 2
Energy strategy: position statement (2021) - Scotland
Scotland's Climate Change Plan – 2026-2040

Local

The Climate Change Act (Northern Ireland) 2022
The Northern Ireland Climate Change Adaptation Programme 2 (2019); the third adaptaion programme was consulted on in 2025
The Marine Plan for Northern Ireland (consultation, 2018)

4.6.1 Key objectives and targets

The United Nations Framework Convention on Climate Change (UNFCCC) entered into force in 1994, a precursor to the Kyoto Protocol which set legally binding targets for the reduction of GHGs which are associated with anthropogenically induced climate change. The Kyoto Protocol was succeeded by the Paris Agreement which was adopted by parties to the UNFCCC in December 2015 and came into force in 2016. The Agreement aims to hold the increase in global average temperatures well below 2˚C above pre-industrial levels, and to pursue efforts to limit this to 1.5˚C (Article 2). A high-level overview of the main provisions of the Agreement are set out below:

- An aim to reach global peaking of GHG emissions as soon as possible, to undertake rapid reductions thereafter in accordance with best available science, and to achieve a balance between emissions and removals by sinks in the second half of this century.
- To communicate and maintain successive Nationally Determined Contributions (NDC) which reflect its highest possible ambition. A NDC shall be communicated every 5 years, with the first considered on a common timeframe, and also report on these.
- The lead should be taken by developed countries by undertaking economy-wide absolute emission reduction targets, with developing country should continuing to enhance their mitigation efforts, moving in time to economy-wide emission reduction or limitation.
- All Parties should strive to formulate and communicate long-term low GHG emission development strategies in line with their common but differentiated responsibilities and capabilities.
- Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of GHGs as referred to in Article 4, paragraph 1(d), of the Convention, including forests[68].
- Establish the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal referred to in Article 2.
- Recognize that adaptation is a global challenge, that the need for adaptation is significant and that greater levels of mitigation can reduce the need for additional adaptation efforts.

[68] sinks and reservoirs of all GHGs not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems.

- Strengthen cooperation on enhancing action on adaptation, and engage in adaptation planning processes and the implementation of actions, including the development or enhancement of relevant plans, policies and/or contributions.
- Recognize the importance of averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage, with the meeting of the Parties to the Paris Agreement being through the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts.
- Developed countries shall provide financial resources to assist developing countries with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention.
- Parties share a long-term vision on the importance of fully realizing technology development and transfer in order to improve resilience to climate change and to reduce GHG emissions, served under the Technology Mechanism of the Convention.
- Capacity-building under this Agreement should enhance the capacity and ability of developing countries, in particular countries with the least capacity, and those that are particularly vulnerable to the adverse effects of climate change.
- Parties shall cooperate in taking measures, as appropriate, to enhance climate change education, training, public awareness, public participation and public access to information.
- Establish an enhanced transparency framework for action and support, with built-in flexibility which takes into account Parties' different capacities and builds upon collective experience.
- A "global stocktake" will periodically review the implementation of the Agreement to assess the collective progress towards achieving its purpose, the first taking place in 2023 and every 5 years thereafter.

In response to the IPCC Special Report on Global Warming of 1.5°C (IPCC 2018), amongst other evidence, the UK's CCC provided advice to Government setting out that in order to meet its obligations under the Paris Agreement, the UK should pursue a "net zero" target for greenhouse emissions by 2050. This commitment was split between UK constituent countries on the basis of their individual circumstances, with Scotland set to achieve net zero by 2045, Wales set to achieve a 95% reduction by 2050, and England, net zero by 2050. The *Climate Change Act 2008 (2050 Target Amendment) Order 2019* commits the UK to achieving the net zero target on 1990 levels by 2050 and the UK's NDC under the Paris Agreement commits the UK to reducing economy-wide GHG emissions by at least 81% by 2035, compared to 1990 levels[69].

[69] https://www.gov.uk/government/publications/uks-2035-nationally-determined-contribution-ndc-emissions-reduction-target-under-the-paris-agreement

While some progress has been made globally in emissions reduction ambitions and the technologies available to address GHG emissions, there still remains a significant gap between these ambitions and what is required to meet a trajectory in which global average temperature rises are on a pathway towards meeting a 1.5°C target. The latest submitted NDCs for Parties to the Paris Agreement would likely use up 87% of the remaining carbon budget, leaving a post-2030 carbon budget equivalent to approximately two years of projected total global CO_2 emissions by 2030, and use 38% in a 2°C scenario, such that GHG emissions reductions would need to be substantially steeper than if action was taken earlier through stronger NDCs. Subject to a range of uncertainties and assumptions, including whether conditional elements[70] of NDCs are implemented, the best estimate 21st century peak temperature is currently 2.1-2.8°C[71].

The *Climate Change Act 2008* makes provisions for the reduction of the UK's domestic carbon dioxide equivalent emissions (i.e. includes other notable GHGs including CH_4 and N_2O) through a number of measures, including the setting of a "carbon budget". As noted above, the UK Government is committed to the reduction of GHG emissions to "net zero" on 1990 levels by 2050, with interim targets of 34% by 2020, 50% by 2025, and 57% by 2032. In Scotland, the *Climate Change (Scotland) Act 2009* sets an interim 56% reduction target for GHGs by 2020, increasing to net zero by 2045 on 1990 levels[72]. Scottish ministers have previously set annual targets through secondary legislation, however, the approach to setting targets was modified by the *Climate Change (Emissions Reduction Targets) (Scotland) Act 2024*, such that a five yearly carbon budget-based approach will be taken. A number of initiatives have stemmed from these reduction targets and other provisions of the *Climate Change Act*, for instance the establishment of a National Adaptation Programme based on the Climate Change Risk Assessment, which forms part of Defra's Adapting to Climate Change in England programme.

The most recent annual statutory report to Parliament by the CCC (2025) on progress on emissions reductions, notes that more than 50% of emissions reductions in the period 2008-2024 have come from the energy supply sector, which includes electricity supply from renewable energy, but that more than 80% of the required reduction to 2030 was needed in other sectors of the economy. With regards to renewables, it was noted that while there was sufficient capacity in the project pipeline to meet 2030 targets, a tripling of the rate of annual installation of such projects was needed. Of the current plans and policies in place to meet the UK's 2030 NDC, the CCC estimates that credible plans are in place for 38%, with some risks related to 23% of these, which include the delivery of the renewables deployment targeted under the Clean Energy Action Plan (see below), with significant risks (20%) or insufficient plans (14%) remaining for others.

The Government's Response to the Progress Report (October 2025) outlined the actions taken towards emissions reductions in the previous year, and the steps it intends to take to address the ten priority actions set out by the CCC. Of relevance to the SEA, these include actions relating to reform of the offshore wind CfD process, and planning reforms to streamline the consenting process to deliver renewable energy projects more effectively. Also of relevance is

[70] most conditional elements of the NDCs depend on access to enhanced financial resources, technology transfer and technical cooperation, and capacity-building support; availability of market-based mechanisms; and absorptive capacity of forests and other ecosystems.
[71] https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs/2024-ndc-synthesis-report
[72] As amended by the *Climate Change (Emissions Reduction Targets) (Scotland) Act 2019*

the Government's commitment to finalise a business model for engineered Greenhouse Gas Removals (GGRs). The model would support projects via a CfD mechanism along with capital grant funding. Carbon dioxide captured by such projects would require geological storage, with two projects presently proceeding to negotiations as part of the HyNet Track-1 expansion.

The Carbon Budget and Growth Delivery Plan (CBGDP)[73] was published alongside the Government Response. It sets out how the Government intends to meet emissions reductions up to, and including, Carbon Budget 6 (2033-2037), and also progress towards meeting the UK's NDC. This takes account of existing policies and other early-stage policies and proposals, in the context of the latest Energy and Emissions Projections 2023 to 2050. The projected residual emissions during the five year sixth carbon budget period are in keeping with budget limits, with some limited overperformance anticipated. The UK's Methane Action Plan[74] was released alongside the CBGDP, which forecast that the UK methane emissions will reduce by ~12.7Mt between 2020 and 2030, so that between 1990 to 2030 such emissions will have reduced by 68%.

The Government's most recent energy policies are outlined in the *Clean Power 2030 Action Plan*[75] (also see Section 3.3.1), which includes the ambition to deploy 43-50GW of offshore wind by 2030, and the development of CCS and hydrogen, noting that 35GW of unabated gas reserve capacity would be maintained to 2030. The UK Government has set out the UK's Modern Industrial Strategy, central to which is investment in renewable and clean energy (e.g. nuclear) production, as set out in the Clean Energy Industries Sector Plan[76]. The *Action Plan* recognises a number of relevant actions which will support the 2030 target for offshore wind deployment, and the broader 2035 target for clean energy production, including the *Action Plan*, working with The Crown Estate on their Future of Offshore Wind plan for 20-30GW of leasing before 2030, and reform of the CfD process, amongst others.

The 2020 Routemap for Renewable Energy reflected the Scottish Government's target to produce 100% of electricity from renewables by 2020. Scotland produced the equivalent of 113% of its 2022 electricity demand, but as this electricity is also distributed to the wider UK, low carbon sources accounted for 91.2% of its electricity consumed in 2023, 70.3% of which was from renewables. The CCC (2025) noted that emissions relating to Scotland's electricity supply were 95% lower than in 1990, with energy and industrial related emissions accounting for a 61% reduction in Scotland's overall emissions over the same period.

Scotland's Offshore Wind Policy Statement[77] indicated that as much as 11GW of offshore wind capacity was possible in Scottish waters by 2030; this statement is being updated with an ambition to deploy 40GW by 2035-2040 in addition to existing operational capacity[78]. As noted in Section 3.5, there is a significant pipeline of offshore wind projects in Scottish waters that relate to the ScotWind and INTOG leasing rounds, to contribute to further decarbonisation in Scotland and the UK, with the UK Government target of 43-50GW of offshore wind by 2030 including those projects in Scottish waters.

[73] https://www.gov.uk/government/publications/carbon-budget-and-growth-delivery-plan-2025
[74] https://www.gov.uk/government/publications/uk-methane-action-plan
[75] https://www.gov.uk/government/publications/clean-power-2030-action-plan
[76] https://www.gov.uk/government/publications/clean-energy-industries-sector-plan
[77] https://www.gov.scot/publications/offshore-wind-policy-statement/
[78] https://www.gov.scot/publications/update-2020-offshore-wind-policy-statement-scotlands-offshore-wind-ambition/

In the UK, the deployment of renewable energy was previously incentivised through the Renewables Obligation from 2002, with a move under the then UK Government's Electricity Market Reform from 2014 to CfDs, which continues to be the support mechanism for renewables. CfDs are offered to operators at a fixed "strike price", with the operator paying back any difference between the value of the CfD and wholesale electricity prices for electricity, effectively capping the cost of electricity to the consumer from these sources, but also guaranteeing a minimum price for the operators. CfDs are offered in allocation rounds, with six having taken place so far. A number of changes to the CfD regime have taken place, including relaxing the rules on eligibility for fixed offshore wind farms to allow them to apply in advance of obtaining consent. Allocation Round 7 opened in 2025, with contracts due to be signed in early 2026.

Shipping emissions are becoming a greater concern both in relation to the environmental and health implications they pose, but also their contribution to climate change. 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 oxides (SOx) emissions. Progressive reductions in nitrogen oxides (NOx) emissions were also agreed, with the most stringent controls being placed on those engines installed on ships constructed on or after 1st January 2016. From 1st January 2015 ships operating in the North Sea and English Channel needed to use fuel not exceeding 0.1% sulphur, and 0.5% sulphur from 1st January 2020 outside of these areas.

Shipping is presently the source of approximately 2.89% (~1,076Mt) of global carbon dioxide equivalent emissions (Fourth IMO GHG Study 2020). Though these were excluded from reduction targets in the Kyoto Protocol, the IMO is progressing measures to reduce them, and the IMO Strategy on reduction of GHG emissions from ships was adopted in 2023, building on the initial strategy of 2018. The IMO Strategy includes new levels of ambition, including; that the carbon intensity of ships decline through further improvement of the energy efficiency for new ships and that the carbon intensity of international shipping, as an average, reduce by 40% by 2030 relative to 2008, that the uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources which are to represent at least 5%, striving for 10%, of the energy used by international shipping by 2030, to peak GHGs from shipping as soon as possible, i.e. close to 2050, consistent with the Paris Agreement goals. Additionally, a number of checkpoints towards net zero emissions from shipping have been introduced, which in addition to the 2030 target indicated above, is that total annual GHG emissions from international shipping decline by at least 70%, striving for 80%, by 2040 compared to 2008.

At the national level, the Maritime Decarbonisation Strategy[79] (2025) was produced in response to the IMO Strategy and sets out the UK's objectives and policy measures to meet the interim 2030, 2040 (80%) and 2050 net zero targets. Domestically, shipping is estimated to have produced ~8 million tonnes of CO_2 equivalent ($MtCO_2e$) in 2019, including all emissions associated with the production and transport of shipping related fuel, its bunkering, and eventual use. Based solely on direct emissions, domestic shipping (including fisheries) generated $6MtCO_2e$ in 2019, with international shipping emissions accounting for $7.3MtCO_2e$ of shipping emissions in 2019.

At an international level, the IPCC provide information and evidence for climate change, its impacts, and how mitigation and adaptation might help alleviate its worst effects. The IPCC

[79] Maritime decarbonisation strategy - GOV.UK

has published two reports as part of the Assessment Report (AR6); the Working Group I paper on the Physical Science Basis was in 2021, and the Working Group II paper on Impacts, Adaptation and Vulnerability was published in February 2022. In the UK, UKCP18 provides medium- to long-term projections (to 2100) for climate change specific to the UK and UK marine area. The MCCIP has close ties with the UKCP programme, and these programmes help to provide climate change evidence and advice which may be used to inform policy and decision-makers.

4.7 Population and 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 and the Rio Political Declaration on Social Determinants of Health (2011)
UN's Sustainable Development Goals (2015)

Regional

Children's Environment and Health Action Plan for Europe 2004

UK

Sustainable Communities Act 2007
The Localism Act 2011
The Health and Safety at Work etc Act 1974 and *The Health and Safety at Work etc. Act 1974 (Application outside Great Britain) Order 1995*
The Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015
The Offshore Petroleum Licensing (Offshore Safety Directive) Regulations 2015
Marine Policy Statement (2011)
Our Seas – a shared resource. High level marine objectives (2009)

Local

Health and Social Care Act 2012 (as amended) - England
National Planning Policy Framework (2021) - England
Inshore and Offshore Marine Plans - England
Clean Air Strategy - England (2019) and the Air quality strategy: framework for local authority delivery
A Green Future: Our 25 Year Plan to Improve the Environment (2018), revised by Environmental Improvement Plan (2023)
Environmental Improvement Plan 2025

National Health Service (Wales) Act 2006 (as amended)
Social Services and Well-being (Wales) Act 2014
Well-being of Future Generations (Wales) Act 2015
Planning (Wales) Act 2015
The Environment (Wales) Act 2016
The Wales Act 2017
Technical Advice Note 16: Sport, Recreation and Open Space (2009) - Wales
Prosperity for All: the national strategy (2017)
Future Wales. The National Plan 2040 (2021)

Public Health etc. (Scotland) Act 2008 (as amended)
Public Services Reform (Scotland) Act 2010 (as amended)
Scotland and the sustainable development goals: a national review to drive action (2020)
Scotland's Economic Action Plan 2019-20 (2019)
Scottish Planning Policy (2014) and the National Planning Framework for Scotland 3 (2014), position statement for NPPF 4 (2020) and consultation of the draft framework (2021)
Scotland's National Marine Plan (2015)

Health and Social Care (Reform) Act (Northern Ireland) 2009
PPS 8: Open Space, Sport and Outdoor Recreation (2004) - Northern Ireland
Making Life Better: Strategic Framework for Public Health 2013-2023 (2015) - Northern Ireland

4.7.1 Key objectives and targets

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. Health is a cross-cutting issue, such that the condition of the water environment (Section 4.4), air quality (Section 4.5) and the potential worst effects of climate change (Section 4.6), all have direct or indirect health implications for which numerous initiatives have been implemented. Additionally, initiatives relating to the economic factors covered in Section 4.8 are also relevant, as are the wellbeing benefits associated with the natural environment (Section 4.1), landscape/seascape (Section 4.3) and cultural heritage (Section 4.9). As a result, reducing risks to, or improving human health are key components of some of the goals of the Environmental Improvement Plan (2023).

At the national and regional planning policy level, human health is a sectoral consideration in the MPS, for instance in relation to fisheries, aquaculture and safe operation of offshore facilities. A high-level objective of the MPS is "*The use of the marine environment is benefiting society as a whole, contributing to resilient and cohesive communities that can adapt to coastal erosion and flood risk, as well as contributing to physical and mental wellbeing.*" Similar objectives are reflected in the English marine plans (e.g. North West Marine Plan 2021) and acknowledged in the Welsh National Marine Plan and Scotland's National Marine Plan.

4.8 Other users of the sea (material assets)

Other Users & Material Assets

International

Convention on International Civil Aviation (Chicago Convention) 1944
The London Convention (1972)
Marine Pollution Convention, MARPOL 73/78 (the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978)
United Nations Convention on the Law of the Sea (1982)
Basel Convention of the control of transboundary movements of hazardous waste and their disposal (1992)
FAO Code of Conduct for Responsible Fisheries (1995)
UN Fish Stocks Agreement (2001)
Nairobi International Convention on the Removal of Wrecks (2007, entered into force 2015)
The Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships (2009)
Joint Roadmap to accelerate Maritime/Marine Spatial Planning processes worldwide (DG MARE and UNESCO) (2017)
2023 IMO Strategy on Reduction of GHG Emissions from Ships

Regional

Convention on the Future Multilateral Cooperation in North-East Atlantic Fisheries (NEAFC) (1980)
Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) (1992)
OSPAR Decision 98/3 on the disposal of disused offshore installations (1998)
OSPAR Recommendation 2016/01 on the reduction of marine litter through the implementation of fishing for litter initiatives, and 2025/02 on the application of best practice for reducing litter in the OSPAR maritime area
OSPAR Recommendation 2010/3 on a Harmonised Offshore Chemical Notification Format (HOCNF)
OSPAR Recommendation 2017/1 on a harmonised pre-screening scheme for offshore chemicals (amended 2019) and guidance on the toxicity of substances used and discharged under the scheme in Agreement 2021/07
OSPAR Agreement 2021-01, Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic 2030
OSPAR Recommendation 2025/01 on the management of discharge water from exhaust gas cleaning systems on board ships in territorial seas

UK

The Merchant Shipping Act 1995
Merchant Shipping and Maritime Security Act 1997
Sea Fisheries (Shellfish) Act 1967
Sea Fish (Conservation) Act 1967
Fisheries Act 1981
Fisheries Act 2020 and associated Fisheries Management Plans
Petroleum Act 1998
Energy Act 2008
Energy Act 2016
Energy Act 2023
Great British Energy Act 2025
Marine and Coastal Access Act 2009
The Energy Act 2008 (Consequential Modifications) (Offshore Environmental Protection) Order 2010
Wreck Removal Convention Act 2011
Petroleum Act 1998 (Specified Pipelines) (Amendment) and Importation and Storage of Combustible Gas (Designation of Substance etc.) Order 2023
The Exclusive Economic Zone Order 2013
The Territorial Sea (Baselines) Order 2014
The Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015
The Offshore Petroleum Licensing (Offshore Safety Directive) Regulations 2015
Harbours Act 1964
Environment Act 2021
Contracts for Difference (2014 to present)
UK Ship Recycling Strategy (2007)
Our Seas - A Shared Resource. High Level Marine Objectives (2009)
The UK Marine Policy Statement (2011)
Round 3 (2009) and Round 4 (2019), Round 5 (2024) offshore wind leasing, 2017 offshore wind extensions, and capacity increases
Offshore Transmission Network Review, Strategic Spatial Energy Plan, and Centralised Strategic Network Plan

UK

The Carbon Budget Delivery and Growth Plan (2025)
The Oil & Gas Strategy (2016, updated 2020)
Oil and Gas Authority Decommissioning Strategy (2021)
Aviation 2050 (2018), and also relevant CAA policy
The Jet Zero Strategy (2022)
North Sea Future Plan (2025)

Local

Waste (England and Wales) Regulations 2011
The Scallop Fishing (England) Order 2012
Byelaws relating to bottom towed fishing gear, including, the *Marine Protected Areas Bottom Towed Fishing Gear Byelaw 2023*
Inshore Fisheries and Conservation Authorities byelaws
MMO's Stage 4 Fisheries in Marine Protected Areas Consultation
National Policy Statements for Energy: - England and Wales
Overarching National Policy Statement for Energy (EN-1)
National Policy Statement for Renewable Energy Infrastructure (EN-3)
National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)
National Policy Statement for Ports - England and Wales
The National Planning Policy Framework - England
Inshore and Offshore Marine Plans - England

Inshore Fishing (Scotland) Act 1984
Sea Fisheries (Shellfish) Act 1967
The Marine (Scotland) Act 2010
The Aquaculture & Fisheries (Scotland) Act 2013
Scottish Marine Regions Order 2015
Vision for sustainable aquaculture (2023) - Scotland
Inshore Fisheries Management Improvement (IFMI) Programme
Future fisheries: management strategy - 2020 to 2030 (2020) - Scotland
National Transport Strategy (2020) - Scotland
Scotland's Draft Energy Strategy and Just Transition Plan (2023)
Sectoral marine plan for offshore wind energy (2020) and draft update (2025) - Scotland
Scotland's Sectoral Marine Plans for Wave and Tidal Energy in Scottish Waters (2013)
Scotland's Marine Tourism Strategy (2020)
Scottish Planning Policy (2014) and the National Planning Framework for Scotland 4 (2023)
Scotland's National Marine Plan (2015), 2021 review, and preparation of the National Marine Plan 2

Wales Act 2017
Future Wales: The National Plan 2040 (2021)
Welcome to Wales: priorities for the visitor economy 2020-2025 (2020)
The Wales Transport Strategy (2021)
Towards Zero Waste: our waste strategy (2021)
Welsh National Marine Plan (2019)

Marine Act (Northern Ireland) 2013
The Sea Fishing (Licenses and Notices) Regulations (Northern Ireland) 2014
Offshore Renewable Energy Strategic Action Plan - Northern Ireland
The Energy Strategy – Path to Net Zero Energy (2021)
Energy Strategy Action Plan 2025 and Action Plan Report 2024 - Northern Ireland
Environmental Improvement Plan for Northern Ireland (2024)
Marine Plan for Northern Ireland (consultation, 2018)

4.8.1 Key objectives and targets

The *Marine and Coastal Access Act 2009* is intended to simplify and strengthen strategic management of the marine environment by enabling economic, social and environmental impacts and objectives to be considered simultaneously. A key objective of the Act is to implement a nationwide system of marine planning that will clarify marine objectives and priorities for the future, and direct decision-makers and users towards more efficient,

sustainable use and protection of marine resources. The MPS made under the Act was jointly adopted in March 2011 by the UK Government, Scottish Government, Welsh Government and the Northern Ireland Executive, and applies to all UK waters. The MPS provides an overarching framework within which the UK's current marine plans have been drafted. The Act established the MMO with responsibility for marine plan making covering English territorial and offshore waters on behalf of the UK Government. Plans covering these areas were adopted between 2014 and 2021, with the first (East Inshore and Offshore) presently under review with a view to adopting revised plans by 2027. In Scotland, Wales and Northern Ireland, plans were prepared by the devolved administrations. The SNMP was adopted in March 2015 and is presently subject to review and revision and is due to be consulted upon in 2026. The Welsh National Marine Plan was adopted in 2019, and the Marine Plan for Northern Ireland was consulted on in 2018 but is yet to be adopted.

