

# Planning Scotland's Seas

Sustainability Appraisal of the Sectoral Plans for  
Offshore Renewable Energy in Scottish Waters

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## 1.2 What is a Sustainability Appraisal?

- 1.2.1 A Sustainability Appraisal is a method of measuring and attempting to understand the environmental, social and economic effects of plans. The central principles of sustainability include sustainable economic growth, living within environmental limits, and ensuring a strong, healthy and just society.
- 1.2.2 A Sustainability Appraisal approach has been undertaken to inform the development of the consultation draft plans and has been informed by detailed technical assessments. A Strategic Environmental Assessment (SEA) which assesses impacts on the environment, a Habitats Regulations Appraisal (HRA) which considers impacts on areas designated for habitats and species of international importance, and a socio-economic assessment that considers the impacts on other marine users and communities. Detailed technical reports from these assessments are also available for consultation.

## 1.3 What does the Sustainability Appraisal say about the plans?

- 1.3.1 There are many recognised benefits of utilising offshore renewables and transferring to a low carbon energy generation. It is highlighted by the Sustainability Appraisal that although beneficial there is still the potential for environmental, economic and social effects. These effects may even be adverse. There are difficulties in determining the significance of some of these due to varying factors such as gaps in knowledge of the governing body on the effects of renewable energy devices and also due to project specific factors, such as design and precise location.
- 1.3.2 The Sustainability Appraisal and accompanying technical assessments, identify mitigation and controls that if applied through the plan review process, and project design, planning and assessment could avoid and minimise adverse effects and increase sustainability. The draft plans incorporate some of these controls into their structure and these are available for comment as part of this assessment.

## 1.4 What are the recommendations of the Sustainability Appraisal?

- 1.4.1 The Sustainability Appraisal combines the recommendations of the technical assessments. These fall into three broad groups. Firstly recommendations for consideration in the planning and assessment of renewables projects within Draft Plan Options. These seek to reduce the potential adverse effects of issues that in many cases relate to aspects of project design or to specific devices, which have the potential to be proposed within Draft Plan Options but cannot be established at this strategic planning stage. Consideration of the recommendations in the development of projects will help to assist in avoiding or minimising the adverse effects identified.

- 1.4.2 Secondly the assessments recommend that further strategic planning and assessment be undertaken for the grid that will support new offshore energy development.
- 1.4.3 Finally there are recommendations in all of the assessments to create a project advisory group who can assist in filling gaps within the knowledge base regarding the likely effects of the plan. This is to be undertaken by creating a framework to draw together project level monitoring of effects, and current research streams into the potential effects of technologies. Furthermore the group can facilitate the means to bring this information into the plan review process and to suggest the necessary and targeted future research to fill outstanding data gaps. The project advisory group will help to provide greater clarity in regards to the significance of the effects of the plans, and enable plan options and growth scenarios to be revisited within the plan review process.

## 1.5 What are the next steps?

- 1.5.1 The Draft Plans, Sustainability Appraisal Report, SEA Environmental Report and Socio-Economics Report are subject to a 16 week statutory consultation period. The relevant documents are available on the Scottish Government's website at <http://www.scotland.gov.uk/Consultations/Current> and in hard copy from:

Offshore Renewable Energy Planning  
Marine Scotland  
Policy and Planning  
Area 1-A South  
Victoria Quay  
Edinburgh  
EH6 6QQ

Tel: 0300 244 1235

- 1.5.2 Submissions regarding the Draft Plan, Sustainability Appraisal Report and accompanying assessment reports are being invited from the public and interested stakeholder organisations. Responses must be made in writing by 13th November 2013. These should be sent to the above address, or emailed to: [offshorerenewableenergy@scotland.gsi.gov.uk](mailto:offshorerenewableenergy@scotland.gsi.gov.uk).
- 1.5.3 Following the completion of the consultation period, the Draft Plans will be reviewed by Marine Scotland (taking account of submissions received), revised as appropriate, and a final version will be formally adopted.
- 1.5.4 A Post-Adoption Statement will be prepared to document the process and demonstrate how issues raised during consultation have been addressed by the final Plans. It is proposed that the Plans are reviewed every two years and updated and revised as appropriate after this period.

## 2 Introduction to the Plans and Sustainability Appraisal

### 2.1 Introduction

- 2.1.1 The Marine and Coastal Access Act 2009 (Schedule 6 s10) states “*a marine plan authority preparing a marine plan must carry out an appraisal of the sustainability of its proposals for inclusion in the plan*”. Whilst this applies to the statutory marine planning undertaken through the National Marine Plan process, the non-statutory sectoral plans for offshore wind, wave and tidal energy have also been subject to a Sustainability Appraisal (SA) for consistency in approach.
- 2.1.2 The plans are required to undertake a Strategic Environmental Assessment (SEA) under the Environment Assessment (Scotland) Act 2005 and the Environmental Assessment of Plans and Programmes Regulations 2004. The plans were also required to undertake a Habitats Regulations Appraisal (HRA) under the Conservation (Natural Habitats, &c.) Regulations 1994 and The Conservation of Habitats and Species Regulations 2010. The technical reports are available online<sup>1 2</sup>.
- 2.1.3 Furthermore Marine Scotland commissioned ABP Mer and RPA to analyse the potential economic impacts of the Draft Plan Options on other activities that make use of the sea, and any consequent social impacts that could arise as a result of these. This analysis, ‘*Developing the Socio-economic Evidence Base for Offshore Renewable Energy Sectoral Marine Plans in Scottish Waters*’<sup>3</sup> (henceforth the ‘socio-economic assessment’) is published as a supporting document to this Sustainability Appraisal.
- 2.1.4 The inputs from the SEA and HRA constitute the ‘environment’ sections of the SA. The socio-economic assessment has informed the ‘people and health’ and ‘economy and other marine users’ sections of this SA.
- 2.1.5 This SA report has been prepared to accompany the plans for offshore wind, wave and tidal energy and considers the relevant sustainability issues facing the potential development of offshore renewable energy. It also highlights the recommendations from the assessments for improving the sustainability of the plans for consideration.
- 2.1.6 The structure of this document is set out as follows:
- Section 1: Non-Technical Summary
  - Section 2: Introduction to the Plans and Sustainability Appraisal

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<sup>1</sup>Scottish Government (2013) *Strategic Environmental Assessment of the Sectoral Marine Plans for Offshore Renewable Energy in Scottish Waters*

<sup>2</sup> ABP Mer (2013) *Habitats Regulations Appraisal of the Sectoral Marine Plans for Offshore Renewable Energy in Scottish Waters*

<sup>3</sup> ABP Mer and RPA (2013, forthcoming), *Developing the Socio-Economic Evidence Base for Offshore Renewable Energy Sectoral Marine Plans in Scottish Waters*



- Section 3: Findings of the SA for the Plan for Offshore Wind
- Section 4: Findings of the SA for the Plan for Wave
- Section 5: Findings of the SA for the Plan for Tidal
- Section 6: Cumulative Effects of Offshore Energy
- Section 7: Next Steps

2.1.7 This SA report is available for consultation alongside the plans, and the technical assessments (SEA Environmental Report, HRA Record, and socio-economic evidence base report). Consultation opened in July 2013 and will run for a period of 16 weeks. Greater detail on the consultation is provided in section 5 of this report.

2.1.8 Throughout the 16 week consultation period, Marine Scotland will be holding a series of open meetings for stakeholders and members of the public to raise awareness of, and encourage further discussion on the Draft Plans and the Sustainability Appraisal. Locations and timings will be published on the Scottish Government website.

## 2.2 Evolution of the Plans for Wind, Wave and Tidal Energy

2.2.1 Marine Scotland is currently undertaking a review of its Sectoral Marine Plan for offshore wind energy development. Scottish Ministers adopted '*Blue Seas - Green Energy: the Plan for Offshore Wind Energy in Scottish Territorial Waters*' in March 2011<sup>4</sup>. '*Blue Seas Green Energy*' set out a number of areas for offshore wind energy development including six 'sites' for development in the short term, and around 25 further 'areas of search' for consideration in the medium to longer term. It contained commitments to further research, data collection, stakeholder engagement and monitoring to accompany this programme of development. It also made a commitment to a 2 year review period, reflecting the fast pace of change within the offshore renewable sector and prompting the current revision of the plan.

2.2.2 '*Blue Seas, Green Energy*' considers the potential of Scottish territorial waters to accommodate offshore wind energy developments in the short, medium and long term. It was also subject to a SA which comprised a SEA<sup>5</sup>, HRA<sup>6</sup> and socio-economic assessment<sup>7</sup>.

2.2.3 At the same time as the aforementioned review, Marine Scotland is also commencing preparation of Sectoral Marine Plans for Wave and Tidal Energy. A Marine Renewables SEA was undertaken during 2004-06 and an

<sup>4</sup> Marine Scotland (2011) *Blue Seas - Green Energy A Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters* [Online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/18141232/0> (accessed 14/2/2013)

<sup>5</sup> Marine Scotland (2011) Strategic Environmental Assessment (SEA) of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters [Online] Available at: <http://www.scotland.gov.uk/Publications/2010/05/14155353/0> (accessed 14/2/2013)

<sup>6</sup> Marine Scotland (2011) Habitats Regulations Appraisal of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters: Appropriate Assessment [Online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/22092539/0> (accessed 14/2/2013)

<sup>7</sup> Marine Scotland (2011) Marine Scotland: Economic Assessment of Short Term Options for Offshore Wind Energy in Scottish Territorial Waters: Costs and Benefits to Other Marine Users and Interests [Online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/22104736/0> (accessed 14/2/2013)

Environmental Report was published in 2007 which examined the environmental effects of developing wave and tidal power.

- 2.2.4 The 2007 SEA has been reviewed as part of the current SEA process, which in turn has informed this SA Report. It has also fed into the preparation and delivery of the Scottish Government's strategy for the development of marine energy in Scotland's marine environment out to 12 nautical miles. The 2007 SEA also provided marine developers with data on the most appropriate and best locations to place wave and tidal devices on the north and west coasts of Scotland; setting out the issues which had to be tackled to facilitate the breakthrough of the wave and tidal energy sectors.
- 2.2.5 The 2007 SEA reported that there were considerable marine renewable energy resources around Scotland and that there were also significant levels of existing users and constraints within the marine environment. The SEA highlighted that the sector would require locational guidance and simplified regulation and that uncertainties concerning environmental interactions with new technology deployments would need to be addressed. Since then on-going studies have been undertaken by The Crown Estate (TCE) and Marine Scotland to identify suitable areas in Scottish territorial waters for wave and tidal development.
- 2.2.6 As a result of this activity Marine Scotland has developed a process of sectoral marine planning to identify the most sustainable locations in Scottish Waters for the development of commercial scale offshore renewable energy<sup>8</sup>. This has enabled the review of the Plan for Offshore Wind Energy in Scottish Territorial Waters has been undertaken alongside the production of new Sectoral Marine Plans for Wave and Tidal Energy technologies (*'the draft plans'*).
- 2.2.7 The sectoral marine planning process firstly involved the production of a scoping study using of the Crown Estate Marine Resource System (MaRS), a Geographic Information Systems (GIS) based system that has enabled Marine Scotland Science to undertake a technical and scientific exercise to identify areas of constraint and opportunity. This identified strategic areas of search which were suitable for development.
- 2.2.8 Building upon the scoping study, the next stage of the process was the development of draft Regional Locational Guidance (RLG). At this point, consideration was given to more detailed environmental, technical and socio-economic issues in relation to the strategic search areas identified in the scoping study. The resultant information was then made available online for informal comment in draft locational guidance. The areas of search were also published within draft Initial Plan Frameworks (IPF). These early stage documents outlined the potential options for areas of search along with the process for developing the draft plans.
- 2.2.9 The draft RLGs and IPFs for the wind, wave and tidal plans were made available for an initial period of comment during a pre-consultation process

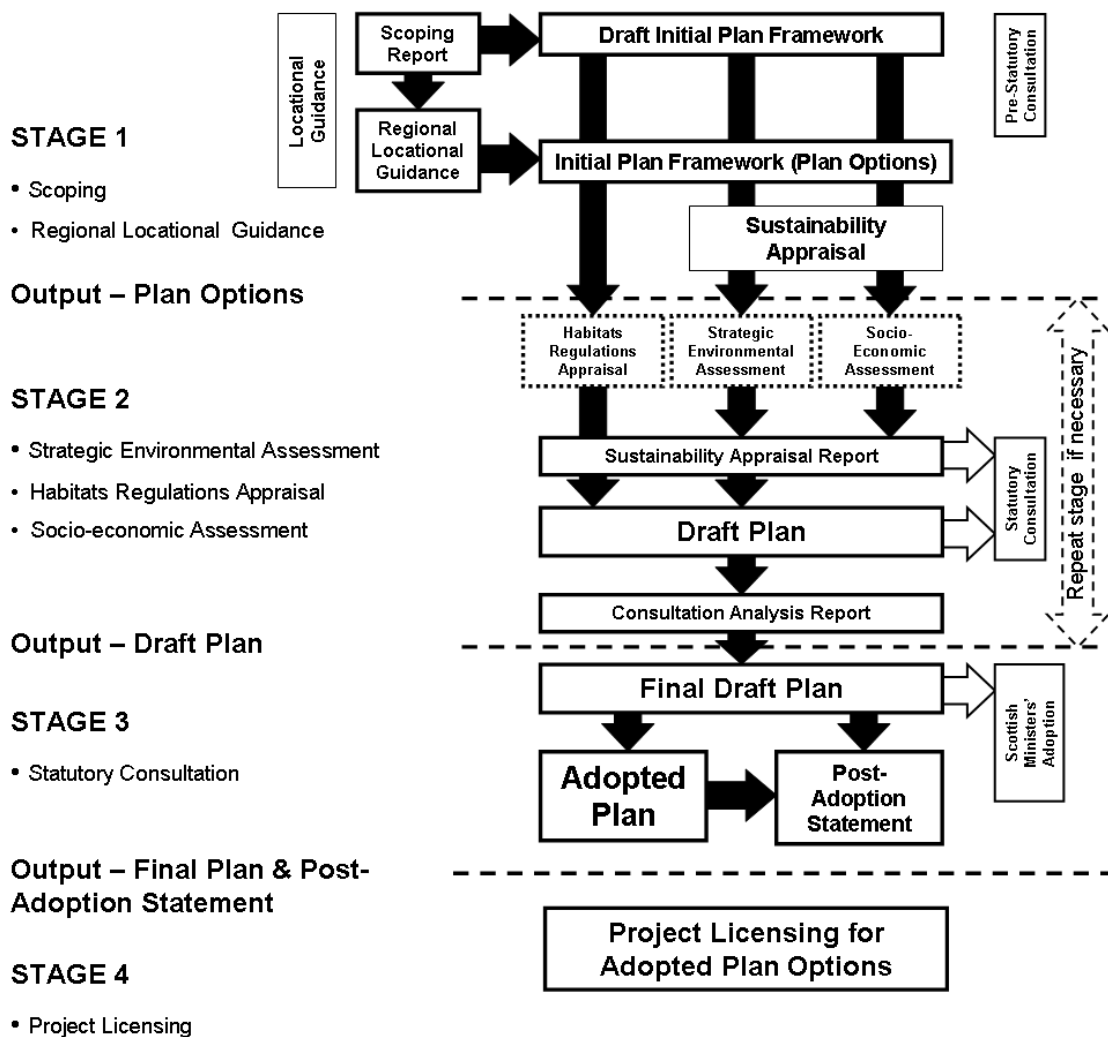
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<sup>8</sup> Sectoral Marine Planning Information is available online at: <http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning> (accessed 14/3/2013)

during September and October 2012. The pre-consultation involved workshops held with sectoral stakeholders and organisations. Regional workshops were held in 10 locations across the country to engage with members of the public

- 2.2.10 The results of the consultation events and the information presented in the draft RLGs were used to refine the search areas to create Draft Plan Options that have been subject to this and the previously mentioned assessments. This report alongside the plans and technical assessments will be subject to consultation with statutory consultees and the public. All consultation responses received will be compiled and presented in a Consultation Analysis Report. This document will also provide an analysis of the key issues arising.
- 2.2.11 The issues and responses arising from the consultation on both the plans and the Sustainability Appraisal Report will then be used to inform the Final Sectoral Marine Plans, which will be put before Scottish Ministers for adoption. When the plans are adopted, a Post-Adoption Statement will be produced which will provide an account of the development of the plan post consultation and an audit of consultation exercise. See Figure 2.1 for the full plan making process.

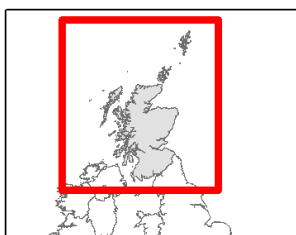
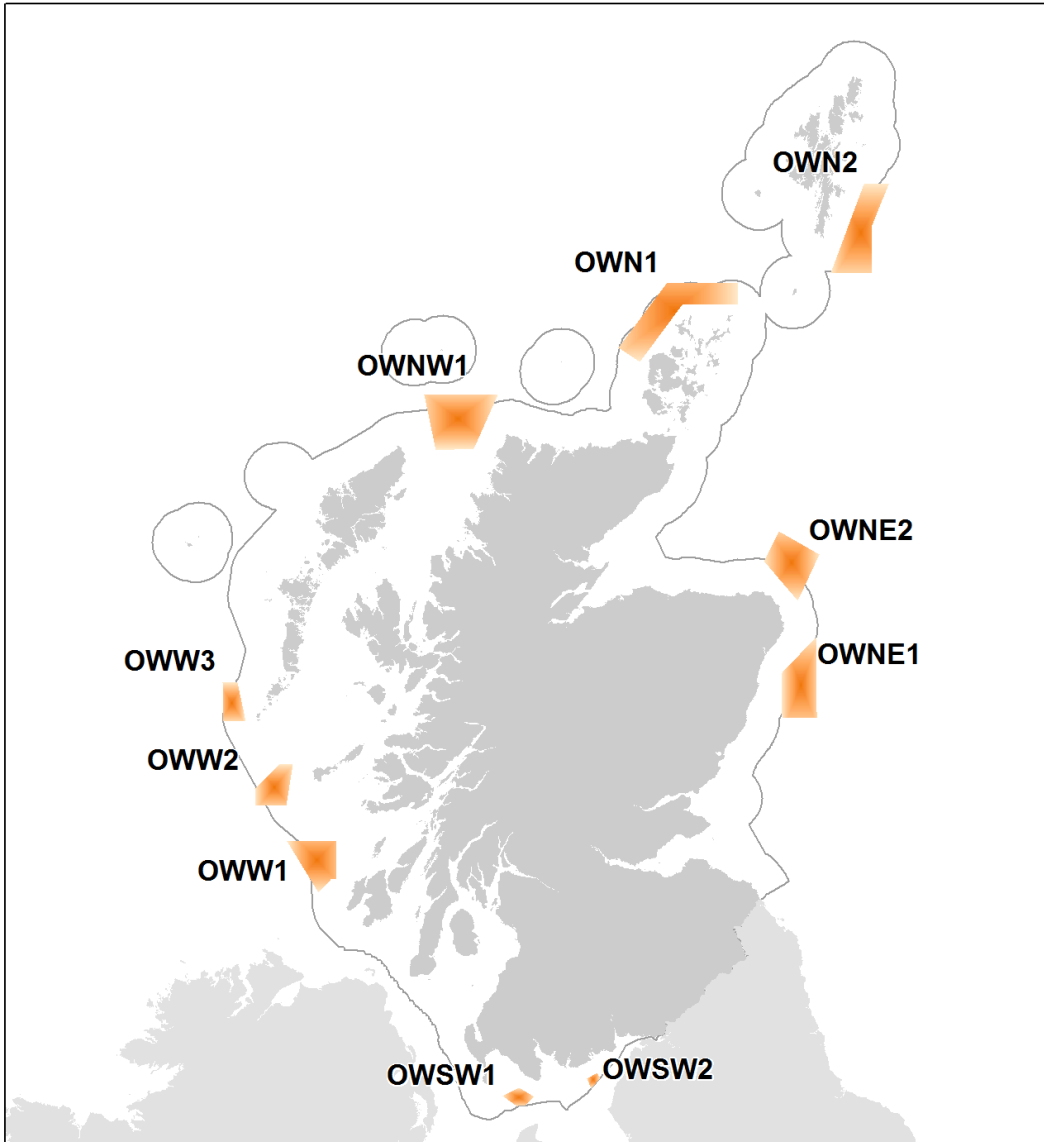
## SECTORAL MARINE PLANNING



**Figure 2.1 Sectoral Marine Planning**

## 2.3 Summary of the Draft Plan Options

- 2.3.1 The areas of search included within the draft RLG have now been developed into Draft Plan Options within the plans for offshore wind, wave and tidal energy. The Draft Plan Options constitute a range of alternative locations in which development might occur. At this stage of the process the plans do not stipulate whether all or some of the sites will be developed, and do not stipulate the number or precise type of device that might be developed. Furthermore, the boundaries of the sites are not fixed at this point and consultation with stakeholders may result in the requirement for amendments. Any proposals for change will occur after the consultation process, as a result of the analysis of responses. Therefore the Draft Plan Options represent distinct locational alternatives that could be subject to some level of change in the draft plans. It is these alternative locations that have been considered as part of the assessments. Figure 2.2 – 2.4 set out the Draft Plan Options. The draft plans provide further detail of the evolution of Draft Plan Options from the Areas of Search set out in Initial Plan Frameworks (IPFs) for wind, wave and tidal energy.
- 2.3.2 The SEA and socio-economics assessment also considered alternative scenarios for the potential percentage occupancy of technologies within the Draft Plan Options as a whole. The socio-economics also considered scenarios for the indicative scale of development, in gigawatt (GW). Details of the location of Draft Plan Options and the scenarios follow.