The marine licensing regime for a number of activities (generally exempting oil & gas, and gas storage) underwent changes resulting from the *Marine and Coastal Access Act 2009*. In considering the need for coordination with regard to marine spatial planning, the responsibilities of the devolved administrations also need to be accounted for. The territorial and offshore waters of Scotland, territorial waters of Wales and Northern Ireland are variously the remit of Scottish, Welsh and Northern Irish Ministers respectively. NRW and MMO are the responsible authorities for issuing marine licences for a range of activities in Welsh and English waters respectively. Section 36 consent for marine renewable arrays of <100MW passed from the Secretary of State to MMO under the Act, and those for electricity generating stations at or below 350MW in Wales and Welsh Zone, passed to Welsh Ministers under the *Wales Act 2017*. The Planning Inspectorate (PINS) is the examining authority with regards to NSIPs, now defined as renewable arrays of >100MW in English waters, and >350MW in Welsh waters, and provides advice to the Secretary of State to inform his decision on Development Consent Orders. Advice is still provided by PINS for developments in Wales of less than 350MW, however, this advice is provided to Welsh Ministers rather than the Secretary of State. Following the granting of a Development Consent Order, the MMO/NRW is then responsible for enforcement[80], post-consent monitoring, and varying, suspending or revoking any marine licence[81], though the Secretary of State/Welsh Ministers ultimately retain responsibility for the review of consents, for example, under the *Conservation of Habitats and Species Regulations 2017* and the *Conservation of Offshore Marine Habitats and Species Regulations 2017*.

In addition to the regulatory regime which provides the framework for consenting, planning policy is variously covered by the MPS, NPSs for energy, regional marine plans, and a range of terrestrial policy including the NPPF and Planning Policy Wales. In Scotland, the Marine Directorate is the relevant authority with marine planning and policy responsibilities, and in Northern Ireland, the NIEA is the licensing and enforcement authority (as part of the Department of Agriculture, Environment and Rural Affairs) for devolved matters.

A significant fraction of renewable energy generation in the next 10 years will come from offshore wind, and potentially other marine renewables, as they are increasingly deployed and become more technically and economically feasible. These will help deliver part of the Government targets to reduce carbon dioxide equivalent emissions, as recognised in the *Clean Power 2030 Action Plan* (see Section 3.3.1).

[80] Note that enforcement functions under Part 4 of the *Marine and Coastal Access Act* were not delegated to NRW and remain with Welsh Ministers

[81] https://www.gov.uk/government/collections/marine-licensing-nationally-significant-infrastructure-projects

Within the UK, sources of carbon dioxide are clustered around a relatively few centres of significant industrial activity which are the source of ~50% of the UK's industrial emissions; Thames Estuary, Humberside, Merseyside, the Firth of Forth and Teesside and Tyneside, and it is recognised that CCUS is likely to be needed to decarbonise heavy industry in these areas. The Government recognises the role that CCUS has in achieving its targets in relation to GHG emissions reductions and reducing the carbon intensity of the energy and industrial sectors. The first two clusters, called Track-1, were selected in 2021 (HyNet North-West Cluster, East Coast Cluster), and storage permits granted in December 2024 and April 2025. In addition to the East Coast Cluster and HyNet North-West Cluster, the UK has a number of further CCUS proposals at a mature stage of development.

While reliance on fossil fuel sources will continue during the decarbonisation of energy supply industry (including through CCUS), the UK is now a net importer of both oil and gas. Since 2000, UK domestic gas supply has declined with net imports commencing in 2004, and similarly, UK oil production has been in decline since a peak in 1999, with net imports of oil commencing in 2005. In 2024, total net import dependency for energy was 43.8%. Reductions in production and exploration of the UKCS sector led to the Wood Review in 2013, which set out a number of recommendations including the creation of the OGA. The OGA has responsibilities for gas storage, carbon dioxide storage and hydrogen storage licensing and future granting of Transitional Energy Certificates for oil and gas production, with environmental and decommissioning regulatory functions retained by OPRED.

The *Petroleum Act 1998* placed an obligation on the OGA to produce a Strategy for enabling the principal objective of "maximising the economic recovery of UK Petroleum". This resulted in the Maximising Economic Recovery (MER) UK Strategy[82] (2016). The strategy was revised in 2020 (The OGA Strategy[83]) to account for the UK's net zero commitment, and the OGA Plan on emissions reduction was also published in March 2024. The latter plan includes a number of measures which seek to decarbonise the upstream activities of oil and gas activities, including that relevant persons 'Produce an Emissions Reduction Action Plan ('ERAP') for each of their assets. The Government published its response to the consultation *Building the North Sea's Energy Future* in the *North Sea Future Plan* in November 2025 and considered that the OGA needs revised objectives to take a broader view across the transition beyond just oil and gas. It was indicated that the OGA's objectives would broadly cover:

- Objective 1 (Economic) – To maximise societal economic value of a relevant activity.
- Objective 2 (Net Zero) – To assist the SoS in meeting the duty under section 1 and section 4(1)(b) of the *Climate Change Act 2008* including supporting decarbonisation of relevant upstream activities.
- Objective 3 (Transition) – To enhance the long-term benefits of the transition to clean energy technologies in the UKCS by considering workers, communities and supply chains.

These objectives will also apply to other areas within the OGA's offshore regulatory remit.
A linked factor in enhancing security of supply is the need for gas storage capacity since, until recently, seasonal fluctuations in UK gas demand were met by varying production rates from UK fields. Gas storage in the UK is comparatively smaller when compared to Europe, as supply has to date been dominated by domestic supply and an abundance of import infrastructure. There are a small number of gas storage facilities in the UK, all of which are located onshore other than the Rough facility off the Holderness coast. The latest UK risk

[82] https://assets.publishing.service.gov.uk/media/5a7f2175ed915d74e622892d/MER_UK_Strategy_FINAL.pdf
[83] https://www.nstauthority.co.uk/media/7105/the-oga-strategy.pdf

assessment of security of gas supply (2024) indicates the general trend is one of declining domestic production (as noted above), but that the UK has a diverse set of import routes and the second largest LNG import infrastructure capacity in Europe. Additionally, a natural gas storage licence covering the former Bains field in the eastern Irish Sea was awarded in April 2023, and a separate gas storage licence was awarded immediately adjacent to Bains in August 2025.

Following the accident involving the Deepwater Horizon semi-submersible in the Gulf of Mexico and subsequent problems in both stemming the flow of oil from the open well and adverse environmental and socio-economic impacts, the UK Government took various actions to ensure that the UK oil and gas sector operates appropriately. These included provisions made in the *Offshore Installations (Offshore Safety Directive) (Safety Case etc.) Regulations 2015*, and the *Offshore Petroleum Licensing (Offshore Safety Directive) Regulations 2015* and amendments to other Regulations, including in relation to environmental liability, implementing the EU Offshore Safety Directive which was itself a response to the Deepwater Horizon accident.

The National Policy Statement for Ports was published in 2012, which outlines the framework for decision making in relation to nationally significant port developments in England and Wales, and recognises the strategic role of UK ports in the movement of goods, and a revised policy was consulted on in 2025[84]. Shipping and port activity has expanded considerably in recent years and will remain the principal means by which the UK exchanges goods. Ships, though emitting less carbon dioxide per tonne of goods transported than other methods of bulk transport, represent a significant source of anthropogenic gaseous and particulate emissions. Regulation of these emissions stems from IMO initiatives (for example, in regulations made under MARPOL to limit SOx emissions, and the IMO strategy on the reduction of GHG emissions from ships – see Sections 4.5 and 4.6). The UK's Maritime Decarbonisation Strategy[85] has a goal of zero fuel lifecycle emissions by 2050, with at least a 30% reduction by 2030, and an 80% reduction by 2040, relative to 2008 levels. GHG emissions from the UK's share of international aviation and shipping have been included in the UK's carbon budget, since the setting of the sixth carbon budget, covering 2033-2037.

UK fisheries have reduced in recent years in part due to declining fish stocks and resulting management techniques including catch and effort management. The *Marine and Coastal Access Act 2009* aims to strengthen fisheries and environmental management protection. Inshore fisheries management is now handled by Inshore Fisheries and Conservation Authorities (IFCAs), which replaced Sea Fisheries Committees. IFCAs are responsible for activities out to 6nm from the coast and in estuaries where they will be responsible for sea fisheries management. In Scotland, the Marine Directorate has a number of roles including marine research, marine policy and regulatory functions. The *Fisheries Act 2020* provides a framework to manage fisheries, enabling UK fisheries policy authorities (Defra, and the devolved administrations in Northern Ireland, Scotland and Wales) to publish fisheries management plans (FMPs) to help deliver sustainable fisheries. The policies to achieve the objectives of the *Fisheries Act 2020* are set out in a Joint Fisheries Statement, which includes a list of the planned UK FMPs[86].

[84] https://www.gov.uk/government/consultations/proposed-amendments-to-the-existing-national-policy-statement-for-ports/draft-national-policy-statement-for-ports-consultation
[85] Maritime decarbonisation strategy - GOV.UK
[86] https://www.gov.uk/government/publications/fisheries-management-plans

4.9 Cultural heritage

Cultural Heritage

International

UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (1972)
UNESCO Renewable Energy Transition and World Heritage (due 2021)
Convention on the Protection of Underwater Cultural Heritage (2001)
United Nations Convention on the Law of the Sea (UNCLOS)
World Heritage Convention 1972
Tentative list of possible future world heritage nominations - United Kingdom of Great Britain and Northern Ireland

Regional

Council of Europe, European Convention on the Protection of the Archaeological Heritage 1992, the 'Valetta Convention'
Council of Europe, European Landscape Convention 2000

UK

Protection of Military Remains Act 1986, and related orders covering the designation of vessels and controlled sites
Ancient Monuments and Archaeological Areas Act 1979
National Heritage Act 2002
Marine and Coastal Access Act 2009
Marine Policy Statement (2011)

Local

Protection of Wrecks Act 1973 - England, Wales and Northern Ireland
National Heritage Act 1983 - England
Treasure Act 1996 - England and Wales
Planning (Listed Buildings and Conservation Areas) Act 1990 - England
Ancient Monuments and Archaeological Areas Act 1979 - England
Inshore and Offshore Marine Plans - England
National Planning Policy Framework (2024)
Historic England Advice Note 8 - Sustainability Appraisal and Strategic Environmental Assessment (2016)
Marine Aggregate Levy Sustainability Fund (MALSF) Regional Environmental Characterisations including : South Coast, Thames, East Coast and the Humber areas.
Historic England Climate Adaptation Report (2024)
Historic England Corporate Plan 2023-26 (2023, updated 2024)
National Historic Seascape Characterisation Consolidation (2018)
Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets, 2nd Edition (2017)
Commercial Renewable Energy Development and the Historic Environment (2021)

Historic Environment (Wales) Act 2016
Historic Environment (Wales) Act 2023
Conservation Principles for the sustainable management of the historic environment in Wales (2011)
Historic Environment Strategy for Wales (2013)
Planning Policy Wales Edition 11 (2020)
Welsh National Marine Plan (2019)

Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997
Marine (Scotland) Act 2010
The Historic Environment Scotland Act 2014
Scottish Planning Policy (2014) and the National Planning Framework for Scotland 4 (2023)
Scotland's National Marine Plan (2015), 2021 review, and preparation of the National Marine Plan 2
Historic Environment Policy for Scotland (2019)
Heritage for all: corporate plan 2025-2028 - Historic Environment Scotland (2025)

Local

The Planning Act 2011 - Northern Ireland
The Planning (Northern Ireland) Order 1991
The Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995
Marine Act (Northern Ireland) 2013
Planning Policy Statement 6: Planning, Archaeology and The Built Heritage (Northern Ireland) (1999) and 2005 addendum (note that this will cease to apply as Local Development Plans are adopted)
Guidance on Setting and the Historic Environment (2018) - Northern Ireland
The Marine Plan for Northern Ireland (consultation, 2018)
Strategic Planning Policy Statement 2015 - Northern Ireland

4.9.1 Key objectives and targets

The United Nations Convention on the Law of the Sea (UNCLOS) and the Convention on the Protection of Underwater Cultural Heritage (CPUCH), provide for the protection to underwater heritage at an international level. 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 CPUCH covers 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. A central tenet of the Convention is that underwater heritage is preserved *in situ*. While the UK has not ratified CPUCH, the principles of the Convention have been adopted by the UK.

At present, the principal form of marine heritage protection in the UK is for that of shipwrecks, provided by the *Protection of Wrecks Act 1973*, the *Protection of Military Remains Act 1986* and the *Marine (Scotland) Act 2010*. 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 *Marine and Coastal Access Act 2009* has a number of provisions in relation to the historic environment, including consideration of historic or archaeological sites within the grounds for designating MCZs. The *Marine (Scotland) Act 2010* has provisions for Scottish Ministers to designate Historic Marine Protected Areas in Scottish territorial waters (i.e. out to 12nm). These provisions have been used to designate all wrecks in Scottish waters formerly designated under the *Protection of Wrecks Act 1973*, which is no longer applicable to Scotland. Military wrecks remain within the remit of the *Protection of Military Remains Act 1986* for all UK waters.

Scottish territorial seas are not within the remit of this SEA other than for reserved matters (gas storage and oil and gas), so any interaction with Historic Marine Protected Areas would be exclusively for these aspects of the draft plan/programme. For the purposes of the *Marine (Scotland) Act 2010* historic assets may include:

- a vessel, vehicle or aircraft (or a part of a vessel, vehicle or aircraft), or it's remains
- an object contained in, or formerly contained in, a vessel, vehicle or aircraft
- a building or other structure (or a part of a building or structure)
- a cave or excavation

- a deposit or artefact (whether or not formerly part of a cargo of a ship) or any other thing which evidences, or groups of things which evidence, previous human activity

Under the reform of heritage protection, the Scottish Government released a policy document in 2008 which consolidated the Scottish Heritage Protection Policy series of reports, followed by the Scottish Historic Environment Policy (SHEP) in 2011. The Historic Environment Policy for Scotland (HEPS) was published in 2019 which sets out a number of policies and principles on how Scotland's historic environment should be managed. This includes policies on managing change as the result of decisions that affect the historic environment, or the planning and implementation of plans, programmes, policies and strategies, including that they should approach the historic environment in a way that protects and promotes it.

5 Environmental Baseline

5.1 Introduction

The provision of environmental information in the Environmental Report is required under Regulation 12(3), Schedule 2 of the SEA Regulations.

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.

5.2 Overview of the Environmental Baseline

The environmental baseline for OESEA5 will build upon that produced for previous OESEAs (DECC 2016, BEIS 2022), being updated with the latest relevant peer-reviewed and grey literature, including any reports and data related to research programmes of particular relevance., A continuous research programme is maintained as part of the OESEA[87], and outputs from commissioned work will inform the environmental baseline, and the consideration of sources of potential effects. Outputs from other research programmes, for example the Scottish Marine Energy Research Programme (ScotMER), and the Offshore Wind Evidence and Change Programme will be used to update the environmental baseline.

The environmental baseline will be provided in full as an Appendix to the Environmental Report to reflect the latest available primary and grey literature, and other inputs including from

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

consultation. The geographic scope (entire UKCS) and level of detail will be the same as for previous OESEAs.

The environmental baseline will consider those topics introduced in Section 5.1 in a UK context, before providing more detailed information on key features specific to UK Regional Sea areas. The following provides a summary of the UK context for each SEA topic area, and the key updates which will be made to each topic chapter.

Consultation Question

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

5.3 UK Context

5.3.1 Biodiversity, habitats, flora and fauna

The UK has a rich marine biodiversity reflecting both the range of habitats from estuaries, through coastal waters to depths of >2400m, and its position where several biogeographical provinces overlap (see for example 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. This section is subdivided into ecological components, with separate descriptions for plankton, benthos, cephalopods, fish & shellfish, turtles, marine birds and marine mammals.

5.3.1.1 Plankton

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. The phytoplankton community is largely dominated by diatoms and dinoflagellates, with others, such as the calcifying coccolithophore *Emiliana huxleyi*, becoming significant components during their seasonal peak in abundance. Phytoplankton blooms typically take place in spring, with a smaller bloom in late summer. Some phytoplankton blooms may be toxic to marine life. The timing, composition and size of these blooms are dependent on a range of environmental factors with important spatial differences across the UKCS. The zooplankton community is dominated by copepods, particularly *Calanus* species which show a strong geographical divide, with *C. finmarchicus* and *C. helgolandicus* dominating northern and southern waters respectively. Jellyfish, krill and salps are also abundant, as are the larvae of fish, and many benthic animals (meroplankton).

5.3.1.2 Benthos

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 and depth ranges. 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) and include both infauna and epifauna. In addition, there are a number of highly localised habitats and communities, including reefs of long lived horse mussels and cold water corals, where high biodiversity is accompanied by high sensitivity to human pressures. Habitat characterisation across the UKCS continues to improve, including through the efforts made in identifying, designating and monitoring MPAs.

5.3.1.3 Cephalopods

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 and 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.

5.3.1.4 Fish and shellfish

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, Atlantic salmon and European eel, with significant recent declines reported for both salmon and eel. A number of sharks and rays are present in UK waters, including the basking shark for which western coasts appear particularly important. 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 although there is some evidence of recovery for some stocks.

5.3.1.5 Turtles

Of the five 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.

5.3.1.6 Birds

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 three 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. The seabird community in the UK comprises a number of gull, auk, tern and skua species, while numerous waders, ducks, and geese make up seasonal and year-round assemblages in coastal wetlands. 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.

The latest census of Britain and Ireland's breeding seabirds (Burnell *et al.* 2023) was undertaken between 2015 and 2021. Overall, eleven of 21 species for which trends could be confidently identified have declined by more than 10% since the previous census (little and Arctic tern, shag, puffin, black-headed gull, fulmar, kittiwake, common gull, great black-backed gull, Arctic skua, Leach's storm petrel), with five showing little change (Sandwich and common tern, cormorant, common and black guillemot), and another five increasing by more than 10% (Mediterranean gull, roseate tern, northern gannet, razorbill, great skua).

5.3.1.7 Marine mammals

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). The most abundant cetacean in UK waters is the harbour porpoise. The SCANS-IV survey completed in the summer of 2022 (Gilles *et al.* 2023), provided abundance estimates for a wide range of species, including: harbour porpoise, bottlenose dolphin, Risso's dolphin, white-beaked dolphin, white-sided dolphin, common dolphin, striped dolphin, pilot whale, all beaked whale species combined, sperm whale, minke whale and fin whale. 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.

5.3.2 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). There are over 100 estuaries in England and Wales of relevance to the draft plan, which can be divided into a number of broad geomorphological types. Potential areas which may be suitable for gas storage and carbon dioxide storage include hydrocarbon reservoirs, halite deposits and saline aquifers.

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 at close proximity to oil and gas infrastructure, with concentrations decreasing with increasing distance from the source.