## Draft plan options wind

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 Wind Draft Plan options  
 12 Nautical mile limit

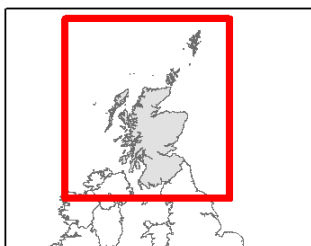
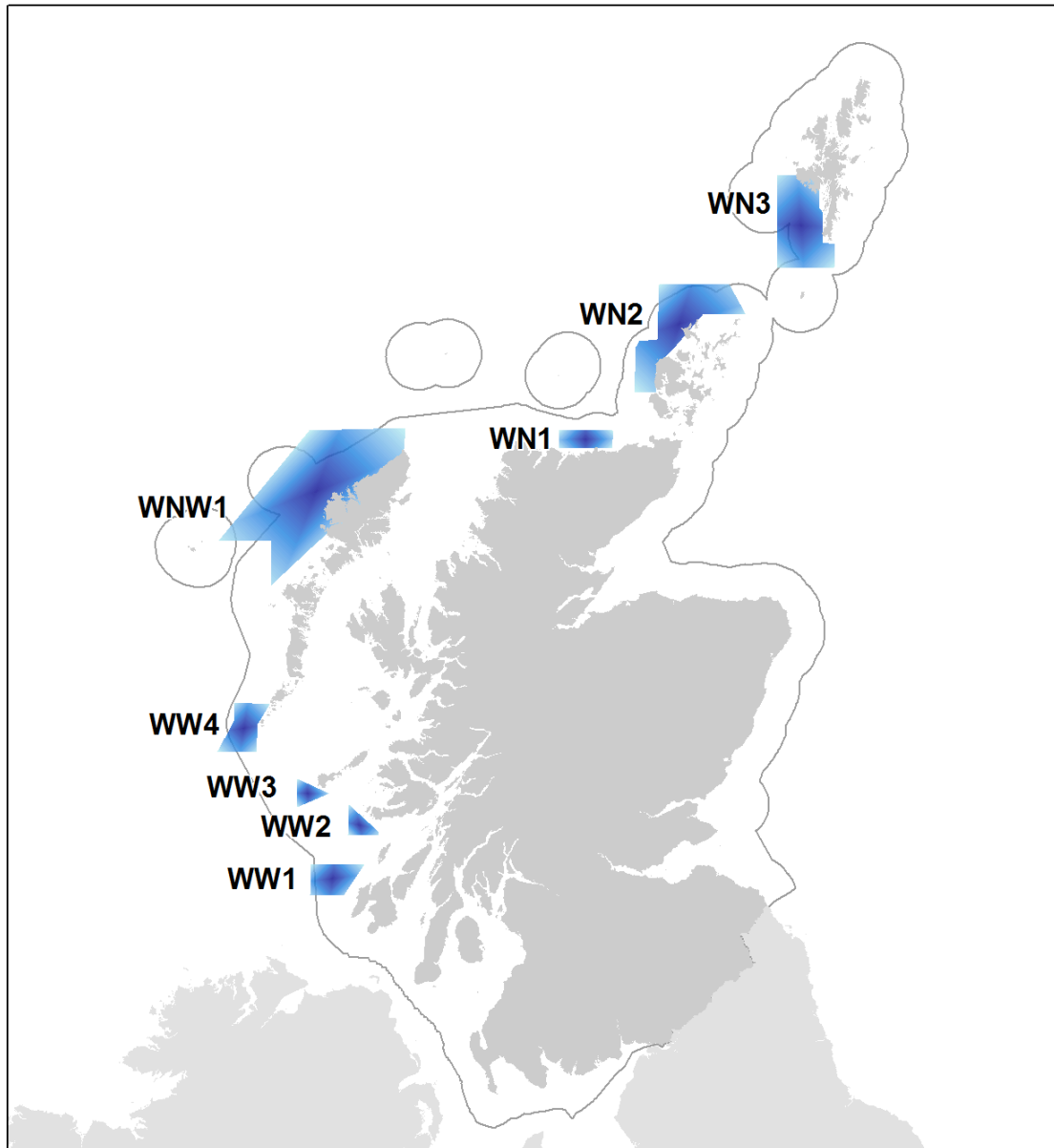
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**Figure 2.2: Draft Plan Options for Wind Energy**

**Table 2.1: Details of scale and occupancy scenarios for wind energy**

Scenario	Indicative Scale of Development (GW)	Indicative Occupancy (%)
Low	3	4.8 – 26.5
Medium	7	11.6 – 26.5
High	15	25.1 – 26.5



## Draft Plan Options

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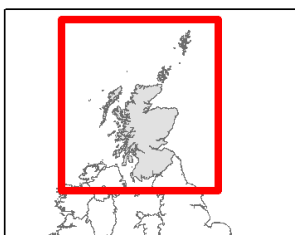
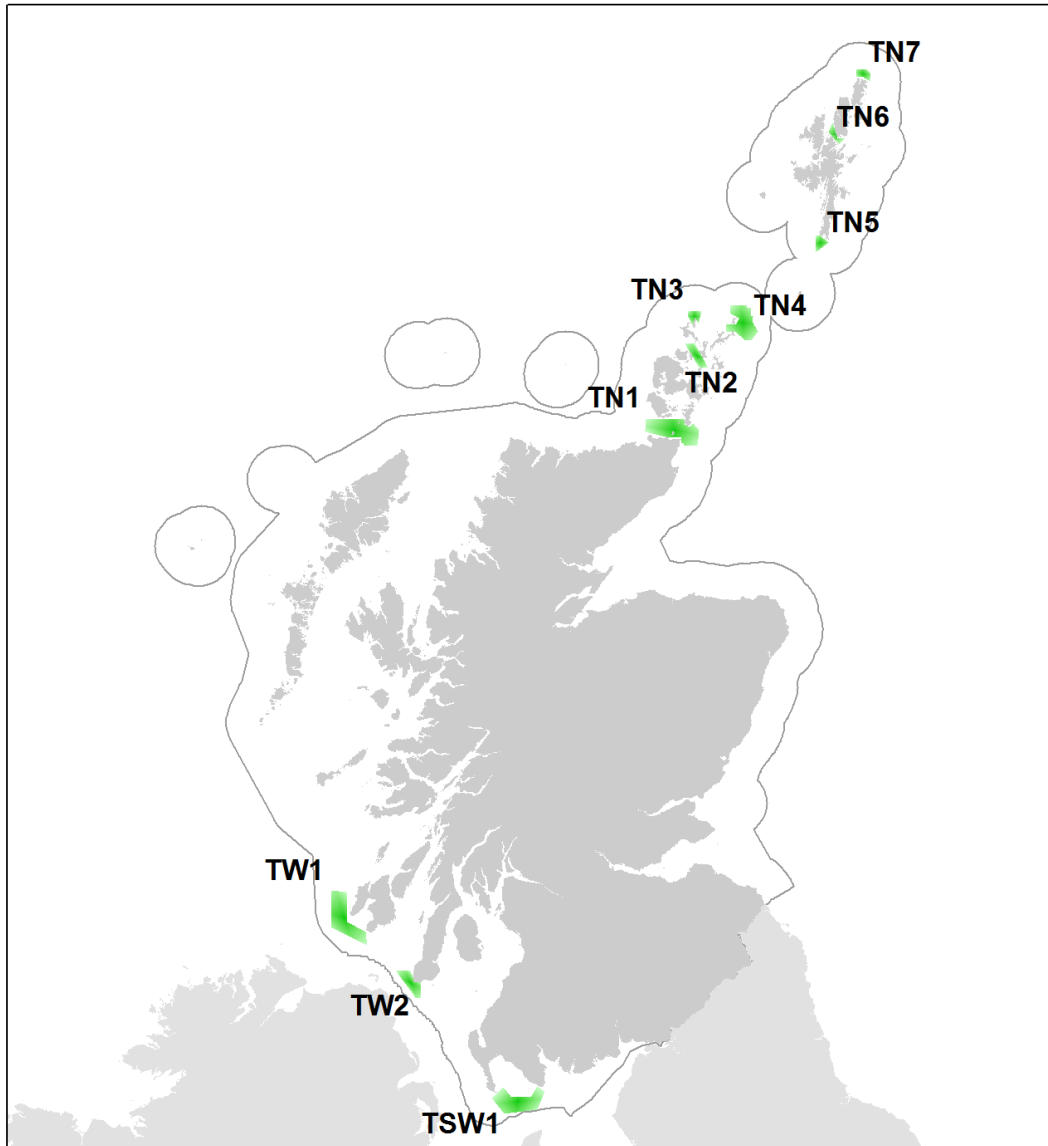
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**Figure 2.3: Draft Plan Options for Wave Energy**

**Table 2.2: Details of scale and occupancy scenarios for wave energy**

Scenario	Indicative Scale of Development (GW)	Indicative Occupancy (%)
Low	0.5	0.2 – 0.6
Medium	1.25	0.5 – 0.6
High	2.5	1.0



### Tidal Scoping 'areas of Search'

tide\_poly\_to\_point2  
 Tidal Draft Plan options  
 12 Nautical mile limit

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**Figure 2.4: Draft Plan Options for Tidal Energy**

**Table 2.3: Details of scale and occupancy scenarios for tidal energy**

Scenario	Indicative Scale of Development (GW)	Indicative Occupancy (%)
Low	0.5	0.8 – 2.5
Medium	1.25	2.6
High	2.5	5.1

## 2.4 Approach to the Sustainability Appraisal

2.4.1 The full details of the approaches to each of the technical assessments are set out in each of the technical reports however the following sections provide a brief overview of the assessment processes.

### *Outline of the SEA*

2.4.2 The SEA was undertaken in a number of stages and was overseen by a Project Steering Group, which included representatives of key stakeholders and consultees. The initial stage involved a review of relevant policies, programmes and strategies to identify relevant environmental objectives, and to compile a baseline of the current and future environmental issues and data that the plans were assessed against. This information was drawn from existing data sources available from SNH, SEPA, Historic Scotland, other environmental groups, and from Marine Scotland Science, and the draft RLGs produced by Marine Scotland.

2.4.3 The next stage of the assessment sought to identify the environmental effects associated with alternative offshore wind, wave and tidal technologies. This involved: reviewing research documents produced for Marine Scotland and the renewables industry; guidance on the effects of renewable energy devices produced by statutory consultees and important stakeholders; and the initial findings of project level environmental impact assessments and monitoring.

2.4.4 The results of the assessment of alternatives technologies helped to inform the next stage of work, identifying the environmental effects of the alternative Draft Plan Options. This assessment was led by baseline information relating to environmental receptors scoped into the report prepared in the initial phase of work. The assessment then involved identifying the potential for significant effects within the Draft Plan Options on the receptor and then proposed mitigation measures where relevant.

2.4.5 The next stage of the assessment considered the cumulative effects and included an assessment of the potential for effects associated with the alternative occupancy scenarios. Finally a high level summary of the effects of the plans as a whole on SEA objectives was undertaken.

2.4.6 The detailed findings of the assessment are set out within the environmental report however the headline findings identified are summarised below:

- The precise significance of effects will depend on the presence, location and sensitivity of environmental receptors and the pathways between the activities associated with construction and operation of devices.
- Some technologies are still developing and this adds a level of uncertainty to effects prediction, and as a result the level of significance of effects in many cases may only be determined as projects come forward. The SEA therefore sought to identify a level of risk for significant effects on a range of identified environmental receptors.



- The results of the monitoring of the effects of initial projects as they are deployed, alongside the results of ongoing and further research should be drawn together to inform a formal plan review process.
- Development of technologies can support the transition to low carbon energy production and support Scotland's carbon emission targets.
- Devices could have effects on biodiversity, either as a result of direct effects on seabed habitats or interactions with mobile marine species (birds, fish and mammals). However, the nature and significance of these interactions in some cases remains unknown and further research and monitoring of developments is recommended.
- Some technologies, wind devices in particular, may have effects for landscape, seascape and the setting of some features of the historic environment, although the significance of effects can reduce with distance from the shoreline. Whilst several near shore wave and tidal devices may be predominantly under the water, some effects may result from infrastructure and lighting associated with the devices.
- Some effects on recreational users could result, particularly as a result of potential displacement of users from any exclusion zones, and resulting concentration of vessels in areas outside of these.
- There may be effects as a result of changes to the complex patterns of hydrodynamics and sedimentation for water quality and coastal processes, and these will require further consideration as projects are developed.

### ***Outline of the HRA***

- 2.4.7 The HRA was taken forward in line with HRA Guidelines published by SNH in 2012<sup>9</sup> and was overseen by a Project Steering Group which included representatives of key stakeholders and consultees. Separate HRAs were undertaken for each of the Sectoral Marine Plans, but it was recognised that a substantial amount of information will be common across all three plan processes. Therefore, five joint documents were created (a pre-screening report, screening report, information for Appropriate Assessment, in-combination effects and plan implementation review, and a non-technical summary review). Within these documents clear distinctions were made between the differing sensitivities of key species and habitats to the various technologies. This is because of the precautionary nature of the HRA process and the fact that there remain numerous uncertainties about the nature of future developments and about the impacts of these plans on their own, together and in-combination with other plans or projects.
- 2.4.8 The initial stage of the HRA was pre-screening. This was to confirm the need for, and scope of, an HRA and then identify the designated European/Ramsar sites and their interest features that could be affected by the Sectoral Plans.

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<sup>9</sup> SNH (2012) Habitats Regulations Appraisal of Plans: Guidance for Plan-Making Bodies in Scotland

- 2.4.9 As a first step in this review, the possible impacts of energy generation projects were reviewed and a list of 20 key “impact pathway” categories were identified. Then, in very broad terms, a list of the potentially affected designated sites was assembled, pending a more detailed review within the screening report. This site selection process including all the designated sites that lie within 100km of the 28 option areas for wind, wave and tidal energy generation. This arbitrary boundary was used as a quantifiable and objective area that is likely to encompass many of the mobile species interest features (fish, seabirds and mammals) in sites which could be indirectly affected by projects within the Draft Plan Options. This stage also set out a methodology for undertaking a further screening assessment.
- 2.4.10 The next stage, screening, used the methods that were identified in the pre-screening report to create a final list of designated sites, and their qualifying interest habitats and species, for which there could be a likely significant effect (LSE) from the draft plans. These sites and features were then taken forward into the subsequent assessment phase. At this stage potential measures for limiting the effects of plans cannot rule out LSE and as a result all sites and features were considered in the next phase. Further details of the screening process are available in the HRA Report and Non-Technical Summary.
- 2.4.11 The next stage of the HRA was the Appropriate Assessment Information Report (AAIR), which assembles the information required to complete an Appropriate Assessment (AA). Building upon the information already assembled during the pre-screening and screening work, the review included the following details:
- An overview of activities and changes that will arise under the Sectoral Marine Plans that could have an impact on the key marine habitats and species groups;
  - A review of the sensitivities to impact of the key marine habitats and species groups identified; and
  - An assessment of the impacts on each habitat and species groups in view of the available (and generic) conservation objectives;
- 2.4.12 The conclusion of this assessment is that it was necessary for two “additional mitigation measures” to be applied in order to ensure that the Sectoral Marine Plans will have no adverse effects on the integrity (AEIOI) on any designated sites either alone or in-combination with other plans or projects. These measures are:
- The legal requirement for individual projects to undergo HRA; and
  - The implementation of the Plans through an iterative plan review (IRP) process.
- 2.4.13 Details about the project-level requirements and the IPR process were set out in summary within the AAIR and in greater detail within the next reporting stage of the HRA which was the in-combination effects and plan implementation report. This fourth report assessed the effects of the Draft Plan Options on the

European sites in combination with a number of plans and projects identified within the HRA. These include coastal development projects, planned offshore renewables developments and areas of lease, and strategies for renewable energy in UK waters.

- 2.4.14 The in-combination review was, necessarily, conducted at a high level. It is recognised that the assessment of in-combination effects will need to be revisited and addressed in a more comprehensive way at the project-level when more detailed information is available. The conclusion from this work reinforced the findings from the AAIR and noted that the uncertainties that exist about the scale, location and timing of project developments this Plan-level.

#### ***Outline of the Socio-Economic Assessment***

- 2.4.15 The social and economic analyses in the Sustainability Appraisal are based on the findings of the socio-economic assessment, which was commissioned by Marine Scotland and undertaken by ABPmer and RPA. This study focussed on assessing potential economic impacts that could arise as a result of interactions between Draft Plan Options and other marine activities taking place in the same area, and any social impacts that could potentially arise as a consequence. The analysis was based on consideration of Draft Plan Options, but has been reported at a regional level, due to the strategic nature of the plans. The project was steered by a Project Steering Group and advised by a Project Advisory Group, which consisted of members of the Scottish Government, plus stakeholder representatives from NGOs, marine activities (including renewable energy interests), local government, the Crown Estate, and the Enterprise Agencies.
- 2.4.16 A detailed discussion of the methods and analytical approach employed in the study is given in Chapter 2 and Appendix B of the socio-economic assessment. Potential impacts on other marine activities arising from Draft Plan Options have been assessed on the basis of potential additional energy generation capacity across different technologies that could be installed under different development 'scenarios'<sup>10</sup>, over and above capacity that is already included within 'baseline' capacity (i.e. developments in the planning system, or for which leases and/or licences have been granted). Portions of additional generation capacity are allocated across Draft Plan Option areas on a spatial 'pro-rata' basis, based on evidence-based assumptions as to the spatial footprint of 1MW of generating capacity for different technologies, and subject to a share of generation capacity in the Draft Plan Option areas exceeding a 'minimum' capacity required for commercially viable projects.
- 2.4.17 The report has assumed that the development of arrays within the Draft Plan Option areas will take place after 2020. For the purposes of the analysis, the study assumes that construction of any arrays developed following this sectoral planning process begins in 2023, and that those arrays will be operational by 2025. However, it is recognised that this is a simplifying assumption for

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<sup>10</sup> The capacities considered in the socio-economics are purely indicative to assist the assessment and do not represent definitive figures for Draft Plan Options.

purposes of the analysis, and that development in individual areas could begin earlier or later than this, depending on developer, market and site circumstances.

- 2.4.18 The assessment of the potential impacts of offshore renewable arrays is based on the assumption that the main impact pathways relevant to the analysis are: the potential for exclusion of marine activities from marine space 'occupied' by future arrays; or the potential for impacts arising from the alteration of seascape on activities.
- 2.4.19 A scoping exercise was undertaken to assess the potential for significant interactions between renewable arrays and other marine activities in each Draft Plan Option area. In areas where this was identified, the analysis attempted to quantify and apply monetary valuations to the resulting impacts as far as possible. This has been attempted for both negative impacts (which create costs) and positive impacts (which create benefits). Where it was not possible to provide monetary valuations, qualitative or qualitative assessments were made. Similar analysis was undertaken for hypothetical cable routes between arrays and the mainland.
- 2.4.20 When undertaking qualitative or quantitative analysis of the scale of impacts, and when valuing costs and benefits arising for other marine activities from Draft Plan Options, the scale of those impacts has been assessed relative to a 'do nothing' option. This option represents what could potentially occur in a Draft Plan Option area, were that Draft Plan Option not to be taken forward. The impacts assessed, and the quantified and unquantified costs and benefits identified as a result, therefore represent those impacts, costs and benefits that would not have arisen in the absence of Draft Plan Options being developed.
- 2.4.21 The assessment takes place over a 20 year period starting from the time at which decisions over the content of the final plans are likely to be made (it is assumed that decisions over the content of the final plans will be made in 2014, following a public consultation in summer 2013). As previously stated it is assumed that that construction of any arrays developed following this sectoral planning process will commence in 2023, and that those arrays will be operational by 2025. Where it has been possible to estimate monetary values for costs and benefits over the appraisal period, these have been converted into present values (in line with HM Treasury Green Book guidance) to reflect the value of future costs and benefits in today's terms.
- 2.4.22 The socio-economic assessment has also attempted to assess the potential social impacts that could arise as a consequence of costs and benefits from development of offshore renewable arrays within Draft Plan Option areas. The social analysis has identified the potential ways in which economic costs and benefits might have social impacts, what social groups (e.g. different age groups, minority groups, genders, and specific geographical communities) could potentially experience these impacts, and in what way they might experience them (e.g. through changes to employment environment, health and access to services). This analysis also attempts to identify the significance of

these impacts and effects, but is largely qualitative in nature. The methodology underpinning the social analysis is described in more detail in Chapter 2.4.4 of the socio-economic assessment.

- 2.4.23 Where potential impacts will need up-front mitigation by the developer, as a condition of consent, the socio-economic assessment has assumed that the residual impacts will not give rise to significant socio-economic impacts. The mitigation costs to be met by the developer have not been included in the costs presented in the assessments described within the study. For example, in the case of potential impacts to aviation radar, mitigation by the developer will therefore mean significant impacts to the aviation sector will be avoided.
- 2.4.24 Similarly, where potential socio-economic impacts are consequential on potential environmental impacts, it has been assumed that mitigation will be required for such impacts as a condition of consent and the residual environmental impacts will not give rise to significant socio-economic impacts. It is recognised that this is a simplification and that in some cases, as indicated by the SEA, the likelihood of significant environmental impacts occurring is not well understood, for example in relation to collision risk between mobile species and tidal stream generators or the impacts of electromagnetic fields on electro- and magneto-sensitive species.
- 2.4.25 There are a range of issues and uncertainties associated with this analysis. These include:
- Uncertainty over the location of Draft Plan Options that will be developed in the future, the portions of individual Draft Plan Options that will be developed, and intensity of development within individual Draft Plan Options;
  - Uncertainty over the timing of developments (and therefore time when impacts are realised);
  - Uncertainty over the nature and scale of impacts on other marine activities, with potential for sensitive marine planning to mitigate some of these;
  - Uncertainty around location and intensity of other marine activities in the future (i.e. uncertainty over whether they will be the same as today) and responses of marine activities to development of arrays (e.g. will fisheries be displaced, or cease);
  - Uncertainty as to the technology types that will be developed and rolled-out on a commercial scale, and the associated interactions these could have with other marine activities (particularly in the case of wave and tidal devices);
  - Lack of available data or valuation evidence limiting opportunities for valuation of some costs, benefits and impacts, or impacting on the accuracy of valuation of specific impacts (e.g. impacts on tourism, leisure and recreation activities);

- The potential for displacement of fishing activity has not been quantified in the consideration of fishing impacts, owing to the difficulties inherent in undertaking such analysis, and the wide range of factors that could influence the nature and extent of any displacement. Instead, the fishing analysis for each region and scenario considers and values a ‘worst case’ outcome, where the value of catch extracted from each Draft Plan Option area is not replaced by catch from other areas. In practice, however, this is unlikely to be the case, and fishing vessels may be expected to adjust their operations in order to target different fishing grounds and/or different species. Consequently, estimates of costs to the fishing industry have the potential to be overestimated.
- While impacts and their significance are assessed at regional and national levels, they may accrue and be felt to be more significant at local levels (e.g. at the level of individual settlements). This is particularly important for (but not restricted to) social analysis.

2.4.26 The detailed findings of the assessment are set out within the socio-economic report however the headline findings identified are summarised below:

- The Present Value of the quantified costs range from £8.1m (Low Scenario) to £161m (High Scenario).
- The quantified potential cost impacts to commercial shipping accounted for around 70-90% of total quantified costs, depending on scenario.
- At a national level, the combined impact of the commercial fisheries sector in terms of impacts to Gross Value Added (GVA) as a result of potential reductions in landings is estimated to be less than 1% of total GVA.
- The impact of renewable development sites on recreational boating is recognised as a deterrent and partly economic where a deviation is encountered to avoid development areas.
- A number of potential impacts have been identified for competing offshore renewables technologies, both in relation to competition for space and cable land falls. The combined impact of these interactions is uncertain.
- Most of the social impacts are limited to localised effects and even these are generally expected to be small.
- No significant benefits to activities could be quantified.

### ***Outline of the Sustainability Appraisal***

2.4.27 This integrated Sustainability Appraisal (SA) provides an overview of the potential social, economic and environmental effects for the development of wind, wave and tidal devices within the alternative Draft Plan Options. It enables the potential cumulative impacts on the environment, on communities

and on other sea users to be considered in a cohesive fashion and for recommendations of a holistic nature to be drawn.

- 2.4.28 This SA reports provides the means to synthesise the results of the assessments to enable the plan to draw upon this information in its development. Therefore, this SA does not itself involve further detailed assessment, rather concentrating on the consideration of the findings and proposing mitigation measures.
- 2.4.29 The SA firstly summarises the key environmental, economic and social effects of the plans for offshore wind, wave and tidal energy in turn (see sections 3 to 5), presenting these at both the regional and national level identifying key effects. Where possible relevant recommendations, mitigation and monitoring have been identified and discussed. The SA then looks at cumulative effects across all three plans, and where possible, discussing recommendations for the draft plans.

## 3 Sustainability Appraisal: The Plan for Offshore Wind Energy

### 3.1 Introduction

3.1.1 The following section provides a summary of the results of the technical assessments for the draft offshore wind plan. The SEA and HRA provide technical detail on the potential for effects environment and also for some of the human health aspects. The socio-economic assessment provides the potential social and economic consequences of effects on existing marine activities. Supporting technical assessment documents provide the detail of how conclusions have been made. The following sections provide a high level summary of these.

### 3.2 Environment

3.2.1 There are a range of potential interactions with the environment from the installation of wind devices in the marine environment. However, there is a degree of uncertainty regarding the precise level of effect in many cases. This is in part due to the often complex interactions in the marine environment, such as between the design of devices and mobile species, or the potential changes to marine hydrodynamics and patterns of sedimentation which interact with coastal processes. Gaps in the understanding of these effects are being filled through research and the assessment and monitoring of demonstrator projects and initial commercial scale projects.

3.2.2 The following sections highlight some of the potential effects and environmental risks associated with wind devices. This is followed by a regional summary of the headline risks from the Draft Plan Options. The level of risk to environmental features is based on the potential effects of the technology and the sensitivity of the receiving environment.

#### ***Biodiversity, Flora and Fauna***

3.2.3 Potential collision with devices can result in of injury and mortality. Bird-strike with turbine blades may be an issue for seabirds and some migratory birds that fly at the heights of blades. There is some risk of collision and entanglement with structures above and below the water level for birds that fly along the water surface, diving birds, and mobile marine species such as seals, cetaceans, elasmobranchs and fish. There remain some gaps in the understanding of just how significant collision risk is for individual species. The ongoing HRA has looked at physical damage to species including Bottlenose dolphins and Harbour porpoise, Grey and Harbour seals, Atlantic salmon, Lamprey, Shad, seabirds and diving birds. The appraisal indicates further work at the project level will be required.



- 3.2.4 Furthermore barrier effects during operation for mobile species and visual disturbance to surface feeding and diving birds noted in the SEA also form part of the ongoing HRA.
- 3.2.5 The significance of impacts is based on the likelihood of collision and impact on viable population levels, which is difficult to determine at the plan level. Project level Environmental Impact Assessment (EIA) and HRA will need to assess, as far as possible, the significant effects on European protected species and habitats and other priority marine features. Furthermore ongoing research should help to better inform the project stage of the likely significance of effects.
- 3.2.6 Collision risk could lead to some displacement of some species, as could noise and vibration associated with construction activity (particularly piling). Whilst the exact effects of noise and vibration are relatively unknown it is thought that some species could be attracted to noise sources and increase the chance of damage to their health. The HRA considers noise and vibration effects for species including Bottlenose dolphins, Harbour porpoise, Grey and Harbour seals, Atlantic salmon, Lamprey and Shad. It is considered that in some cases construction outside of breeding or migratory seasons might minimise effects.
- 3.2.7 Species health could also be impacted by the effects of electromagnetic fields (EMF) from cabling, in particular elasmobranchs and fish. Although research on effects is ongoing the indication is effects could be minimal. Again these types of effects are also considered within the HRA.
- 3.2.8 There will be direct impacts to the seabed as a result of installation, which may vary between the types of base used (e.g. gravity bases cover a greater area of the seabed than a device constructed on a monopile). Impacts include loss of benthic habitat at the site and potentially where dredging provides fill for gravity based devices, sediment dispersion and deposition, changes to water hydrology and turbidity, and potential release of contaminated materials. These could impact to on marine ecosystems in the locality of devices and will form part of project level assessment. The assessment does identify the potential for the creation of artificial habitats for marine organisms as a result of new structures in the water. This may be aided by potential reductions in other marine use in areas where wind technology is located. Direct and indirect physical damage to designated and potential sensitivity of habitats (reefs, subtidal sandbanks, intertidal habitats including saltmarshes, and supralittoral habitats) during the construction, operation and decommissioning phase also form part of the ongoing HRA as does contamination resulting from elevated turbidity.