5.3.3 Landscape/seascape

Seascape is defined by the ELC as “an area perceived by people, whose character is the result of the action and interaction of natural and/or human factors”, and can be separated into areas of sea, land and intervening coastline, and more recently in the MPS as, “landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other.” The study of seascape is not only concerned with the physical character of a given view but the interaction of that view with individuals and how changes can affect 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. AONB, Heritage Coast, National Scenic Area), however the ELC, MPS, and seascape assessments covering the English Marine Plan regions, define landscape and how they are to be considered in more general terms, acknowledging the value of all landscapes whether or not they are subject to designation.

5.3.4 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. The OESEA5 baseline will describe key information sources and monitoring programmes, as well as the characteristics of the UK water environment with respect to water masses and circulation, stratification and frontal zones, coastal tidal flows, temperature, salinity and wave climate.

5.3.5 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 a number of Air Quality Management Areas (AQMAs) have been declared to deal with problem areas, primarily related to road transport. Industrialisation of the coast and certain inshore areas has led to increased levels of pollutants in these locations which decrease further offshore, though oil and gas platforms provide numerous fixed point sources of atmospheric emissions. Shipping emissions represent a significant source of pollutants with emission control areas in operation (sulphur oxide) or approved (nitrogen oxide) in the North Sea.

5.3.6 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. Evidence for human influenced climate change is now unequivocal (IPCC 2018). Over the last century anthropogenic sources of GHGs have amplified the natural greenhouse effect and are estimated to have caused approximately 1.09°C of global surface warming above pre-industrial levels (likely range of 0.95°C to 1.2°C), with there being a greater than 50% likelihood that this will reach 1.5°C in the near term (IPCC 2021)[88]. Based on the five year average up to 2024, human activities are estimated to have caused between approximately 1.3-1.4°C of global warming above pre-industrial levels (1850-1900 reference period), with temperatures increasing faster over land than the sea, and in Europe than the global average[89]. Related changes include increase in sea-level, possibly more changeable and extreme weather, and alteration to metocean conditions[90]. The implications of climate change will be considered for the other topics covered by the OESEA5 baseline.

5.3.7 Population and human health

The total mid-2024 UK population is estimated to have been 68.2 million people[91]. Population density was highest in England at 450 persons per km^2, comparably lower in Wales and Northern Ireland at 154 and 139 persons per km^2 respectively, and the lowest by a considerable margin in Scotland at 70 persons per km^2. 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

[88] This likelihood is relevant to all five scenarios assessed by the IPCC Working Group I, with this being the case even for the very low emissions scenario (SSP1-1.9). See Section 15.12.3 for an explanation of SSPs. Near term covers 2021-2040.
[89] https://climate.copernicus.eu/climate-indicators/temperature; based on the ERA5 dataset.
[90] https://www.mccip.org.uk/all-uk/uk-impacts/hub
[91] https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates

higher densities are dotted around much of the coast. Higher densities are also observed in several coastal areas of Northern Ireland.

Life expectancy at birth in the UK between 2020 to 2022 was 78.6 years for males and 82.6 years for females, a reduction from previous years as a result of the COVID-19 pandemic. England had the highest life expectancy at birth of 78.8 for males and 82.8 for females, Wales and Northern Ireland were similar at 77.9 and 78.4 for males and 81.8 and 82.3 for females, Scotland has the lowest life expectancy at birth of 76.5 for males and 80.7 for females[92].

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

UK waters are subject to multitude of uses – particularly in coastal areas. The range and importance of existing and potential uses of the sea will be fully described in an appendix to the Environmental Report. This will use accurate and recent information on other current and likely uses of the sea in the foreseeable future, using input from marine spatial plans where these have been completed.

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 IMO has established a number of traffic separation schemes and other vessel routeing measures to reduce risks of ship collision and groundings. In addition, IMO measures 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. From 2012, fishing vessels over a certain size (initially >24m, but >15m since 2014) have also been required to have an AIS installed, and all vessels >12m are required to carry a Vessel Monitoring System (VMS) device. Since May 2025, a licence condition came into force such that the smaller (<12m) inshore vessel fleet are now required to use a MMO approved inshore VMS (I-VMS) device.

Fishing in the UK has a long history and is of major economic and cultural importance. In 2022, there were 10,356 working fishermen in the UK (of which 80% were full time), operating 5,541 vessels (MMO 2023). These vessels, while fishing in UK and non-UK waters, landed 719,000 tonnes of sea fish and shellfish in 2023 (440,000 tonnes into UK ports), with a total value of £1.1 billion (£815 million into UK ports) (MMO 2023)[93]. 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

92 https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/bulletins/nationallifetablesunitedkingdom/2020to2022

93 https://www.gov.uk/government/collections/uk-sea-fisheries-annual-statistics

of effort was greatest to the northeast of Scotland (particularly the Fladen Ground), around the Northern Isles and to the southwest of the UK.

Military use of the coasts and seas of the UK is extensive, with all three 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. Tourism and recreational use of UK coasts and coastal waters is of major importance in many areas. 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), surfing and sea angling. Taking indirect effects into account, the total estimated economic impact of sea angling in the UK in 2017 was estimated to be £1.94 billion and supporting c. 16,300 jobs (Hyder *et al*. 2020). 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, AONBs 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 and other marine renewables, surface and subsea oil and gas production, gas storage and export infrastructure, and carbon dioxide storage. Potential future uses/enhanced use of the sea and seabed includes carbon dioxide storage in geological formations, wave, tidal and hydrogen projects, and subsea cables forming connections as part of an offshore grid. Projects in these areas are either in the demonstration phase; construction or in early planning but are expected to be commercially proven or be in planning in the coming years.

5.3.9 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 led to a large number of ship and aircraft wrecks in UK waters.

A number of coastal sites have been designated as cultural World Heritage Sites for example St Kilda, the Cornwall and West Devon Mining Landscape and the Heart of Neolithic Orkney.

5.3.10 Conservation of sites and species

Designated conservation sites are widespread and abundant around the UK coast; a variety of levels of designations exist from statutory international to voluntary local, affording various levels of protection to habitats, species, and geological, cultural and landscape features. Some of the most widespread designations include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) which cover a range of terrestrial and marine habitats and species, and Sites/Areas of Special Scientific Interest (SSSIs/ASSIs), which are largely terrestrial, but which may contain coastal or intertidal components. The *Marine and Coastal Access Act 2009* required the identification and designation of Marine Conservation Zones (Marine Protected Areas in Scotland), and the current network of sites is the result of several designation phases. The first three HPMAs were established in 2023 in English waters. The intention of these sites is to prevent certain damaging activities taking place to allow them to recover to a more natural state. Detailed listing and descriptions of relevant conservation sites, species and nature conservation measures will be provided as an appendix to the Environmental Report.

5.4 Summary of UK Regional Seas

The previous OESEAs used the draft Regional Sea boundaries defined by JNCC (2004) as a means of considering the broad scale biogeographical regions within UK waters. Following a review of these and other boundaries during scoping for OESEA3 (DECC 2016), a modified version of the Charting Progress 2 boundaries were used (Figure 5.1) to distinguish several important areas including: the Atlantic South West Approaches (Regional Sea 5), and the Faroe-Shetland Channel (Regional Sea 9), Rockall Trough and Bank (Regional Sea 10), and Atlantic North West Approaches (Regional Sea 11). It is considered that the basis for these Regional Seas has not altered in the period since the publication of OESEA3.

The text below 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 will be provided by the various sub-appendices to the Environmental Report.

Consultation Question

4. Do you agree with the choice of Regional Seas used to help describe the environmental baseline?

5.4.1 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. Regional Sea 1 supports a high number of coastal and offshore designations encompassing SAC, SPA, MPA and MCZ sites. The Regional Sea also includes one of three pilot HPMAs, North East of Farnes Deep.

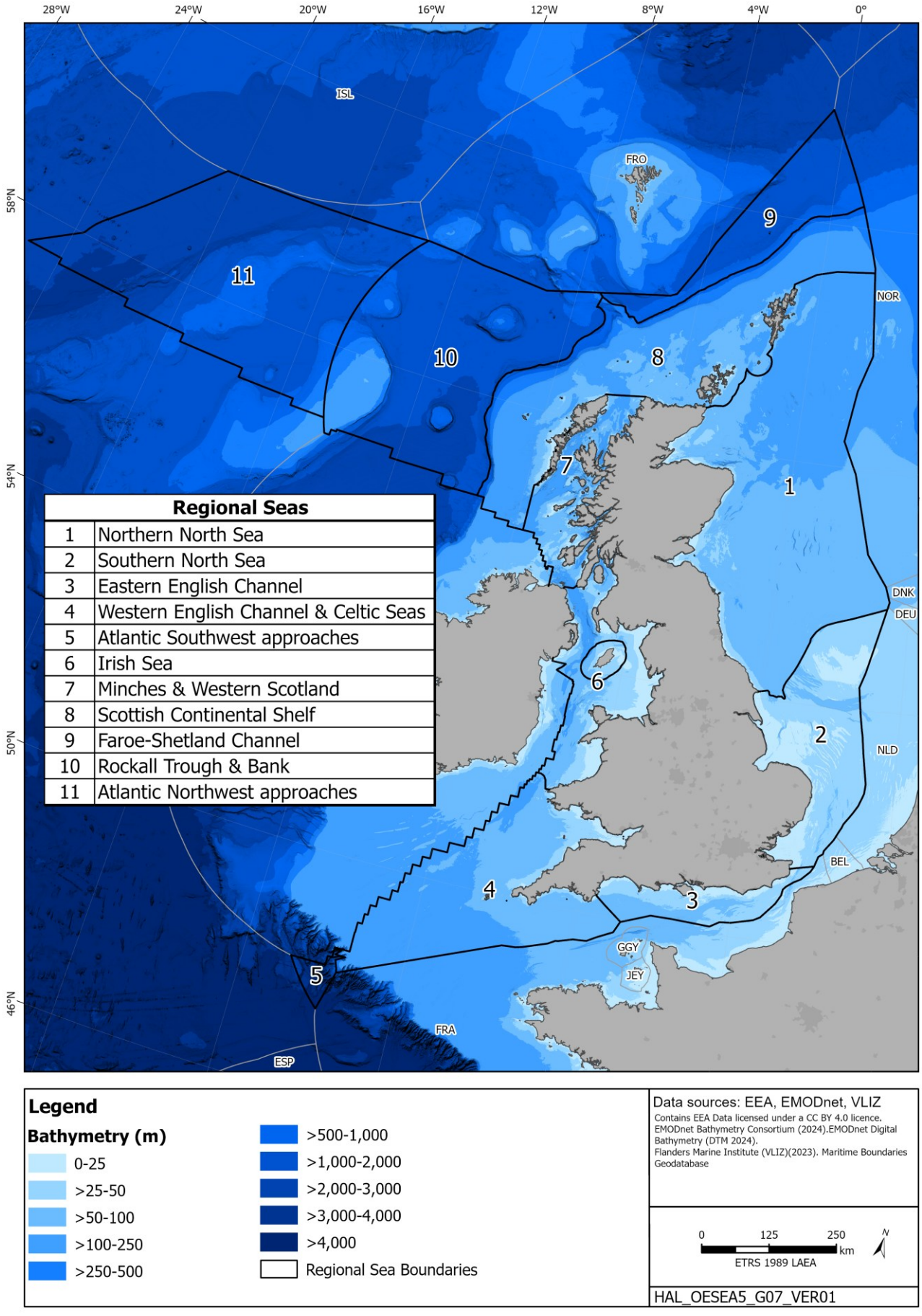
Oil and gas development is extensive, particularly in the east, and current renewables activity is centred on the territorial and offshore waters of the Moray Firth and the Firth of Forth, however agreements for lease now cover a number of areas in offshore waters, primarily off the north and east coast of Scotland, the Orkney Islands and Shetland, with relatively less proposed activity off the west coast. The Meygen tidal power development in the Pentland Firth represents the first commercial scale tidal stream array in the world and there are a number of tidal and wave lease areas granted in the territorial waters around Orkney and Shetland. There are three licences for offshore carbon dioxide storage in Regional Sea 1, all located in the central North Sea.

5.4.2 Regional Sea 2

The southern North Sea extends from the Flamborough front in the north to north of the Dover Straits in the south, with a transition 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 in certain areas, and it exhibits a characteristic plankton composition.

Much of Regional Sea 2 is less than 50m water depth, with many extensive sandbank features present at less than 25m depth; these include protected areas such as the North Norfolk Sandbanks and Saturn Reef SAC, the Inner Dowsing, Race Bank and North Ridge SAC and the Haisborough, Hammond and Winterton SAC. Dogger Bank SAC, while designated as a sandbank, was formed by glacial processes before being submerged through sea level rise during the last marine transgression. Further seabed features have been designated as MCZs. The western flank of the Dogger Bank also supports high densities of seabirds, with notable colonies on the east coast located at Flamborough Head including for kittiwake, gannet, guillemot, razorbill and fulmar. Harbour porpoise are widely distributed throughout much of the area with the Southern North Sea SAC including key winter and summer habitat for the species. Large (but declining) numbers of harbour seals breed on the coast adjacent to the Wash; these animals forage widely in adjacent waters. Similarly, grey seals are present in increasing numbers throughout the area with a notable haulout and breeding site located at Donna Nook on the entrance to the Humber Estuary SAC.

Figure 5.1: Regional Sea subdivisions to be used in OESEA5



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. Many dredging licence and application areas are present in the region, though overall, the area dredged annually is small relative to the area of the Regional Sea, and most is undertaken within long established licence areas.

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, the Dogger Bank and off Holderness and East Anglia. Regional Sea 2 is the most prospective area for carbon dioxide storage due to its underlying geology, and includes 18 licence areas for carbon dioxide storage, one of which, covering the Endurance site, has a storage permit. The Rough gas storage site is located off the Holderness coast, and is the UK's only offshore natural gas store, and its largest, holding ~50% of the UK's gas storage capacity. Interconnectors are increasingly important, both internationally (e.g. Viking Link) and domestically (e.g. Eastern Green Link 2).

5.4.3 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 Start Point and Cherbourg on the north coast of France. Depths are generally shallow and rarely exceed 60m. There are isolated deeps of 80-100m (e.g. the Northern Palaeovalley) and shallower deeps (60-70m) such as St Catherine's Deep to the south of the Isle of Wight. Waters are mixed, with strong tidal current velocities in the central channel which decrease to the west and east. 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 (Lusitanean fauna).

Regional Sea 3 contains a range of coastal SPA sites (e.g. Chesil Beach & The Fleet, Chichester & Langstone Harbours, Pagham Harbour, Solent & Dorset Coast). Additionally, SACs include those with marine components (South Wight Maritime) or entirely offshore sites (Wight-Barfleur Reef SAC), augmented by a large number of MCZs, which includes the Dolphin Head HPMA.

The majority of Regional Sea 3 receives high to very high densities of shipping traffic. 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. A number of dredging licence and application areas are present in the region, but like in other areas, the area dredged relative the licence area and wider Regional Sea is small. Offshore wind farm development is limited to Rampion and its extension, Rampion 2. There is no offshore oil and gas activity in the area.

5.4.4 Regional Sea 4 and 5

The western English Channel and Celtic Sea is a large region west of a line drawn between Start Point 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 Lusitanean species. The region is heavily influenced by Atlantic water, with reduced coastal influences; turbidity is moderate.

The Atlantic south west Approaches is a region bounded to the east by the shelf break and extends westwards into the northeast Atlantic. As only a very small proportion of this region lies within UK waters, it is therefore grouped with the adjacent Regional Sea 4. 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, influences from the Mediterranean current are stronger in this region leading to Lusitanean 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. 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 designated as a SAC. Additional SAC sites containing reef features are located in inshore waters including Start Point to Plymouth Sound and Eddystone SAC, Lizard Point SAC and Land's End and Cape Bank SAC. More recently, MCZs have been designated for features including high to moderate energy circalittoral, infralittoral or intertidal rock, and coarse sediments (Skerries Bank and Surrounds MCZ, Padstow Bay MCZ, East of Haig Fras MCZ). Three sites are located in the south west Approaches which are, The Canyons MCZ (deep sea bed, cold water coral reefs, coral gardens, sea-pen and burrowing megafauna communities) and the South-West Deeps (West, subtidal coarse sediment, subtidal sand, subtidal mixed sediments, Celtic Sea relict sandbanks, subtidal mud and fan mussel), and the South-West Deeps (East, Celtic Sea relict sandbanks, deep-sea bed, subtidal coarse sediment and subtidal sand features).

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. To date offshore energy activity has been limited, with no commercial hydrocarbon discoveries, and three floating offshore wind sites are proposed to be developed as part of TCE's Round 5 of offshore wind leasing. There have been a number of proposals for tidal lagoon developments in the Severn (Swansea Bay, Cardiff and Newport) but none of these have proceeded to development.

5.4.5 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 glacigenic 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 the primary reason for designation of the Cardigan Bay SAC and one of the qualifying features of the Lleyn Peninsula and the Sarnau SAC. Shell Flat and Lune Deep SAC is located in inshore waters near Morecambe Bay, and the territorial waters of Northern Ireland contain The Maidens SAC (reefs, sandbanks and grey seal) and Red Bay SAC (sandbanks). There are a number of designated MCZs located in Liverpool Bay including Fylde (subtidal sand and mud), West of Walney (subtidal sand and mud, sea-pen and burrowing mega-fauna communities), and West of Copeland (subtidal coarse and mixed sediment, and sand), and the Wyre Lune (smelt). The Allonby Bay HPMA is also located in the Regional Sea, within the wider Solway Firth. In offshore waters, the Croker Carbonate Slabs SAC and Pisces Reef Complex SAC are designated for Annex I submarine structures made by leaking gases and reefs respectively.

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, targeting the Irish Sea Mudbelt for high value *Nephrops*. Considerable gas infrastructure is present in the eastern Irish Sea, though like the southern North Sea much is subject to decommissioning planning, and there are limited oil producing fields. Four carbon dioxide storage licences have been issued in the Irish Sea, three of which proposed to use depleted hydrocarbon fields including Hamilton and Lennox. Two gas storage licences also cover parts of the depleted Bains gas field. A high number of offshore wind farms are located in the Liverpool Bay and eastern Irish Sea area, are there are proposals for additional wind farm developments (Morecambe, Mona, Morgan).

5.4.6 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. Fishing effort is very high throughout much of the

area, and is dominated by small, inshore vessels. 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.

A very large number of designated conservation sites are present along the adjacent coast, including numerous habitat, species and landscape designations, as well as the East Mingulay SAC. Additionally, numerous MPAs have been designated, which include the Small Isles and Wester Ross – both have been selected on the basis of supporting a range of habitat and species features, with the former containing the only known aggregation of fan mussels in UK waters, and also marine geodiversity features. Other MPA sites include North-east Lewis (Risso's dolphin, sandeel, marine geomorphology and features related to the Quaternary of Scotland), Shiant East Bank (broadscale sands and mixed sediment, sea fan and sponge communities and shelf bank mounds, and features related to the Quaternary of Scotland), and the large Sea of the Hebrides (basking shark, minke whale, fronts, and marine geological features).

5.4.7 Regional Sea 8

Regional Sea 8 includes the continental shelf to the north and northwest of the UK bounded to the west, south of the Wyville Thomson Ridge by the 1,000m depth contour - reflecting the changes in community composition observed in various studies on shelf slope fauna. To the north of the Wyville Thomson Ridge (also a designated SAC), 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 (>8ºC) North Atlantic waters of the continental shelf current until the Orkney and Shetland Isles. The boundary to the east reflects the division between Lusitanean and Boreal fauna in the channel between the Orkney and Shetland Islands, with Lusitanean fauna occurring in the Orkney Islands but not in the Shetland Islands. The seabed is characterised by sand and coarse sediment of glacigenic 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 there are numerous conservation designations, including dual World Heritage status for both its natural and cultural significance, and SPA designation for the islands and surrounding waters. Large numbers of breeding seabirds also occur on the adjacent coast of the Outer Hebrides, north mainland and Northern Isles. The region includes two sites designated for reef features (Stanton Banks SAC and Solan Bank Reef SAC), and MPA sites including the West Shetland Shelf, North-west Orkney and part of the Faroe-Shetland Sponge Belt.

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.

5.4.8 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 main water masses in the region are oceanic in origin and turbidity is typically low but there are periods with elevated turbidly in near slope areas. 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 SAC, a large area of full salinity stony and bedrock reef. The area also includes part of the Faroe-Shetland Sponge Belt MPA, and the North-East Faroe-Shetland Channel MPA. Amongst other features, both are designated for deep sea sponge aggregations and offshore subtidal sands and contain representative marine geomorphological features.

A number of UKCS Blocks are presently licensed for oil and gas in Regional Sea 9, which has been subject to historical licensing covering most of the area. No fields have been developed to date in Regional Sea 9, however, a number of discovery fields are present.

5.4.9 Regional Sea 10 & 11

Regional Seas 10 and 11 cover the Rockall Trough and Bank and Atlantic North West Approaches. These are deep-sea regions west of the Scottish continental shelf, bound to the east by the 1,000m depth contour and to the west by the western extent of the UKCS. The seabed supports a different faunal community to that observed at depths less than 1,000m, 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 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 the Atlantic North West Approaches due to an influx of south flowing Arctic water.

Compared to UK shelf waters, information on the natural environmental of Regional Seas 10 and 11, particularly the Atlantic North West Approaches, is sparse. Known key features include a diversity and abundance of cetaceans, including several large baleen whale 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 SAC, and the Darwin Mounds SAC. In the far west of Regional Sea 10 lies the North West Rockall Bank 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.