### ***Water and the Marine Environment***

- 3.2.9 Effects on the water and the marine environment are, in general, related to the installation of turbine foundations and structures. Changes to turbidity, seabed disturbance from placement of gravity-based devices and from piling activities, contamination from installation equipment and maintenance vessels, could all impact on local water quality.

- 3.2.10 Furthermore pollution can affect the ability of fish species to spawn, respire and feed, and the health of shellfish growing waters. The significance of these effects will depend on the proximity of devices and polluted sediments to these waters. However, it is anticipated that effects will be of a lower significance
- 3.2.11 Effects can be mitigated largely through applying environmental controls during construction and from hydrodynamic modelling and design to reduce impacts such as turbidity.

#### ***Climatic Factors***

- 3.2.12 Offshore wind is considered to contribute to the decarbonisation of electricity generation over the long-term which will be beneficial for climatic factors.
- 3.2.13 Some coasts and coastal processes are already impacted by climate change and project level assessments should consider how new devices may interact with this existing pattern of change.

#### ***Marine Geology and Coastal Processes***

- 3.2.14 Preparation of the seabed for the installation of devices, such as dredging or piling, can result in effects, with some large gravity based devices, having potentially greater effects. Impacts on the seabed may also result from changes to turbidity, sediment disturbance, loss of geology, release of contaminated materials bonded to sediments. Installed devices can result in scouring, deposition and abrasion around foundation structures present on the seabed. However, it is assumed that scour protection would be used for such foundation structures and this may alleviate such risks.
- 3.2.15 Changes to hydrodynamics and water flows may have an interaction with coastal processes. Impacts would be of greatest significance where important coastal geological features including geological Sites of Special Scientific interest (SSSI) and Geological Conservation Review sites (GCRs) are located. Project level assessment will need to consider impacts on geology and coastal features based on the location of individual projects.

#### ***Historic Environment***

- 3.2.16 Effects on designated and non-designated submerged archaeology, including wrecks have been identified. Impacts can be associated with direct damage during construction but also from scouring, siltation and deposition around assets located in the vicinity of devices or arrays. Careful location of devices in regards of historic assets can mitigate potential effects.
- 3.2.17 Wind devices, specifically masts, turbines and supporting infrastructure, could impact on the setting of features of the historic environment. The magnitude of visual effects depends on visibility and positioning of devices in regards to onshore features. Effects and appropriate mitigation can be applied through appropriate project design and location within Draft Plan Options.

### ***Landscape and Seascape***

- 3.2.18 Wind turbines and their supporting infrastructure have the potential for visual impacts on landscape and seascape, as a result of their presence in the water and also from associated infrastructure, marker buoys and lighting. The significance of effects depends on the setting of devices, distance from shore and the presence of other marine users (in particular for recreation). Project level assessment is required to determine the significance of effects within the Draft Plan Options. Development that will affect National Scenic Areas (NSA) should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.

### ***Regional Issues***

- 3.2.19 The environmental issues identified above are relevant for Draft Plan Options within all of the regions. The following sections highlight regions where the receiving environment may be particularly sensitive to potential effects and hence a higher risk of significance.

#### **South West Region**

- 3.2.20 Based on known presence of species there are risks to species based on the potential for collision, disturbance and displacement for seabirds, fish, and in particular elasmobranchs (including Basking Shark) and cetaceans (including whales) in the vicinity of OWSW1 which is understood to be close to migratory routes. The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Project level EIAs will need to determine the significance of effects and establish such mitigation measures. Ongoing research can help to provide more information to assist in this determination of significance.
- 3.2.21 The potential for effects on coastal habitats should be considered at the project level in relation to any impacts on the seabed, patterns of sedimentation and changes to hydrodynamics.
- 3.2.22 Landscape and seascape character and quality are considered high across the regions coastline. The height of wind devices makes them visible at a distance. A detailed impact assessment will need to form part of EIAs in order to determine the significance of impacts on landscape, including National Scenic Areas (NSAs) and an Area of Outstanding Natural Beauty (AONB) on both sides of the Solway coastline. Furthermore, impacts on local communities and also the setting of historic features, such as those at Whitthorn Peninsula. Development that will affect NSAs should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.

#### **West Region**

- 3.2.23 Given the presence of many important breeding and roosting sites for birds in the region there is a level of risk of collision and disturbance to birds during both

construction and operation. These risks also extend to the many important mobile marine species found in the region, including amongst others Basking shark, Harbour porpoise, Minke whales and seal species.

- 3.2.24 The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Project level EIAs will need to determine the significance of effects and establish such mitigation measures. Ongoing research can help to provide more information to assist in this determination of significance.
- 3.2.25 Draft Plan Option OWW2 overlaps with existing and proposed designations as follows:
- Stanton Banks SAC - project level HRAs should demonstrate that development does not adversely affect the integrity of the designation alongside any other SPA/SAC scoped into an assessment.
  - Skye to Mull MPA search area (Basking shark and Minke whale interest features) - project level EIAs will need to demonstrate that development is compatible with the conservation objectives of the proposed MPA irrespective of its final boundary.
- 3.2.26 The potential for effects on coastal habitats should be considered at the project level in relation to any impacts on the seabed, patterns of sedimentation and changes to hydrodynamics.
- 3.2.27 Landscape and seascape character and quality are considered high across the regions coastline, with NSA designations and several areas considered to be wild land. The height of wind devices makes them visible at a distance and will result in change. Detailed impact assessment as part of EIAs can determine the significance of impacts on landscape. Development that will affect NSAs should avoid adverse effects on the integrity of the area or the qualities for which it has been designated. Impacts on local communities and also the setting of historic features, such as Skerryvore lighthouse will also need to be considered.

#### North West Region

- 3.2.28 The region is known to be frequented by many mobile marine species including White beaked dolphin, Risso Dolphin, Grey seal, Sand eels, whales, sharks and many important bird species. Risks to mobile species include collision and displacement during construction and operation. The level of risk to protected species will need to be established as part of the development planning and licencing process.
- 3.2.29 The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Project level EIAs will need to determine the significance of effects and establish such mitigation measures. Ongoing research can help to provide more information to assist in this determination of significance.

- 3.2.30 The potential loss of seabed and impacts on reef habitat, such as Solan Bank Reef, can be limited through site level survey, avoidance of important habitat, and project level assessment of changes to patterns of sedimentation and hydrodynamics.
- 3.2.31 Landscape and seascape character and quality are considered high across the regions coastline, with several areas considered to be wild land. The height of wind devices makes them visible at a distance and will result in change. Detailed impact assessment will need to form part of project assessment in order to determine the significance of impacts on landscape, including valued features such as the regions NSAs and local communities. Development that will affect NSAs should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.

#### North Region

- 3.2.32 Based on known presence of species there are risks for the potential for collision, disturbance and displacement, both during construction and operation, for seabirds, fish (including Atlantic salmon and Sand eel), Common and Grey seals, whales, dolphins and elasmobranchs (including Basking Shark).
- 3.2.33 The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Project level EIAs will need to determine the significance of effects and establish such mitigation measures. Ongoing research can help to provide more information to assist in this determination of significance.
- 3.2.34 The potential for effects on coastal habitats should be considered at the project level in relation to any impacts on the seabed, patterns of sedimentation and changes to hydrodynamics.
- 3.2.35 Draft Plan Option OWN2 overlaps with the Pobie Bank cSAC. Project level HRA should demonstrate that development does not adversely affect the integrity of the designation alongside any other SPA/SAC scoped into an assessment.
- 3.2.36 Draft Plan Option OWN1 overlaps with the North West Orkney MPA (proposed with Sand eel interest features). Project level EIA will need to demonstrate that development is compatible with the conservation objectives of the proposed MPA.
- 3.2.37 Landscape and seascape character and quality are considered high across the regions coastline, with several areas considered to be wild land. The height of wind devices makes them visible at a distance and will result in change and Draft Plan Options may be visible from the Shetland NSA and Hoy and West Mainland NSA. A detailed impact assessment will need to form part of project assessment in order to determine the significance of impacts on the NSAs. Furthermore assessment of effects on landscape and seascape in general, local communities and also the setting of historic features, particularly the Heart of Neolithic Orkney WHS will be required. Development that will affect NSAs

should avoid adverse effects on the integrity of the area or the qualities for which it has been designated and avoid impacts on the outstanding unique value of the WHS.

### North East Region

- 3.2.38 The region is known to be frequented by many mobile marine species including Grey seals, Bottlenose Dolphins, whales and important seabirds associated with European designated areas from the Firth of Forth to the Moray Firth. Risks to mobile species include collision and displacement during construction and operation. The level of risk to protected species and habitats will need to be established as part of the development planning and licencing process.
- 3.2.39 The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Project level EIAs will need to determine the significance of effects and establish such mitigation measures. Ongoing research can help to provide more information to assist in this determination of significance.
- 3.2.40 The potential for effects on coastal habitats should be considered at the project level in relation to any impacts on the seabed, patterns of sedimentation and changes to hydrodynamics.
- 3.2.41 Draft Plan Options OWNE1 and OWNE2 overlap with the Southern Trench Marine Protection Area (MPA) area of search (proposed for Minke whale and White-beaked dolphin interest features). Project level EIA will need to demonstrate that development is compatible with the conservation objectives of the MPA.
- 3.2.42 Whilst landscape and seascape character is important for the region with sections of the coastline of high quality, the region does not contain national level coastal designations and fewer areas of wildness value than other regions. The height of wind devices makes them visible at a distance and will result in some change, however, with fewer high value landscape receptors and an already busy working seascape effects may be of lower significance than in other locations. Detailed impact assessment will need to form part of project assessment in order to determine the significance of impacts on landscape, local communities and also the setting of historic features.

## 3.3 Economy and other marine users

- 3.3.1 This section summarises the findings of the socio-economic assessment relating to the economic impacts of Draft Plan Options for offshore wind on other marine activities. Impacts are reported at the regional level, rather than at the level of specific Draft Plan Options. More detail on this analysis can be found in the socio-economic assessment.

## *Regional Issues*

### South West Region<sup>11</sup>

- 3.3.2 Based on a pro-rata share of the indicative scale of development shown in Table 3.1, it is assumed that the following proportions of Draft Plan Option areas OWSW1 and OWSW2 could be developed.

**Table 3.1: Potential Portions of Draft Plan Options Developed in the South West Region (% of Spatial Area)**

Scenario	OWSW1	OWSW2
Low	8.5%	26.5%
Medium	11.6%	26.5%
High	25.1%	26.5%

- 3.3.3 Such development could have the potential to interact with aviation, commercial fisheries, energy generation, military interests, recreational boating, shipping, tourism, and water sports.

#### Quantified Impacts

- 3.3.4 The socio-economic assessment was able to quantify aspects of the impacts on commercial fisheries, recreational boating, shipping, and tourism. These estimated costs are set out in Table 3.2 below. The most significant impact at a regional level was observed for shipping, as a result of additional fuel costs associated with route deviation. No impacts were recorded for tourism expenditure under the Low Scenario, as it has been assumed that spatial planning can be used to locate arrays within the Draft Plan Option areas so as to avoid impacts to tourism.

**Table 3.2: Present value (PV) costs for Offshore Wind in the South West Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.05	0.06	0.13
Recreational boating	Additional fuel costs	0.05	0.06	0.10
Shipping	Additional fuel costs	4.87	5.08	5.98
Tourism	Reduction in tourism expenditure	-	0.03	0.33
<b>Total PV costs</b>		<b>4.97</b>	<b>5.23</b>	<b>6.54</b>

#### Non-Quantified Impacts

- 3.3.5 The study identified several other sources of cost that could arise to marine activities from development in the Draft Plan Option areas. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 3.3.

<sup>11</sup> More detail on this analysis can be found in Chapter 4.1 and Appendix C of the socio-economic assessment.

**Table 3.3: Non Quantified Impacts on Other Marine Activities for Offshore Wind in the South West Region**

Marine Activity	Non-Quantified Impact
Aviation	Potential interference with NATS surveillance radar
Commercial Fisheries	Potential overlap with steaming routes; potential for knock on consequences from displacement of fisheries.
Energy Generation	Potential competition for space between offshore wind development and tidal development.
Military Interests	Potential overlap between proposed cable routes and military practice and exercise areas. Potential to interfere with underwater communications.
Recreational Boating	Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.
Water Sports	Costs to water sports activities (diving, recreational angling) associated with offshore wind development in Draft Plan Option areas assessed as negligible.

West Region<sup>12</sup>

3.3.6 Based on a pro-rata share of the indicative scale of development shown in Table 3.4, it is assumed that the following proportions of Draft Plan Option areas OWW1, OWW2 and OWW3 could be developed.

**Table 3.4: Potential Portions of Draft Plan Options Developed in the West Region (% of Spatial Area)**

Scenario	OWW1	OWW2	OWW3
Low	4.8%	4.8%	4.8%
Medium	11.6%	11.6%	11.6%
High	25.1%	25.1%	25.1%

3.3.7 Such development could have the potential to interact with aviation, commercial fisheries, energy generation, military interests, ports and harbours, recreational boating, shipping, tourism, and water sports.

Quantified Impacts

3.3.8 The socio-economic assessment was able to quantify aspects of the impacts on commercial fisheries, shipping, and tourism. These estimated costs are set out in Table 3.5 below. The most significant impact at a regional level was observed for Shipping, as a result of additional fuel costs associated with route deviation. No costs to shipping or tourism were recorded under the Low Scenario.

<sup>12</sup> More detail on this analysis can be found in Chapter 5.1(p36-38) and Appendix C of the socio-economic assessment.



**Table 3.5: Present value (PV) costs for Offshore Wind in the West Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.13	0.31	0.67
Shipping	Additional fuel costs	-	3.80	7.88
Tourism	Reduction in tourism expenditure	-	0.01	0.06
<b>Total PV costs</b>		<b>0.13</b>	<b>4.12</b>	<b>8.61</b>

### Non-Quantified Impacts

3.3.9 The study identified several other sources of cost that could arise to marine activities from development in the Draft Plan Option areas. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 3.6.

**Table 3.6: Non Quantified Impacts on Other Marine Activities for Offshore Wind in the West Region**

Marine Activity	Non-Quantified Impact
Aviation	Potential interference with NATS surveillance radar; OWW2 lies within 15nm of safeguarding zone around secondary surveillance radar around nearest airport.
Commercial Fisheries	Potential overlap with steaming routes, resulting in deviation of navigation for affected vessels, particularly under high scenario, with associated costs. Vessels most likely to be affected expected to be those based in Oban.  Potential for knock on consequences from displacement of fisheries.
Energy Generation	Potential competition for space between offshore wind development and wave development.
Military Interests	Potential overlap between all Draft Plan Option areas and proposed cable routes and military practice and exercise areas. Potential to interfere with underwater communications.
Ports and Harbours	Potential for temporary collision risk during cable laying or maintenance activities.
Recreational Boating	Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.
Water Sports	Potential overlap between some indicative cable routes and scuba diving, although assessed as unlikely. Costs to water sports activities (diving, recreational angling) associated with offshore wind development in Draft Plan Option areas assessed as negligible.

### North West Region<sup>13</sup>

3.3.10 Based on a pro-rata share of the indicative scale of development shown in Table 3.7, it is assumed that the following proportions of Draft Plan Option area OWNW1 could be developed.

<sup>13</sup> More detail on this analysis can be found in Chapter 6.1 and Appendix C of the socio-economic assessment.

**Table 3.7: Potential Portions of Draft Plan Options Developed in the North West Region (% of Spatial Area)**

Scenario	OWNW1
Low	4.8%
Medium	11.6%
High	25.1%

- 3.3.11 Such development could have the potential to interact with commercial fisheries, energy generation, military interests, recreational boating, shipping, and water sports.

Quantified Impacts

- 3.3.12 The socio-economic assessment was able to quantify aspects of the impacts on commercial fisheries, and shipping. These estimated costs are set out in Table 3.8 below. The most significant impact at a regional level was observed for Shipping, as a result of additional fuel costs associated with route deviation.

**Table 3.8: Present value (PV) costs for Offshore Wind in the North West Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.11	0.27	0.58
Shipping	Additional fuel costs	-	1.45	2.90
<b>Total PV costs</b>			<b>0.11</b>	<b>1.72</b>

Non-Quantified Impacts

- 3.3.13 The study identified several other sources of cost that could arise to marine activities from development in the Draft Plan Option area. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 3.9.

**Table 3.9: Non Quantified Impacts on Other Marine Activities for Offshore Wind in the North West Region**

Marine Activity	Non-Quantified Impact
Commercial Fisheries	Potential overlap with significant navigation routes, resulting in deviation of navigation for affected vessels, particularly under high scenario, with associated costs. Vessels most likely to be affected expected to be those based in Stornoway, Lochinver, Kinlochbervie and possibly Ullapool.  Potential for knock on consequences from displacement of fisheries.
Energy Generation	Energy generation from differing forms of technology will lead to competition for transmission capacity which would affect all Draft Plan Option areas
Military Interests	Potential overlap between the proposed cable routes and military practice and exercise areas. Potential to interfere with underwater communications.

Recreational Boating	Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.
Water Sports	Potential overlap with scuba diving, windsurfing and surfing, though assessed as unlikely. Costs to water sports activities (including recreational angling) associated with offshore wind development in Draft Plan Option area assessed as negligible.

### North Region<sup>14</sup>

- 3.3.14 Based on a pro-rata share of the indicative scale of development shown in Table 3.10, it is assumed that the following proportions of Draft Plan Option areas OWN1 and OWN2 could be developed.

**Table 3.10: Potential Portions of Draft Plan Options Developed in the North Region (% of Spatial Area)**

Scenario	OWN1	OWN2
Low	4.8%	4.8%
Medium	11.6%	11.6%
High	25.1%	25.1%

- 3.3.15 Such development could have the potential to interact with aviation, carbon capture and storage, commercial fisheries, energy generation, military interests, oil and gas, ports and harbours, recreational boating, shipping, tourism, and water sports.

### Quantified Impacts

- 3.3.16 The socio-economic assessment was able to quantify aspects of the impacts on commercial fisheries, shipping, tourism, and water sports (sea angling). These estimated costs are set out in Table 3.11 below. The most significant impact at a regional level, with the exception of the Low Scenario, was observed for shipping, as a result of additional fuel costs associated with route deviation for an average number of shipping movements based on the shipping density within the Draft Plan Option areas.

**Table 3.11: Present value (PV) costs for Offshore Wind in the North Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.74	1.8	3.9
Shipping	Additional fuel costs	-	7.11	14.22
Tourism	Reduction in expenditure	-	0.22	0.59
Water sports – sea angling	Reduction in expenditure	-	-	0.47
<b>Total PV costs</b>			<b>0.74</b>	<b>9.13</b>

<sup>14</sup> More detail on this analysis can be found in Chapter 7.1 and Appendix C of the socio-economic assessment.

## Non Quantified Impacts

- 3.3.17 The study identified several other sources of cost that could arise to marine activities from development in the Draft Plan Option areas. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 3.12.

**Table 3.12: Non Quantified Impacts on Other Marine Activities for Offshore Wind in the North Region**

<b>Marine Activity</b>	<b>Non-Quantified Impact</b>
Aviation	Potential for overlaps between the siting for offshore wind turbines and helicopter routes, particularly under central and high scenarios. OWN2 also falls within 15nm of the safeguarding zone around the secondary surveillance radar around the nearest airport, and the site intersects with the suggested 17km CAA consultation around airports
Carbon Capture and Storage	Potential overlaps with possible carbon and storage sites. In addition, the cable corridors have the potential to overlap or lie inshore of potential storage areas. Particularly significant under the central and high scenarios.
Commercial Fisheries	Potential overlap with significant navigation routes, resulting in deviation of navigation for affected vessels, particularly under high scenario, with associated costs. Vessels most likely to be affected expected to be those based in Scrabster, Kirkwall and Lerwick.  Potential for knock on consequences from displacement of fisheries.
Energy Generation	Potential competition for space between offshore wind development in and wave development.
Military Interests	Potential overlap between the Draft Plan Option areas and the proposed cable routes and military practice and exercise areas. Potential to interfere with underwater communications. In addition, potential for overlap with a Low Priority Military Low Flying Area.
Oil and Gas	Should offshore wind farm export cables cross over existing oil and gas pipelines or cables, it has been assumed that the costs would be borne by the offshore wind developer. While the oil & gas industry's interests will largely be protected by the relevant cable crossing agreements, it is currently unclear whether all of the industry's liabilities may be covered by such agreements.
Ports and Harbours	Potential for temporary collision risk during cable laying or maintenance activities.
Recreational Boating	Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.
Water Sports	Potential overlap with scuba diving, windsurfing and surfing. Costs to water sports activities associated with offshore wind development in Draft Plan Option area assessed as negligible.

## North East

- 3.3.18 Based on a pro-rata share of the indicative scale of development shown in Table 3.13, it is assumed that the following proportions of Draft Plan Option areas OWN1 and OWN2 could be developed

**Table 3.13: Potential Portions of Draft Plan Options Developed in the North East Region, % of Spatial Area**

Scenario	OWN1	OWN2
Low	4.8%	4.8%
Medium	11.6%	11.6%
High	25.1%	25.1%

- 3.3.19 Such development could have the potential to interact with aviation, carbon capture and storage, commercial fisheries, energy generation, military interests, oil and gas, ports and harbours, power connectors, recreational boating, shipping, and water sports.

Quantified Impacts

- 3.3.20 The socio-economic assessment was able to quantify aspects of the impacts on carbon capture and storage, commercial fisheries, recreational boating, and shipping. These estimated costs are set out in Table 3.14 below. The most significant impact at a regional level, with the exception of the Low Scenario, was observed for shipping, as a result of additional fuel costs associated with route deviation.

**Table 3.14: Present value (PV) costs for Offshore Wind in the North East Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Carbon Capture and Storage	Additional costs of constructing cable crossings	1.85	4.32	9.27
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.18	0.43	0.92
Recreational boating	Additional fuel costs	-	0.66	0.81
Shipping	Additional fuel costs	-	48.57	98.61
<b>Total PV costs</b>		<b>2.03</b>	<b>53.98</b>	<b>109.61</b>

Non Quantified Impacts

- 3.3.21 The study identified several other sources of cost that could arise to marine activities from development in the Draft Plan Option areas. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 3.15.

**Table 3.15: Non Quantified Impacts on Other Marine Activities for Offshore Wind in the North East Region**

Marine Activity	Non-Quantified Impact
Aviation	<p>Potential for overlaps between the siting for offshore wind turbines and helicopter routes, particularly under central and high scenarios.</p> <p>Potential interference with NATS surveillance radar; OWNE1 and OWNE2 lie within 15nm of safeguarding zone around secondary surveillance radar around nearest airport.OWNE1 intersects with the suggested 17km CAA consultation around airports.</p>
Commercial Fisheries	<p>Significant overlap with steaming grounds and major navigation routes, resulting in deviation of navigation for a significant number of vessels, with associated costs. Vessels most likely to be affected expected to be those based in Fraserburgh and Peterhead.</p> <p>Potential for knock on consequences from displacement of fisheries.</p>
Energy Generation	<p>There is potential for OWNE1 and OWNE2 to compete for transmission capacity.</p>
Military Interests	<p>Potential overlap between the proposed cable routes and military practice and exercise areas. Potential to interfere with underwater communications.</p>
Oil and Gas	<p>Should offshore wind farm export cables cross over existing oil and gas pipelines or cables, it has been assumed that the costs would be borne by the offshore wind developer. While the oil &amp; gas industry's interests will largely be protected by the relevant cable crossing agreements, it is currently unclear whether all of the industry's liabilities may be covered by such agreements.</p>
Ports and Harbours	<p>Potential increase in marine risk, specifically the temporary collision risk while cable laying or maintenance is being carried out.</p>
Power Interconnectors	<p>Should offshore wind farm export cables cross over existing power interconnector cables, it has been assumed that the costs would be borne by the offshore wind developer. While the power interconnector asset owner/operator will largely be protected by the relevant cable crossing agreements, it is currently unclear whether all of the industry's liabilities may be covered by such agreements.</p>
Recreational Boating	<p>Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.</p>
Water Sports	<p>Water sport activities of scuba diving, windsurfing and surfing are carried out in the North East Region. Costs to water sports activities (including Recreational Angling) associated with offshore wind development in Draft Plan Option area assessed as negligible.</p>

## 3.4 People and Health

3.4.1 This section summarises the findings of the socio-economic assessment relating to the potential social impacts of Draft Plan Options for offshore wind that could arise from impacts on other marine activities. These impacts are reported at 'planning region' level, rather than at the level of specific Draft Plan Options. More detail on this analysis can be found in Chapters 4.1, 5.1, 6.1, 7.1, 8.1 and Appendix C of the socio-economic assessment, and within the population and human health section of the Environmental Report.

### ***Population and Human Health***

- 3.4.2 As discussed within the previous section there is potential for conflicts of space with commercial, fishing and recreational vessel movement and thus there is a level of collision risk. Measures including exclusion zones, lighting and marker buoys can mitigate for some accident risk.
- 3.4.3 Some displacement of activities is possible. In terms of recreational activities these may be particularly acute if devices are placed in near shore areas where recreational use can be more concentrated. Several of the wind Draft Plan Options are located far enough from the coast that these recreational impacts might be reduced. Collision and displacement risks are also considered to be reversible and would reduce upon decommissioning.
- 3.4.4 Other potential impacts on human health are noise and shadow flicker effects, which can cause nuisance and irritation to people who live or travel through areas. The significance of effects will depend on the proximity of wind farms to the shore line and its inhabitants and users, and the location of turbines in relation to the sun, particularly when low in the sky. Impacts on mobile sea users could be magnified if they are in closer proximity to the turbines. Effects can only however be reasonably established at the project design stage.

### ***Regional Issues***

- 3.4.5 The following sections highlight regional social issues identified in the assessments.

#### **South West Region**

- 3.4.6 The socio economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: commercial fisheries, recreational boating, and tourism. The SEA also identified that the area is popular for recreational boating and that there is potential for displacement of activities with human health benefits. Consultation with the sector during project planning is recommended to reduce the likelihood of impacts.

#### **Quantified Impacts**

- 3.4.7 None of the social impacts within the South West Region have been quantified.

#### **Non Quantified Impacts**

- 3.4.8 Tables 3.16 and 3.17 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. Dredgers and potters within commercial fisheries in Ayr and Campbeltown may possibly be impacted due to potential lost landings. Recreational boating may possibly be impacted in Wigtown, Kirkcudbright and Whitehaven due to increased fuel costs and decreased access to sites. For most groups, the impacts are only minimal and are unlikely to result in noticeable effects.



**Table 3.16: Distributional analysis for Offshore Wind in the South West Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	x	xx	xx Ayr, Campbeltown	X	x	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	x	x Ayr, Campbeltown	X	x	x	x	xx Processors more likely to be female
Recreational boating	Additional fuel costs	0	x	x	0 Not relevant in SW	x	x	x	x
	Increased deterrent to access in sites that are already challenging to navigate	0	x	xx Wigtown, Kirkcudbright, Whitehaven could be particularly affected	0 Not relevant in SW	x	x	x	x
Tourism	Reduction in expenditure	0	x	No specific settlements affected	0 Not relevant in SW	x	x	x	x

**Impacts:** x x x: significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected.

**Table 3.17: Distributional analysis for Offshore Wind in the South West Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Value of potentially lost landings	x	x	x	0 Not relevant in SW	x	0 Unlikely to be employed in fisheries	xx Dredgers and potters	xx Vessels >10m length x Vessels <10m in length
	Consequential impacts to fish processors	x	x	x	0 Not relevant in SW	x	0	x	x
Recreational boating	Additional fuel costs	0 Unlikely to own boat	x	x	0 Not relevant in SW	x	x	xx Boat users	No other specific group identified



	Increased deterrent to access in sites that are already challenging to navigate	x	x	x	0 Not relevant in SW	x	x	xx Could mean they need to relocate to maintain level of access for recreational boating	xx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to reduce activity if navigation risks increase
Tourism	Reduction in expenditure	x	x	x	x	x	x	x	No other specific group identified
<b>Impacts:</b> x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected									

### West Region

3.4.9 The socio economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: commercial fisheries, recreational boating, and tourism. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover), the environment (mainly due to increased emissions or changes in environmental quality), and culture and heritage (related to changes in seascape). Other impacts, such as on access to services, health, and culture and heritage could largely be mitigated, although there may be minimal impacts on recreational boaters and tourists/visitors to the coast.

3.4.10 The SEA identified that area is popular for recreational boating and cruising with several popular routes between islands and the mainland. It concluded that there is potential for some displacement of some activities, although impacts on some activities may be reduced as Draft Plan Options are not located in near shore areas. Consultation with the recreation sector during project planning is recommended to reduce the likelihood of impacts.

### Quantified Impacts

3.4.11 In most cases, it has not been possible to quantify the impacts, although employment impacts for fisheries are estimated (based on use of multipliers, which are uncertain) and shown in Table 3.18 below.

**Table 3.18: Employment Impacts arising from interaction with Offshore Wind Draft Plan Options in the West Region (FTE per annum, rounded to nearest 0.5 FTE)**

Sector	Social impact	Scenarios		
		Low	Central	High
Commercial Fisheries	Employment (FTE per annum)	0	0.5	1.5

Non Quantified Impacts

3.4.12 Tables 3.19 and 3.20 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. Potters and Nephrops trawlers within commercial fisheries in Oban, Mallaig and Stornoway will probably be impacted due to potential lost landings and obstruction of navigation routes. There may possibly be a consequential impact to fish processors in these areas too. For most groups the impacts are minimal and are unlikely to result in noticeable effects.

**Table 3.19: Distributional analysis for Offshore Wind in West Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	0	xxx	xxx Oban, Mallaig, Stornoway	x	xxx	x	xxx Fishermen more likely to be male	x
	Obstruction of navigation routes	0	Xxx	xxx Oban, Mallaig, Stornoway	x	xxx	x	xxx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	xx	xx Oban, Mallaig, Stornoway	x	xx	x	x	xx Processors more likely to be female
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	0	x	x Oban, Dunstaffnage marinas could be affected if number of boaters reduces (but others could benefit)	0	x	x	x	x
Tourism	Reduction in expenditure	0	x	No specific settlements affected	x	x	x	x	x

**Impacts:** xxx : significant negative effect; xx : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected

**Table 3.20: Distributional analysis for Offshore Wind in West Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Value of potentially lost landings	xxx	xxx	xx	xxx Where fishing provides additional income	xx	0 Unlikely to be employed in fisheries	xxx Potters	xxx Nephrops trawlers
	Obstruction of navigation routes	xxx	xxx	xx	xxx Where fishing provides additional income	xx	0 Unlikely to be employed in fisheries	xxx Potters	xxx Nephrops trawlers
	Consequential impacts to fish processors	xx	xx	x	x	xx	0	x	x
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	x	x	x	xx May be more likely to have smaller boats	x	x	xx Could mean they need to relocate to maintain level of access for recreational boating	xx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to reduce activity if navigation risks increase
Tourism	Reduction in expenditure	x	x	x	x	x	x	x	No other specific group identified
Impacts: xxx : significant negative effect; xx : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected									

North West Region

3.4.13 The socio-economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: commercial fisheries and recreational boating. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover) and the environment (mainly due to increased emissions or changes in environmental quality). Other impacts, such as on access to services, health, and culture and heritage could largely be mitigated.

3.4.14 The SEA also identified the region is popular for recreational boating and also commercial shipping routes and there is potential for displacement of activities. There is potential for some displacement of activities, although impacts on some activities may be reduced as Draft Plan Options are not located in near shore areas. Consultation with the recreation sector during project planning is recommended to reduce the likelihood of impacts.

Quantified Impacts

3.4.15 In most cases, it has not been possible to quantify the impacts, although employment impacts for fisheries are estimated (based on use of multipliers, which are uncertain) and shown in Table 3.21 below.

**Table 3.21: Employment Impacts arising from interaction with Offshore Wind Draft Plan Options in the North-West Region (FTE per annum, rounded to nearest 0.5 FTE)**

Sector	Social impact	Scenarios		
		Low	Central	High
Commercial Fisheries	Employment (FTE per annum)	Impacts on jobs not quantified as regional effects do not exceed 5% threshold	Impacts on jobs not quantified as regional effects do not exceed 5% threshold	1.5

Non Quantified Impacts

3.4.16 Tables 3.22 and 3.23 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. The pelagic sector and herring vessels within commercial fisheries in Kinlochbervie, Lochinver and Ullapool may possibly be impacted due to potential lost landings. For most groups the impacts are at worst minimal and in many cases are unlikely to be noticeable.

**Table 3.22: Distributional analysis for Offshore Wind in the North West Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	0	xx	xx Kinlochbervie, Lochinver, Ullapool	x	xx	x	xx Fishermen more likely to be male	x
	Obstruction of navigation routes	0	x	x Kinlochbervie, Lochinver, Ullapool	0	x	0	x Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	x	x Kinlochbervie, Lochinver, Ullapool	x	xx	x	x	xx Processors more likely to be female
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	0	x	x Pontoon facilities, e.g. at Kinlochbervie could be affected if number of boaters reduces (but others could benefit)	0	x	x	x	x

**Impacts:** x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected

**Table 3.23: Distributional analysis for Offshore Wind in the North West Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Value of potentially lost landings	x	x	x	xx Where fishing provides additional income	x	0 Unlikely to be employed in fisheries	xx Pelagic sector x Potters, demersal trawls	xx Vessels >15m (herring) x Vessels <15m
	Obstruction of navigation routes	x	x	x	xx Where fishing provides additional income	x	0 Unlikely to be employed in fisheries	xx Pelagic sector x Potters, demersal trawls	xx Vessels >15m (herring) x Vessels <15m
	Consequential impacts to fish processors	x	x	x	x	x	0	x	x
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	x	x	x	xx May be more likely to have smaller boats	x	x	xx Could mean they need to relocate to maintain level of access for recreational boating	xx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to reduce activity if navigation risks increase

**Impacts:** x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected

North Region

- 3.4.17 The socio-economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: carbon capture and storage, commercial fisheries, recreational boating, tourism, and water sports (sea angling). The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover) and the environment (mainly due to increased emissions or changes in environmental quality). Other impacts, such as on access to services, health, and culture and heritage could largely be mitigated, although there may be some noticeable impacts, such as on sea anglers or recreational boaters.
- 3.4.18 The SEA identified that the region is popular for recreational boating and cruising with several popular routes between islands and the mainland. Furthermore there are commercial shipping routes. There is potential for some displacement of activities, although impacts on some activities may be reduced as Draft Plan Options are not located in near shore areas. Consultation with

the commercial and recreation sector during project planning is recommended to reduce the likelihood of impacts.

### Quantified Impacts

3.4.19 In most cases, it has not been possible to quantify the impacts, although employment impacts for fisheries are estimated (based on use of multipliers, which are uncertain) and shown in Table 3.24 below.

**Table 3.24: Employment Impacts arising from interaction with Offshore Wind Draft Plan Options in the North Region (FTE per annum, rounded to nearest 0.5 FTE)**

Sector	Social impact	Scenarios		
		Low	Central	High
Commercial Fisheries	Employment (FTE per annum)	1.0	4 – 4.5	9 - 10

### Non Quantified Impacts

3.4.20 Tables 3.25 and 3.26 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. The pelagic and demersal sector within commercial fisheries in Orkney, Scrabster and Shetland will probably be impacted due to potential lost landings and possible obstruction of navigation routes. There will probably be an impact on the shellfish sector due to potential lost landings and a consequential impact to fish processors in these areas too. Recreational boating may possibly be impacted in Bressay Lerwick and Pierowall due to decreased access to sites. Sea angling may possibly be impacted due a reduction of expenditure in this region. For most groups the impacts are likely to be minimal.

**Table 3.25: Distributional analysis for Offshore Wind in the North Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Carbon capture and storage	Competition for space: Draft Plan Option areas and/or cable corridors overlap or lie inshore of potential storage areas	0	x Could have impact on rural economy if investment goes elsewhere	0 Unlikely to affect specific locations	0	x Could have impact on employment opportunities if investment goes elsewhere	0	x	x
Commercial fisheries	Value of potentially lost landings	0	xx	xxx Orkney, Scrabster, Shetland	x	xxx	x	xxx Fishermen more likely to be male	x
	Obstruction of navigation routes	0	x	xx Orkney, Scrabster, Shetland	x	xx	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	xx	xxx Orkney, Scrabster, Shetland	x	xxx	x	x	xx Processors more likely to be female

Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	0	x	xx Bressay, Lerwick and Pierowall could be affected	0	x	x	x	x
Tourism	Reduction in expenditure	0	x	No specific settlements affected	x	x	x	x	x
Water sports-Sea Angling	Reduction in expenditure	xx	xx	xx	xx	xx	xx	xx	x
<b>Impacts:</b> x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected									

**Table 3.26: Distributional analysis for Offshore Wind in the North Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Carbon capture and storage	Competition for space: Draft Plan Option areas and/or cable corridors overlap or lie inshore of potential storage areas	xx economic impacts could affect this group more than others	x	x	x Unlikely to be employed in this industry (but may be for extra income)	x	0 Unlikely to be affected, economic impacts likely to be small	0 None likely to be affected	xx Local businesses that might otherwise have been involved
Commercial fisheries	Value of potentially lost landings	xxx	xxx	xx	xxx Where fishing provides additional income	xx	0 Unlikely to be employed in fisheries	xxx Pelagic, demersal sector xx Shellfish	xxx Vessels >15m xxx Vessels <15m
	Obstruction of navigation routes	x	x	x	xx Where fishing provides additional income	x	0 Unlikely to be employed in fisheries	xx Pelagic, demersal sector x Shellfish	xx Vessels >15m xx Vessels <15m
	Consequential impacts to fish processors	xx	xx	x	x	x	0	x	x
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	x Where employed in this area	x	x	0 Unlikely to be employed in this area	x	xx Could affect ability to support trips for disabled/sick	xx Could mean they need to relocate to maintain services	No other specific group identified
Tourism	Reduction in expenditure	x	x	x	x	x	x	x	No other specific group identified
Water sports – Sea Angling	Reduction in expenditure	xx	xx	xx	xx	xx	x Level of sea angling activity may be lower for sick	xxx	No other specific group identified
<b>Impacts:</b> x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected									

### North East Region

3.4.21 The socio-economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: carbon capture and storage, commercial fisheries, and recreational boating. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover) and the environment

(mainly due to increased emissions or changes in environmental quality). Other impacts, such as on access to services, health, and culture and heritage could largely be mitigated, although there may be some noticeable impacts, such as on carbon capture and storage (mainly due to additional costs of rerouting pipelines, such that the social impacts might be minimal) and recreational boaters.

- 3.4.22 The SEA identified is has some recreational boating and also commercial shipping routes and there is potential for displacement of activities consultation with the commercial and recreational sector during project planning is recommended to reduce the likelihood of impacts.

Quantified Impacts

- 3.4.23 In most cases, it has not been possible to quantify the impacts, although employment impacts for fisheries are estimated (based on use of multipliers, which are uncertain) and shown in Table 3.27 below.

**Table 3.27: Employment Impacts arising from interaction with Offshore Wind Draft Plan Options in the North East Region (FTE per annum, rounded to nearest 0.5 FTE)**

Sector	Social impact	Scenarios		
		Low	Central	High
Commercial Fisheries	Employment (FTE per annum)	Impacts on jobs not quantified as regional effects do not exceed 5% threshold	Impacts on jobs not quantified as regional effects do not exceed 5% threshold	1.5

Non Quantified Impacts

- 3.4.24 Tables 3.28 and 3.29 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. Dredgers and potters within commercial fisheries in Fraserburgh and Peterhead will probably be impacted due to obstruction of navigation routes. There may possibly be an impact in Aberdeen, Buckie, Fraserburgh and Peterhead due to potential lost landings. Recreational boating may possibly be impacted in Peterhead, Banff and Whitehills marinas due to decreased access to sites. For most groups the impacts are likely to be minimal.



**Table 3.28: Distributional analysis for Offshore Wind in the North East Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Carbon capture and storage	Competition for space: Draft Plan Option areas and/or cable corridors overlap or lie inshore of potential storage areas	0	x Could have impact on rural economy if investment goes elsewhere	0 Unlikely to affect specific locations	0	x Could have impact on employment opportunities if investment goes elsewhere	0	x	x
Commercial fisheries	Value of potentially lost landings	0	xx	xx Aberdeen, Buckie, Fraserburgh, Peterhead	x	xx	x	xx Fishermen more likely to be male	x
	Obstruction of navigation routes	0	xx	xxx OWNE2 (Fraserburgh and Peterhead)	x	xxx	x	xxx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	xx	xx Aberdeen, Buckie, Fraserburgh, Peterhead	x	xx	x	x	xx Processors more likely to be female
Recreational boating	Additional fuel costs	0	x	x	x	x	x	x	x
	Increased deterrent to access in sites that are already challenging to navigate	0	x	xx Peterhead, Banff and Whitehills marinas could be affected	0	x	x	Increased deterrent to access in sites that are already challenging to navigate	0

**Impacts:** xxx : significant negative effect; xx : possible negative effects; x : minimal negative effect, if any; 0: no noticeable effect expected

**Table 3.29: Distributional analysis for Offshore Wind in the North East Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Carbon capture and storage	Competition for space: Draft Plan Option areas and/or cable corridors overlap or lie inshore of potential storage areas	xx economic impacts could affect this group more than others	x	x	0 Not relevant in NE	x	0 Unlikely to be affected, economic impacts likely to be small	0 None likely to be affected	xx Local businesses that might otherwise have been involved
Commercial fisheries	Value of potentially lost landings	xx	xx	xx	0 Not relevant in NE	xx	0 Unlikely to be employed in fisheries	xx Dredgers, potters x Demersal, pelagic sectors, Nephrops	xx Vessels >15m xx Vessels <10m x Vessels <15m
	Obstruction of navigation routes	xxx	xxx	xxx	0 Not relevant in NE	xxx	0 Unlikely to be employed in fisheries	xxx Dredgers, potters xxx Demersal, pelagic sectors, Nephrops	xxx Vessels >15m xxx Vessels <10m xxx Vessels <15m

	Consequential impacts to fish processors	xx	xx	x	0 Not relevant in NE	x	0	x	x
Recreational boating	Additional fuel costs	0 Unlikely to own boat	x	x	0 Not relevant in NE	x	x	xx Boat users	No other specific group identified
	Increased deterrent to access in sites that are already challenging to navigate	x	x	x	0 Not relevant in NE	x	x	xx Could mean they need to relocate to maintain level of access for recreational boating	xx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to reduce activity if navigation risks increase
<b>Impacts:</b> x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected									

### 3.5 Summary of Effects

3.5.1 The SEA cannot predict with certainty the precise significance of effects on the environment as opportunities to mitigate and minimise effects exist at the project level, primarily through project design and location. Furthermore the significance of predicted effects may only be fully understood as initial projects are monitored. The headline environmental effects of the draft plan for offshore wind are summarised in the bullets below:

- Potential effects on biodiversity as a result of collision with devices, particularly blades, barriers to movement of mobile species. Noise impacts on sensitive mobile species from the construction of devices (seabirds, cetaceans, seals, elasmobranchs, and fish species). Additionally there may be direct loss of seabed habitat from the installation of devices and effects associated with potential changes to patterns of tidal and sediment movement on marine habitats.
- Scope for impacts on water quality from contamination as a result of changes to turbidity and seabed disturbance in areas of existing contamination, or cross contamination of material used to fill gravity based devices. The significance of effects will depend on the proximity of devices to sensitive areas such as areas, such as those for fish spawning and feeding and shellfish growing waters.
- Positive effects for climate change mitigation through moving to decarbonisation of energy supply.
- Changes to turbidity, sediment disturbance, and loss of geology in placing devices may have secondary impacts on coastal processes. The significance of effects will depend on the proximity of devices to more sensitive coastlines such as those with geological SSSI and GCRs.

- Potential direct effects on submerged archaeology during construction and in some cases potential for effects on the setting of features of the historic environment.
- Visual impacts on landscape and seascape character. Wind devices will result in change, however the magnitude of visual effects depends in general on visibility and positioning of devices in regards to onshore features. Visual effects for other sea users, such as recreation vessels, may increase if constructed in popular recreational locations. Effects from lighting at night time are possible although of greater significance for plan options in greater proximity to onshore and offshore receptors.
- In some locations new structures could increase collision risk for some vessels, including with each other as a result of narrowed channels of use due to potential exclusion zones. The likelihood of effects are considered to be of lower significance and able to be mitigated.

3.5.2 Table 3.30 sets out the quantified economic impacts of Draft Plan Options for offshore wind on other marine activities at a national level. These figures are aggregated from the regional level analyses.

**Table 3.30: Present value (PV) costs for Offshore Wind in at a national level, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Carbon Capture and Storage	Additional costs of constructing cable crossings	1.85	4.32	9.27
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	1.21	2.87	6.2
Recreational boating	Additional fuel costs	0.05	0.72	0.91
Shipping	Additional fuel costs	4.87	66.01	129.59
Tourism	Reduction in expenditure	0	0.26	0.98
Water sports - Sea Angling	Reduction in expenditure	0	0	0.47
<b>Total PV costs</b>		<b>7.98</b>	<b>74.18</b>	<b>147.42</b>

3.5.3 The majority of quantified impacts of the Draft Offshore Wind Plan fall upon the shipping industry, particularly within the North East region. Other industries with significant costs include carbon capture and storage and commercial fisheries.

3.5.4 In addition to the above, there are a number of non-quantified impacts. They impact on the following marine activities: aviation, carbon capture and storage, commercial fisheries, energy generation, military interests, oil and gas, ports and harbours, power interconnectors, recreational boating, shipping, tourism and water sports. The nature of these does not lend itself to them being aggregated at a national level, but the relevant information is presented within the regional sections above.

- 3.5.5 There will also be a number of social impacts, as discussed in the previous section. These will fall almost entirely at a regional (or sub-regional) level, but may include national impacts on coastal communities, the 10% most income deprived decile and some specific social groups.
- 3.5.6 Nonetheless, most of the social impacts are likely to be felt at a very local level. The real significance of the local impacts could only be fully explored through a specific, local assessment, which is beyond the scope of this appraisal. For example, it has not been possible to explore whether a local area might become increasingly deprived if there were impacts on jobs, partly because the impacts are generally small but also because the specific locations of the impacts cannot be clearly identified. In addition, the 5% threshold for assessing quantitative impacts may under-estimate effects on certain businesses that may be disproportionately affected as impacts are unlikely to be evenly distributed across a sector.
- 3.5.7 Social impacts have generally been assessed as knock-on impacts from the direct effects on activities. This means that areas such as employment, environment and health have been included to a greater extent than the much more indirect effects on crime or education. Again, these indirect effects may become more evident in a specific, local assessment.

## 4 Sustainability Appraisal: The Plan for Wave Energy

### 4.1 Introduction

4.1.1 The following section provides a summary of the results of the technical assessments for the draft wave energy plan. The SEA and HRA provide technical detail on the potential for effects environment and human health. The socio-economic assessment provides the potential social and economic consequences of effects on existing marine activities. Supporting technical assessment documents provide the detail of how conclusions have been made. The following sections provide a high level summary of these.

### 4.2 Environment

4.2.1 There are a range of potential interactions with the environment from the installation of wave devices in the marine environment. However, there is a degree of uncertainty regarding the precise level of effect in many cases. This is in part due to the often complex interactions in the marine environment, such as between the design of devices and mobile species, or the potential changes to marine hydrodynamics and patterns of sedimentation with coastal processes. Gaps in the understanding of these effects are being filled through research and the assessment and monitoring of demonstrator projects and initial commercial scale projects.

4.2.2 The following sections highlight some of the potential effects and environmental risks associated with wave devices. This is followed by a regional summary of the headline risks from the Draft Plan Options. The level of risk to environmental features is based on the potential effects of the technology and the sensitivity of the receiving environment.

#### ***Biodiversity, Flora and Fauna***

4.2.3 There is potential for effects on marine fauna and flora as a result of development of wave energy as detailed below. Some effects could also be exacerbated, as a result of bird aggregation utilising above water elements of some devices, if located in foraging waters. Furthermore, the significance of effects is yet to be fully established for technologies that are still under development and for which limited commercial deployment and monitoring information is available.

4.2.4 Potential collision and entanglement with devices could result in injury and mortality to marine fauna, particularly where devices have moving parts and multiple mooring lines. However, this will be largely dependent on the size, location and design of the device, and the response of the marine fauna involved. Avoidance of devices is a likely response for many species, in particular some species of fish, but if collision were to occur, impacts could be

fatal in some instances, especially with larger species such as seals, cetaceans, and elasmobranchs. Whilst there is potential for collision risk for diving birds with wave devices with below surface components, it is considered to be of lower significance for those devices that are placed on the water surface. The ongoing HRA has looked at physical damage to species including Bottlenose dolphins and Harbour porpoise, Grey and Harbour seals, Atlantic salmon, Lamprey, Shad, seabirds and diving birds. The appraisal indicates further work at the project level will be required.