Relatively little oil and gas licensing has taken place in Regional Sea 10, and even less activity. There are presently no licences in the Regional Sea 10 area.

5.5 Relevant Existing Environmental Problems

The SEA Regulations requires consideration of any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of environmental importance, such as areas designated under the Habitats Regulations. The principal problems in UK waters have been reviewed and considered in relation to UK Marine Strategy descriptors of GES[94], and set against relevant targets and monitoring programmes with a view to meeting the requirements of the UK Marine Strategy[95]. The 2019 assessment of GES in UK waters noted that GES was unlikely to be met for some descriptors by 2020 or else there was some uncertainty; the most recent assessment, consulted on in 2025, similarly notes that GES has either not been met or is uncertain for most descriptors[96]. These inputs have been reviewed and are considered here in relation to their implications for this SEA. In addition to these, a number of other potential problems of relevance to the SEA not specifically related to conservation of environmental protection are considered, for instance in relation to material assets and cultural heritage. No judgement of importance should be inferred from the position of problems/issues in the section.

Consultation Question

5. Are there any additional environmental problems you consider to be relevant to the SEA?

5.5.1 Eutrophication

The majority of UK waters do not experience significant eutrophication – the eutrophication problems are restricted to a small number of areas in coastal waters, primarily estuaries and embayments with restricted water circulation. In a limited number of areas on the north east and southern coasts of the UK and on the south-west coasts of England and Wales and in Northern Ireland, inputs of nutrients of anthropogenic origin (notably nitrate and phosphate from agriculture and urban waste water sources) have resulted in nutrient enrichment in some small estuaries and bays.

Existing programmes for assessing the eutrophication status for coastal and marine waters developed under the WFD and the OSPAR Convention have to a large extent already been applied successfully with the UK largely achieving GES in the latest 2024 assessment[97], and

[94] As referred to in https://www.gov.uk/government/publications/marine-strategy-part-one-uk-updated-assessment-and-good-environmental-status
[95] See the Marine Strategy Part 1 and Part 2. An update to the Marine Strategy Part 1: UK Updated assessment and Good Environmental Status, is ongoing, having been consulted on in 2025.
[96] Note that the OEP launched an investigation in January as it believed that the available evidence indicated that the duty to have taken the necessary measures to achieve or maintain GES of marine waters within the marine strategy area by 31st December 2020.not been met.
[97] https://moat.cefas.co.uk/pressures-from-human-activities/eutrophication/

the updated assessment of GES consulted on in 2025 indicated that the majority (95%) of coastal, shelf and offshore waters where found to be at GES[98]. In general, changes in nitrogen and phosphorus inputs, concentrations of contaminants, and chlorophyll concentrations show improvements, however, nutrient loads in 4 out of 39 areas are showing a statistically significant increase in nitrate. Additionally, while oxygen levels are high enough for GES to have been achieved, their status is trending negatively away from this. Where measures have been taken to reduce nutrient inputs, it may take a long time to result in the desired outcome due to time lags between taking measures and change in the large reservoirs of nitrogen that have built up in soils and ground-waters in previous decades.

5.5.1.1 Implications for SEA

The SEA must consider the potential implications of the draft plan/programme on attaining GES of both marine and coastal/estuarine waters. One of the descriptors for determining GES under the Marine Strategy (Descriptor 5) is that human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters. Whilst plan level activities may not directly contribute to or generate eutrophication, any effects which could lead to cumulative effects should be considered.

5.5.2 Hazardous Substances

The UK has largely achieved its aim of GES for contaminants. The updated assessment of achieving GES with respect to descriptor 8 (Defra 2019, 2025) indicates that concentrations of hazardous substances in the Celtic Seas and the Greater North Sea and their biological effects are generally meeting agreed target thresholds which means they are at levels that should not cause harm to sea life (89% for contaminant concentrations and 96% for biological effects). Contaminant concentrations for four metals (lead, mercury, copper, zinc) and two persistent pollutants (CB118 and BDE209) are above thresholds in sediments and/or biota in at least one region, such that, overall, GES has not been met for contaminants.

Heavy metals (mercury, cadmium, and lead), polycyclic aromatic hydrocarbons (PAHs), organotins and synthetic substances such as polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) are routinely measured for OSPAR. Measurements focus on marine sediments and on organisms in which these contaminants tend to accumulate or through which they biomagnify up the food chain. Contaminant concentrations have continued to decrease in the majority of areas assessed within the OSPAR area, though the rate of decrease has slowed in recent years. Although concentrations are generally below levels likely to harm marine species, they have mostly not yet reduced to background levels, and it is noted that there in an overall increasing trend for pollution in the Southern North Sea, and no significant improvements have been seen in the Northern North Sea or the English Channel[99].

The volume of oil accidentally spilled varies widely from year to year and is generally small and of relatively minor ecological and economic significance unless there is a major spill. The UK Marine Strategy assessment considers spills of >1 tonne and thus the cumulative effect of higher frequency smaller spills and permitted oil discharges from offshore activities such as shipping and oil & gas exploration and production may not be adequately reflected. In relation

[98] https://consult.defra.gov.uk/uk-marine-strategy-1/uk-marine-strategy-part-one-update-2025/consult_view/
[99] https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/thematic-assessments/hazardous-substances/

to the offshore oil & gas industry, all accidental spills regardless of size are required to be reported to OPRED (using Petroleum Operations Notice 1[100]) who undertake inspections and implement enforcement actions as necessary. Routine discharges are subject to various national and international standards, compliance against which is monitored e.g. through the sampling, analysis and reporting of oil concentrations in produced water, and through regional aerial surveillance of installations. For routine discharges, OPRED undertake inspections and enforcement actions as necessary.

5.5.2.1 Implications for SEA

The SEA must consider 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 activities, and transportation and storage of carbon dioxide, and those from offshore renewables activities).

Descriptor 8 of the UK Marine Strategy is of particular relevance, including that, "Concentrations of substances identified within relevant legislation and international obligations are below the concentrations at which adverse effects are likely to occur" and that "Occurrence and extent of significant acute pollution effects (e.g. slicks resulting from spills of oil and oil products or spills of chemical) and their impact on biota affected by this pollution should be minimised through appropriate risk based approaches."

5.5.3 Marine Litter

The issue of plastics in the marine environment (which represent ~70% of all marine litter) has attracted increasing scientific, media and societal attention in recent years. The potential negative consequences to marine fauna of entanglement and ingestion of macro-plastic (i.e. >5mm in size) continue to be reported, while there is a growing body of evidence on the global prevalence of microplastic pollution. Due to their persistence and increasing global annual production, levels of plastic in the marine environment are presumed to be rising and likely to do so for years to come, albeit with trends varying geographically and by type of plastic. In particular, the quantity of microplastic is likely to increase, as existing marine litter is eroded into increasingly small fragments and accumulations in river systems are flushed into the sea. The biological consequences of microplastic ingestion and their entry into the human food chain are largely unknown and are the subject of increasing research. In relation to the UK Marine Strategy in its related descriptor for marine litter, overall GES has not been achieved, though there have been some decreasing trends in beach litter and plastic in fulmar (though this remains above the OSPAR threshold), with indicators met for beach and floating litter. Conversely, seafloor litter has shown an increase in the greater North Sea.

5.5.3.1 Implications for SEA

The SEA must consider how marine litter is controlled (e.g. in relation to MARPOL Annex V, OSPAR Regional Action Plan for marine litter) for the potential activities arising from the draft plan/programme, its implications, and any other potential waste sources and how they are handled (including waste to shore).

[100] https://www.gov.uk/guidance/oil-and-gas-environmental-alerts-and-incident-reporting

5.5.4 Impact of Climate Change

The pace of warming of the sea over the past 40 years has been highest in the southern North Sea and least across the north-west, with a warming trend of ~0.3°C per decade. Compared to 1982-1998, the annual number of marine heatwaves has increased by an average of four events per year in the period 2000-2016 (Comes *et al.* 2023), with significant heatwaves occurring in recent years, including in 2025.

Plankton and fish communities are already changing in response to warming. Fish like sea bass and red mullet are becoming more common further north, while stocks of cold-adapted species in the North Sea such as cod, haddock and whiting have declined. Additionally, there is a northwards movement of non-native species.

Sea level is rising, increasing the risk to coastal erosion, and from flooding and loss of intertidal habitat due to 'coastal squeeze'. This is a particular concern in the southern North Sea, eastern Channel and Bristol Channel regions due to continued adjustment of the land following the end of the last glaciation, which is resulting in gradual sinking, and the coasts of south-eastern England are low lying. The coasts of the south and east are also generally formed of soft sediments compared to those in the north and west, and these softer sediments are more susceptible to erosion and retreat. The southern North Sea and Channel coasts have the highest proportion of coastal defence and flood protection schemes in the UK and further development in response to rising sea level will add to the existing pressure on intertidal sediment habitats. In some areas, shoreline management plans and other coastal policies are directing towards managed realignment or retreat where further defences may not be economically feasible or else would themselves be environmentally detrimental. A connected issue relates to the challenges involved in identifying and creating areas of potential compensatory habitat (e.g. in relation to flood defence measures and effects on SAC or SPA sites) as mitigation against loss of intertidal areas. The potential rate of future sea-level rise continues to be updated as models improve and confidence in what might happen improves.

In addition to the direct effects of temperature changes, other effects include those from ocean acidification (Findlay *et al.* 2025). Approximately 25% of all anthropogenically emitted carbon dioxide has been absorbed by the oceans, with acidification expected to continue to take place. Subject to emissions scenarios considered, bottom water pH is expected to decrease at a rate of between -0.002 yr^{-1} and -0.003 yr^{-1} to 2050, with a high degree of spatial variation. Aragonite undersaturation events are projected to begin by 2030, though will be spatially restricted. Ecological consequences of reduced pH include changes to the carbonate system which could affect a range of calcifying organisms such as echinoderms, molluscs and corals.

5.5.4.1 Implications for SEA

The SEA must consider how aspects of the draft plan/programme will result in GHG emissions or contribute to their reduction, and the implications of emissions from the activities that could follow from the adoption of the draft plan/programme will be considered in relation to wider UK energy policy and legally binding GHG reduction targets.

The SEA should also consider relevant UK policy (e.g. MPS and National Planning Policy) and that of devolved administrations with regards to the design and siting of developments, particularly at or near the coast, in terms of resilience to climate change effects including sea-level rise.

5.5.5 Pressures on Fish Stocks

The latest assessment of progress towards achieving GES, consulted on in 2025, (Defra 2025, Marine online assessment tool[101]) reported that despite the improving status of some individual populations of sensitive fish[102], when considering all indicators, overall, fish had not achieved GES across UK seas.

Populations of sensitive fish (excluding commercial stocks) were assessed[103] for the Greater North Sea and Celtic Seas. Most assessed populations were no longer declining (stable or increasing): 79% in the Greater North Sea (26 of 33 species), 73% in the Celtic Seas (19 of 26 species). Many assessed populations were found to be recovering in the long-term: 42% in the Greater North Sea (14 species), 46% in the Celtic Seas (12 species). However, several populations remained at their lowest observed levels, indicating depleted populations that were not recovering (27% in Celtic Seas and 21% Greater North Sea). Long-term declines were evident in the proportion of large demersal fish in both regions and there was evidence of a shift in species composition within the community, toward species that do not grow large, in the central and southern North Sea.

The GES status for commercially exploited fish and shellfish stocks integrates the outcome of two indicators, fishing pressure and reproductive capacity to provide an estimate of the percentage of stocks within safe biological limits, i.e. that are fished at or below levels associated with maximum sustainable yield and have a biomass capable of producing maximum sustainable yield (Defra 2025). The most recent assessment for the period 2016-2021) showed that 42% of marine quota fish stocks and 11% of non-quota shellfish stocks have achieved GES, an increase of 9% for marine quota and 6% for non-quota shellfish since the previous assessment period (2010-2015).

Defra (2025) indicates that the extraction of biomass through fishing activities remains the dominant pressure on fish populations in the North-East Atlantic and most significant factor affecting the abundance of fish species in UK waters. Beyond fishing activity, fish and shellfish populations are subject to a wide range of other marine pressures from licensed marine activities such as offshore wind and aggregate dredging, as well as the effects of climate change. These pressures can result in environmental changes to the marine ecosystem, habitats and hydrographical conditions, which can impact fish stocks.

5.5.5.1 Implications for SEA

Activities resulting from implementation of the draft plan/programme may have the potential to improve local fish stocks through the designation of safety zones around structures, and fish attraction to structures, though the corollary to this is fisheries displacement. The SEA should also consider any potential source of effect on fish and shellfish from activities, in the context of the current understanding of fish stocks and pressures on these from other activities, and those targets and indicators set under the UK Marine Strategy descriptor on populations of commercially exploited fish.

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[101] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/fish/

[102] Fish deemed sensitive to additional mortality from fishing as a result of life history traits such as large ultimate body size, slow growth rate, large length and late-age-at-maturity. https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/indicator-assessments/recovery-sensitive-fish-species/

[103] The assessments were based on the OSPAR QSR 2023 which assessed the population status of marine fish, across coastal, demersal, pelagic and deep-sea groups.

5.5.6 Declines in Bird Numbers

The 2025 assessment of GES in UK waters, consulted on in 2025, notes that marine birds in both the Greater North Sea and Celtic Seas regions have not met GES. Along the eastern coast of the UK, some seabirds have continued to decline in numbers, and experience poor or failed breeding, possibly due to the combined effects of climate change and fishing on key prey species (e.g. sandeels). Fish discards from trawling may have contributed to elevated population sizes in some species in the past. The implementation of the discard ban, phased in from 2015-2019 across the majority of EU fisheries, is expected to impact those seabird species that exploit this resource, e.g. herring gull, lesser black-backed gull, great black-backed gull, great skua, northern gannet, northern fulmar and black-legged kittiwake (JNCC 2020). The latest census of Britain and Ireland's breeding seabirds (Burnell *et al.* 2023) was undertaken between 2015 and 2021. Overall, eleven of 21 species for which trends could be confidently identified have declined by more than 10% since the previous census (little and Arctic tern, shag, puffin, black-headed gull, fulmar, kittiwake, common gull, great black-backed gull, Arctic skua, Leach's storm petrel), with five showing little change (Sandwich and common tern, cormorant, common and black guillemot), and another five increasing by more than 10% (Mediterranean gull, roseate tern, northern gannet, razorbill, great skua).

Declines in seabird breeding numbers have also been observed to the west of Scotland associated with predation by introduced mammals and food supply shortages, the latter of which may be due in part to climate change; introduced predator eradication programmes on some islands is reducing the predation pressure on some seabirds.

While insufficient data makes it difficult to produce population trends for some species from Northern Ireland, a pattern of decline for some species e.g. northern fulmar, is evident, with (severe) weather, predation and food shortages cited as reasons for poor breeding or breeding failures. However, relative to overall UK trends, populations of some species, notably black-legged kittiwake, are stable (Booth *et al.* 2024).

Populations of some waterbird species continue to decline, with numbers reduced at principal sites (those supporting more than 75,000 birds) on both the east and west coasts of the UK. Climate change is thought to be one of the biggest drivers of broad scale changes in wintering numbers and distributions; milder weather around the Baltic is likely shortening time many species spend in the UK, low numbers and poorer breeding success could be the result of adverse weather at breeding locations in Russia, while climate change is also thought to be leading to short-stopping in migration journeys of some species (e.g. European white fronted goose and goldeneye) and influencing colonisation by egrets. At a site-specific level, pressures such as coastal human disturbance and development at estuaries can affect numbers (Frost *et al.* 2020).

It has still to be determined what population level impact the highly pathogenic avian influenza (subtype H5N1) outbreak has had on seabirds in the UK and further afield, particularly amongst those species most severely affected; in 2022 species most affected by the virus were great skua (Camphuysen *et al.* 2022) and northern gannet (Lane *et al.* 2023). In 2023, the virus appears to have affected kittiwake, guillemot, tern (e.g. Sandwich) and gull species in Scotland, although the full extent of the impact is still unclear. Similarly, some species of wintering birds have been particularly affected (e.g. Greenland and Svalbard barnacle geese, mute swan), again population level impacts are unclear.

The 10 year population trend (Austin *et al.* 2023) for gadwall, teal and goosander has changed from positive (increase) to negative (decrease). Conversely a negative to positive change was

recorded for little grebe, pintail, golden plover, sanderling and knot (the 25 year trend for knot also changed from negative to positive). Bewick's swan saw another record low index value in 2021/22 (10 year trend of -90%, compared to -88% in 2020/21), while the 10 year indices for pochard, mallard and smew also reached record lows. Bar-tailed godwit, curlew, purple sandpiper, oystercatcher, grey plover, and ringed plover all had declines of 10% or more over the decade, while egrets continued to do well (Austin *et al.* 2023 – see also Massimino *et al.* 2023).

5.5.6.1 Implications for SEA

Given that many seabird and waterbird species may be in decline, the SEA should review potential areas which could be licensed/leased for offshore wind, marine renewables, gas, hydrogen or carbon dioxide transport and storage activities, and/or granted Transitional Energy Certificates for oil and gas production and ensure awareness so that potential activities do not exacerbate the risk of surface pollution or significant disturbance to bird populations. Potential activities which may impact on coastal and marine SPAs will be subject to Appropriate Assessment by the relevant Competent Authority. The SEA should consider any potential effect of plan activities in the context of targets relating to bird abundance and productivity under GES descriptors 1 and 4.

5.5.7 Damage/disturbance to Seabed Habitats

Benthic habitats in the UK are impacted by a range of activities that operate and/or interact with seabed habitats, including fish and shellfish harvesting, shipping, extraction of minerals, tourism and leisure, renewable energy, submarine cables, oil and gas, agriculture and aquaculture (Defra 2025). The latest UK Marine Strategy assessment[104] (Defra 2025), indicated that whilst there had been some improvements for benthic habitats since the 2019 assessment, the overarching situation was one of continued deterioration, with GES not achieved. The assessment of benthic habitats was undertaken using a variety of biodiversity indicators and assessment methods applied at different scales. However, it was noted that the number of areas in which some indicators could be assessed in 2024 had decreased compared to 2019 due to a general reduction in monitoring (Defra 2025).

One of the key indicators informing the assessment was the extent of physical disturbance to benthic habitats from fisheries with mobile bottom-contacting gears. Utilising outputs from the QSR 2023 assessment of the OSPAR indicator (BH3a)[105], a dual value threshold was used to account for varying sensitivities of biotopes within broad habitat definitions: no greater than 15% of habitat area in High disturbance alone, and no greater than 25% of habitat area in High and Moderate disturbance collectively. A more restrictive 5% threshold was applied to the proportion of OSPAR Threatened and/or Declining habitat area in High and Moderate disturbance collectively.

The assessment found the percentage of broad scale habitats to achieve the dual threshold varied from 13% in the English Channel to 40 to 47%, in the central and southern North Sea, respectively, with the majority of broad scale habitats not achieving GES. In the Celtic Sea region, the percentage of broad scale habitats to achieve the dual threshold was approximately 70% in both the southern and northern Celtic Sea assessment units, with the majority of broad

[104] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/benthic-habitats/
[105] Extent of Physical Disturbance to Benthic Habitats: Fisheries with mobile bottom-contacting gears - https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/indicator-assessments/phys-dist-habs-fisheries/

scale habitats achieving GES. Across all assessment units, particularly large proportions (over 50%) of habitat area subject to High and Moderate disturbance collectively were observed in habitats such as Offshore Circalittoral sand and Offshore circalittoral mud.

In the southern North Sea, half of the threatened and/or declining habitats present achieved GES, with the majority of these habitats in the central North Sea and the Channel achieving GES (57% and 60%, respectively). In the northern Celtic Sea, half of the threatened and/or declining habitats achieved GES with 43% achieving GES in the southern Celtic Sea. It was noted that particularly large proportions of threatened and/or declining habitats predicted to be in High and Moderate disturbance collectively were observed in the southern Celtic Sea, where over 99% of Sea-pen and burrowing megafauna communities and 100% of *Desmophyllum pertusum* (=*Lophelia pertusa*) reefs were in these disturbance groups. However, the accuracy of the assessment was influenced by the generally coarse resolution of habitat and sensitivity data, as well as fisheries data.

The Marine Strategy assessment noted that UK Fisheries Management Plans (FMPs) (a requirement of the Fisheries Act 2020) which are currently being developed, may provide a mechanism to address potential ecosystem-level impacts associated with specific fisheries.

5.5.7.1 Implications for SEA

The UK Marine Strategy assessment concluded that one of the main challenges will be balancing the protection of benthic habitats with the need to achieve Net Zero through activities such as *"new renewables developments, continued oil exploration and new carbon capture and storage"*[106]. The SEA should review potential areas which could be licensed/leased for offshore wind, marine renewables or carbon dioxide transport and storage activities, and/or granted Transitional Energy Certificates for oil and gas production and ensure awareness of existing problems related to the benthos so that potential activities do not exacerbate the problem. Where implemented, safety zones around infrastructure will likely locally reduce trawling activities in these areas thereby reducing trawling pressure on benthos. The potential for marine renewable devices to affect sediments and seabed morphology (e.g. through energy removal, changes to tidal regimes) should also be considered. The SEA should consider effects from activities likely to arise from adoption of the draft plan/programme on benthos in the context of those targets set to achieve GES under Marine Strategy descriptors 1 and 6.

5.5.8 Poor Knowledge of the Status of Marine Mammals

The latest Marine Strategy assessment (2024)[107] indicated that data availability limited the capacity to confidently assess the status of marine mammals, but evidence suggested that bycatch is a significant contributor to poor GES, particularly for cetaceans. Grey seals are stable or increasing across their range while harbour seals remain in decline despite stable populations in the west of Scotland. A pilot indicator assessment also highlighted that small, toothed cetaceans continue to be at high risk of toxicity from legacy pollutants such as polychlorinated biphenyls (PCBs).

5.5.8.1 Implications for SEA

There is the potential for disturbance of marine mammals from the activities that may result from implementation of the draft plan/programme. Activities will be spatially variable, though

[106] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/benthic-habitats/
[107] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/marine-mammals/

noise will certainly be concentrated in areas of renewable energy development involving pile driving, and oil and gas activities, gas storage activities, including of carbon dioxide and hydrogen, using seismic survey methods, principally the North Sea, and Irish Sea. The SEA should consider such activities in the context of current controls on their occurrence, available mitigation, and implications in relation to monitoring under the UK Marine Strategy. There is also a collision risk associated with offshore structures, including secondary entanglement from lost fishing gear for example, and shipping activity.

5.5.9 Problems associated with the conservation of species and habitats

Pressures such as the removal of species (e.g. by fishing), loss of and damage to habitats, the introduction of non-indigenous species, obstacles to species migration and poor water quality are still present. Some pressures are still increasing in parts of the OSPAR area, and all can act in synergy or be exacerbated by climate change. These pressures result in loss of biodiversity, including declines in the abundance and variety of species and habitats. Interruption of ecological processes, such as spawning, migration, and biological communication, may also occur.

The most sensitive features are those that are easily damaged and slow to recover. Reefs of the cold-water coral *Desmophyllum pertusum* (=*Lophelia pertusa)* and individuals of the fan mussel *Atrina fragilis* are slow-growing and delicate and can be severely damaged by bottom trawl fisheries. As noted in Section 4.1.1 the MMO has introduced a range of byelaws prohibiting the use of bottom towed fishing gear across a range of MPAs, with measures covering a further 41 sites for habitat features consulted on, and a fourth stage covering mobile species, for example, in relation to harbour porpoise bycatch[108].

Coastal waters contain feeding grounds, spawning and nursery areas, and feature on migration routes for seabirds and some fish species. These areas also host intense and varied human activities, which exert a wide range of pressures and can lead to the damage or loss of key habitats in estuaries and intertidal areas. Salt marshes and seagrass beds, which are highly productive and act as natural carbon sinks, are under pressure from relative sea-level rise and coastal development. Key areas of the shelf seas, including offshore banks and reefs, and frontal zones between different water masses, play important roles in pelagic productivity. Fishing is recognised as a key pressure on species and habitats in the shelf seas and there continues to be a need for information about ecologically important areas to guide improvements in management.

JNCC have assessed the conservation status of species and habitats listed in the Habitats Directive and Birds Directive, including those outside of conservation sites, for over 30 years. This was reported to the European Commission through Article 12 and 17 reporting, however, following the UK's departure from the EU and under assimilated law, reports fulfilling this former reporting requirement must now be produced at the UK constituent country level. The Statutory Nature Conservation Bodies (SNCBs, comprising Natural England, NatureScot, Natural Resources Wales and Northern Ireland Environment Agency) are working on these reports to cover the period 2019-2024, with a view to publishing this in 2026, with a combined UK (including offshore) report expected to be complete in 2028[109].

[108] https://www.gov.uk/government/publications/stage-4-marine-protected-areas-interactive-maps
[109] https://jncc.gov.uk/our-work/habitats-regulations-reporting/

The most recent overall assessment of conservation status for Annex I habitats is the 2019 Article 17 report[110] prepared as the UK's fourth, six year report. When assessing the conservation status of habitats, four parameters were considered: range, area, structure and functions (referred to as habitat condition), and future prospects. For species, the parameters were: range, population, habitat (extent and condition) and future prospects. Each of these parameters was assessed as being in one of the following conditions: Favourable, Unfavourable-inadequate, Unfavourable-Bad, or Unknown. An overall assessment was determined by reference to the conclusions for the individual parameters, and, in general, reflects the least favourable of the individual parameter conclusions.

The overall UK assessments for eight Annex I marine habitats assessed included: 3 which were determined to be in 'unfavourable-bad' condition (estuaries; mudflats and sandflats not covered by seawater at low tide; sandbanks which are slightly covered by seawater all the time); 4 in 'unfavourable-inadequate' condition (coastal lagoons; large shallow inlets and bays; reefs; submerged or partially submerged sea caves), and 1 in 'unknown' condition (submarine structures made by leaking gases). Compared to the 2013 assessment, there was a large decline in the overall status of sandbanks which are slightly covered by seawater all the time, due to a change in the assessment method, with the OSPAR indicator "Extent of physical damage to predominant and special habitats"[111], being used to assess the condition of offshore sandbanks. This is also reflected in the site condition assessment for multiple SACs in the southern North Sea, such as the North Norfolk Sandbanks and Saturn Reef. The condition of many site features have not been assessed, and so the status of these features and wider site condition is uncertain, and for sites with condition assessments, monitoring is required to understand the nature and trajectory of change.

Of the 22 Annex II marine species assessed: 5 were considered in 'unfavourable-inadequate' condition (common seal, maerl, allis shad, twaite shad, Atlantic salmon), 3 in 'favourable' condition (grey seal, river lamprey, otter), and 14 in 'unknown' condition (leatherback turtle, bottlenose dolphin, common dolphin, harbour porpoise, killer whale, long-finned pilot whale, Risso's dolphin, Atlantic white-sided dolphin, white-beaked dolphin, minke whale, fin whale, sperm whale, sea lamprey, brook lamprey). With respect to the cetacean species there has been a change in overall conservation status from favourable to unknown since 2013. This is due to the implementation of a more robust assessment methodology, supported by updated guidance, which requires consideration of population trends in setting the Favourable Reference Population (FRP) value. However, this requires a higher number of UK population estimates over time than are currently available, resulting in the unknown conclusion.

As noted in Section 5.5.6, there have been declines in abundance and breeding success for a number of seabird species (Burnell *et al.* 2024), many of which are protected by SPA designations.

In addition to the general status of habitats and species at the UK level reported above, the condition of features of site-based designations are often judged to be unfavourable. However, in some circumstances, feature condition has not been assessed, or else is based on judgement rather than site monitoring, which could be a limiting factor in understanding effects on site features.

[110] https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019/
[111] https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/habitats/extent-physical-damage-predominant-and-special-habitats/

5.5.9.1 Implications for SEA

The SEA should consider the implications of the draft plan/programme on the wider marine environment, in relation to the features of conservation sites of international and national importance, and those areas for which designations are proposed. 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. At this more general level, the SEA must consider the potential implications of the draft plan/programme on attaining GES.

5.5.10 Changes to landscape and seascape

Prior to the development of offshore renewables, 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 generally in the form of cable and pipe landfall and associated infrastructure, and also helicopter, port activity and vessel traffic. Drilling activity and production platforms have in the most part been too far from shore to be visible, notable exceptions being Beatrice in the Moray Firth, exploration well sites off Dorset and Cardigan Bay, structures in the east Irish sea and those associated with the Cromarty Firth rig support industry. The more recent development of offshore renewables, namely offshore wind farms, has led to a greater consideration of landscape/seascape issues as they were initially restricted on technical and economic grounds to shallow water depths in nearshore waters. Cost reduction and technical advances have led to deployment progressively moving offshore in most European countries, including in the UK. While not a consideration of OESEA5, some nearshore landscape pressures remain associated with cable installation and landfall, however, offshore effects from these are generally temporary. Pressures from changes to landscape and seascape also involve those onshore, including continued urban expansion and the development of the onshore renewables industry.

5.5.10.1 Implications for SEA

The SEA should consider the potential scale and location of activities which could arise from the adoption of the draft plan/programme in relation to seascape (including historic seascape) character, in the context of existing and proposed developments, and relevant landscape planning policy as contained in National Policy Statements, the MPS and national and regional marine plans of the UK and devolved administrations.

5.5.11 Impact of air quality on human health and the environment

A recent Royal College of Physicians (RCP) report (2025) noted that historically, air pollution has been framed as predominantly an environmental issue in the UK, which explains why policy responsibility for this falls predominantly on Defra and equivalent bodies in local government with responsibility to deliver local air quality management. With the health evidence now connecting both acute and chronic exposure to air pollution to so many different diseases and health outcomes, the RCP recommended that national, regional and local governments across the UK must recognise air pollution as a key public health issue and take increasingly ambitious action to reduce people’s short- and long-term exposure to outdoor and indoor air pollution.

5.5.11.1 Implications for SEA

The SEA should consider the potential scale of draft plan/programme activities in relation to current air quality problems and in the context of the range of emissions control measures in place.

5.5.12 Possible disturbance 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 and even the specific locations of known sites are sometimes not precise. These include former occupied landscapes (palaeolandscapes) and any potential associated material, in addition to more recent maritime archaeology. These areas and sites are vulnerable to offshore operations which disturb the seabed (e.g. drilling, piling, cabling, and trawling), though development-led studies, for instance associated with the aggregates industry, have added considerably to knowledge in this area.

5.5.12.1 Implications for SEA

The SEA should consider the potential implications of the draft plan/programme in relation to current understanding of submerged cultural heritage in the context of international and national protection measures and planning policy. The SEA should raise awareness of available industry guidance on marine cultural heritage.

5.5.13 Coastal erosion and flooding

A large proportion of the UK coastline is suffering from erosion (ca. 17% in the UK) with England (ca. 30%) and Wales (ca. 23%) having the greatest proportion of eroding coast, particularly the Yorkshire and Humber region. The coastline of England is also the most protected with ca. 46% of its length lined with coastal defence works (seawalls, groins) or fronted by artificial beaches. Estimates of the number of properties at risk from flooding and/or coastal erosion in England indicate that almost 3,500 dwellings are at risk for the period up to 2055, which includes an assumption that funding and implementation of all actions in Shoreline Management Plans (SMPs) are delivered. If these are not delivered, the number of properties at risk is nine times greater, at 32,800 by 2055.

5.5.13.1 Implications for SEA

The SEA should consider the potential scale and location of activities in particular tidal range schemes which could arise from the implementation of the draft plan/programme with respect to their potential impact on coastal erosion and flooding, and relevant SMP policies.

5.5.14 Underwater noise

Many human activities introduce sound into the marine environment, e.g. shipping, geophysical survey, underwater construction, and the use of sonars and explosives. Some of these sounds are of very high amplitude at source and often of low frequency, and therefore may be detectable by marine mammals at substantial ranges from the source. Recent technological developments have introduced many new sources of noise in offshore waters. Those typically of greatest concern to marine mammals, and marine fauna in general, are those producing the most intense sound pressure levels: seismic exploration, underwater explosions (e.g. related to UXO disposal), sonar (particularly naval), pile-driving and some acoustic harassment devices (AHDs). However, less intense noise sources such as shipping are also of concern due to their persistent nature and long-range of audibility. Shipping is the dominant noise source at low frequencies in most locations, and its contribution to increased ambient noise levels has

been considerable in recent decades. Some progress has been made in better understanding the characteristics of certain noise sources (e.g. geophysical devices such as sub-bottom profilers) and in methods to reduce noise intensity (e.g. low order UXO disposal).

5.5.14.1 Implications for SEA

The SEA should consider the potential scale and location of activities which could arise from the implementation of the draft plan/programme, with respect to their potential to cause injury and/or disturbance to marine mammals and other sensitive marine fauna.

5.5.15 Cetacean bycatch

The QSR 2023 recognised that bycatch was a major cause of human-induced mortality of harbour porpoise. Bycatch estimates were made for three assessment units covering UK waters, the Greater North Sea, Irish and Celtic Seas and West Scotland and Ireland. Each estimate, totalling more than 7,000 in 2020, was considered to significantly exceed threshold values for anthropogenic removal from bycatch, as was that for common dolphin in the North-East Atlantic assessment unit, however, it was noted there was low confidence in the bycatch estimates due to incomplete monitoring data.

The 2024 ICES fisheries advice on bycatch of species (ICES 2024) noted that for the period 2017-2023, the majority of harbour porpoise bycatch in the Greater North Sea was through the use of trammel nets and that of common dolphin in purse seine nets. It was also noted that a number of fishing methods with high levels of effort and perceived risk of bycatch were poorly monitored in 2023, and it was recommended that monitoring coverage should improve, in particular, for those higher risk fishing gears. The ICES working group on bycatch of protected species (WGBYC) completed Bycatch Risk Assessments (BRA) for harbour porpoise in the Celtic Seas and Greater North Sea ecoregions in 2019 using data pooled from 2015-2017, and noted that the percentage mortality of the Greater North Sea harbour porpoise population was estimated at between 0.33-0.59% in nets, and in the Celtic Seas between 0.29-0.8% in nets and bottom trawls combined. Both estimates were below the ASCOBANS 1.7% threshold defining unacceptable levels of interaction and below the 1% precautionary environmental limit. It was also noted that ICES ecoregions were arbitrary and unlikely to reflect the true population structure of harbour porpoise; the working group therefore conducted a further BRA using the latest definition of a Celtic Sea subpopulation and this suggested that levels of mortality in 2017 due to bycatch may be between 2.1-5.6% of that subpopulation (ICES 2019).

More recently, the WGBYC developed the bycatch evaluation and assessment matrix (BEAM) as a screening procedure to evaluate the inputs needed to quantitatively assess population level impacts of fisheries bycatch. The method considers various criteria, including data availability, quality, and representativity, within group expertise and the existence of bycatch management/conservation thresholds or reference points. Estimates of cetacean bycatch mortality are made in the most recent WGBYC report (ICES 2025), however, population level impacts for some ecoregions are limited by a lack of species abundance data. The estimates of total bycatch of harbour porpoise for the greater North Sea and Celtic seas, based on the year 2023 and for the available fishing activity metier, were 413 and 75 respectively, but with a significant range in upper and lower 95% confidence intervals.

While covering only a portion of the range of harbour porpoise in UK waters, the MMO are considering a range of measures to manage fisheries impacts on the species in two SACs in

UK waters (Southern North Sea SAC and Bristol Channel Approaches SAC[112]), noting that evidence suggests bycatch from gillnets is above sustainable levels in both sites. Additionally, MMO want to understand how wider management measures might apply across harbour porpoise Management Units (MUs) in the North Sea, and the Celtic and Irish Seas. The MMO are continuing to develop site level assessments and management options, but no decisions have yet been made about what these could be.

5.5.15.1 Implications for SEA

The SEA should consider the potential scale and location of activities which could arise from the implementation of the draft plan/programme, with respect to their potential to impact cetacean populations which may be experiencing levels of bycatch deemed unacceptable.

5.6 Likely Evolution of the Baseline

Regulations 12(3) of the SEA Regulations requires that the Environmental Report shall include such of the information referred to in Schedule 2 including the likely evolution of the relevant aspects of the current state of the environment without implementation of the draft plan/programme.

Consultation Question

6. Are there any additional influences, and supporting data sources, on the likely evolution of the environmental baseline?

5.6.1.1 Biodiversity, habitats, flora and fauna

5.6.1.2 Plankton

The UK Marine Strategy requires that the biodiversity, distribution and abundance of species and habitats be in line with prevailing physiographic, geographic and climatic conditions. The current status of pelagic habitats in the Greater North Sea and Celtic Seas remains uncertain as plankton communities are experiencing changes in biomass, abundance, and community structure that may have consequences on the functioning, dynamics and structure of the whole marine ecosystem. The latest overall assessment of GES, however, indicates that all currently available evidence suggests that pelagic habitats in UK seas are in “not good” status. Prevailing oceanographic and climatic conditions are likely to be driving these changes, but the extent of pressure from direct human activities is unclear. GES also requires that ecosystems are not adversely affected by eutrophication, contamination, and non-indigenous species introduced through anthropogenic activities. The planktonic ecosystem of the British Isles meets these criteria as, though eutrophication and contamination may occur in some highly localised areas, the majority of plankton are unaffected by nutrient loading or chemical contamination. Additionally, changes to marine foodwebs caused by alterations in plankton phenology (trophic mismatch) or community composition appear to be related to prevailing oceanographic and climatic conditions and are not likely to be the direct result of anthropogenic pressures although the cumulative effects of these pressures on the food web are unclear.

[112] https://www.gov.uk/government/collections/managing-harbour-porpoise-bycatch-in-english-waters

Long-term trends in the plankton indices indicate a general increase in phytoplankton biomass for most regions in the North Atlantic and in the regional seas around the British Isles, with differing timings for the main step-wise increase occurring, being later in oceanic regions compared to the North Sea. In the North Sea, the population of the previously dominant and important zooplankton species (the cold-water copepod *Calanus finmarchicus*) has declined in biomass by 70% since the 1960s. Species with warmer-water affinities (e.g. *Calanus helgolandicus*) are moving northwards to replace the species but are not as numerically abundant (Edwards *et al.* 2020). Currently the distributions of plankton organisms are moving northwards at an average rate of ~23km per year, although the rates of individual species vary substantially (Beaugrand *et al.* 2009). There is also evidence from the Continuous Plankton Recorder survey that warming temperatures decrease the size of the plankton community for both phytoplankton and zooplankton; this may also eventually lead to a decrease in size of fish species (Beaugrand *et al.* 2010).

The most recent MCCIP report card (Edwards *et al.* 2020) indicates a medium level of confidence in predictions of future changes to plankton from climate change. Future warming and increased ocean acidification are likely to alter the geographical distribution of primary and secondary plankton production (0-5 yrs), affecting ecosystem services such as oxygen production, carbon sequestration and biogeochemical cycling (20-50 yrs). Such changes have the potential to place additional stress on fish stocks and therefore on mammals and seabird populations which rely on fish as prey species.

5.6.1.3 Benthos

Over recent geological timescales (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.

Clark & Frid (2001) reviewed long-term changes in the North Sea ecosystem, at all trophic levels, and concluded that in the northern, western and central areas of the North Sea, long-term changes are predominantly influenced by climatic fluctuations. Here, primary productivity during a particular year is related to the effect of weather on the timing of stratification and the resulting spring bloom. In the southern and eastern areas of the North Sea, the lack of stratification and the large inputs of nutrients mean that primary productivity is more strongly influenced by variations in anthropogenic nutrient inputs and is only weakly related to climatic variation. However, the weight of evidence shows that long-term changes in the ecosystem may ultimately be related to long-term changes in either climate or nutrients, although the long-term dynamics of certain taxa and communities do show evidence of being influenced by both anthropogenic factors and/or internal factors such as competition and predation.

The most recent MCCIP Report Card 2020 scientific review of shallow and shelf subtidal habitats (Moore & Smale 2020) concluded that:

- North Sea infaunal (burrowing) species have shifted their distributions in response to changing sea temperature, however, most species have not been able to keep pace with shifting temperature, meaning that species are subjected to warmer conditions.

Leading (expanding) edges are responding more quickly than trailing (retreating) edges, which has been observed elsewhere in the world.

- A number of studies have used modelling approaches to predict changes in the distribution and/or abundance of kelp and cold-water corals at the UK scale, and benthic infauna and epifauna within the North Sea. All suggest significant shifts in species ranges into the future leading to altered community structures with implications for food-web dynamics, fisheries, carbon cycling and ultimately human society.

The UK Marine Strategy requires that benthic biodiversity (descriptor 1) and sea-floor integrity (descriptor 6) are not adversely affected. The UK assessment of GES, consulted on in 2025 (Defra 2025) indicates that the Greater North Sea and Celtic Sea regions have not met GES. The main problem is caused by physical disruption of the seabed from fishing gear, which at least for certain conservation sites, is being addressed through site management measures involving fisheries byelaws (see Section 4.1.1). Potential future issues could arise from enhanced coastal squeeze from climate change related sea-level rise and impacts from ocean acidification.

5.6.1.4 Cephalopods

The biology and ecology of many cephalopod species remains little known and as a result, the potential effects of a changing climate on cephalopod populations are not easy to predict. However, it is known that for many species, temperature has an important influence on a number of life history processes, including recruitment (through maturation rate and the rate of embryonic development), the timing of migration and the distribution range. As well as this, food availability and predator abundance and distribution are likely to be affected by changes in the marine environment.

The latest MCCIP update on climate change impacts on fish (Fox et al. 2023)[113] noted that several species of cephalopods have shown noticeable increases in abundance and geographical spread in UK waters, a change consistent with warming waters (e.g. van der Kooij *et al.* 2016, Oesterwind *et al.* 2020, 2022).

5.6.1.5 Fish and Shellfish

The general colonisation of the warming southern North Sea and Celtic Sea regions by Lusitanean demersal species (e.g. sea bass), and a retreat of Boreal species (e.g. cod, whiting) into the deeper parts of UK waters in the northern North Sea is likely to continue. However, variations in habitat preferences and sensitivities to prey and environmental conditions of individual species, the possible role of food web effects, and particularly the extent of future fisheries may complicate this simple picture. Some pelagic fish species have and are likely to continue to show pronounced latitudinal responses to seasonal sea temperatures (e.g. anchovy, horse mackerel), although predicting their likely distribution is complicated by the important influence of poleward flowing shelf edge currents which carry warm water into high latitudes. Species which are unable to adapt their distributions due to strict habitat association (e.g. lesser sandeels which closely associate with coarse sandy sediments) are likely to be less able to respond to predicted climate changes (Heath *et al.* 2012).