- 4.2.5 Noise and vibration during construction and operation could also lead to disturbance and displacement in marine fauna. Research demonstrates that there is a significant amount of uncertainty regarding the level of disturbance likely to occur to all species as effects will be site-specific, and will depend on the noise levels generated by the devices. Displacement can also result from the placement of devices in areas used by species for foraging activities, courtship behaviour and breeding sites. The HRA considers noise and vibration effects for species including Bottlenose dolphins, Harbour porpoise, Grey and Harbour seals, Atlantic salmon, Lamprey and Shad. It is considered that in some cases construction outside of breeding or migratory seasons might minimise effects.
- 4.2.6 Potential impacts on the behaviour of seals and otters can be particularly associated with near shore devices. Where devices are placed near to shoreline habitats they might restrict movements for birds to migratory routes or foraging areas. Cetaceans and elasmobranchs might be particularly affected by offshore devices as can the foraging grounds of some bird species. Barriers to movement and effects on species including Bottlenose dolphins, Harbour porpoise, Grey and Harbour seals, Atlantic salmon, Lamprey and Shad are also considered within the ongoing HRA. Furthermore the HRA will consider visual disturbance to surface feeding and diving birds.
- 4.2.7 Species health could also be impacted by the effects of electromagnetic fields (EMF) from cabling, in particular elasmobranchs and fish. Although research on effects is ongoing the indication is that the effects could be minimal. Again these types of effects are also considered within the HRA.
- 4.2.8 Some wave technologies have the potential for impacts arising from shock waves or pressure waves which occur when large waves hit the side of surface-piercing structures which have high profiles above the water surface. The magnitude of any impacts (to seals, cetaceans, otter and elasmobranchs) is not conclusively known.
- 4.2.9 There will be direct impacts to the seabed as a result of installation, which may vary between the types of device used (e.g. floating devices or devices placed on the seabed in near shore locations) and the receiving habitat. The presence and type of mooring used for devices and the presence of structures on the seabed are the main impacts to benthic habitats. Impacts include loss of benthic habitat, sediment dispersion and deposition, changes to water hydrology and turbidity, and potential release of contaminated materials. The

HRA also considers direct and indirect physical damage to habitats and contamination resulting from elevated turbidity. These types of effect could impact on marine ecosystems in the locality of devices and will form part of project level assessment.

- 4.2.10 The assessment does identify the potential for the creation of artificial habitats for marine organisms as a result of new structures in the water. This may be aided by potential reductions in other marine use in areas where wave technology is located.

#### ***Water and the Marine Environment***

- 4.2.11 Wave devices have the potential to result in local changes to hydrodynamics, tidal flows and fluxes, water turbidity and water turbulence, vibration, dissipation of wave energy and impact on wave period. Water turbidity and vibration might, in particular, be associated with the construction and installation phase. Furthermore, there may be additional contamination risks from leakage from vessels or equipment associated with the construction and maintenance of devices.
- 4.2.12 Furthermore there is potential for impacts to the ability of fish species to spawn, respire and feed, and on shellfish growing waters in the vicinity of wave farm sites, particularly near shore devices. The significance of these effects will depend on the proximity of devices to these waters.
- 4.2.13 Effects can be mitigated largely through applying environmental controls during construction and from hydrodynamic modelling and design to reduce impacts such as turbidity.

#### ***Climatic Factors***

- 4.2.14 Wave energy is considered to contribute to the decarbonisation of electricity generation over the long-term which will be beneficial for climatic factors.
- 4.2.15 Some coasts and coastal processes are already impacted by climate change and projects level assessment should consider how new devices may interact with this existing pattern of change.

#### ***Marine Geology and Coastal Processes***

- 4.2.16 Impacts on the seabed and geology may result from changes to turbidity, wave dissipation and tidal fluxes, sediment disturbance, loss and abrasion of geology, release of contaminated materials bonded to sediments. These can result from the installation of mooring systems and subsea cabling and the interplay of these effects may also interact with coastal processes.
- 4.2.17 Changes to hydrodynamics and water flows may have an interaction with coastal processes. Impacts would be of greatest significance where important coastal geological features including geological SSSI and GCRs are located. Project level assessment will need to consider impacts on geology and coastal features based on the location of individual projects.

### ***Historic Environment***

- 4.2.18 Effects on designated and non-designated submerged archaeology, including wrecks, have been identified. Impacts can be associated with direct damage during construction but also from scouring, siltation and deposition around assets located in the vicinity of devices or arrays. Careful location of devices in regards of historic assets can mitigate potential effects.
- 4.2.19 Wave devices, in particular elements of wave devices that sit above the water surface, could impact on the setting of features of the historic environment. The magnitude of visual effects depends on visibility and positioning of devices in regards to onshore features. Effects and appropriate mitigation can be applied through appropriate project design and location within Draft Plan Options.

### ***Landscape and Seascape***

- 4.2.20 Landscape, seascape and visual effects may vary between technologies depending on the presence of surface-piercing structures, marker buoys and lights for navigation, particularly if located near-shore and in large numbers. Submerged and oscillating devices may have fewer impacts than devices which sit on top of the water, but this will depend on location and the quality of the receiving environment. Near shore devices tend to have a greater amount of infrastructure below water and would have reduced visibility, although part of the device infrastructure may be above the surface. Project level assessment is required to determine the significance of effects within the Draft Plan Options. Development that will affect NSAs should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.

### ***Regional Environmental Issues***

- 4.2.21 The environmental issues identified above are relevant for Draft Plan Options within all of the regions. The following sections highlight regions where the receiving environment may be particularly sensitive to potential effects and hence a higher risk of significance.

#### **West Region**

- 4.2.22 Given the presence of many important breeding and roosting sites for birds in the region there is a level of risk of collision and disturbance to birds during both construction and operation, in particular diving birds (for devices with underwater components) and birds that fly across the surface of the water. These risks also extend to the many important mobile marine species found in the region, including amongst others Basking shark, Harbour porpoise, Minke whales and seal species. Devices acting as barriers to movement may also interrupt migratory routes and courtship behaviours for some species.
- 4.2.23 The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Project level EIAs will need to determine the significance



of effects and establish such mitigation measures. Ongoing research can help to provide more information to assist in this determination of significance.

- 4.2.24 Draft Plan Options WW2 and WW3 overlap with the Skye to Mull MPA search area (proposed for Basking shark and Minke whale interest features). Project level EIAs will need to demonstrate that development is compatible with the conservation objectives of any proposed MPAs.
- 4.2.25 The potential for effects on coastal habitats should be considered at the project level in relation to any impacts on the seabed, patterns of sedimentation and changes to hydrodynamics including changes to wave period and water turbidity and turbulence.
- 4.2.26 Landscape and seascape character and quality are considered high across the region that includes South Uist Machair and Loch Na Keal NSAs, and several areas considered to be wild land. Whilst any installed devices will result in a level of change, the significance of effects may reduce for devices with submerged elements even in near shore locations. However, effects associated with night time lighting may remain. Whilst above surface devices will remain visible they may still be located some distance from the shore. Detailed impact assessments will need to form part of project assessment in order to determine the significance of impacts on landscape, local communities and also the setting of historic features. Development that will affect NSAs should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.

#### North West Region

- 4.2.27 The region is known to be frequented by many mobile marine species including White beaked dolphin, Risso Dolphin, Grey seal, Sand Eels, whales, sharks and many important bird species. There is a level of risk of collision and noise disturbance to birds during both construction and operation, in particular diving birds (for devices with underwater components) and birds that fly across the surface of the water. Collision, displacement and barriers to movement for all mobile marine species remains a risk, although this may vary between the type of wave device installed within a Draft Plan Option. The significance of risk to protected species will need to be established as part of EIA and HRA during the development planning and licencing process. The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Furthermore, ongoing research can help to provide more information to assist in this determination of significance.
- 4.2.28 Draft Plan Option WNW1 overlaps with existing and proposed designations as follows:
- Flannan Isles SPA - project level HRA should demonstrate that development does not adversely affect the integrity of the designation alongside any other SPA/SAC scoped into an assessment.

- Eye Peninsula and Butt of Lewis proposed MPA (Rissos dolphin, White-beaked dolphin and Sand eel whale interest features) - project level EIA will need to demonstrate that development is compatible with the conservation objectives of the proposed MPA.

4.2.29 The potential loss of seabed and benthic habitat can be limited through site level survey. Avoidance of important habitat and project level assessment of changes to patterns of sedimentation and hydrodynamics may also provide mitigation of potential effects.

4.2.30 Landscape and seascape character and quality are considered high across the regions coastline, with several areas considered to be wild land. Whilst any installed devices will result in a level of change, the significance of effects may reduce for devices with submerged elements even in near shore locations. However, effects associated with night time lighting may remain. Whilst above surface devices will remain visible they may still be located some distance from the shore. Detailed impact assessment will need to form part of project assessment in order to determine the significance of impacts on landscape, local communities, including valued features such as the regions National Scenic Areas (NSA), and also the setting of historic features, in particular the St Kilda WHS. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated and avoid impacts on the outstanding unique value of the WHS.

#### North Region

4.2.31 The region is known to be frequented by many mobile marine species including seabirds, fish (including Atlantic salmon and Sand eel), Common and Grey seals, whales, dolphins and elasmobranchs (including Basking Shark). There is a level of risk of collision and noise disturbance to birds during both construction and operation, in particular diving birds (for devices with underwater components) and birds that fly across the surface of the water. Collision, displacement and barriers to movement for all mobile marine species remains a risk, although this may vary between the type of wave device installed within a Draft Plan Option.

4.2.32 The significance of risk to protected species will need to be established as part of EIA and HRA during the development planning and licencing process. The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Furthermore, ongoing research can help to provide more information to assist in this determination of significance.

4.2.33 Several Draft Plan Options overlap with European sites. WN1 overlaps with Strathy Point SAC; WN2 overlaps with the Marwick SPA Stromness Heath and Coast SPA and the Hoy SPA; and WN3 overlaps with the Sumburgh Head SPA. Project level HRAs should demonstrate that development does not adversely affect the integrity of the designation alongside any other SPA and SAC scoped into an assessment.

- 4.2.34 Draft Plan Option WN2 overlaps with the North West Orkney MPA (proposed with Sand eel interest features). Project level EIAs will need to demonstrate that development is compatible with the conservation objectives of the proposed MPA.
- 4.2.35 The potential loss of seabed and benthic habitat can be limited through site level survey. Avoidance of important habitat and project level assessment of changes to patterns of sedimentation and hydrodynamics may also provide mitigation of potential effects.
- 4.2.36 Landscape and seascape character and quality are considered high across the regions coastline, with several areas considered to be wild land. Devices within the Draft Plan Options may be visible from the Shetland NSA and Hoy and West Mainland NSA. Whilst any installed devices will result in a level of change, the significance of effects may reduce for devices with submerged elements even in near shore locations. However, effects associated with night time lighting may remain. Whilst above surface devices will remain visible they may still be located some distance from the shore. Detailed impact assessment will need to form part of project assessment in order to determine the significance of impacts on landscape, local communities, including valued features such as the regions NSAs, and also the setting of historic features, in particular the Heart of Neolithic Orkney WHS. Development that will affect NSAs should avoid adverse effects on the integrity of the area or the qualities for which it has been designated and avoid impacts on the outstanding unique value of the WHS.

### 4.3 Economy and other marine users

- 4.3.1 This section summarises the findings of the socio-economic assessment relating to the economic impacts of Draft Plan Options for wave energy on other marine activities. These impacts are reported at 'planning region' level, rather than at the level of specific Draft Plan Options. More detail on this analysis can be found in Chapters 5.2, 6.2, 7.2 and Appendix C of the socio-economic assessment.

#### West Region

- 4.3.2 The socio-economic assessment indicated that, based on a pro-rata share of the indicative scale of development shown in Table 4.1, the following proportions of Draft Plan Option areas WW1, WW2, WW3 and WW4 could be developed.

**Table 4.1: Potential Portions of Draft Plan Options Developed in the West Region (% of Spatial Area)**

Scenario	WW1	WW2	WW3	WW4
Low	0.20	0.50	0.59	0.17
Medium	0.47	0.50	0.59	0.47
High	0.95	0.95	0.95	0.95

4.3.3 Such development could have the potential to interact with commercial fisheries, energy generation, military interests, recreational boating, and water sports.

Quantified Impacts

4.3.4 The study was able to quantify aspects of the impacts on commercial fisheries. These estimated costs are set out in Table 4.2 below.

**Table 4.2: Present value (PV) costs for Offshore Wind in the South West Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.01	0.01	0.03
<b>Total PV costs</b>		<b>0.01</b>	<b>0.01</b>	<b>0.03</b>

Non-Quantified Impacts

4.3.5 The study identified several other sources of cost that could arise to marine activities from development in Draft Plan Option areas WW1, WW2, WW3 and WW4. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 4.3:

**Table 4.3: Non Quantified Impacts on Other Marine Activities for Wave Energy in the West Region**

Marine Activity	Non-Quantified Impact
Commercial Fisheries	Some overlap with moderate concentrations of steaming pings, indicating overlap with fishing navigation routes. Careful location of devices is expected to be able to avoid impacts for this wave area.
Energy Generation	There is a significant degree of overlap between Draft Plan Option areas WW1, OWW1 and OWW3 which could result in competition for space between the different technologies. Energy generation from differing forms of technology may also lead to competition for transmission capacity.
Military Interests	Potential overlap between all Draft Plan Option areas and with all cable routes and military practice and exercise areas. Potential to interfere with underwater communications.
Recreational Boating	Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.
Water Sports	Sea kayaking activities overlap with all wave Draft Plan Option areas in the West Region. In addition scuba diving overlaps with area WW2 and with the potential cable routes of all three Draft Plan Option areas. While recreational angling is an important activity within the West Region, no significant cost impacts have been identified. The cost to water sports activities associated with wave developments within the Draft Plan Option areas is assessed as negligible.

### North West Region

- 4.3.6 The socio-economic assessment indicated that, based on a pro-rata share of the indicative scale of development shown in Table 4.4, the following proportions of Draft Plan Option area WNW1 could be developed.

**Table 4.4: Potential Portions of Draft Plan Options Developed in the North West Region (% of Spatial Area)**

Scenario	WNW1
Low	0.17
Medium	0.47
High	0.95

- 4.3.7 The study found that such development could have the potential to interact with commercial fisheries, energy generation, military interests, ports and harbours, recreational boating, and water sports.

### Quantified Impacts

- 4.3.8 The study was able to quantify aspects of the impacts on commercial fisheries. These estimated costs are set out in Table 4.5 below.

**Table 4.5: Present value (PV) costs for Offshore Wind in the North West Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.03	0.09	0.18
<b>Total PV costs</b>		<b>0.03</b>	<b>0.09</b>	<b>0.18</b>

### Non-Quantified Impacts

- 4.3.9 The study identified several other sources of cost that could arise to marine activities from development in Draft Plan Option areas WNW1. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 4.6.

**Table 4.6: Non Quantified Impacts on Other Marine Activities for Wave Energy in the North West Region**

Marine Activity	Non-Quantified Impact
Commercial Fisheries	WNW1 overlaps with the navigation routes heading east from the northern coast of the Isle of Lewis. Careful location of devices is expected to be able to avoid impacts for this wave area.
Energy Generation	Energy generation from differing forms of technology may lead to competition for transmission capacity.
Military Interests	Potential overlap between all Draft Plan Option areas and with all cable routes and military practice and exercise areas. Potential to interfere with underwater communications.
Ports and Harbours	Increase in marine risk, specifically the temporary collision risk while cable laying or maintenance is being carried out. Careful planning is

	expected to be able to avoid impacts for this wave area.
Recreational Boating	Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.
Water Sports	Surfing, windsurfing and scuba diving occur within the area of WNW1. Windsurfing, surfing and scuba diving are also undertaken within the potential cable route areas between the Draft Plan Option areas and landfall. Sea kayaking is undertaken in all wave Draft Plan Option areas. The cost to water sports activities associated with wave developments is assessed as negligible.

### North Region

- 4.3.10 The socio-economic assessment indicated that, based on a pro-rata share of the indicative scale of development shown in Table 4.7, the following proportions of Draft Plan Option areas WN1, WN2 AND WN3 could be developed.

**Table 4.7: Potential Portions of Draft Plan Options Developed in the North Region (% of Spatial Area)**

Scenario	WN1	WN2	WN3
Low	0.35	0.17	0.17
Medium	0.47	0.47	0.47
High	0.95	0.95	0.95

- 4.3.11 The study found that such development could have the potential to interact with commercial fisheries, energy generation, military interests, ports and harbours, recreational boating, and water sports.

### Quantified Impacts

- 4.3.12 The study was able to quantify aspects of the impacts on commercial fisheries and water sports (in the form of recreational angling). These estimated costs are set out in Table 4.8.

**Table 4.8: Present value (PV) costs for Wave energy in the North Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.03	0.09	0.18
Water sports - Sea Angling	Reduction in expenditure	-	-	0.10
<b>Total PV costs</b>		<b>0.03</b>	<b>0.08</b>	<b>0.27</b>

### Non-Quantified Impacts

- 4.3.13 The study identified several other sources of cost that could arise to marine activities from development in Draft Plan Option areas WN1, WN2 and WN3. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 4.9.

**Table 4.9: Non Quantified Impacts on Other Marine Activities for Wave Energy in the North Region**

Marine Activity	Non-Quantified Impact
Commercial Fisheries	Wave area WN1 overlaps with the navigation route along the north coast of Scotland. Careful location of devices is expected to be able to avoid impacts for this wave area.
Energy Generation	There is a significant degree of overlap between Draft Plan Option areas WN2 and OWN1 which could result in competition for space between the different technologies. Energy generation from differing forms of technology may also lead to competition for transmission capacity.
Military Interests	Potential overlap between all Draft Plan Option areas and with all cable routes and military practice and exercise areas. Potential to interfere with underwater communications.
Ports and Harbours	Increase in marine risk, specifically the temporary collision risk while cable laying or maintenance is being carried out. Careful planning is expected to be able to avoid impacts for this wave area.
Recreational Boating	Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.
Water Sports	Sea kayaking is undertaken in all wave Areas of Search while scuba diving is known to take place at WN2. Windsurfing and surfing and scuba diving are also undertaken within the potential cable route areas between the Draft Plan Option areas and landfall. The cost to water sports activities associated with wave developments within the Draft Plan Option areas is assessed as negligible.

## 4.4 People and Health

4.4.1 This section summarises the findings of the socio-economic assessment relating to the potential social impacts of Draft Plan Options for wave energy that could arise from impacts on other marine activities. These impacts are reported at ‘planning region’ level, rather than at the level of specific Draft Plan Options. More detail on this analysis can be found in Chapters 5.2, 6.2, 7.2, and Appendix C of the socio-economic assessment, and within the population and human health section of the Environmental Report.

### *Population and Human Health*

4.4.2 Potential conflicts with commercial, fishing and recreational ship movement in terms of collision risk have been identified through the SEA. Measures including exclusion zones, lighting and marker buoys can mitigate for some accident risk. Collision risk could increase for smaller recreational craft particularly where sea conditions could make devices that sit on the surface of the sea difficult to see from a distance.

4.4.3 Displacement of recreational activities could be particularly acute if devices are placed in near shore areas where recreational use can be more concentrated. Some wave devices that sit within the water column would be located in these areas. The displacement of shipping, both commercial and recreational, from wave sites as a result of restricting access, could increase the potential risk of collision by limiting the space for vessels. Shallow water devices may in



particular reduce the space available for some recreational boating. Collision and displacement risks are also considered to be reversible and would reduce upon decommissioning.

### ***Regional Issues***

4.4.4 The following sections highlight regional social issues.

#### **West Region**

4.4.5 The socio-economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: commercial fisheries and water sports. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover). Other impacts, such as on access to services, health, and culture and heritage could largely be mitigated.

4.4.6 The SEA identifies the region is popular for recreational boating, water sports and cruising with several popular routes between islands and the mainland. There is potential for some increased collision risk or displacement of activities particularly if devices in near shore areas narrow navigation channels. Consultation with the recreation sector during project planning is recommended to reduce the likelihood of impacts.

#### **Quantified Impacts**

4.4.7 None of the social impacts within the West Region are quantified as being significant.

#### **Non Quantified Impacts**

4.4.8 Tables 4.10 and 4.11 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. For example, impacts may be greater on sea kayakers as they could be directly affected however even here the impacts are unlikely to be significant. The only noticeable impacts are likely to be on commercial fisheries.

**Table 4.10: Distributional analysis for Wave Energy in the West Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	0	x	x Oban, Mallaig, Stornoway	x	x	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	x	x Oban, Mallaig, Stornoway	x	x	x	x	xx Processors more likely to be female
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	0	x	No specific settlements affected	x	x	x	x	x

**Impacts:** x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected



**Table 4.11: Distributional analysis for Wave Energy in the West Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Value of potentially lost landings	x	x	x	x Where fishing provides additional income	x	0 Unlikely to be employed in fisheries	x Potters	x Nephrops trawlers
	Consequential impacts to fish processors	x	x	x	x	x	0	x	x
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	x	x	x	x	x	x	xx Sea kayakers could have to change routes or look for alternatives	No other specific group identified

**Impacts:** x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected

North West Region

4.4.9 The socio-economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: commercial fisheries and recreational boating. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover). Other impacts such as on health could largely be mitigated, such that there are unlikely to be any noticeable impacts. The only exception may be during construction for surfers and windsurfers, but this would be minimal and only for a short-time.

4.4.10 The area is popular for recreational boating and also commercial shipping routes and there is potential for displacement of activities. There is potential for some increased collision risk or displacement of activities particularly if devices in near shore areas narrow navigation channels. Consultation with the recreation sector during project planning is recommended to reduce the likelihood of impacts.

Quantified Impacts

4.4.11 None of the social impacts within the West Region are quantified as being significant.

Non Quantified Impacts

4.4.12 Tables 4.12 and 4.13 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. The pelagic sector and herring vessels within commercial fisheries in Kinlochbervie, Lochinver and Ullapool may possibly be impacted due to potential lost landings and loss of traditional fishing grounds. The only noticeable impacts are likely to be on commercial fisheries.

**Table 4.12: Distributional analysis for Wave Energy in the North West Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	0	xx	xx Kinlochbervie, Lochinver, Ullapool	x	xx	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	x	x Kinlochbervie, Lochinver, Ullapool	x	xx	x	x	xx Processors more likely to be female
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	0	x	x Pontoon facilities, e.g. at Kinlochbervie could be affected if number of boaters reduces (but others could benefit)	0	x	x	x	x

**Impacts:** x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected

**Table 4.13: Distributional analysis for Wave Energy in the North West Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Loss of traditional fishing grounds	x	x	x	xx Where fishing provides additional income	xx	0 Unlikely to be employed in fisheries	xx Pelagic sector x Potters, demersal trawls	xx Vessels >15m mackerel) x Vessels <15m
	Consequential impacts to fish processors	x	x	x	x	x	0	x	x
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	x	x	x	xx May be more likely to have smaller boats	x	x	xx Could mean they need to relocate to maintain level of access for recreational boating	xx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to reduce activity if navigation risks increase

**Impacts:** x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected

North Region

4.4.13 The study found that social impacts within the region might arise through interactions between development and the following sectors: carbon capture and storage, commercial fisheries, recreational boating and water sports. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover) and the environment (mainly due to increased emissions or changes in environmental quality). There may also be impacts on education (specifically research and development) if opportunities for carbon, capture and storage are minimised (although it is likely that investment would move elsewhere if competition for space was a deciding factor). Other impacts, such as on access to services, health, and culture and

heritage could largely be mitigated, although there may be some noticeable impacts, such as on sea anglers, sea kayakers and recreational boaters.

- 4.4.14 The SEA identifies that the region is popular for recreational boating, water sports and cruising with several popular routes between islands and the mainland. Furthermore there are commercial shipping routes. There is potential for some increased collision risk or displacement of activities particularly if devices in near shore areas narrow navigation channels. Consultation with the recreation sector during project planning is recommended to reduce the likelihood of impacts.

#### Quantified Impacts

- 4.4.15 None of the social impacts within the North Region are quantified as being significant.

#### Non Quantified Impacts

- 4.4.16 Tables 4.14 and 4.15 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. For example, impacts on sea anglers could fall disproportionately onto males (although this will depend on the local make-up of sea anglers). Sea kayakers may also be impacted, although this will depend on sea kayaking routes and the level of overlap between those routes and the location of devices. For carbon capture and storage, there could be larger effects for local businesses and people of working age if investment were to go elsewhere due to competition for space. However, these are likely to be similar businesses and employees involved in renewable energy, so the impacts may be negligible. The pelagic and demersal sector within commercial fisheries in Orkney, Scrabster and Shetland may possibly be impacted due to potential lost landings and consequential impacts to fish processors. For most groups, though, the impacts are likely to be minimal.