[113] https://www.mccip.org.uk/sites/default/files/2023-10/Impacts%20on%20Fish%20of%20Relevance%20to%20the%20UK%20and%20Ireland.pdf

The latest updated assessment towards achieving GES as part of the UK Marine Strategy[114] reported that despite the improving status of some individual populations of sensitive fish, when considering all indicators, overall fish have not achieved GES across UK seas. Most assessed populations of sensitive fish species were no longer declining in both the Greater North Sea and Celtic Seas. However, long-term declines in the proportion of large demersal fish were evident in both regions. Furthermore, in the central and southern North Sea there was evidence of a shift in species composition within the fish community, toward species that do not grow large.

5.6.1.6 Turtles

Records of marine turtle sightings and strandings in UK waters indicate that they are predominantly of leatherback and loggerhead turtles in 2024 (e.g. Penrose & Westfield 2025), with UK waters likely to represent the northerly limit of routine seasonal leatherback foraging migrations (e.g. McMahon & Hays 2006). Leatherback turtles visit only during the warmer months of the year, and it has been suggested that through climate change increased seawater temperature might see them use UK waters for longer (McMahon & Hays 2006). However, the low numbers of recorded turtles and the quality of recording effort make determining likely future trends very difficult.

5.6.1.7 Birds

Seabird breeding populations in the UK increased in size over much of the last century, but since 1999 populations of some species have seen significant declines; in 2019, the UK seabird indicator stood at 24% below the 1986 baseline, with most of the decline occurring since the mid-2000s. Some of the greatest reductions have occurred at Scottish sites, and the decline has largely been driven by the declines for Arctic skua, great black-backed gull, herring gull, and black-legged kittiwake (Hayhow *et al.* 2017, Harris *et al.* 2024). Breeding success has also seen recent declines for several species, with kittiwake showing a decline to 2008, following which there was an increase to a UK average of 0.75 in 2023 across 25 sites. Arctic skua productivity has been highly variable with some very poor years, particularly 2004, though there was an increase in the number of chicks fledged per pair in 2022 and 2023 of 0.69 and 0.58 respectively.

Climate change is one of the main threats to seabirds in terms of numbers affected and is considered to be one of the primary causes of the decline in seabird populations in the UK. Burton *et al.* (2023) provide a summary of the influence climate change is already having on birds in the UK, which include population responses across annual cycles and ranges, declines in breeding seabird numbers, in part linked to climate-mediated changes in fish prey species (e.g. sandeel and sprat) and changes in storminess affecting winter survival. Additionally, seabirds are becoming increasingly vulnerable to extreme heat both directly, and indirectly through food web effects (Burton *et al.* 2023). Lack of food availability is a likely cause of poor breeding success across a range of species, including Arctic skua, kittiwake, and puffin. For example, reduced sandeel numbers are thought to be a result of hydro-climatic, sea temperature and oceanographic changes, which has reduced prey abundance and availability directly, and indirectly for Arctic skuas which kleptoparasitise from other species (Harris *et al.* 2024).

Warmer winter sea temperatures have resulted in changes in abundance, distribution and species composition of plankton in the North Sea that have contributed to the reduction in

[114] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/fish/

abundance and quality of seabird prey species such as sandeels, at times of peak energy demands in the breeding season, with knock-on effects for some species of seabirds (Burton *et al.* 2024). There is growing evidence that breeding phenology is changing, with seabirds becoming increasingly de-synchronised from their prey, and species which have been unable to keep pace with the temporal changes of sandeel and their prey life history events, have had to rely on prey of lower calorific value during the chick rearing period (JNCC 2020). However, regional variations in the impacts of climate change are apparent, with effects of temperature weaker in the western UK, and while requiring more research, this may be to do with a lower reliance on sandeel (Burton *et al.* 2024).

There is increasing evidence that the overwintering distributions of many waterbirds (e.g. wildfowl and wader species) have changed, along with evidence that populations of many wader species and some wildfowl species are in long-term decline (Burton *et al.* 2020). In recent decades, in response to warming, distributions for some species have shifted north and eastwards out of the UK. A correlation between temperature and distribution shift is more evident on those "deep water habitats" species (as defined by Pavón-Jordán *et al.* 2018) such as tufted duck, goldeneye, smew, and goosander, all of which are diving ducks, requiring ice-free water, less so with dabbling ducks (species defined as associated with "shallow-water habitats), e.g. wigeon. This has resulted in declines in usage of the UK's sites, e.g. by waders, in favour of The Netherlands, Sweden and Finland. However, the redistributions may also reflect wider overall declines in the abundance of migrants, and potentially range contractions, which warrants further investigation (Burton *et al.* 2023). A change in migration (and breeding) timing is also evident, with a general advancement in first arrival dates (e.g. wildfowl and waders) to breeding sites (resulting in those species which breed in the UK arriving earlier, and those species which over-winter in the UK, departing earlier to their breeding grounds). In the longer term, potential sea-level rise and other changes such as storminess, may have effects on survival and the area of habitat available for overwintering.

There have been outbreaks of highly pathogenic avian influenza (HPAI) in recent years, and particularly in 2021-2023 caused by the H5N1 strain, and were responsible for significant levels of seabird (Tremlett *et al*. 2024) and waterbird mortality. The population level consequences are not yet clear but unusually high numbers of great skua (see Falchieri *et al.* 2022, Camphuysen *et al.* 2022), gannets (see Lane *et al.* 2023), guillemots, Arctic terns, common terns, Sandwich terns and kittiwake were recorded dead from ring recoveries, with a broader range of species also testing positive for the virus, with a minimum of 20,500 losses reported in Scotland alone[115], with many more unreported cases also likely.

5.6.1.8 Marine Mammals

The ability to detect long-term trends in cetaceans around the UK is limited by the paucity of effort-based sightings data, and difficulties associated with their monitoring (e.g. they are highly mobile, and some are deep diving). There is increasing evidence of several species undergoing shifts in their distributions around the UK, both annually and seasonally, this includes a number of bottlenose dolphin populations around the UK. Stranding data has provided some indications of changes in distribution, for example, the number of warm water adapted species (e.g. short-beaked common dolphin and striped dolphin) has increased while that of cold water adapted species (e.g. Atlantic white-sided and white-beaked dolphin) has decreased, with range shifts considered to be a response to distribution shifts in their prey

[115] https://www.nature.scot/doc/naturescot-scientific-advisory-committee-sub-group-avian-influenza-report-h5n1-outbreak-wild-birds

(Martin *et al.* 2023), including the type of prey, which is considered to be a driver of the southerly distribution shift in harbour porpoise in the early 2000s. The mechanisms causing changes remain uncertain, and it is difficult to differentiate between short-term responses and longer-term ones driven by climate change, in part due to the multiple other pressures on marine mammals.

With respect to seals, whilst it is possible that recent demographic changes (increases in most grey seal populations and declines in some harbour seal populations) are linked in some way to climate-mediated changes in food supply, or indirect climate related effects including increases in harmful algal blooms and disease prevalence (SCOS 2021, 2024, Martin *et al.* 2023), other factors (depletion of food resources from fishing, recovery from epizootics, interspecific competition, density dependent effects) may be more important (SCOS 2008, cited in Evans & Bjørge 2013).

5.6.1.9 Geology, Substrates and Coastal Geomorphology

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, and energy removal from renewables has the potential to result in local or regional changes to sedimentary processes.

Relative sea levels under the RCP 2.6 scenario are predicted to rise by 29-70cm by 2100 (relative to 1981-2000 average) (for London) – note there are regional UK variations in the predicted rate of sea-level rise, including due to glacial isostasy. For example, under the same scenario, Edinburgh is predicted to experience sea level change of 8-49cm by 2100. Under the RCP8.5 scenario, sea level is expected to rise to between 53-115cm for London and 30-90cm for Edinburgh (Palmer *et al.* 2018). Coastal erosion is estimated to affect 17% of UK coasts and there are large regional variations connected with coastal rock types – England and Wales have the highest overall erosion rates with 28% of coasts retreating at more than 10cm per year. These rates are expected to rise in the future, corresponding primarily to higher sea levels.

5.6.1.10 Landscape/Seascape

There is a likelihood of landscape effects from coastal and terrestrial wind generation projects, other marine energy developments and continued industrial, port and urban expansion. With the exception of landfalls and temporary nearshore works, most new offshore renewable capacity is distant from shore.

5.6.1.11 Water Environment

Climate change has and will continue to have a pervasive effect on all aspects of the coastal and marine environment including flooding, coastal erosion, water quality and resources. Over the 21st century, the ocean is projected to transition to unprecedented conditions with increased temperatures (virtually certain), greater upper ocean stratification (virtually certain), further acidification (virtually certain) and deoxygenation (high confidence), at rates dependent on future emissions (IPCC 2021).

Warming of UK shelf seas is projected to continue over the coming century with most models suggesting an increase of between 0.25°C and 0.4°C per decade. There may be some regional differences with warming expected to be greatest in the English Channel and North Sea, with smaller increases in the outer UK shelf regions (MCCIP 2020, Tinker & Howes 2020,

Cornes *et al*. 2023). Compared to 1982–1998, the annual number of marine heatwaves increased around the British Isles by an average of four events per year in the period 2000–2016. Larger increases of up to six additional events per year occurred to the north of the British Isles with smaller changes to the south (Cornes *et al.* 2023).

There is a history of strong variability in UK wave climate. Inter-annual variability in the modern wave climate is strongest in the winter and can be related to atmospheric modes of variability, most notably the NAO. Rather dramatic increases in wave height occurred between 1960 and 1990, but these are now seen as just one feature within a longer history of variability and there is no clear pattern in results since 1990. There is as yet no consensus on the future storm and wave climate (Woolf & Wolf 2013, Wolf *et al.* 2020). However, Bricheno *et al.* (2025) note there is a likelihood that the UK will experience increasing storminess and an intensified wintertime storm track.

Temperature stratification over the NW European shelf seas is showing evidence of beginning slightly earlier in the year, on average although it is very difficult to decipher trends against natural variability (Sharples *et al.* 2013, 2020, 2025). Sharples *et al*. (2025) note that marine heatwaves (MHWs) have been observed to significantly strengthen stratification over wide areas of ocean on the European shelf (Berthou *et al.* 2024), with more monitoring and research required to understand the frequency and impacts of MHWs for the wider marine ecosystem (Jacobs *et al.* 2024, Cornes *et al.* 2025).

5.6.1.12 Air Quality

Air quality statistics for the UK (urban and rural areas) indicate a general long-term improvement in air quality metrics, and fewer days of moderate or higher pollution. Urban sites experienced more days of moderate or higher pollution, on average, before 2015 compared to rural sites due to PM2.5 and PM10 levels. Rural air pollution has been higher since 2015 predominantly due to ozone pollution; variation in ozone is expected due to fluctuations in the occurrence of hot summer weather conditions. Road transport is the main source of pollution in 97% of the air quality management areas declared, the majority of which are for NO_2 with significantly fewer for PM10.

Atmospheric emissions associated with offshore oil and gas remained relatively stable over the 2000s, with a decline occurring across SO_2, CO_2, NO_x and NMVOC since 2020. Carbon dioxide accounts for the greatest proportion of emissions to air from UKCS offshore installations, primarily generated from fuel consumed by combustion equipment to provide electrical power and drive compressors for oil and gas export (OEUK 2025). Carbon dioxide equivalent (includes CO_2, CH_4 and N_2O) emissions declined by 34% between 2018 and 2024, with approximately half of this reduction coming from installations ceasing production, and the other half from reductions from producing installations. While air quality may be locally affected around offshore oil and gas installations, their distance offshore effectively negates any effect on terrestrial air quality.

Factors which may influence atmospheric emissions in the future, include ageing fields requiring a higher consumption of energy (e.g. additional compression), and the consequent depletion of available gas for fuel, which may require additional usage of diesel for power generation leading to increased atmospheric emissions; however, recent energy integration concepts such as platform electrification from shore or offshore renewable sources may ameliorate this, as well as progress to reduce emissions from venting and flaring, and the decommissioning of some older infrastructure will also lead to a corresponding decline in

emissions. The North Sea Transition Deal includes a commitment from industry to reduce their emissions by 50% by 2030, 90% by 2040, and net zero by 2050, against a 2018 baseline.

5.6.1.13 Climate and Meteorology

Human activities, principally through emissions of GHGs, have unequivocally caused global warming. Reflecting the long-term warming trend since pre-industrial times, observed global mean surface temperature (GMST) for the decade 2011-2020 was 1.09°C (0.95°C and 1.02°C) higher than the average over the 1850-1900 period. Global GHG emissions in 2030 implied by NDCs announced by October 2021 make it likely that warming will exceed 1.5°C during the 21st century and make it harder to limit warming below 2°C. There are gaps between projected emissions from implemented policies and those from NDCs (see Section 4.6) and finance flows fall short of the levels needed to meet climate goals across all sectors and regions (high confidence).

Potential regional changes to climate associated with global warming up to 1.5°C, include warming of extreme temperatures in many regions (high confidence), increases in frequency, intensity, and/or amount of heavy precipitation in several regions, and an increase in intensity or frequency of droughts in some regions (high confidence) (IPCC 2023). In a marine context, the environment is affected by a number of consequences of the emissions of carbon dioxide and other GHGs, and related global warming, including ocean acidification, marine heatwaves, and movements in the range and abundance of species, including those which are prey for seabirds and marine mammals (see Sections 5.5.4 and 5.6.1.1-5.6.1.8).

5.6.1.14 Population and Human Health

In the UK as a whole, population is expected to increase by 7.3% percent to 72.5 million by 2032 compared with the estimated UK population for 2022 (67.6 million). Growth is projected to be most significant in England (7.8% growth) and least in Northern Ireland (2.1%) over the same period. Within England, by mid-2032, regions in the north are projected to grow at a slower rate than regions in the Midlands (East – 6.78%) and south (South West – 7.46%). The North East is the region with the slowest projected population growth (4.83%). Continued growth will increase population density. Human health in the UK is unlikely to change considerably in the near future, with life expectancy at birth projected to increase to 82 years for males and 85.6 years for females by 2047, showing limited or no change with recent years. The UK population is an ageing population with the proportion aged >85 years projected to almost double over the next 25 years[116].

5.6.1.15 Other Users

Existing marine activities include shipping and port activities, military exercises, fishing, recreational sailing, oil and gas production and decommissioning, aggregates extraction, aviation and offshore wind farm construction and operation. Port activities have been continuously expanding 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

116 https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2022based

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. Additionally, offshore development including of offshore energy, and fisheries management measures, including in Marine Protected Areas, may result in fisheries displacement.

A number of demonstrator and small array scale wave and tidal power electricity generation devices have been deployed which may lead to commercial scale developments in the future. Offshore wind continues to expand with further leasing rounds planned towards 2030 and beyond. Oil and gas production is in decline as reserves in basins of the UKCS become depleted. Decommissioning activity has increased in recent years and is likely to continue to do so, subject to some potential re-use of infrastructure for carbon dioxide storage.

5.6.1.16 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 (drilling, piling, cabling). The development of increasingly sophisticated detection methods, mapping, and underwater excavation and updated guidance to industry means that the recovery of archaeological material or information is increasingly likely.

5.6.1.17 Conservation of Sites and Species

MCZs and MPAs established under the *Marine and Coastal Access Act 2009* and the *Marine Scotland Act 2010* have the aim of completing an ecologically coherent and well-managed network of MPAs, together with existing and future SACs, SPAs, OSPAR and other conservation sites. Defra recently reported on progress on the MPA network in English waters[117]. Since the last report in 2018, a third tranche of MCZs were designated, which introduced 41 new sites to the MPA network, and there have been some new and extended SPAs and the designation of three HPMAs. The MPA network now consists of 181 MPAs across 35,000 square miles, or 40% of English waters. After the third tranche of MCZ designations in 2019, Defra considered the MPA network to be substantially complete and representative of the English and Northern Ireland offshore marine environment. At a UK level, there are presently 377 designated MPAs protecting 38% of UK waters, which compares to 314 sites covering 24% of UK waters in 2018, and 217 sites covering 8% of UK waters in 2012. The 2024 assessment of progress towards an ecologically-coherent and well-managed network of Marine Protected Areas in the UK, which included a consideration of fisheries management measures and HPMAs, noted continued progress in developing the UK MPA network over time, which play an essential role towards achieving and maintaining GES over the coming years[118]. The potential implications of climate change on habitats and species, including those of conservation concern, are becoming increasingly well understood though how this will affect the integrity of individual sites, and their management remains uncertain.

5.6.1.18 Onshore

Coastal habitats in the UK (e.g. saltmarsh, machair, sand dunes, shingle and maritime cliff and slope), provide many ecosystem services, such as flood defence, climate regulation, and

[117] https://www.gov.uk/government/publications/marine-protected-areas-network-report-2019-to-2024
[118] https://moat.cefas.co.uk/biodiversity-food-webs-and-marine-protected-areas/marine-protected-areas/

tourism opportunities, which are all beneficial to society and the economy. They represent a zone of transition between the terrestrial and marine domain and are in a constant state of flux. Coastal processes are dependent on tides, waves, winds, flora, fauna, and sediment processes; they are susceptible to and altered by climatic changes, whilst also vulnerable to, and often negatively affected by, human activities (Burden *et al.* 2020).

Future projections of sea-level rise around the UK contain considerable uncertainty, with the total rise in sea-level by 2100, relative to the 1981-2000 average, potentially exceeding one metre, subject to which emissions scenario is considered (Palmer *et al.* 2018, Horsburgh *et al.* 2020). The frequency of intense storm events may increase and lead to more coastal flooding, though attributing recent storm events to climate change is challenging due to natural variability and a limited understanding of associated mechanisms (Bricheno *et al.* 2025). Temperatures are expected to rise, particularly in the south and east of the UK. Winter precipitation is likely to increase markedly on the northern and western UK coastline. Coastal erosion is also expected to increase, partly due to sea-level rise. Low-lying and soft-sediment coasts in the east of England will be most vulnerable as they are most easily eroded. The most-exposed locations and estuaries may be particularly vulnerable (Burden *et al.* 2020).

Jones *et al.* (2013) and Burden *et al.* (2020) summarise the likely impact that climate change will have on coastal habitats. In addition to sea-level rise, changes in temperature, rainfall, wind speed and direction will affect dune landform development, but the likely results of such changes are uncertain. The range of some plant communities may extend northwards, such as the *Leymus arenarius* and the *Ammophila arenaria-Festuca rubra-Hypnum cupressiforme* subcommunity. Warmer and wetter conditions may be favourable in terms of dune stabilisation and development, though these are likely to be offset by drought periods and storms. Hydrological changes in dune slacks may also lead to changes in dune slack communities. Low-lying machair habitats are similarly affected by sea-level rise and storm events should they increase as a result of climate change. Similarly, saltmarsh environments may be affected by sea-level rise and any increase in storminess, which may further decrease their extent. Their inability in some cases to adjust through inland migration enhances their vulnerability. Regional changes in precipitation could also result in effects such as changes in sediment supply from freshwater runoff, and species distribution could be affected by elevated carbon dioxide levels. Shingle beaches and structures may be affected by changes in wave and tidal energy potentially resulting in the movement of some features out of designated site boundaries. Where movement is not considered acceptable (e.g. in proximity to Dungeness power station), replenishment will be required. There is likely to be landward migration of narrow beaches (coastal squeeze), and coastal defences may be more at risk of being undermined as beach levels lower. Sea-level related impacts to key shingle areas may be disproportionate as they coincide with areas where projected sea-level rise is greatest (i.e. in the south and east). Changes in vegetation of shingle beaches are also likely (for instance the loss of the northern oysterplant in several southern areas is attributed to warmer temperatures), along with assisting the spread of invasive garden species which could displace native species. Additionally, more frequent storms could also affect the rate of recolonisation of sparse native vegetation.

Maritime cliffs may erode more rapidly as sea-level and storminess increase, exacerbated by an increase in rainfall which may help promote a greater number of landslips. Such increased disturbance would favour early successional species and may reduce vegetation mosaics important for scarce invertebrates, and warmer temperatures may also favour invasive species.

6 Approach to Assessment

6.1 Introduction

This SEA will cover a very large marine area comprising relevant UK territorial and offshore waters from the low water mark to depths of more than 2,400m. The draft plan/programme includes leasing/licensing in relation to offshore wind, wave and tidal energy, offshore gas storage, including carbon dioxide and hydrogen and offshore hydrogen production and transport. The OESEA5 will also cover the granting of Transitional Energy Certificates for offshore oil and gas production to manage existing fields for their lifetime. 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 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 incorporating inputs from a variety of sources:

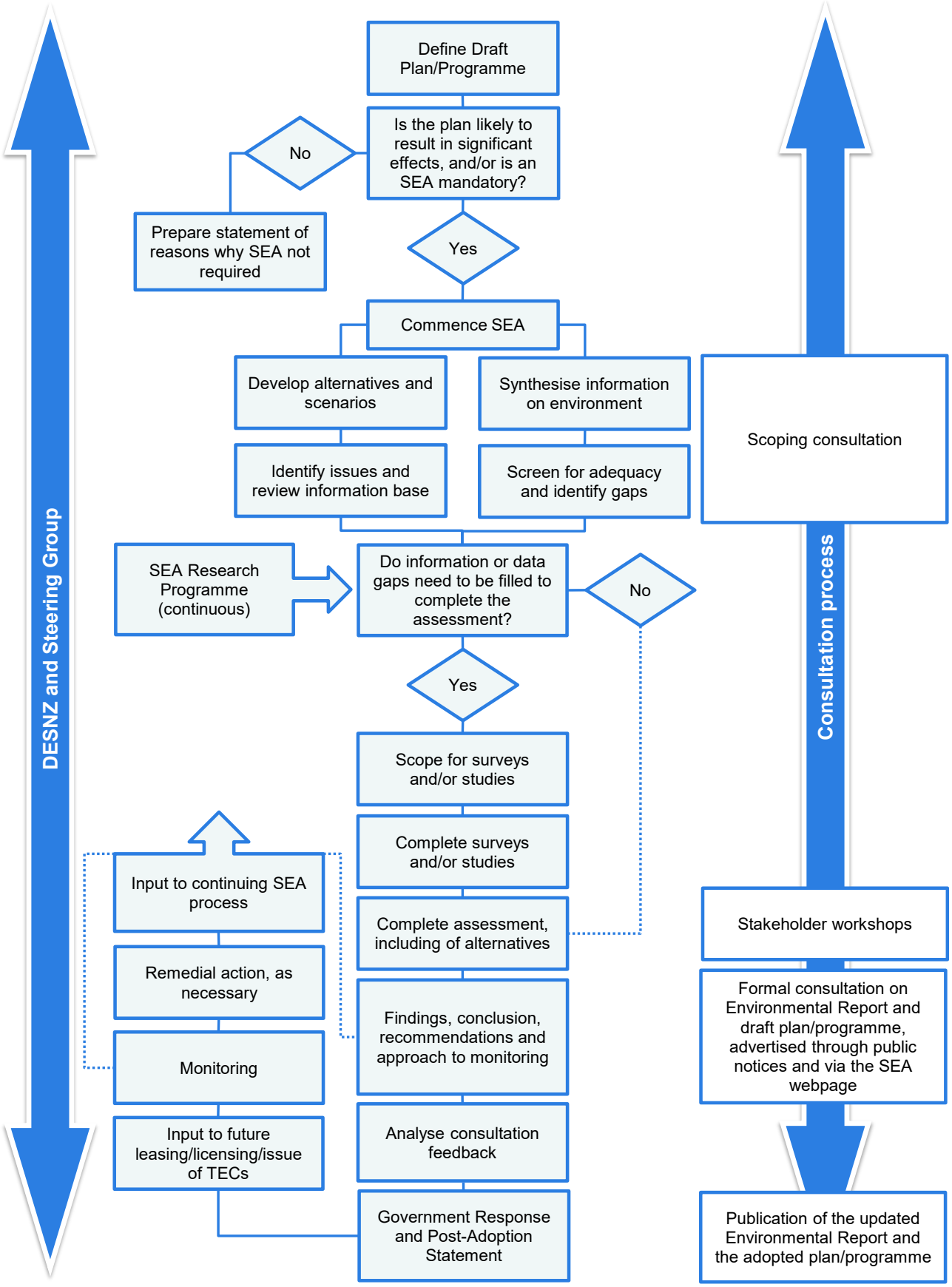
- Baseline understanding of the relevant receptors (including other users) grouped according to Schedule 2 of the SEA Regulations together with existing environmental problems and the likely evolution of the baseline conditions
- The likely activities, and potential sources of effect and the existing mitigations, regulatory and other controls
- The evolving regulatory framework
- The evolution of technology
- SEA objectives
- The evidence base regarding the relative risks and potential for significant effects from offshore wind farm, offshore oil and gas production, hydrogen and gas transportation and storage including of carbon dioxide
- Steering Group, statutory consultee and stakeholder perspectives on important issues, information sources and gaps, and potential areas to exclude from licensing/leasing or granting Transitional Energy Certificates 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 not be 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 conservation sites.

Figure 6.1: Overview of the OESEA process



6.2 Consideration of Alternatives

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

Need or demand: is it necessary?

Can the need or demand be met without implementing the plan or programme at all?

Mode or process: how should it be done?

Are there technologies or methods that can meet the need with less environmental damage than 'obvious' or traditional methods?

Location: where should it go?

Timing and detailed implementation: When, in what form and in what sequence, should the plan or programme be carried out? What are the important issues? Do existing controls and measures address them? What other controls and measures are required?

Adapted from: Office of the Deputy Prime Minister (2005)

The development of the alternatives has been made within the context of the objectives and geographical scope of the draft plan/programme, including its wider legislative and policy context. The elements of the draft plan/programme are diverse, with some relating to energy/electricity generation, and others relating to various types of gas transportation and storage, with the plan having a relatively low level of spatial precision. Alternatives based on a number of mixes of these plan elements are, therefore, not considered to be reasonable, as they seek to address connected but separate objectives of the overall draft plan/programme as they relate to a number of UK Government policies.

The location and scale of leasing/licensing or granting Transitional Energy Certificates is dependent on a number of factors including key resource locations and constraints, and the commercial interest in developing the resources, some of which are not well understood at this stage. More precision may be possible as the SEA progresses but only for certain elements of the draft plan/programme, for example, offshore wind. Others, such as areas to be used for any form of geological gas storage, have a higher degree of uncertainty.

The reasonable alternatives reflect the high-level nature of the draft plan/programme and its objectives in relation to the national policy context; the draft plan/programme is not spatially specific in defining areas where to develop any particular technology, nor do all aspects have well-defined targets beyond those in UK Government policy.

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

- Not to proceed with licensing/leasing or granting Transitional Energy Certificates for any activities
- To proceed with licensing/leasing or granting Transitional Energy Certificates as proposed
- To restrict the licensed/leased areas or areas for Transitional Energy Certificates temporally or spatially

Note that the same alternative may not necessarily be chosen for all aspects of the draft plan/programme, or may not take the same form, e.g. the same spatial or temporal restrictions may not be appropriate for all aspects of the plan. Any proposed spatial and temporal restrictions will be clearly described and mapped within the Environmental Report.

Consultation Question

7. Are there any additional alternatives that you feel the SEA should reflect?

6.3 Draft SEA Objectives and Indicators

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 previous OESEAs were developed with a range of stakeholder inputs, including discussion with the Steering Group. A list of draft objectives and indicators proposed for this SEA are given in Table 6.1.

Consultation Questions

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

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

Table 6.1: SEA topics, objectives and indicators

SEA Objectives	Guide Phrases	SEA Indicators
Biodiversity, habitats, flora and fauna		
Contributes to conservation of the biodiversity and ecosystems of the UK and its seas.	Plan activities do not lead to the loss of biological diversity, the degradation in the quality and occurrence of habitats, and the distribution and abundance of species.	No significant loss of diversity or decline in a population attributable to plan related marine activities and promotion of recovery wherever possible, and compensation where necessary.
Avoids significant impact to conservation sites designated at an International and National level (e.g. Ramsar, SACs, SPAs, MCZs, NCMPAs, and SSSI).	Plan activities do not cause adverse effects on marine ecosystems/valued ecosystem components. Plan activities contribute to the ecological knowledge of the marine and coastal environment through survey and discovery. Plan activities do not lead to disruption in habitat and species connectivity. Plan activities do not lead to the introduction of noise at levels which adversely affect the marine environment, including by leading to significant effects on conservation sites and sensitive species.	Activities subsequent to licensing/leasing or the issue of a Transitional Energy Certificate which overlap, or potentially affecting designated sites (e.g. SACs, SPAs, Marine Conservation Zones, Marine Protected Areas, Ramsars), or with the potential to disturb a protected species, are compliant with the requirements of relevant UK and devolved Regulations[119], and consistent with national and regional policy. No adverse change in the environmental status of marine sub-regions, including in relation to the attainment of targets for Marine Strategy descriptors; or in the ecological status of transitional waters and the attainment of good status/potential, attributable to the plan.
Avoids significant impact to, or disturbance of, protected species and loss of habitat.		

[119] *The Conservation of Habitats and Species Regulations 2017, the Conservation of Offshore Marine Habitats and Species Regulations 2017*, *the Marine Scotland Act 2010, the Marine and Coastal Access Act 2009, the Conservation (Natural Habitats, &c.) Regulations 1994*, the *Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001*.

SEA Objectives	Guide Phrases	SEA Indicators
	Plan activities do not lead to the introduction of non-native species at levels which adversely alter marine ecosystems. The plan recognises the ecosystem importance of land-sea coupling, for instance its role in species migration. The plan promotes the achievement of good ecological/environmental status for water bodies and marine sub-regions as outlined in the UK's Marine Strategy.	No adverse impact on the ability of the UK to achieve its objectives for good environmental status, and related Marine Strategy indicators.
Geology and Soils		
Protects the quality of the seabed and its sediments and avoids significant effects on seabed morphology and sediment transport processes.	Activities arising from the plan do not adversely affect the quality and character of the geology and geomorphology of seabed or coastal sediments. Plan activities do not lead to changes in seafloor integrity which could adversely affect the structure and function of ecosystems. Plan activities avoid adverse effects on designated geological and geomorphological sites of international and national importance.	No adverse change in quality of seabed sediments, and seabed sediment transport, informed by project-specific monitoring, and regional monitoring stations (e.g. those used for OSPAR monitoring). No adverse physical damage to designated marine and coastal geological conservation sites (e.g. GCRs, SSSIs, MCZs/MPAs).
Protects the integrity of coastal and estuarine processes.		
Avoids significant damage to geological conservation sites and protects important geological/geomorphological features.		

SEA Objectives	Guide Phrases	SEA Indicators
Landscape/Seascape		
To accord with and contribute to the delivery of the aims and articles of the ELC and minimise significant adverse impact on seascape/landscape including designated and non-designated areas.	Activities do not adversely affect the character of the landscape/seascape. The plan helps to conserve the physical and cultural visual resource associated with the land and sea.	No significant impact on nationally-designated areas (including the setting of heritage assets). Number of areas of landscape sensitivity (e.g. national or local landscape designations) affected by proposed developments (e.g. offshore wind). Extent of the visual resource potentially affected by plan activities. Trajectory of change in coastal Character Areas defined at UK constituent country level show no adverse effects arising from plan activities.
Water Environment		
Protects estuarine and marine surface waters, and potable and other aquifer resources.		No adverse change in quality of water body status, including in relation to attainment of good

SEA Objectives	Guide Phrases	SEA Indicators
Avoid significant impact on flood and coastal risk management activities.	Plan activities do not result in concentrations of contaminants at levels giving rise to pollution effects. Plan activities do not result in permanent alteration of hydrographical conditions which adversely affect coastal and marine ecosystems. Plan activities do not result in adverse effects on saline and potable aquifer resources.	ecological status or potential, or good chemical status. No adverse impact on the ability of the UK to achieve its objectives for GES, and related UK Marine Strategy indicators. UKCS Production meets OSPAR discharge reduction targets. Number of oil and chemical spills and quantity of material spilled. No adverse impact on flood risk as a result of plan activities.
Air Quality		
Avoids degradation of regional air quality from plan related activities.	The plan contributes to the achievement of air quality targets outlined in the Clean Air Strategy 2019, Cleaner Air for Scotland 2, and other strategies of devolved administrations. Emissions from plan activities do not contribute to, or result in, air quality issues which adversely affect human health or the wider environment.	Monitoring of local air quality shows no adverse impact. Targets relating to airborne emissions at a regional and UK level are not exceeded.

SEA Objectives	Guide Phrases	SEA Indicators
Climatic Factors		
Minimises GHG emissions.	The plan contributes to decarbonisation in the energy sector, and the achievement of targets relating to GHGs at a national and international level, which include the UK's Net Zero target, related carbon budgets, and the Nationally Determined Contribution under the Paris Agreement.	Reductions in GHG emissions from oil and gas activities, consistent with requirements under the Oil and Gas Strategy, and the North Sea Transition Deal, including achieving no routine flaring and venting by 2030. UK progress towards meeting legally mandated GHG reduction targets, and the relative reduction in emissions delivered by aspects of the draft plan/programme. Progress towards targets for offshore wind installed capacity, and offshore carbon dioxide transport and storage associated with CCUS (e.g. that deployed in industrial clusters).
Resilience to climate change.	Plan activities recognise the potential impact of climate change during their lifetime, in relation to their potential impact on coastal change, flood risk, or other climate change adaptation. Plan activities recognise the potential for climate change related impacts to affect them and take this into account in their design.	See also; water environment indicators in relation to flood and coastal risk management.

SEA Objectives	Guide Phrases	SEA Indicators
Population and Human Health		
Has no adverse impact on human health and wellbeing.	Plan activities do not result in or contribute to the contamination of fish and other seafood for human consumption at levels which exceed those established in legislation or other relevant standards. Plan activities avoid adverse effects on physical and mental health.	Progress in achieving measures set out by OSPAR, for the continued reduction in the harmfulness of offshore discharges. No adverse impact on the ability of the UK to achieve its objectives for GES, and related UK Marine Strategy indicators. Relevant Office for National Statistics wellbeing metrics. Percentage of population in good health.
Avoids disruption, disturbance and nuisance to communities.	Plan activities avoid adverse nuisance to communities, for instance through noise or vibration. Adverse effects on the quality or access to areas used for recreation (e.g. amenity, sailing, surfing), are minimised or avoided.	Monitoring in relation to Noise Action Plans shows no adverse effects. See also; seascape indicators and those for other users of the sea, material assets.
Other users of the sea, material assets (infrastructure, and natural resources)		
Balances other UK 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.	Plan activities integrate with the range of other existing uses of the marine environment. Plan activities do not result in adverse effects on marine assets and resources.	Spatial planning capable of addressing changes in technology, policy and prioritisation of site selection. Economic and social impact (both positive and negative).

SEA Objectives	Guide Phrases	SEA Indicators
Safety of Navigation.	Plan activities avoid adverse effects on, and contribute to the maintenance of, safe navigation, including recognised shipping routes, traffic separation and existing and proposed port operations.	Increased collision risks and restrictions on pollution prevention methods or Search & Rescue options in the event of an emergency.
Reduces waste.	Properties and quantities of waste and litter resulting from plan activities do not cause harm to the coastal and marine environment.	Progress in reducing volumes of waste to landfill from plan activities.
Cultural Heritage		
Protects the historic environment and cultural heritage of the UK, including its setting.	Activities avoid adverse effects on the character, quality and integrity of the historic and/or cultural landscape, including those sites which are designated or registered, and areas of potential importance.	Any impact upon the condition of designated sites and features (including impact on their setting) and all other recorded sites and features.
Contributes to archaeological knowledge.	Plan activities contribute to the archaeological and cultural knowledge of the marine and coastal environment through survey and discovery.	Number of archaeological finds reported through best practice as a result of plan activities, and their deposit with national curatorial bodies of archaeological studies produced by offshore energy projects.

6.4 Potential Sources of Effect

Those activities outlined in Section 3.5 can interact with the natural and broader environment in a number of ways. An initial list of the main potential sources of environmental effects from activities which could follow adoption of the draft plan/programme is provided below:

- Noise (impulsive, semi-continuous or continuous)
- Physical damage or change to the seabed and subsurface
- Other indirect physical effects on seabed and water column
- Ecological effects of presence of structures
- Interactions with other users of the sea
- Visual intrusion
- Chemical and other inputs
- Atmospheric emissions
- Electromagnetic fields
- Waste disposal onshore
- Decommissioning and legacy issues
- Accidental events

These are further elaborated upon in Table 6.2 below, where more specific potential sources of significant effects on the environment from the activities covered in the draft plan/programme have been identified, including on which SEA topics effects are considered possible. A question mark indicates uncertainty of potential for effect.

Consultation Question

10. 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?

Table 6.2: Sources of Potentially Significant Effect against Plan Level Activities

Sources of Potentially Significant Effect	Oil & Gas	Gas Storage	CCUS	Offshore Wind	Tidal Stream	Tidal Range	Wave	Hydrogen
Biodiversity, habitats, flora and fauna								
Physical damage to/loss of biotopes from infrastructure construction including seabed preparation, operation and maintenance, and decommissioning (direct effects on the physical environment)	X	X	X	X	X	X	X	X
Changes/loss of habitats related to the placement of structures on the seabed and related protection materials	X	X	X	X	X	X	X	X
Behavioural and physiological effects on marine mammals, birds and fish from deep geological seismic surveys	X	X	X					
Behavioural and physiological effects on marine mammals, birds and fish from other geophysical surveys	X	X	X	X	X	X	X	X
Behavioural and physiological effects on marine mammals, birds and fish associated with construction phase noise[120]	X	X	X	X	X	X	X	X
Behavioural and physiological effects on marine mammals, birds and fish associated with operational noise	X	X	X	X	X	X	X	X
Behavioural and physiological effects on marine mammals, birds and fish associated with decommissioning noise	X	X	X	X	X	X	X	X
The introduction and spread of non-native species	X	X	X	X	X	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	X
Collision risks to birds				X	X	X	X	

[120] May include piling noise, and the detonation of unexploded ordnance (UXO).

Sources of Potentially Significant Effect	Oil & Gas	Gas Storage	CCUS	Offshore Wind	Tidal Stream	Tidal Range	Wave	Hydrogen
Collision risks to bats				X				
Collision risks to water column megafauna (e.g. fish, marine mammals), including entanglement in moorings and from vessels	X	X	X	X	X	X	X	
Barriers to movement of birds (e.g. foraging, migration)				X	X	X		
Barriers to movement of fish and marine mammals					X	X	X	
Changes/loss of habitats from major alteration of hydrography or sedimentation (indirect effects on the physical environment)				X	X	X	?	
Potential for effects on flora and fauna of produced or treated water and drilling discharges	X	X	X	X	X	?	X	X
EMF effects on electrosensitive species	X	X	X	X	X	X	X	X
The nature and use of antifouling materials				?	X	?	X	
Accidental events – major oil or chemical spill	X							
Accidental events – major release of carbon dioxide			X					
Accidental events – major release of hydrogen								X
Geology and Soils								
Physical effects of anchoring and infrastructure construction (including pipelines and cables), operation and maintenance, and decommissioning on seabed sediments and geomorphological features (including scour)	X	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	X	X	X	X	X
Effects of reinjection of produced water and/or cuttings and carbon dioxide	X	X	X					

Sources of Potentially Significant Effect	Oil & Gas	Gas Storage	CCUS	Offshore Wind	Tidal Stream	Tidal Range	Wave	Hydrogen
Onshore disposal of returned wastes – requirement for landfill	X	X	X	X	X	X	X	X
Post-decommissioning (legacy) effects – cuttings piles, footings, foundations, *in situ* pipelines, cabling etc	X	X	X	X	X	X	X	X
Changes to sedimentation regime and associated physical effects				X	X	X	X	
Accidental events – risk of sediment contamination from oil spills	X							
Accidental events – blow out impacts on seabed	X							
Offshore disposal of seabed dredged material	X	X	X	X	X	X	X	X
Landscape/Seascape								
Potential effects of development on seascape including change to character (interactions between people (and their activities) and places (and the natural and cultural processes that shape them))	X	X	X	X	X	X	X	X
Water Environment								
Contamination by soluble and dispersed discharges including produced water, saline discharges (aquifer water and halite dissolution), and drilling discharges from wells and foundation construction	X	X	X	X	X	?	X	X
Changes in seawater or estuarine salinity, turbidity and temperature from discharges (such as aquifer water and halite dissolution) and impoundment		X	X			X		
Energy removal from wet renewable devices, and offshore wind farms				X	X	X	X	
Changes to thermal stratification, current strength and wave climate				X	X	X	X	?
Accidental events - contamination of the water column by dissolved and dispersed	X	X	X	X	X	X	X	X

Sources of Potentially Significant Effect	Oil & Gas	Gas Storage	CCUS	Offshore Wind	Tidal Stream	Tidal Range	Wave	Hydrogen
materials from oil and chemical spills or gas releases								
Air Quality								
Local air quality effects resulting from exhaust emissions, flaring and venting	X	X	X	X	X	X	X	X
Air quality effects of a major gas release or volatile oil spill	X	X	X					X
Climatic Factors								
Contributions to net greenhouse gas emissions	X	X	X	X	X	X	X	X
Reduction in net greenhouse gas emissions			X	X	X	X	X	X
Effects on blue carbon	X	X	X	X	X	X	X	X
Population and Human Health								
Potential for effects on human health associated with reduced local air quality resulting from atmospheric emissions associated with plan activities	X	X	X					
Potential for effects on human health associated with discharges of naturally occurring radioactive material in produced water	X	X	?					
Accidental events – potential food chain or other effects of major oil or chemical spills or gas release	X	X	X					
Other users of the sea, material assets (infrastructure, and natural resources)								
Socio-economic effects of the draft plan/programme	X	X	X	X	X	X	X	X
Interactions with fishing activities (exclusion, displacement, seismic, gear interactions, “sanctuary effects”)	X	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	X

Sources of Potentially Significant Effect	Oil & Gas	Gas Storage	CCUS	Offshore Wind	Tidal Stream	Tidal Range	Wave	Hydrogen
Accidental events – socio-economic consequences of oil or chemical spills and gas releases	X	X	X					
Cultural Heritage								
Physical damage to submerged heritage/archaeological contexts from infrastructure construction, vessel/rig anchoring etc. and impacts on the setting of coastal historic environmental assets and loss of access.	X	X	X	X	X	X	X	X

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) by SEA topic – note at this stage no activities, potential effects or receptors have been scoped out.