**Table 4.14: Distributional analysis for Wave Energy in the North Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Carbon capture and storage	Competition for space: Draft Plan Option areas and/or cable corridors overlap or lie inshore of potential storage areas	0	x Could have impact on rural economy if investment goes elsewhere	0 Unlikely to affect specific locations	0	x Could have impact on employment opportunities if investment goes elsewhere	0	x	x
Commercial fisheries	Value of potentially lost landing	0	xx	xx Orkney, Scrabster, Shetland	x	xx	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	xx	xx Orkney, Scrabster, Shetland	x	xx	x	x	xx Processors more likely to be female
Recreational boating	Increased deterrent to access in sites that are	0	x	x	0	x	x	x	Increased deterrent to access in

	already challenging to navigate								sites that are already challenging to navigate
Water sports – Sea Angling	Reduction in expenditure	xx	xx	xx	xx	xx	xx	xx	xx
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	0	x	No specific settlements affected	x	x	x	x	x
<b>Impacts:</b> x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected									

**Table 4.15: Distributional analysis for Wave Energy in the North Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Carbon capture and storage	Competition for space: Draft Plan Option areas and/or cable corridors overlap or lie inshore of potential storage areas	xx economic impacts could affect this group more than others	x	x	x Unlikely to be employed in this industry (but may be for extra income)	x	0 Unlikely to be affected, economic impacts likely to be small	0 None likely to be affected	xx Local businesses that might otherwise have been involved
Commercial fisheries	Value of potentially lost landing	xx	xx	xx	xx Where fishing provides additional income	xx	0 Unlikely to be employed in fisheries	xx Demersal, pelagic sector x Shellfish	xx Vessels <10m xx Vessels <15m
	Consequential impacts to fish processors	xx	xx	x	x	x	0	x	x
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	x	x	x	xx May be more likely to have smaller boats	x	x	xx Could mean they need to relocate to maintain level of access for recreational boating	xx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to reduce activity if navigation risks increase
Water sports – Sea Angling	Reduction in expenditure	xx	xx	xx	xx	xx	x Level of sea angling activity may be lower for sick	xxx Sea anglers will be most affected	No other specific group identified
Water sports	Spatial overlap between Draft Plan Option areas and water sports activity (sea angling)	x	x	x	x	x	x	xx Sea kayakers could have to change routes or look for alternatives	No other specific group identified
<b>Impacts:</b> x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected									

## 4.5 Summary of Effects

4.5.1 The SEA cannot predict with certainty the precise significance of effects on the environment as opportunities to mitigate and minimise effects exist at the project level, primarily through project design and location. Furthermore the significance of predicted effects may only be fully understood as initial projects are monitored. The headline environmental effects of the draft plan for wave energy are summarised in the bullets below:

- Potential effects on biodiversity as a result of collision with devices, particularly those with underwater components, barriers to movement of mobile species. Noise impacts on sensitive species from the construction of devices. The SEA considers potential effects on diving birds, cetaceans, seals, elasmobranchs and fish species. Additionally there may be direct loss of seabed habitat from the installation of devices and effects associated with potential changes to patterns of tidal and sediment movement on marine habitats.
- Scope for impacts on water quality from contamination as a result of changes to turbidity and turbulence, and seabed disturbance in areas of existing contamination. The significance of effects will depend on the proximity of devices to sensitive areas, such as those for fish spawning and feeding and shellfish growing waters.
- Positive effects for climate change mitigation through moving to decarbonisation of energy supply.
- Changes to turbidity, sediment disturbance, and loss of geology in placing devices may have secondary impacts on coastal processes. The significance of effects will depend on the proximity of devices to more sensitive coastlines such as those with geological SSSI and GCRs.
- Potential direct effects on submerged archaeology during construction and in some cases, particularly those devices that sit above the water surface potential for effects on the setting of features of the historic environment.
- Potential for visual impacts on landscape and seascape character as a result of the presence of surface-piercing structures, and potentially marker buoys and lights for navigation, particularly if located near-shore and in large numbers. Submerged and oscillating devices may have fewer impacts than devices which sit on top of the water, but this will depend on location and the quality of the receiving environment. The magnitude of visual effects depends in general on visibility and positioning of devices in regards to onshore features. Visual effects for other sea users, such as recreation vessels, may increase if constructed in popular recreational locations. Effects from lighting at night time are possible and potentially of greater significance for near shore areas.

- In some locations new structures could increase collision risk for some vessels, particularly for small vessels in conditions where waves might make it difficult to locate devices from a distance. Collision risk may increase if channels of vessel movements are reduced due to potential exclusion zones. The likelihood of effects are considered to be of lower significance and able to be mitigated. Furthermore there may be some potential for displacement of recreational activity in some near shore locations.

4.5.2 Table 4.16 sets out the quantified economic impacts of Draft Plan Options for wave energy on other marine activities at a national level. These figures are aggregated from the regional level analyses presented above

**Table 4.16: Present value (PV) costs for Wave Energy at a national level, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.07	0.18	0.38
Water sports - Sea Angling	Reduction in expenditure	0.00	0.00	0.10
<b>Total PV costs</b>		<b>0.07</b>	<b>0.18</b>	<b>0.48</b>

4.5.3 The majority of quantified impacts from the Draft Plan for Wave fall upon the commercial fishing industry, although these remain relatively minor. In addition to the above, there are a number of non-quantified impacts. They impact on the following marine activities: commercial fisheries, energy generation, military interests, ports and harbours, recreational boating and water sports. The nature of these does not lend itself to them being aggregated at a national level, but the relevant information is presented within the regional sections above.

4.5.4 There will also be a number of social impacts, as discussed in the previous section. These will fall almost entirely at a regional (or sub-regional) level, but may include national impacts on coastal communities, the 10% most income deprived decile and some specific social groups.

4.5.5 Nonetheless, most of the social impacts are likely to be felt at a very local level. The real significance of the local impacts could only be fully explored through a specific, local assessment, which is beyond the scope of this appraisal. For example, it has not been possible to explore whether a local area might become increasingly deprived if there were impacts on jobs, partly because the impacts are generally small but also because the specific locations of the impacts cannot be clearly identified. In addition, the 5% threshold for assessing quantitative impacts may under-estimate effects on certain businesses that may be disproportionately affected as impacts are unlikely to be evenly distributed across a sector.

4.5.6 Social impacts have generally been assessed as knock-on impacts from the direct effects on activities. This means that areas such as employment, environment and health have been included to a greater extent than the much more indirect effects on crime or education. Again, these indirect effects may become more evident in a specific, local assessment.

## 5 Sustainability Appraisal: The Plan for Tidal Energy

### 5.1 Introduction

5.1.1 The following section provides a summary of the results of the technical assessments for the draft tidal plan. The SEA and HRA provide technical detail on the potential for effects environment and human health. The socio-economic assessment provides the potential social and economic consequences of effects on existing marine activities. Supporting technical assessment documents provide the detail of how conclusions have been made. The following sections provide a high level summary of these.

### 5.2 Environment

5.2.1 There are a range of potential interactions with the environment from the installation of tidal devices in the marine environment. However, there is a degree of uncertainty regarding the precise level of effect in many cases. This is in part due to the often complex interactions in the marine environment, such as between the design of devices and mobile species, or the potential changes to marine hydrodynamics and patterns of sedimentation with coastal processes. Gaps in the understanding of these effects are being filled through research and the assessment and monitoring of demonstrator projects and initial commercial scale projects.

5.2.2 The following sections highlight some of the potential effects and environmental risks associated with tidal devices. This is followed by a regional summary of the headline risks from the Draft Plan Options. The level of risk to environmental features is based on the potential effects of the technology and the sensitivity of the receiving environment.

#### *Biodiversity, Flora and Fauna*

5.2.3 The SEA identified potential effects on fauna and flora from tidal development which has the potential for a number of types of effect as detailed below. However, the significance of many effects may not be fully known as technologies are still in development, and until the results monitoring from existing installations is available.

5.2.4 Mortality and injury risks to marine fauna have been considered. The potential for collisions and entanglement between marine fauna and devices and their moorings has been identified, particularly for those with moving parts. Significance depends on the size and design of the device, the location of the device and its proximity to receptors. Avoidance is a likely response for many species, and so risk is generally considered to be low and unlikely, but if collision were to occur, impacts could result in serious injury or fatality in some instances especially with larger species (seals, otters, cetaceans, basking



sharks). The presence of new structures in the water column can disrupt movements or migration of marine mammals and fish, particularly where devices are grouped. Currently the precise migration routes for species are not well defined and there is uncertainty about whether devices will impact directly on species or whether they will simply alter their movement accordingly.

- 5.2.5 There is potential for collision of diving birds with devices within the water column. Collisions could be fatal for some marine birds, especially deep divers (e.g. common guillemots). The ongoing HRA has looked at physical damage to species including Bottlenose dolphins and Harbour porpoise, Grey and Harbour seals, Atlantic salmon, Lamprey, Shad, seabirds and diving birds. The appraisal indicates further work at the project level will be required.
- 5.2.6 Noise and vibration during construction and operation can also lead to displacement in marine fauna. Whilst the exact effects of noise and vibration are relatively unknown it is thought that some species could be attracted to noise sources and increase the chance of damage to their health. Displacement can also result from the placement of devices in areas used by species for foraging activities, courtship behaviour and breeding sites. The HRA considers noise and vibration effects on species including Bottlenose dolphins, Harbour porpoise, Grey and Harbour seals, Atlantic salmon, Lamprey and Shad. It is considered that in some cases construction outside of breeding or migratory seasons might minimise effects.
- 5.2.7 Potential impacts on the behaviour of seals and otters can be particularly associated with near shore devices, as could birds where devices are placed near to shoreline habitats, restrict movements, and migratory routes or foraging areas. Barriers to movement and effects on species including Bottlenose dolphins, Harbour porpoise, Grey and Harbour seals, Atlantic salmon, Lamprey and Shad are also considered within the ongoing HRA. Furthermore the HRA will consider visual disturbance to surface feeding and diving birds.
- 5.2.8 Species health could also be impacted by the effects of electromagnetic fields (EMF) from cabling, in particular elasmobranchs and fish. Although research on effects is ongoing the indication is effects could be minimal. The HRA considered these the effects of EMF on European habitats and species.
- 5.2.9 Research and assessment of tidal technologies has identified a range of potential impacts on benthic habitats. There is a degree of direct loss as a result of installation. The presence and type of mooring used for devices and the presence of structures on the seabed are the main impacts to benthic habitats. Impacts to seabed habitats from the devices are likely to result from changes to wave energy dissipation, tidal flows and flux changes and deposition, scouring, deposition, abrasion, smothering and siltation, due in large to this presence of structures in the water column and on the seabed. The HRA also considers direct and indirect physical damage to habitats and contamination resulting from elevated turbidity.

- 5.2.10 Previous assessments have also identified the potential for the creation of artificial habitats for marine organisms as a result of new structures in the water. This may be aided by potential reductions in commercial fishing (e.g. trawling) in areas where tidal technology is located.

#### ***Water and the Marine Environment***

- 5.2.11 Tidal devices have the potential to result in local changes to hydrodynamics, alter water turbulence and change tidal flows and fluxes. Water quality impacts could arise as a result of changes to sediment dynamics, scouring, deposition, smothering and changes to water turbulence. These may be associated with the installation and presence of support cables and structures on the seabed. Additional contamination risks might be associated with leakage from vessels or equipment during installation and operation of devices.
- 5.2.12 Furthermore there is potential for impacts to the ability of fish species to spawn, respire and feed, and on shellfish growing waters in the vicinity of wave farm sites, particularly near shore devices. The significance of these effects will depend on the proximity of devices to these waters.
- 5.2.13 Effects can be mitigated largely through applying environmental controls during construction and from hydrodynamic modelling and design to reduce impacts such as turbidity.

#### ***Climatic Factors***

- 5.2.14 Tidal energy is considered to contribute to the decarbonisation of electricity generation over the long-term which will be beneficial for climatic factors.
- 5.2.15 Some coasts and coastal processes are already impacted by climate change and projects level assessment should consider how new devices may interact with this existing pattern of change.

#### ***Marine Geology and Coastal Processes***

- 5.2.16 Preparation of the seabed for the installation of devices could result in disturbance of sediments and loss and abrasion of geology. Further impacts include from changes to turbidity, wave dissipation and tidal fluxes, release of contaminated materials bonded to sediments. These can result from the installation of devices, mooring systems and subsea cabling and the interplay of these effects may also interact with coastal processes.
- 5.2.17 Changes to hydrodynamics and water flows may have an interaction with coastal processes. Impacts would be of greatest significance where important coastal geological features including geological SSSI and GCRs are located. Project level assessment will need to consider impacts on geology and coastal features based on the location of individual projects.

### ***Historic Environment***

- 5.2.18 Effects on designated and non-designated submerged archaeology, including wrecks have been identified. Impacts can be associated with direct damage during construction but also from scouring, siltation and deposition around assets located in the vicinity of devices or arrays. Careful location of devices in regards of historic assets can mitigate potential effects.
- 5.2.19 Tidal devices sit on the seabed or within the water column, however, some elements of the devices and supporting infrastructure and lighting are visible above the water line. The magnitude of visual effects depends on visibility and positioning of devices in regards to onshore features. Whilst effects are considered likely to be of low significance on the setting of features, these will be determined and appropriate mitigation can be applied through appropriate project design and location within Draft Plan Options.

### ***Landscape and Seascape***

- 5.2.20 Landscape and visual effects of the devices will depend on the presence of surface-piercing structures, marker buoys and lights for navigation, particularly if located near-shore and in large numbers. As predominantly submerged devices, the significance of impacts of tidal technology may be lower than for other technologies, although this will depend on their location and the characteristics of the receiving environment. The greatest effects are likely to result during construction of devices. EIA is required to determine the significance of effects within the Draft Plan Options. Development that will affect NSAs should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.

### ***Regional Environmental Issues***

- 5.2.21 The environmental issues identified above are relevant for Draft Plan Options within all of the regions. The following sections highlight regions where the receiving environment may be particularly sensitive to potential effects and hence a higher risk of significance.

#### ***South West Region***

- 5.2.22 Based on known presence of species, many of form the basis of designated areas in the Solway, there are risks to species based on the potential for collision, disturbance and displacement for diving birds, fish (including Atlantic salmon and Lamprey), and in particular elasmobranchs (including Basking Shark) and cetaceans (including whales) in the vicinity of TSW1 which is understood to be close to migratory routes. The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Project level EIA will need to determine the significance of effects and establish such mitigation measures. Ongoing research can help to provide more information to assist in this determination of significance.

- 5.2.23 The Draft Plan Option TSW1 overlaps with the Luce Bay and Sands SAC and Mull of Galloway SAC. Project level HRA should demonstrate that development does not adversely affect the integrity of the designation alongside any other SPA/SAC scoped into an assessment.
- 5.2.24 The potential for effects on coastal habitats should be considered at the project level in relation to any impacts on the seabed, patterns of sedimentation and changes to hydrodynamics.
- 5.2.25 Landscape and seascape character and quality are considered high across the regions coastline with three NSAs and an AONB on both sides of the Solway coastline. As devices will be largely below the water surface visual effects may be limited, however effects of associated lighting and infrastructure on Luce Bay will need to be considered as part of project level EIA. Furthermore, impacts on local communities and also the setting of historic features, such as those at Whitthorn Peninsula require consideration. Development that will affect NSA should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.

#### West Region

- 5.2.26 Given the presence of many important breeding and roosting sites for birds in the region there is a level of risk of collision and disturbance to birds during both construction and operation, in particular diving birds. These risks also extend to the many important mobile marine species found in the region, including amongst others Basking shark, Harbour porpoise, Minke whales and seal species. Devices acting as barriers to movement may also interrupt migratory routes and courtship behaviours for some species.
- 5.2.27 The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Project level EIAs will need to determine the significance of effects and establish such mitigation measures. Ongoing research can help to provide more information to assist in this determination of significance.
- 5.2.28 Draft Plan Option TW2 has a small overlap with the Clyde Sea Sill MPA (proposed for Black guillemot). Project level EIAs will need to demonstrate that development is compatible with the conservation objectives of the any proposed MPA.
- 5.2.29 The potential for effects on coastal habitats should be considered at the project level in relation to any impacts on the seabed, patterns of sedimentation and changes to hydrodynamics including changes to wave period and water turbidity and turbulence.
- 5.2.30 Landscape and seascape character and quality are considered high and the region includes the Mull of Kintyre and Islay and several areas considered to be wild land. As devices will be largely below the water surface visual effects may be limited, however effects of associated lighting and infrastructure may remain. Detailed impact assessment will need to form part of project assessment in

order to determine the significance of impacts on landscape, local communities and also the setting of historic features.

### North Region

- 5.2.31 The region is known to support many mobile marine species including seabirds, fish (including Atlantic salmon and Sand eel), Common and Grey seals, whales, dolphins and elasmobranchs (including Basking Shark). There is a level of risk of collision and noise disturbance to birds during both construction and operation, in particular for diving birds. Collision, displacement and barriers to movement for all mobile marine species remains a risk, although this may vary between the types of tidal device installed within a Draft Plan Option.
- 5.2.32 The significance of risk to protected species will need to be established as part of EIAs and HRAs during the development planning and licencing process. The timing of construction activity may be one particular means to avoid the greatest impacts and should be based around the life cycles of species potentially impacted. Furthermore, ongoing research can help to provide more information to assist in this determination of significance.
- 5.2.33 A number of Draft Plan Options overlap with European designations, although often the overlap may be minimal. TN1 overlaps with the North Caithness Cliffs SPA, Hoy SPA and Pentland Firth Island SPA; TN2 overlaps with Rousay SPA; TN3 overlaps with Papa Westray SPA; TN4 overlaps with East Sanday Coast SPA and Ramsar and Sanday SAC; TN5 overlaps with the Sumburgh Head SPA; TN6 overlaps with Yell Sounds Coast SAC; and TN7 overlaps with the Hermaness, Saxa Vord and Valla Field SPA. Project level HRAs should demonstrate that development does not adversely affect the integrity of these SPAs and any other SPA/SAC scoped into an assessment.
- 5.2.34 Draft Plan Option TN4 overlaps with the North West Orkney MPA (proposed with Sand eel interest features). TN3 overlaps with the Papa Westray MPA, (proposed for Black guillemot and Marine Geomorphology). TN2 overlaps with Wyre and Rousay Sounds MPA (proposed for kelp and seaweed communities on sublittoral sediment, maerl beds and marine geomorphology). Project level EIA will need to demonstrate that development is compatible with the conservation objectives of the proposed MPA.
- 5.2.35 The potential loss of seabed and benthic habitat can be limited through site level survey. Avoidance of important habitat and project level assessment of changes to patterns of sedimentation and hydrodynamics may also provide mitigation of potential effects.
- 5.2.36 Landscape and seascape character and quality are considered high across the regions coastline, with several areas considered to be wild land. Designations in the region include the Hoy and West Mainland NSA and the Shetland NSA. The latter is particularly relevant to site TN5. As devices will be largely below the water surface visual effects may be limited, however effects of associated lighting and infrastructure may remain. Detailed impact assessment will need

to form part of project assessment in order to determine the significance of impacts on landscape, local communities, including valued features such as the regions NSAs, and also the setting of historic features, in particular the Heart of Neolithic Orkney WHS which is particularly relevant to Draft Plan Options TN2 and TN3. Development that will affect NSAs should avoid adverse effects on the integrity of the area or the qualities for which it has been designated and avoid impacts on the outstanding unique value of the WHS.

## 5.3 Economy and other marine users

5.3.1 This section summarises the findings of the socio-economic assessment relating to the economic impacts of Draft Plan Options for tidal energy on other marine activities. These impacts are reported at ‘planning region’ level, rather than at the level of specific Draft Plan Options. More detail on this analysis can be found in Chapters 4.2, 5.3, 7.3 and Appendix C of the socio-economic assessment.

### South West Region

5.3.2 Based on a pro-rata share of the indicative scale of development shown in Table 5.1, it is assumed that the following proportions of Draft Plan Option area TSW1 could be developed.

**Table 5.1: Potential Portions of Draft Plan Options Developed in the South West Region (% of Spatial Area)**

Scenario	TSW1
Low	0.8%
Medium	2.6%
High	5.1%

5.3.3 Such development could have the potential to interact with commercial fisheries, energy generation, military interests, recreational boating, shipping, and water sports.

### Quantified Impacts

5.3.4 The study was able to quantify aspects of the impacts on commercial fisheries, recreational boating, and shipping. The most significant impact at a regional level was observed for shipping, as a result of additional fuel costs associated with route deviation. No costs to shipping or recreational boating were recorded under the low or medium scenario. These estimated costs are set out in Table 5.2 below.

**Table 5.2: Present value (PV) costs for Tidal Energy in the South West Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.01	0.03	0.06
Recreational boating	Additional fuel costs	-	-	0.06
Shipping	Additional fuel costs	-	-	1.07
<b>Total PV costs</b>		<b>0.01</b>	<b>0.03</b>	<b>1.19</b>

#### Non-Quantified Impacts

- 5.3.5 The study identified several other sources of cost that could arise to marine activities from development in Draft Plan Option area TSW1. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 5.3.

**Table 5.3: Non Quantified Impacts on Other Marine Activities for Wave Energy in the West Region**

Marine Activity	Non-Quantified Impact
Commercial Fisheries	Potential small overlap with steaming routes.
Energy Generation	Potential competition for space between offshore wind development and tidal development.
Military Interests	Potential to interfere with underwater communications.
Recreational Boating	Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.
Water Sports	Sea kayaking and scuba diving occur with the TSW1 Draft Plan Option area while scuba diving also overlaps with the route corridor between this Draft Plan Option area and the potential landfall. The cost to water sports activities (including recreational angling) associated with tidal developments within the Draft Plan Option areas is assessed as negligible

#### West Region

- 5.3.6 Based on a pro-rata share of the indicative scale of development shown in Table 5.4, the following proportions of Draft Plan Option areas TW1 and TW2 could be developed.

**Table 5.4: Potential Portions of Draft Plan Options Developed in the West Region (% of Spatial Area)**

Scenario	TW1	TW2
Low	0.8%	0.9%
Medium	2.6%	2.6%
High	5.1%	5.1%

- 5.3.7 Such development could have the potential to interact with commercial fisheries, energy generation, military interests, ports and harbours, recreational boating, shipping, and water sports.

Quantified Impacts

- 5.3.8 The study was able to quantify aspects of the impacts on commercial fisheries, and shipping. The most significant impact at a regional level was observed for shipping, as a result of additional fuel costs associated with route deviation. No costs to shipping were recorded under the low or medium scenario. These estimated costs are set out in Table 5.5 below.

**Table 5.5: Present value (PV) costs for Tidal Energy in the West Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.02	0.05	0.1
Shipping	Additional fuel costs	-	-	1.89
<b>Total PV costs</b>		<b>0.02</b>	<b>0.05</b>	<b>1.99</b>

Non-Quantified Impacts

- 5.3.9 The study identified several other sources of cost that could arise to marine activities from development in Draft Plan Option areas TW1 and TW2. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 5.6.

**Table 5.6: Non Quantified Impacts on Other Marine Activities for Tidal Energy in the West Region**

Marine Activity	Non-Quantified Impact
Commercial Fisheries	Overlap with a significant navigation route for vessels steaming around this area. Coupled with the strong currents experienced in this location, this may pose a potential navigation hazard. This is most likely to affect vessels from Ayr and Campbeltown
Energy Generation	Energy generation from differing forms of technology will lead to competition in the transmission capacity which would affect all Draft Plan Option areas.
Military Interests	Potential overlap between the Draft Plan Option areas and the proposed cable routes and military practice and exercise areas. Potential to interfere with underwater communications
Ports and Harbours	Potential to interact with all the ports and harbours in the West region. In addition there is the potential for reduced port development opportunities to occur with the presence of the Draft Plan Option area TW2 under the high scenario. However the assessment has identified that due to the scale of the development within under any scenario within the Draft Plan Option areas it would be possible to avoid conflict with port access routes and channels through careful planning.
Recreational	Potential for deterring sailing through areas, owing to increased



Boating	difficulties for navigation arising from development.
Water Sports	Sea kayaking occurs within TW1 and TW2 Draft Plan Option areas while scuba diving also overlaps with the route corridor between these Draft Plan Option areas and the potential landfall together with surfing and windsurfing in TW2. Costs to water sports activities, including recreational angling, associated with offshore wind development in Draft Plan Option area assessed as negligible.

### North Region

- 5.3.10 Based on a pro-rata share of the indicative scale of development shown in Table 5.7, the following proportions of Draft Plan Option areas TN1, TN2, TN3, TN4, TN5, TN6, and TN7 could be developed.

**Table 5.7: Potential Portions of Draft Plan Options Developed in the West Region (% of Spatial Area)**

Scenario	TN1	TN2	TN3	TN4	TN5	TN6	TN7
Low	0.8%	1.5%	2.0%	0.8%	2.0%	2.5%	2.2%
Medium	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
High	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%

- 5.3.11 Such development could have the potential to interact with carbon capture and storage, commercial fisheries, energy generation, military interests, oil and gas, ports and harbours, recreational boating, shipping, and water sports.

### Quantified Impacts

- 5.3.12 The study was able to quantify aspects of the impacts on commercial fisheries, shipping, and water sports (sea angling). The most significant impact at a regional level was observed for shipping, as a result of additional fuel costs associated with route deviation. No costs to shipping or water sports (sea angling) were recorded under the low or medium scenario. These estimated costs are set out in Table 5.8 below.

**Table 5.8: Present value (PV) costs for Tidal Energy in the North Region, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.06	0.13	0.25
Shipping	Additional fuel costs	-	-	9.33
Water Sports - Sea Angling	Reduction in expenditure	-	-	0.35
<b>Total PV costs</b>		<b>0.06</b>	<b>0.13</b>	<b>9.93</b>

### Non-Quantified Impacts

- 5.3.13 The study identified several other sources of cost that could arise to marine activities from development in the Draft Plan Option areas. However, it was not possible to monetise these costs, so these have been assessed qualitatively in Table 5.9.

**Table 5.9: Non Quantified Impacts on Other Marine Activities for Tidal Energy in the West Region**

Marine Activity	Non-Quantified Impact
Carbon Capture and Storage	Potential overlaps with possible carbon and storage sites.
Commercial Fisheries	Potential overlap with navigation routes, resulting in deviation of navigation for affected vessels, particularly under high scenario, with associated costs. Vessels most likely to be affected expected to be those based in Scrabster and Kirkwall.
Energy Generation	Energy generation from differing forms of technology will lead to competition for transmission capacity which would affect all Draft Plan Option areas.
Military Interests	Potential overlap between the proposed cable routes and military practice and exercise areas. Potential to interfere with underwater communications.
Oil and Gas	Should tidal energy export cables cross over existing oil and gas pipelines or cables, it has been assumed that the costs would be borne by the developer. While the oil & gas industry's interests will largely be protected by the relevant cable crossing agreements, it is currently unclear whether all of the industry's liabilities may be covered by such agreements.
Ports and Harbours	The main identified impact to ports and harbours associated with tidal developments within the Draft Plan Option areas relates to increases in marine risk, specifically the temporary collision risk while cable laying or maintenance is being carried out. However the assessment considers that it would be possible to avoid conflict with port access routes and channels through careful planning of cable laying and maintenance activities.
Recreational Boating	Potential for deterring sailing through areas, owing to increased difficulties for navigation arising from development.
Water Sports	Sea kayaking occurs within all Draft Plan Option areas while scuba diving also overlaps with the TN3 Draft Plan Option area. Windsurfing and surfing are also undertaken within the potential cable route areas between all Draft Plan Option areas and landfall except for TN6 and TN7. Costs to water sports activities associated with offshore wind development in Draft Plan Option area assessed as negligible.

## 5.4 People and Health

5.4.1 This section summarises the findings of the socio-economic assessment relating to the potential social impacts of Draft Plan Options for tidal energy that could arise from impacts on other marine activities. These impacts are reported at 'planning region' level, rather than at the level of specific Draft Plan Options. More detail on this analysis can be found in Chapters 4.2, 5.3, 7.3, and Appendix C of the socio-economic assessment and within the population and human health section of the Environmental Report.

### ***Population and Human Health***

- 5.4.2 There is potential for conflicts of space with commercial, fishing and recreational vessel movement and thus there is a level of collision risk. However, risks for vessels with smaller hulls may be lower than for larger ships, dependant on location and device types. Measures including exclusion zones, lighting and marker buoys can mitigate for some accident risk.
- 5.4.3 Some displacement of activities is possible. In terms of recreational activities these may be particularly acute if devices are placed in near shore areas with blanket vessel exclusions where recreational use can be more concentrated. Collision and displacement risks are also considered to be reversible and would reduce upon decommissioning.

### ***Regional Issues***

- 5.4.4 The following sections highlight regional social issues identified in the assessments.

#### **South West Region**

- 5.4.5 The socio-economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: commercial fisheries, recreational boating, and water sports. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover), and environment and health, in relation to sea kayaking.
- 5.4.6 The SEA identifies that the region is popular for recreational boating and cruising. There is potential for some collision risk, particularly with large hull vessels, or displacement of activities particularly if devices include exclusion zones in near shore areas narrowing navigation channels. Consultation with the sector during project planning is recommended to reduce the likelihood of impacts.

#### **Quantified Impacts**

- 5.4.7 None of the social impacts within the South West Region are quantified as being significant.

#### **Non Quantified Impacts**

- 5.4.8 Tables 5.10 and 5.11 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. Dredgers and potters within commercial fisheries in Ayr and Campbeltown may possibly be impacted due to potential lost landings. Recreational boating may possibly be impacted in Wigtown, Kirkcudbright and Whitehaven due decreased access to sites. For most groups the impacts are only minimal and are unlikely to result in noticeable effects.

**Table 5.10: Distributional analysis for Tidal Energy in the South West Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	x	xx	xx Ayr, Campbeltown	x	x	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	x	x Ayr, Campbeltown	x	x	x	x	xx Processors more likely to be female
Recreational boating	Additional fuel costs	0	x	x	0 Not relevant in SW	x	x	x	x
	Increased deterrent to access in sites that are already challenging to navigate	0	x	xx Wigtown, Kirkcudbright, Whitehaven could be particularly affected	0 Not relevant in SW	x	x	x	x
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	0	x	No specific settlements affected	0 Not relevant in SW	x	x	x	x
<b>Impacts:</b> x x x : significant negative effect, x x : possible negative effects, x: minimal negative effect, if any, 0: no noticeable effect expected									

**Table 5.11: Distributional analysis for Tidal Energy in the South West Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Value of potentially lost landings	x	x	x	0 Not relevant in SW	x	0 Unlikely to be employed in fisheries	xx Dredgers and potters	xx Vessels >10m length x Vessels <10m in length
	Consequential impacts to fish processors	x	x	x	0 Not relevant in SW	x	0	x	x
Recreational boating	Additional fuel costs	0 Unlikely to own boat	x	x	0 Not relevant in SW	x	x	xx Boat users	No other specific group identified
	Increased deterrent to access in sites that are already challenging to navigate	x	x	x	0 Not relevant in SW	x	x	xx Could mean they need to relocate to maintain level of access for recreational boating	xx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to reduce activity if navigation risks increase
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	x	x	x	0 Not relevant in SW	x	x	xx Sea kayakers could have to change routes or look for alternatives	No other specific group identified
<b>Impacts:</b> x x x : significant negative effect, x x : possible negative effects, x: minimal negative effect, if any, 0: no noticeable effect expected									

### West Region

- 5.4.9 The socio-economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: commercial fisheries, recreational boating, and tourism. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover), and environment (mainly due to increased emissions or changes in environmental quality). Other impacts, such as on access to services, health, and culture and heritage could largely be mitigated, although there may be some minimal impacts on recreational boating and sea kayaking.
- 5.4.10 The SEA identified that the region is popular for recreational boating and cruising with several popular routes between islands and the mainland. There is potential for some increased collision risk, particularly with large hull vessels, or displacement of activities particularly if devices include exclusion zones in near shore areas narrowing navigation channels. Consultation with the sector during project planning is recommended to reduce the likelihood of impacts.

#### Quantified Impacts

- 5.4.11 None of the social impacts within the West Region are quantified as being significant.

#### Non Quantified Impacts

- 5.4.12 Tables 5.12 and 5.13 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. Potters and Nephrops trawlers within commercial fisheries in Oban, Mallaig and Stornoway may possibly be impacted due to potential lost landings and obstruction of navigation routes. Recreational boating may possibly be impacted in Oban and Dunstaffnage marinas due decreased access to sites. For most groups the impacts will be minimal at worst.

**Table 5.12: Distributional analysis for Tidal Energy in the West Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	0	xx	xx Oban, Mallaig, Stornoway	x	xx	x	xx Fishermen more likely to be male	x
	Obstruction of navigation routes	0	xx	xx Oban, Mallaig, Stornoway	x	xx	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	x	x Oban, Mallaig, Stornoway	x	xx	x	x	xx Processors more likely to be female
Recreational boating	Increased deterrent to access in sites that are already challenging to	0	x	x Oban, Dunstaffnage marinas could be affected if number of	0	x	x	x	x

	navigate			boaters reduces (but others could benefit)					
Water sports	Spatial overlap between Draft Plan Option areas and water sports activity (sea kayaking)	0	x	No specific settlements affected	x	x	x	x	x
<b>Impacts:</b> x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected									

**Table 5.13: Distributional analysis for Tidal Energy in the West Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Loss of traditional fishing grounds	x	x	x	xx Where fishing provides additional income	x	0 Unlikely to be employed in fisheries	xx Potters	xx <i>Nephrops</i> trawlers
	Obstruction of navigation routes	x	x	x	xx Where fishing provides additional income	x	0 Unlikely to be employed in fisheries	xx Potters	xx <i>Nephrops</i> trawlers
	Consequential impacts to fish processors	x	x	x	x	x	0	x	x
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	xx Where employed in this area	xx	xx	xx May be more likely to have smaller boats	xx	xxx Could affect ability to support trips for disabled/sick	xxx Could mean they need to relocate to maintain services	xxx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely reduce activity if navigation risks increase
Water sports	Spatial overlap between Draft Plan Option areas and water sports activity (sea kayaking)	x	x	x	x	x	x	xx Sea kayakers could have to change routes or look for alternatives	No other specific group identified
<b>Impacts:</b> x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected									

### North Region<sup>15</sup>

5.4.13 The socio-economic assessment found that social impacts within the region might arise through interactions between development and the following sectors: carbon capture and storage, commercial fisheries, recreational boating and water sports. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover) and the environment (mainly due to increased emissions or changes in environmental quality). There may also be impacts on education (specifically research and development) if opportunities for carbon, capture and storage are minimised (although it is likely that investment would move elsewhere if competition for space was a deciding factor). Other impacts, such as on access to services, health, and culture and heritage could largely be mitigated, although there may

<sup>15</sup> More detail on this analysis can be found in Chapter 7.3 and Appendix C of the socio-economic assessment.

be some noticeable impacts, such as on sea anglers, sea kayakers and recreational boaters.

- 5.4.14 The SEA identifies that the region is popular for recreational boating and cruising with several popular routes between islands and the mainland. Furthermore there are commercial shipping routes. There is potential for some increased collision risk, particularly with large hull vessels, or displacement of activities particularly if devices include exclusion zones in near shore areas narrowing navigation channels. Consultation with the sector during project planning is recommended to reduce the likelihood of impacts.

#### Quantified Impacts

- 5.4.15 None of the social impacts within the West Region are quantified as being significant.

#### Non Quantified Impacts

- 5.4.16 Tables 5.14 and 5.15 summarise the results of the distributional analysis, showing where impacts are likely to be greater for a particular social group, equal, or lower than the overall impact. The shellfish sector within commercial fisheries in Orkney, Scrabster and Shetland may possibly be impacted due to additional fuel costs. Recreational boating may possibly be impacted in Kirkwall and Pierowall due to decreased access to sites. Sea angling may possibly be impacted due a reduction of expenditure in this region. For most groups the impacts will be minimal at worst.

**Table 5.14: Distributional analysis for Tidal Energy in the North Region (location, age and gender)**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Carbon capture and storage	Competition for space: Draft Plan Option areas and/or cable corridors overlap or lie inshore of potential storage areas	0	x Could have impact on rural economy if investment goes elsewhere	0 Unlikely to affect specific locations	0	x Could have impact on employment opportunities if investment goes elsewhere	0	x	x
Commercial fisheries	Additional fuel costs	0	xx	xx Orkney, Scrabster, Shetland	x	xx	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	x	x Orkney, Scrabster, Shetland	x	x	x	x	xx Processors more likely to be female
Recreational boating	Alterations to informal cruising routes	0	x	x	x	x	x	x	x
	Increased deterrent to access in sites that are already challenging to navigate	0	x	xx Pierowall and Kirkwall, plus pontoons could be affected	0	x	x	x	x
Water sports	Reduction in	xx	xx	xx	xx	xx	xx	xx	x

– Sea Angling	expenditure							(may be more likely to be involved in sea angling)	
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	0	x	No specific settlements affected	x	x	x	x	x

**Impacts:** x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected

**Table 5.15: Distributional analysis for Tidal Energy in the North Region (income and social groups)**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Carbon capture and storage	Competition for space: Draft Plan Option areas and/or cable corridors overlap or lie inshore of potential storage areas	xx economic impacts could affect this group more than others	x	x	x Unlikely to be employed in this industry (but may be for extra income)	x	0 Unlikely to be affected, economic impacts likely to be small	0 None likely to be affected	xx Local businesses that might otherwise have been involved
Commercial fisheries	Additional fuel costs	xx	xx	xx	xx Where fishing provides additional income	xx	0 Unlikely to be employed in fisheries	xx Shellfish x Demersal, pelagic sectors	xx Vessels <15m x Vessels >15m
	Consequential impacts to fish processors	xx	xx	x	x	x	0	x	x
Recreational boating	Alterations to informal cruising routes	0 Unlikely to own boat	x	x	x	x	x	xx Boat users	No other specific group identified
	Increased deterrent to access in sites that are already challenging to navigate	x	x	x	xx May be more likely to have smaller boats	x	x	xx Could mean they need to relocate to maintain level of access for recreational boating	xx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to reduce activity if navigation risks increase
Water sports – Sea Angling	Reduction in expenditure	xx	xx	xx	xx	xx	x Level of sea angling activity may be lower for sick	xxx	No other specific group identified
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	x	x	x	x	x	x	xx Sea kayakers could have to change routes or look for alternatives	No other specific group identified

**Impacts:** x x x : significant negative effect; x x : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected



## 5.5 Summary of Effects

5.5.1 The SEA cannot predict with certainty the precise significance of effects on the environment as opportunities to mitigate and minimise effects exist at the project level, primarily through project design and location. Furthermore the significance of predicted effects may only be fully understood as initial projects are monitored. The headline environmental effects of the draft plan for tidal energy are summarised in the bullets below:

- Potential effects on biodiversity as a result of collision with devices, particularly those with underwater components, barriers to movement of mobile species, and impacts on behaviours of species in inshore areas. Furthermore potential for noise impacts on sensitive species are possible from the construction of devices. The SEA considers potential effects on diving birds, cetaceans, seals, elasmobranchs and fish species, particularly from collision with moving parts of tidal devices. Additionally there may be direct loss of seabed habitat from the installation of devices and effects associated with potential changes to patterns of tidal and sediment movement on marine habitats.
- Scope for impacts on water quality from contamination as a result of changes to turbidity and turbulence, and seabed disturbance in areas of existing contamination. The significance of effects will depend on the proximity of devices to sensitive areas, such as those for fish spawning and feeding and shellfish growing waters.
- Positive effects for climate change mitigation through moving to decarbonisation of energy supply.
- Changes to turbidity, sediment disturbance, and loss of geology in placing devices may have secondary impacts on coastal processes. The significance of effects will depend on the proximity of devices to more sensitive coastlines such as those with geological SSSI and GCRs.
- Potential direct effects on submerged archaeology during construction and in some cases. Tidal devices and associated infrastructure may have some above water elements and so the setting of features of the historic environment remains a consideration, although the potential for significant effects is not considered to be high.
- Potential for visual impacts on landscape and seascape character as a result of the presence of surface-piercing structures, and potentially marker buoys and lights for navigation, particularly if located near-shore and in large numbers. As predominantly submerged devices, the significance of impacts of tidal technology may be low, although this will depend on location and the quality of the receiving environment. Effects may therefore be greater during the construction rather than operation phase. The magnitude of visual effects depends in general on visibility and positioning of devices in regards to onshore features. Visual effects for other sea users, such as recreation vessels, may increase if

constructed in popular recreational locations. Effects from lighting at night time are possible and potentially of greater significance for near shore areas.

- In some locations new devices could increase collision risk between vessels if channels of vessel movements are reduced due to potential exclusion zones. Collision risks with devices are low for small recreational craft. The likelihood of effects are considered to be of lower significance and able to be mitigated. Furthermore there may be some potential for displacement of recreational activity in some near shore locations.

5.5.2 Table 5.16 demonstrates the quantified economic impacts of Draft Plan Options for tidal energy on other marine activities at a national level. These figures are aggregated from the regional level analyses presented above.

**Table 5.16: Present value (PV) costs for Tidal energy at a national level, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.09	0.21	0.41
Recreational boating	Additional fuel costs	0	0	0.06
Shipping	Additional fuel costs	0	0	12.29
Water Sports -Sea Angling	Reduction in expenditure	0	0	0.35
<b>Total PV costs</b>		<b>0.09</b>	<b>0.21</b>	<b>13.11</b>

5.5.3 The majority of quantified impacts of the Draft Plan for Tidal fall upon the shipping industry, particularly within the North region. In addition to the above, there are also a number of non-quantified impacts. These impacts on the following marine activities: commercial fisheries, carbon capture and storage, energy generation, military interests, oil and gas, ports and harbours, recreational boating, shipping and water sports. The nature of these does not lend itself to them being aggregated at a national level, but the relevant information is presented within the regional sections above.

5.5.4 There will also be a number of social impacts, as discussed in the previous section. These will fall almost entirely at a regional (or sub-regional) level, but may include national impacts on coastal communities, the 10% most income deprived decile and some specific social groups.

5.5.5 Nonetheless, most of the social impacts are likely to be felt at a very local level. The real significance of the local impacts could only be fully explored through a specific, local assessment, which is beyond the scope of this appraisal. For example, it has not been possible to explore whether a local area might become increasingly deprived if there were impacts on jobs, partly because the

impacts are generally small but also because the specific locations of the impacts cannot be clearly identified. In addition, the 5% threshold for assessing quantitative impacts may under-estimate effects on certain businesses that may be disproportionately affected as impacts are unlikely to be evenly distributed across a sector.

- 5.5.6 Social impacts have generally been assessed as knock-on impacts from the direct effects on activities. This means that areas such as employment, environment and health have been included to a greater extent than the much more indirect effects on crime or education. Again, these indirect effects may become more evident in a specific, local assessment.

## 6 Cumulative Effects of Offshore Renewable Energy

### 6.1 Environment

6.1.1 This section summarises the key findings of the cumulative impacts assessment of the SEA. The summaries are presented at the regional level. Further detail on individual plan options and further discussion of potential cumulative effects can be found within the SEA Environmental Report.

#### *Main Findings*

##### South West Region

6.1.2 The South West region contains one draft wind and one draft tidal plan option to the south of Luce Bay, and a second draft wind option located further east within the Solway Firth, near to the existing offshore wind energy array at Robin Rigg.

6.1.3 The SEA identifies potential cumulative risk of collision for some seabirds and diving birds with wind and tidal devices, although some species may only be affected by one type of technology. The level of risk and significance of effects would need exploration through the project level HRA in combination test for those species associated with the regions European designations.

6.1.4 There is potential for impacts as a result of the creation of barriers to movement, collision, and from noise impacts associated with construction activities, to mobile marine fauna (e.g. Atlantic salmon, Lamprey, Cetaceans and elasmobranchs).

6.1.5 Wind energy development within the Firth will result in some degree of visibility from the Solway coast, much of which is recognised for its landscape and seascape value. The distance between the two wind options will limit cumulative effects between these, however future developments within OWSW2 and the existing array at Robin Rigg are both likely to be visible from parts of the Solway and Cumbrian coasts. Cumulative impacts from Draft Plan Options on the setting of some coastal features of the historic environment have also been considered within the SEA.

6.1.6 There is the potential for interactions with existing sediment and coastal processes, particularly for tidal sites located south of Luce Bay, which could affect important and potentially vulnerable sites such as the Luce Bay Sands SAC. The significance of effects will need to be established as part of project level EIA.

##### West Region

6.1.7 A number of Draft Plan Options are proposed across the west region with areas of significant wind, wave and tidal resources. The region however contains

many important sites of nature conservation interest and proposals for MPA. This indicates the regions importance for marine biodiversity and risks of cumulative effects. Of particular note is the potential for increased collision and displacement risk for seabirds associated with multiple arrays of operating wind turbines, and similar risks for diving birds associated with groups of wave and tidal devices. Furthermore, some bird species could be affected by several technologies.

- 6.1.8 Devices may create barriers to movement, provide a risk of collision and displacement and involve impacts from construction noise for mobile fauna including elasmobranchs, cetaceans, and seals. The SEA identified the importance of waters within the West Region for a range of mobile species, particularly for Basking sharks, Common skate, cetaceans and seals. Effects within the Draft Plan Options could work in combination with other planned and licensed projects.
- 6.1.9 The landscapes and seascapes of the region are renowned for their scenic quality and character, with several areas also recognised for wildness value. However, given that a large number of commercial vessels already using waters, particularly between the Minches, the west of the Outer Hebrides and the North Channel, there is, to a degree, areas of existing working seascape.
- 6.1.10 Wind and near-shore wave devices are likely to be the most visible to coastal receptors. The potential for massing of offshore wind and wave infrastructure in particular in areas to the west of Islay (e.g. OWW1, WW1, TW1 and for proposed developments such as West Islay Wind and Tidal sites) and west of Tiree (e.g. OWW2, WW3 and Argyll Array) will require further consideration as potential projects come forward.
- 6.1.11 The region contains features of historic interest, including designated coastal sites such as Skerryvore Lighthouse in Tiree and Iona Abbey, and the potential for cumulative impacts on the setting of historic sites has been identified. For example, the placement of wind turbines in the Argyll Wind Array and nearby Draft Plan Options OWW1 and OWW2 may have the potential to occupy much of the seascape west of Skerryvore Lighthouse, particularly under a high occupancy scenario. The potential for such effects will be a key consideration for any project level EIA.
- 6.1.12 The effects on hydrodynamics and patterns of sedimentation on water quality and coastal processes, as a result of development within the Draft Plan Options, will require further consideration as projects are developed.

#### North West Region

- 6.1.13 Given the location of the Draft Plan Options, either side of the Western Isles, cumulative effects in the region are considered most likely to be associated with development within Draft Plan Option WNW1 in combination with existing and proposed renewable energy developments.

- 6.1.14 The assessment considers potential cumulative effects for mobile species. There is some potential for impacts on seabirds and diving birds as a result of the potential for a number of devices being constructed, which will require further exploration through project level EIAs and HRAs. Collision, displacement, barriers to movement and construction are all identified as potential risks to mobile marine mammals, elasmobranchs and fish. Risks may vary depending on the type of device that might eventually be installed.
- 6.1.15 The region contains many valued and designated areas of landscape and seascape quality and areas of wildness value. However, both OWNW1 and WNW1 may only be visible from the north of the Isle of Lewis, and furthermore wave devices that sit within the water column in near shore locations may not necessarily result in significant cumulative effects.
- 6.1.16 The effects on hydrodynamics and patterns of sedimentation on water quality and coastal processes, as a result of development within the Draft Plan Options, will require further consideration as projects are developed.

#### North Region

- 6.1.17 The region contains several Draft Plan Options across all three technologies, and already has a number of tidal and wave projects at various stages of the planning and licencing process. It is considered that many of the potential effects identified in the assessment might be appropriately reduced through project mitigation, such as for construction and maintenance. Project EIAs and HRAs will play a key role in identifying the significance of effects and appropriate levels of mitigation. However, the following paragraphs set out some of the potential cumulative effects.
- 6.1.18 Collision risk for seabirds and diving birds was raised as a risk, particularly for wind and tidal devices. The magnitude and significance of effects depends on the response of species that might be affected by development, the vulnerability of its population and the design of devices.
- 6.1.19 Wave and tidal devices, and the infrastructure to moor them, could result in a risk of collision and entanglement, impacts on species health as a result of construction noise, and provide barriers to movement for mobile species of fish, cetaceans, seals and elasmobranchs which are all present in the waters surrounding Shetland, Orkney and the Sutherland coast. Certainty in the potential interactions between many species and devices is uncertain and the significance of risks will become clearer with further research and monitoring.
- 6.1.20 The region is home to many valued and important landscape receptors, including NSAs, and developments should demonstrate the integrity of these are not significantly affected. Whilst there are several options within the region the greatest risk of visual effects is associated with wind devices, although near shore wave and tidal devices and associated infrastructure and lighting may have significant effects. Similarly impacts on the setting of features of the historic environment, particularly the Heart of Neolithic Orkney World Heritage

Site, will need detailed consideration when bringing forward options within the Orkney Isles, options to the west of the islands.

- 6.1.21 The effects on hydrodynamics and patterns of sedimentation on water quality and coastal processes, as a result of development within the Draft Plan Options, will require further consideration as projects are developed.