The assessment will consider the entirety of the relevant waters for each aspect of the plan, however, it is proposed that the assessment is also focussed by considering the resource areas identified for each aspect of the plan, where relevant (see Section 3.5), and will consider how spatial aspects could further constrain the plan (see below).

6.5 Spatial consideration

The draft plan/programme is not well spatially defined beyond the relevant UK waters it covers, and it is proposed that a spatial assessment is undertaken to understand the level of offshore constraint there is for aspects of the draft plan/programme, building on that of previous OESEAs. A strategic spatial consideration has been undertaken for previous SEAs, starting in 2009, and while not directly connected to offshore wind leasing rounds, those areas identified to be of lower spatial constraint have in many cases been in part those areas selected to be leased. It is recognised that a number of other programmes of work have made significant progress in identifying spatial constrain in all or part of the relevant waters covered by the draft plan/programme, for example, MSPri, the SSEP, and TCE's Marine Delivery Routemap, all of which have been, or will be, variously informed by TCE including its *Whole of Seabed*[121] work. It is not the intention for OESEA5 to duplicate this work, and it will therefore seek synergies with these other programmes, where possible, to understand potential spatial constraints. OESEA5 will, however, make an independent consideration of potential spatial constraints for

[121] https://www.thecrownestate.co.uk/our-business/marine/marine-overview

the draft plan/programme that will inform its consideration of the reasonable alternatives, and overall conclusion.

6.6 Monitoring

In fulfilment of the requirements of the SEA Regulations[122], the Department will monitor the effects of the activities arising following the adoption of the draft plan/programme for the purpose of identifying unforeseen adverse effects at an early stage, and to allow appropriate remedial action to be undertaken where necessary. The indicators shown in Table 4.1 form the basis of providing a high-level framework within which to monitor the effects of the plan/programme, and previous SEAs have used a number of existing monitoring and other arrangements to fulfil the requirements of the Regulations[123]. A high-level overview of these sources is provided in Table 6.3 below.

Consultation Question

11. Are there any additional information sources or existing monitoring arrangements which could be used to inform monitoring of the offshore energy draft plan/programme?

Table 6.3: SEA Indicators and Related Monitoring

Indicator	High Level Monitoring Outcomes and Relevant links
Biodiversity, habitats, flora and fauna	
No significant loss of diversity or decline in population attributable to plan related marine activities and promotion of recovery wherever possible.	Research and monitoring relating to conservation sites and species are kept under review by DESNZ as part of the SEA programme. These include: Monitoring and Advice by The Special Committee on Seals (SCOS) The Seabird Monitoring Programme (SMP) The Wetland Bird Survey (WeBS) Site condition monitoring for conservation sites Common Standards Monitoring for Designated Sites (CSM) The Clean Seas Environment Monitoring Programme (CSEMP)

[122] Regulation 17(1), "The responsible authority shall monitor the significant environmental effects of the implementation of each plan or programme with the purpose of identifying unforeseen adverse effects at an early stage and being able to undertake appropriate remedial action."
[123] In keeping with Regulation 17(2), "The responsible authority's monitoring arrangements may comprise or include arrangements established otherwise than for the express purpose of complying with paragraph 17(1)".

Indicator	High Level Monitoring Outcomes and Relevant links
	Studies undertaken to further understand potential effect of plan activities on birds and marine mammals – see OESEA gov.uk webpages Links: UKMMAS, SCOS Reports, SMP Results, WeBS Report, CSM, the Offshore Energy SEA BGS data archive, Marine Strategy Part Two: UK Marine Monitoring Programmes, and data underpinning UK's OSPAR Joint Assessments and Monitoring Programme requirements, and the UK Marine Strategy
Activities subsequent to licensing/leasing or issue of a Transitional Energy Certificate which overlap, or potentially affecting designated sites (e.g. SACs, SPAs, Marine Conservation Zones, Nature Conservation Marine Protected Areas), or with the potential to disturb a protected species, are compliant with the requirements of relevant UK and devolved Regulations, and consistent with national and regional policy.	HRA screenings (and Appropriate Assessments where a likely significant effect were identified) and MCZ/MPA assessments have been undertaken for Block licence awards relating to past licensing rounds, and also for gas storage licences, including for carbon dioxide. Appropriate Assessment was undertaken for offshore wind leasing by The Crown Estate, including for Round 4, Round 5, project extensions, and capacity increases, and all relevant projects related to these Round 4, and project extensions are subject to HRA as part of their applications for development consent. Where adverse effects on the integrity of sites were identified at the plan level (Round 4, Capacity Increase Programme) and project level, compensatory measures were identified. The Offshore Wind Environmental Improvement Package (OWEIP) is being developed by Government to help offshore wind project applicants address unavoidable impacts to Marine Protected Areas (MPA) at a strategic level, facilitated through one or more Marine Recovery Funds (MRF) into which applicants can choose to pay to discharge environmental compensation obligations. Work is ongoing on the MRF, with interim guidance presently in place. The Marine Recovery Funds Regulations 2025 came into force in December 2025, which enables one or more MRFs to be established, and sets out the procedures for applications and decisions in relation to a MRF.
No adverse change in the environmental status of marine sub-regions, including in relation to the attainment of targets for UK Marine Strategy descriptors; or in the ecological status of	Progress towards achieving Good Environmental/Ecological Status in relation to the UK Marine Strategy. Links: Marine Strategy Part Two: UK Marine Monitoring Programmes, Environment Agency Catchment Data Explorer

Indicator	High Level Monitoring Outcomes and Relevant links
WFD transitional waters and the attainment of good status/potential. No adverse impact on the ability of the UK to achieve its objectives for good environmental status, and related MSFD indicators.	
Geology and soils	
No adverse change in quality of seabed sediments, and seabed sediment transport, at a series of regional monitoring stations.	Results from regional surveys (e.g. those formerly undertaken by OGUK, and those commissioned as part of the OESEA programme, those related to the Offshore Wind Evidence and Change Programme (OWEC)), and syntheses of offshore wind farm licensing conditions monitoring do not reveal adverse changes to sediment quality or character associated with plan activities. Links: Review of Offshore Wind Farm Monitoring Data 2010 and 2014, OSPAR Coordinated Environmental Monitoring Programme (CEMP) Reporting, Marine Strategy Part One[124], Marine Strategy Part Two: UK Marine Monitoring Programmes (to be considered in relation to descriptors 6 and 7), POSEIDON (Planning Offshore wind Strategic Environmental Impact DecisiONs) project.
No physical damage to designated marine and coastal geological conservation sites (e.g. GCRs SSSIs, MCZs/MPAs).	Keep under review the level of plan related activity, e.g. new pipelines (including landfalls), and related assessments and identification of potential effects. For those constructed, each was subject to Environmental Impact Assessment (EIA) and consultation with the public and statutory consultees including nature conservation bodies responsible for the identification and management of conservation sites. DESNZ have required consideration of designated and potential MCZ/MPAs for all new licence applications in recent licensing rounds for oil and gas, and carbon dioxide storage and requires their consideration during permitting of all subsequent activities.

[124] An updated assessment was subject to consultation in 2025: https://consult.defra.gov.uk/uk-marine-strategy-1/uk-marine-strategy-part-one-update-2025/consult_view/

Indicator	High Level Monitoring Outcomes and Relevant links
	Links: Environmental Statements reviewed/ approved in relation to oil and gas activity (including pipelines), Nationally Significant projects related to the plan/programme
Landscape/seascape	
No significant impact on nationally-designated areas.	Maintain awareness of development decisions and their reasoning, and associated consent conditions following plan adoption on the basis of landscape or seascape effects on nationally-designated sites.
Extent of the visual resource potentially affected by the particular developments.	Taken as a measure of the number of proposed or approved developments associated with the plan which are within 12nm, or viewable distance, of the coast.
Number of areas of landscape sensitivity affected by proposed developments (e.g. offshore wind).	Taken as a measure of the number of proposed or approved developments associated with the plan which are within 12nm, or viewable distance, of sensitive or designated landscapes.
Trajectory of change in coastal National Character Areas shows no adverse effects arising from plan activities.	The majority of plan activities to date have taken place some distance offshore or are transient, however the scale of future offshore wind may present changes to the character of some coasts associated with National Character Areas (NCAs). Such a trajectory of change will be reviewed following offshore wind farm construction and review of NCAs, however, it is acknowledged that these are identified as a driver of change within certain NCA descriptions. Link: National Character Areas
Water Environment	
No adverse change in quality of coastal/transitional water body status, including in relation to attainment of good ecological status or potential, or good chemical status.	Indicators of chemical and biological status for coastal and transitional waters. Trends or condition with regards to hazardous substances, eutrophication, litter and radioactivity in marine waters. Links: Marine Strategy Part Two: UK Marine Monitoring Programmes, Environment Agency Catchment Data Explorer, Marine Strategy Part One (note pending update referred to above).
No adverse impact on the ability of the UK to achieve its objectives for GES, and	Marine Strategy Part Two: UK Marine Monitoring Programmes (to be considered in relation to descriptors 5, 8 and 10).

Indicator	High Level Monitoring Outcomes and Relevant links
related UK Marine Strategy indicators.	
UKCS Production meets OSPAR discharge reduction targets.	The quantity of produced water discharged between 2016 and 2020 reduced from 154 to 136 million m^3, with a minor average increase in oil in produced water from 13 to 17.8mg/l, reversing a trend of declining oil concentrations over the preceding five years. Links: OSPAR discharges, spills and emissions from offshore oil and gas installations
Number of oil and chemical spills and quantity of material spilled.	Links: PON1 reporting
No adverse impact on flood risk as a result of plan activities.	Changes in coastal flood risk as noted in updates to the UK Climate Change Risk Assessment.
Air Quality	
Monitoring of local air quality shows no adverse impact.	Contribution of plan activities to emissions associated with designation of Local Air Quality Management Areas. Links: Air Pollution in the UK annual report
Targets relating to airborne emissions at a regional and UK level are not exceeded.	Levels of pollutants on the National Atmospheric Emissions Inventory (NAEI) during the currency of the plan/programmes for England and the devolved administrations. National Emissions Ceilings Directive targets for NOx, NMVOCs, SO2 and NH3 and those targets set under the Gothenburg Protocol, to be met by 2020. Regional deposition of air pollutants around the North Sea and the North-East Atlantic. Links: OSPAR Comprehensive Atmospheric Monitoring Programme (CAMP) Reporting, Emissions of Air Quality Pollutants 1970-2023, NAEI data and reports, National Statistics: Emissions of air pollutants
Climatic Factors	
Reductions in upstream GHG emissions from oil and gas activities are consistent	GHG emissions from activities related to the plan/programme.

Indicator	High Level Monitoring Outcomes and Relevant links
with requirements under the Oil and Gas Strategy and the North Sea Transition Deal.	Link: OSPAR oil and gas emissions and discharges, UK greenhouse gas emissions statistics (Exploration, production and transport of oils and gas), NSTA Emissions Monitoring (latest 2025)
UK progress towards meeting legally mandated GHG reduction targets, and the relative reduction in emissions delivered by aspects of the plan/programme.	DESNZ are mindful of the updated IPCC (2013) physical science basis (and its update in 2023 as part of the Sixth Assessment Report (AR6)), and subsequent special reports (e.g. on global warming of 1.5°C and on the Oceans and Cryosphere) and the introduction of a revised set of emissions scenarios to inform modelling of UK regional and National trends. This indicator is being kept under review. Link: UK greenhouse gas emissions statistics, UK Carbon Budget
Population and human health	
Progress in achieving measures set out by OSPAR, for the continued reduction in the harmfulness of offshore discharges.	See response to indicators for Water Environment and Air Quality.
No adverse impact on the ability of the UK to achieve its objectives for GES, and related UK Marine Strategy indicators.	Link: Marine Strategy Part Two: UK Marine Monitoring Programmes (to be considered in relation to descriptor 9).
Monitoring in relation to Noise Action Plans shows no adverse effects.	Contribution of plan activities to noise for those agglomerations where Noise Action Plans have been implemented. Link: Noise Action Plans
Relevant Office for National Statistics wellbeing metrics.	Trends in well-being are reported through the Office for National Statistics (ONS). Link: Relevant ONS wellbeing statistics
Other users of the sea, material assets (infrastructure, and natural resources)	
Spatial planning capable of addressing changes in technology, policy and prioritisation of site selection	Keep emerging marine spatial planning policy under review, including those subject to revision and update. Link: Marine Plans (England), National Marine Plan for Scotland, Wales, Northern Ireland

Indicator	High Level Monitoring Outcomes and Relevant links
Economic and social impact (both positive and negative).	Contribution of the plan/programme to the maintenance of security of supply, jobs and fiscal returns. Links: Offshore Energies UK (OEUK) Economic Reporting, The ONS UK Environmental Accounts, DESNZ Energy Trends, Recent Decisions on Energy Infrastructure Applications
Increased collision risks and restrictions on pollution prevention methods or Search & Rescue options in the event of an emergency.	Compliance of all developments to undertake suitable navigational risk assessments. Adherence of offshore wind farm applications to MCA Marine Guidance Note 543: Offshore Renewable Energy Installations (OREIs)[125] - Guidance on UK Navigational Practice, Safety and Emergency Response Issues. Links: Oil and gas environmental data: consent to locate, relevant offshore wind farm application navigation risk assessments, inspectorate recommendations and SoS decisions
Progress in reducing volumes of waste to landfill.	Waste quantity, type and disposal route (e.g. landfill, recycling) as monitored by DESNZ through EEMS. General trends in operator waste production and disposal routes publicised through annual OSPAR Environmental Management System (EMS) reporting requirements. Links: EMS Public statements
Cultural Heritage	
Any impact upon the condition of designated sites and features (including impact on their setting) and all other recorded sites and features.	Any plan activities which could interact with designated protected sites (e.g. Military remains, protected wrecks).
Number of archaeological finds reported through best practice as a result of plan activities, and their deposit with national curatorial bodies of archaeological	Information collected by the Receiver of Wreck, relevant local Historic Environment Records and National Monuments Records. Link: Wreck and salvage law

[125] This is presently subject to review: https://www.gov.uk/government/consultations/second-consultation-on-the-review-of-mgn-543-and-methodology

Indicator	High Level Monitoring Outcomes and Relevant links
studies produced by offshore energy projects.	

6.7 Environmental Outcomes Reports

The Government remains committed to bringing forward Environmental Outcomes Reports (EORs), for which it is due to publish a roadmap. Originally created under the *Levelling Up and Regeneration Act 2023*, the purpose of EORs is to replace the arrangements for SEA and EIA transposed from EU Directives with a domestic framework, while maintaining the UK's obligations under the UN Aarhus and Espoo Conventions. Their purpose is to streamline the current assessment process to support faster delivery of infrastructure and drive growth, by refocusing on key environmental issues and reducing administrative burden. Awareness will be maintained of any progress on implementing EORs during the SEA process.

6.8 Habitats Regulations Assessment

As noted in Section 3.1, leasing/licensing and granting of Transitional Energy Certificates are split between a number of authorities, and for the purposes of Habitats Regulations Assessment (HRA). In relation to the aspects considered in the draft plan/programme, The Crown Estate is the Competent Authority for renewables leasing, and whilst the OGA is the licensing authority for further licensing relating to gas storage, including of carbon dioxide and hydrogen, and for future granting of Transitional Energy Certificates for oil and gas production, the Secretary of State remains the Competent Authority for HRA purposes.

6.9 Production of the Environmental Report

Table 6.4, indicates the proposed Environmental Report document structure be divided into 7 sections not including a bibliography, glossary, non-technical summary and appendices.

Table 6.4: Proposed Environmental Report Section Contents

Report Section	Summary	
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.	Environmental Report
Section 2: Overview of the draft plan/programme & Relationship to Other Initiatives	Will provide details of the background to the proposed plan/programme, the draft plan/programme itself, its objectives and relationships to other initiatives. Alternatives to the draft 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. OESEA5 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/granting of Transitional Energy Certificates 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 draft plan/programme would be adopted.	
References	List of all sources cited in the assessment text and appendices.	

Report Section	Summary	
Glossary & abbreviations	-	
Appendix 1: 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.	**Appendices to Environmental Report**
Appendix 2: 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 3: SEA Workshops	Will contain summaries of the SEA workshops which will be held to contribute to the SEA process and information base.	
Appendix 4: Other initiatives	Describes in a hierarchy, other initiatives, plans and programmes of relevance to the draft plan/programme, the implications of these for the draft plan/programme and the implications of the proposed plan/programme on these other plans and programmes. This will be a version of that presented in Section 4 of this scoping report.	
Appendix 5: Regulatory and other controls	Summarises the key environmental legislation and controls in relation to the draft plan/programme.	

7 Consultation

The OESEA consultation process has been designed to be in keeping with the Cabinet Office guidance[126] on Consultation Principles for engaging stakeholders when developing policy and legislation.

7.1 Consultation process

There are several opportunities for consultation bodies and other stakeholders to provide input during the different phases of the SEA process as described below.

Consultation Question

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

7.1.1 Scoping

A copy of this scoping report will be sent to the relevant consultation bodies/authorities listed below with a formal request for their input. Input from the general public is also welcomed during this period and the scoping report will be available to freely download from the SEA pages of the gov.uk website[127].

In accordance with the requirements of the relevant SEA Regulations, the period of consultation for this SEA scoping report will be **five weeks**. All feedback from the scoping consultation will be reviewed and will be used to inform the SEA process and where appropriate, addressed in the Environmental Report. A compilation of the scoping feedback and a response to these will be published at the end of the scoping stage on the OESEA pages of gov.uk.

7.1.2 Workshops

It is proposed to hold a number of regional stakeholder workshops during the preparation of the SEA. These workshops may be held in person or virtually.

7.1.3 The Draft Plan/Programme and Environmental Report

The draft Plan/Programme and OESEA5 Environmental Report will be issued for formal public consultation for a period of **eight weeks**, which is likely to be in mid-2026. During this period, the draft Plan/Programme and the OESEA5 Environmental Report will be available to view or freely download from the OESEA pages of the gov.uk website. Notices will be inserted in national and regional newspapers to inform the general public of the SEA consultation. Copies

[126] https://www.gov.uk/government/publications/consultation-principles-guidance (latest version at time of publication was 2018)
[127] https://www.gov.uk/guidance/offshore-energy-strategic-environmental-assessment-sea-an-overview-of-the-sea-process

of the OESEA5 Environmental Report will be sent to consultation bodies and authorities in the UK and to Member States, as required by the SEA Regulations.

7.1.4 Post Consultation

Following the consultation period, a summary of the issues raised, and other comments received during the public consultation will be produced and, where appropriate, responses to comments will provide factual and technical clarifications. This response will be available to view or freely download from the OESEA pages of the gov.uk website.

There are many considerations which the Department 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. Subject to the outcome of the above SEA 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. A copy of the plan or programme, as it was adopted, and updated Environmental Report will also be made available.

7.1.5 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:

- Historic England
- Natural England
- Environment Agency
- Historic Environment Scotland (previously Historic Scotland)
- NatureScot (previously Scottish Natural Heritage)
- Scottish Environment Protection Agency
- Cadw (Welsh Assembly Government's historic environment division)
- Natural Resources Wales
- Department of Agriculture, Environment and Rural Affairs (NI) (taking over relevant functions from the former Department of the Environment)
- Scottish Ministers
- National Assembly for Wales

In addition, the JNCC, the MMO and Scottish Government Marine Directorate are included as consultees for this SEA. It is also proposed to include the wide range of interested stakeholders and the general public in the scoping consultation exercise. The plan scope and other aspects of this document have also been informed by the SEA Steering Group, meetings

of which will take place through the SEA process. The SEA Steering Group[128] is composed of departmental representatives, conservation and other agencies, Non-Governmental Organisations (NGOs), industry representatives and independent experts.

[128] https://www.gov.uk/government/groups/offshore-energy-sea-steering-group

8 Input to Scoping and Next Steps

8.1 Scoping Input

For convenience the consultation questions are listed again below:

Consultation Questions

1. **Do you have any comments on the key marine energy resource areas and likely scale of aspects of the draft plan/programme to be considered in OESEA5?**
2. **Consultees are invited to highlight additional initiatives which they consider are relevant to the draft plan/programme.**
3. **Consultees are invited to draw attention to and provide (where relevant/possible) additional information and data sets which they consider of potential relevance to this SEA.**
4. **Do you agree with the choice of Regional Seas used to help describe the environmental baseline?**
5. **Are there any additional environmental problems you consider to be relevant to the SEA?**
6. **Are there any additional influences, and supporting data sources, on the likely evolution of the environmental baseline?**
7. **Are there any additional alternatives that you feel the SEA should reflect?**
8. **Are there any objectives that you feel should be included or removed?**
9. **Are the indicators for each objective suitable? If not, please suggest alternatives.**
10. **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?**
11. **Are there any additional information sources or existing monitoring arrangements which could be used to inform monitoring of the offshore energy draft plan/programme?**
12. **Do you have any comments on the proposed approach to consultation?**

8.2 Next Steps

All feedback from the scoping consultation will be reviewed and, where appropriate, addressed in the Environmental Report. A compilation of the scoping feedback and a response to these will be published at the end of the scoping stage on the OESEA pages of gov.uk. The scoping feedback will be used to inform the SEA process.

The Environmental Report will be published for a period of public consultation expected to be in 2026.

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