#### North East Region

- 6.1.22 The SEA identifies the potential for cumulative effects between the two wind Draft Plan Options and in combination with existing and proposed renewable energy developments. It is considered that many of the potential effects identified in the assessment might be appropriately reduced through project mitigation, such as for construction and maintenance. However, the following paragraphs set out some of the potential cumulative effects.
- 6.1.23 Potential cumulative impacts on biodiversity include collision risk for seabirds with wind devices. The east coast is used extensively by seabirds, some of which can regularly travel through the area from locations including the Firth of Forth, Moray Firth and beyond. Impacts on the populations of protected seabirds of development within the Draft Plan Options in combination is possible, the significance of this will depend on the impacts to viable population numbers of individual species.
- 6.1.24 Furthermore potential collision risk extends to mobile marine species, especially seals and cetaceans. In particular effects on the population of bottlenose dolphins attached to the Moray Firth SAC, and common seals from the Firth of Tay and Eden Estuary SAC are considered to be important concerns when bringing forward development within the Draft Plan Options.
- 6.1.25 In addition there could be potential for effects on terrestrial habitats associated with increased activity supporting renewable energy in ports within the region.
- 6.1.26 Wind developments will result in some change to seascape, the significance of which will depend on the design of devices and placement within Draft Plan Options. There is potential for cumulative effects with Round 3 developments along much of the east coast. The region has a working seascape with many commercial vessels already using the seas. The Draft Plan Options will add additional static structures to this busy seascape.

## 6.2 Economy and marine users

- 6.2.1 This section summarises the findings of the socio-economic assessment relating to the economic impacts of Draft Plan Options for the cumulative effects of offshore renewable energy on other marine activities. These impacts are reported at 'planning region' level, rather than at the level of specific Draft Plan Options. More detail on this analysis can be found in Chapter 9 and Appendix C of the socio-economic assessment.

## ***Key Challenges***

- 6.2.2 The challenges and issues in undertaking this analysis at each sectoral level also apply to the cumulative assessment. In addition, the combined assessment poses particular challenges owing to the complexity of such assessments and the limited scientific understanding of impacts. The starting point for each assessment has been to sum the estimated impacts for offshore wind, wave and tidal development (as appropriate) and then to consider the extent to which combined impacts may be more or less than the summed estimates.

## ***Main Findings***

### **South West Region**

- 6.2.3 Table 6.1 presents costs for the offshore wind and tidal Draft Plan Option areas in South West Region for those activities for which quantified cost estimates have been made. Unquantified impacts were also identified for a number of activities including commercial fisheries, energy generation, military interests, water sports, and for social impacts.

**Table 6.1: Discounted PV Costs in £millions for all technologies within the South West Region (numbers rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Value of potentially lost GVA (derived from landed values)	0.06	0.09	0.19
Recreational boating	Additional fuel costs	0.05	0.06	0.16
Shipping	Additional fuel costs	4.87	5.08	7.05
Water Sports - Sea Angling	Reduction in expenditure	-	0.02	0.33
<b>Total PV costs</b>		<b>4.98</b>	<b>5.25</b>	<b>7.73</b>

- 6.2.4 The table below shows those activities which are relevant to more than one Draft Plan Option area and have the potential to experience significant combined impacts within the South West region.

**Table 6.2: Estimation of potentially significant impacts for all technologies within the South West Region**

Marine Activity	Estimation of potentially significant impacts
Commercial Fisheries	The combined impact of potential wind and tidal development on fish landings is considered to be additive, given the relatively low value of the summed impact. Obstruction to navigation routes for commercial fishing vessels in South West SORER is assessed as relatively minor.
Energy Generation	There is some potential for competition between offshore wind and tidal developments for grid connection. However, it is not possible to quantify the cost impact of this interaction.
Recreational Boating	The combined impact of potential wind and tidal development is considered to be additive, given the value of the summed impact.
Shipping	Most shipping activity within the Region is through traffic transiting



	from the Isle of Man and English ports along the Cumbrian Coast, Morecambe Bay and Liverpool. The combined assessment has therefore been made at national level.
Tourism	There is no anticipated impact on tourism activity from tidal development. Therefore the combined impact of offshore wind and tidal development is the same as for offshore wind development alone.

### West Region

6.2.5 Table 6.3 presents summed discounted costs for offshore wind, wave and tidal Draft Plan Option areas in West Region for those activities for which quantified cost estimates have been made

**Table 6.3: Discounted PV Costs in £millions for all technologies within the West Region (numbers rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Loss of GVA associated with possible reduction in fish landings	0.16	0.37	0.80
Shipping	Additional fuel costs	-	3.80	9.77
Tourism	Reduction in expenditure	-	0.01	0.05
<b>Total PV costs</b>		<b>0.16</b>	<b>4.18</b>	<b>10.62</b>

6.2.6 The table below shows those activities which are relevant to more than one Draft Plan Option area and have the potential to experience significant combined impacts within the South West region.

**Table 6.4: Estimation of potentially significant impacts for all technologies within the West Region**

Marine Activity	Estimation of potentially significant impacts
Commercial Fisheries	The combined impact of potential offshore wind, wave and tidal development on fish landings is considered to be additive, given the relatively low value of the summed impact. Obstruction to navigation routes for commercial fishing vessels in West region may be significant for some Draft Plan Option areas. Generally these Draft Plan Option areas are well separated and it is therefore unlikely that an individual fishing vessel would be affected by multiple Areas,
Energy Generation	There is some potential for competition between offshore wind and tidal developments for grid connection. However, it is not possible to quantify the cost impact of this interaction.
Shipping	Most shipping activity within the Region is through traffic. A wider combined assessment has therefore been made at national level.
Tourism	There is no anticipated impact on tourism activity from wave or tidal development. Therefore the combined impact of offshore wind, wave and tidal development is the same as for offshore wind development alone.

### North West Region

6.2.7 Table 6.5 presents summed discounted costs for offshore wind and wave Draft Plan Option areas in the North West region for those activities for which quantified cost estimates have been made.

**Table 6.5: Discounted PV Costs in £millions for all technologies within the North West Region (numbers rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Loss of GVA associated with possible reduction in fish landings	0.14	0.36	0.76
Shipping	Additional fuel costs	-	1.45	2.90
<b>Total PV costs</b>		<b>0.14</b>	<b>1.81</b>	<b>3.66</b>

6.2.8 Table 6.6 below shows those activities which are relevant to more than one Draft Plan Option area and have the potential to experience significant combined impacts within the North West region.

**Table 6.6: Estimation of potentially significant impacts for all technologies within the North West Region**

Marine Activity	Estimation of potentially significant impacts
Commercial Fisheries	The combined impact of potential offshore wind and wave development on fish landings is considered to be additive, given the relatively low value of the summed impact. Obstruction to navigation routes for commercial fishing vessels in North West region may occur in relation to offshore wind Area OOWNW1, but interaction with the two wave Areas is expected to be small. Given that the Draft Plan Option areas are well separated, it is therefore unlikely that individual fishing vessel would be affected by multiple Areas.
Energy Generation	There is some potential for competition for grid connection between offshore wind Area NW1 and wave Areas WNW1, WW4. However, it is not possible to quantify the cost impact of this interaction.
Shipping	Most shipping activity within the Region is through traffic. The combined assessment has therefore been made at national level.

### North Region

6.2.9 Table 6.7 presents summed discounted costs for offshore wind and wave Draft Plan Option areas in the North region for those activities for which quantified cost estimates have been made.

**Table 6.7: Discounted PV Costs in £millions for all technologies within the North Region (numbers rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Commercial Fisheries	Loss of GVA associated with possible reduction in fish landings	0.83	2.01	4.32
Shipping	Additional fuel costs	-	7.12	23.55
Tourism	Reduction in expenditure	-	0.22	0.59
Water Sports - Sea Angling	Reduction in expenditure	-	-	0.92
<b>Total PV costs</b>		<b>0.83</b>	<b>9.35</b>	<b>29.38</b>

6.2.10 The table below shows those activities which are relevant to more than one Draft Plan Option area and have the potential to experience significant combined impacts within the North region.

**Table 6.8: Estimation of potentially significant impacts for all technologies within North Region**

Marine Activity	Estimation of potentially significant impacts
Commercial Fisheries	The combined impact of potential offshore wind, wave and tidal development on fish landings is considered to be additive, given the relatively low value of the summed impact. Obstruction to navigation routes for commercial fishing vessels in North region may be significant for some Draft Plan Option areas. Offshore wind Area OWN1 and wave Area WN2 both overlap with important steaming routes to the north-west of Orkney. More generally, the concentrations of Areas for offshore wind, wave and tidal energy development around Orkney and Shetland create the potential for combined impacts for fishing vessels working in these areas.
Energy Generation	There is a significant overlap between offshore wind Area OWN1 and wave Area WN2 which could result in competition for space. There may also be competition for grid connection between offshore wind, wave and tidal developments, particularly around Orkney and Shetland. However, it is not possible to quantify the cost impact of this interaction.
Shipping	Most shipping activity within the Region is through traffic along the Pentland Firth, or further offshore passing through the Fair Isle Channel or further north around the top of the Shetland Islands. The combined assessment has therefore been made at national level.
Tourism	There is no anticipated impact on tourism activity from wave or tidal development. Therefore the combined impact of offshore wind and tidal development is the same as for offshore wind development alone.
Water Sports (Sea Angling)	The combined impact of potential offshore wind, wave and tidal development is considered to be additive, given the relatively low value of the summed impact.

### North East Region

- 6.2.11 With no wave or tidal Draft Plan Option areas in North East Region. The combined costs are therefore the same as those for offshore wind alone (found in Table 3.14 and 3.15).

## 6.3 People and Health

- 6.3.1 This section summarises the findings of the socio-economic assessment relating to the social impacts of Draft Plan Options for the cumulative effects of offshore renewable energy on other marine activities. These impacts are reported at 'planning region' level, rather than at the level of specific Draft Plan Options. More detail on this analysis can be found in Chapter 9 and 10 and Appendix C of the socio-economic assessment and the population and human health topic within the SEA.

### *Key Challenges and Issues*

- 6.3.2 The challenges and issues experienced in undertaking this analysis at each sectoral level also apply to the cumulative assessment. In addition, the combined assessment poses particular challenges owing to the complexity of such assessments and the limited scientific understanding of impacts. The starting point for each assessment has been to sum the estimated impacts for offshore wind, wave and tidal development (as appropriate) and then to consider the extent to which combined impacts may be more or less than the summed estimates

### *Main Findings*

### South West Region

- 6.3.3 The SEA discusses the importance of the Solway Firth for recreational boating and fishing, and given its location near commercial shipping traffic lanes in the North Channel to the west, there is a likely to be a cumulative increase in the navigational risk to shipping and marine traffic. However, it is considered that the mitigation is available and can reduce this. While the adoption of exclusion zones around the technologies will likely assist in reducing collision risk, their presence may have the potential to displace some recreational and fishing activities in the region.
- 6.3.4 Tables 6.9 and 6.10 show that most of the impacts remain as minimal or possible negative effects, suggesting they would not be noticeable for most groups. There are some exceptions, notably commercial fisheries, as a result of loss of traditional fishing grounds and the additional costs incurred in finding and moving to new fishing grounds. These impacts may be significant for dredgers and potters. Impacts may also be seen on recreational boat users due to increased difficulty with navigation. This could have knock-on implications for local employment in marinas and boat maintenance businesses if boat owners choose to relocate to other areas. However, these impacts are considered to be very localised. A combination of recreational boating and

tourism effects could increase the significance of the impacts for boat-based businesses (for example, if tourists chose to go elsewhere due to seascape changes reducing demand for boat trips). The costs are not expected to be large, though, so the impacts on employment and the local economy of the South West region are likely to be negligible.

**Table 6.9: Combined distributional analysis (location, age and gender) for the South West**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	0	xx	xx Ayr, Cambelton	x	x	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	x	x Ayr, Cambelton	x	x	x	x	xx Processors more likely to be female
Recreational boating	Additional fuel costs	0	xx	xx	x	xx	xx	xx	xx
	Increased deterrent to access in sites that are already challenging to navigate	0	xx	xxx Wigtown, Kirkcudbright, Whitehaven could be particularly affected	x	xx	xx	xx	xx
Tourism	Reduction in expenditure	0	x	No specific settlements affected	x	x	x	x	x
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	0	x	No specific settlements affected	x	x	x	x	x

Impacts:  
 x x x : significant negative effect, x x : possible negative effects, x: minimal negative effect, if any, 0: no noticeable effect expected  
 Rules:  
 Any impacts scored x under both wind and tidal are now scored xx  
 Any impacts scored xx under wind or tidal, plus x under other technology are now scored xxx  
 Any impacts scored xxx under wind or tidal, plus x or xx under other technology are now scored xxx+ (to indicate cumulative impacts may be greater)

**Table 6.10: Combined distributional analysis (income and social groups) for the South West**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Value of potentially lost landings	xx	xx	xx	0 Not relevant in SW	0	0 Unlikely to be employed in fisheries	xxx Dredgers and potters	xxx Vessels >10m length x Vessels <10m in length
	Consequential impacts to fish processors	x	x	x	0 Not relevant in SW	0	0	x	x
Recreational boating	Additional fuel costs	0 Unlikely to own boat	xx	xx	0 Not relevant in SW	xx	xx	xxx Boat users	No other specific group identified
	Increased deterrent to access in sites that are already challenging to navigate	xx Where employed in this area	xx	xx	0 Not relevant in SW	xx	xx Could affect ability to support trips for disabled/	xxx Could mean they need to relocate to maintain level of access for	xxx Potentially greater impact on less affluent sailors with smaller, less powerful boats

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
							sick	recreational boating	without electronic aids. They may be more likely reduce activity if navigation risks increase
Tourism	Reduction in expenditure	x	x	x	x	x	x	x	No other specific group identified
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	x	x	x	0 Not relevant in SW	x	x	xx Sea kayakers could have to change routes or look for alternatives	No other specific group identified

Impacts:  
 x x x : significant negative effect, x x : possible negative effects, x: minimal negative effect, if any, 0: no noticeable effect expected  
 Rules:  
 Any impacts scored x under both wind and tidal are now scored xx  
 Any impacts scored xx under wind or tidal, plus x under other technology are now scored xxx  
 Any impacts scored xxx under wind or tidal, plus x or xx under other technology are now scored xxx+ (to indicate cumulative impacts may be greater)

### West Region

- 6.3.5 The SEA identified that given the presence of recreational boating and shipping channels in the region, particularly between islands in the Inner and Outer Hebrides, in the Sea of the Hebrides and in the North Channel to the south, there is a likely to be a cumulative increase in navigational risk to shipping and marine traffic.
- 6.3.6 There is the potential for cumulative effects to displace recreational sailing and cruising from current routes. However, it is anticipated that under the occupancy scenarios for wind and wave, effects on these activities are likely to be low. Individual projects could result in some issues for navigation through near shore areas and project level assessment should include consultation with recreational groups.
- 6.3.7 Tables 6.11 and 6.12 show that most of the impacts for the West region are still identified as being ‘possibly negative’ at worst, suggesting they would not be noticeable for most groups. There are some exceptions, notably commercial fisheries, due to loss of traditional fishing grounds and the additional costs incurred in finding and moving to new fishing grounds. These impacts may be significant for potters and Nephrops trawlers. Crofters could also be disproportionately affected if they are involved in these type of fishing activities to supplement their incomes. There may also be issues with navigation routes, especially in TW2.
- 6.3.8 Of the other groups, recreational boat users and could reduce their activities or potentially relocate their activities if navigation becomes more difficult. This may be more significant for people with smaller boats that have fewer navigational aids, with the potential for knock-on implications for income to marinas and boat maintenance businesses. However, these impacts are likely to be very localised. A combination of recreational boating and tourism effects could increase the significance of the impacts for boat-based businesses (for example, if tourists chose to go elsewhere due to seascape changes reducing

demand for boat trips). The costs are not expected to be large, though, so the impacts on employment and the local economy of the West region are likely to be negligible.

6.3.9 The study found that social impacts within the region might arise through interactions between development and the following sectors: commercial fisheries, recreational boating, and tourism. The main impacts are likely to be on employment (as a result of the impact of increased costs or reductions in turnover), the environment (mainly due to increased emissions or changes in environmental quality), and culture and heritage (related to changes in seascape). Other impacts, such as on access to services, health, and culture and heritage could largely be mitigated, although there may be minimal impacts on recreational boaters and tourists/visitors to the coast.

**Table 6.11: Combined distributional analysis (location, age and gender) for the West**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	0	xxx More significant for OWW1	xxx Oban, Mallaig, Stornoway	x	xxx	x	xxx Fishermen more likely to be male	x
	Obstruction of navigation routes	0	xxx More significant for OWW1 and OWW3	xxx Oban, Mallaig, Stornoway	x	xxx	x	xxx Fishermen more likely to be male	x
	Consequential impacts to fish processors	xx	xx	xx Oban, Mallaig, Stornoway	x	xx	x	xx	xx Processors more likely to be female
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	0	xx	xx Oban, Dunstaffnage marinas could be affected if number of boaters reduces (but others could benefit)	0	xx	xx	xx	xx
Tourism	Reduction in expenditure	0	x	No specific settlements affected	x	x	x	x	x
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	0	xx	No specific settlements affected	xx	xx	xx	xx	xx
<p>Impacts:  x x x : significant negative effect,  x x : possible negative effects  x: minimal negative effect, if any  0: no noticeable effect expected</p> <p>Rules:  Any impacts scored x under both wind and tidal are now scored xx  Any impacts scored xx under wind or tidal, plus x under other technology are now scored xxx  Any impacts scored xxx under wind or tidal, plus x or xx under other technology are now scored xxx+ (to indicate cumulative impacts may be greater)</p>									



**Table 6.12: Combined distributional analysis (income and social groups) for the West**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Value of potentially lost landings	xxx	xxx	xx	xxx Where fishing provides additional income	0	0 Unlikely to be employed in fisheries	xxx Potters	xxx <i>Nephrops</i> trawlers
	Obstruction of navigation routes	xxx	xxx	xx	xxx Where fishing provides additional income	0	0 Unlikely to be employed in fisheries	xxx Potters	xxx <i>Nephrops</i> trawlers
	Consequential impacts to fish processors	xx	xx	xx	xx	0	0	xx	xx
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	xx Where employed in this area	xx	xx	xx Maybe more likely to have smaller boats	xx	xx Could affect ability to support trips for disabled/sick	xxx Could mean they need to relocate to maintain level of access for recreational boating	xxx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to look for alternative sailing sites if navigation risks increase
Tourism	Reduction in expenditure	x	x	x	x	x	x	x	No other specific group identified
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	xx	xx	xx	xx	xx	xx	xxx Sea kayakers could have to change routes or look for alternatives	No other specific group identified
<p>Impacts:            x x x : significant negative effect            x x : possible negative effects            x: minimal negative effect, if any            0: no noticeable effect expected</p> <p>Rules:            Any impacts scored x under both wind and tidal are now scored xx            Any impacts scored xx under wind or tidal, plus x under other technology are now scored xxx            Any impacts scored xxx under wind or tidal, plus x or xx under other technology are now scored xxx+ (to indicate cumulative impacts may be greater)</p>									

North West Region

6.3.10 The SEA identifies that given that the region has major shipping channels (e.g. shipping off the north west coast of Lewis to the North Minch) as well as established recreational sailing routes (e.g. St Kilda to Lewis), there is a likely increase in the navigational and collision risks to shipping and marine traffic from development in both Draft Plan Options. However, it is considered that the mitigation suggested would reduce this.

6.3.11 Tables 6.13 and 6.14 show that most of the impacts for the North West region are associated with commercial fishing, particularly due to loss of traditional fishing grounds and the additional costs incurred in finding and moving to new fishing grounds or steaming around arrays. These impacts may be significant for the pelagic sector, however this region has the largest impact on fisheries



therefore the combined impact on fisheries therefore may be greater. There may also be impacts for recreational boaters, who could reduce or potentially relocate their activities if navigation becomes more difficult. This may be more significant for people with smaller boats that have fewer navigational aids, with the potential for knock-on implications for income to marinas and boat maintenance businesses.

**Table 6.13: Combined distributional analysis (location, age and gender) for the North West**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Commercial fisheries	Value of potentially lost landings	0	xxx	xxx Kinlochbervie, Lochinver, Ullapool	x	xxx	x	xxx Fishermen more likely to be male	x
	Obstruction of navigation routes	0	x	x Kinlochbervie, Lochinver, Ullapool	0	x	0	x Fishermen more likely to be male	x
	Consequential impacts to fish processors	x	x	xx Kinlochbervie, Lochinver, Ullapool	x	xx	x	x	xx Processors more likely to be female
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	0	x	XX Pontoon facilities, e.g. at Kinlochbervie could be affected if number of boaters reduces (but others could benefit)	0	x	x	x	x

Impacts:  
x x x : significant negative effect , x x : possible negative effects, x: minimal negative effect, if any, 0: no noticeable effect expected

Rules:  
Any impacts scored x under both wind and wave are now scored xx  
Any impacts scored xx under wind or wave, plus x under other technology are now scored xxx  
Any impacts scored xxx under wind or wave, plus x or xx under other technology are now scored xxx+ (to indicate cumulative impacts may be greater)

**Table 6.14: Combined distributional analysis (income and social groups) for the North West**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Commercial fisheries	Value of potentially lost landings	x	x	x	xx Where fishing provides additional income	0	0 Unlikely to be employed in fisheries	xx Pelagic sector x Potters, demersal trawls	xx Vessels >15m (herring) x Vessels <15m
	Obstruction of navigation routes	x	x	x	xx Where fishing provides additional income	0	0 Unlikely to be employed in fisheries	x Pelagic sector 0 Potters, demersal trawls	x Vessels >15m (herring) 0 Vessels <15m
	Consequential impacts to fish processors	x	x	x	x	0	0	x	x
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	x	x	xx May be more likely to have smaller boats	0 Unlikely to be employed in this area	x	xxx Could mean they need to relocate to maintain level of access for recreational boating	xxx Could mean they need to relocate to maintain level of access for recreational boating	No other specific group identified

Impacts:

x x x : significant negative effect  
x x : possible negative effects  
x : minimal negative effect, if any  
0 : no noticeable effect expected  
Rules:  
Any impacts scored x under both wind and wave are now scored xx  
Any impacts scored xx under wind or wave, plus x under other technology are now scored xxx  
Any impacts scored xxx under wind or wave, plus x or xx under other technology are now scored xxx+ (to indicate cumulative impacts may be greater)

## North Region

- 6.3.12 The SEA considered that the regions seas are busy with vessel traffic, both commercial and recreational. Development of renewables within the Draft Plan Options in combination with the existing planned sites, and furthermore under the higher occupancy scenario, could result in some increased collision risk. Exclusion zones around the technologies will assist in reducing this risk. There may also be some residual impacts for displacement of recreational activities, and potentially cessation in some locations.
- 6.3.13 Tables 6.15 and 6.16 show that almost all of the potentially significant cumulative impacts for the North region are associated with commercial fishing, particularly due to loss of traditional fishing grounds and the additional costs incurred in finding and moving to new fishing grounds or steaming around arrays, but inshore fisheries may also suffer significant impacts. These impacts may be most significant for the pelagic and demersal sectors. Crofters could be disproportionately affected if they are involved in these types of fishing activities to supplement their incomes.
- 6.3.14 Possible negative impacts on other groups are identified but it is suggested by the socio-economic assessment that these may not be noticeable. The main exceptions are impacts on sea anglers and recreational boaters, who could reduce or potentially relocate their activities if navigation becomes more difficult. This may be more significant for people with smaller boats that have fewer navigational aids, with the potential for knock-on implications for income to marinas and boat maintenance businesses. This could have knock-on implications for local employment in marinas and boat maintenance businesses. However, these impacts could be very localised. A combination of effects on recreational boating, sea angling and tourism could increase the significance of the impacts for boat-based businesses (for example, if tourists and sea anglers chose to go elsewhere reducing demand for boat trips). The costs are not expected to be large, though, so the impacts on employment and the local economy of the North region are likely to be negligible. Impacts on sea angling may be significant for the 10% most deprived proportion of the population (although other groups within the population may be equally affected). However, as with the other impacts, these effects are likely to be localised.

**Table 6.15: Combined distributional analysis (location, age and gender) for the North**

Sector	Impact	Location			Age			Gender	
		Urban	Rural	Settlement	Children	Working age	Pensionable age	Male	Female
Carbon capture and storage	Costs of additional cable crossings	0	xx Could have impact on rural economy if investment goes elsewhere	0 Unlikely to affect specific locations	0	xx Could have impact on employment opportunities if investment goes elsewhere	0	xx	xx
Commercial fisheries	Value of potentially lost landings	0	xxx	xxx Orkney, Scrabster, Shetland	x	xxx	x	xxx Fishermen more likely to be male	xx
	Obstruction of navigation routes	0	x	xx Orkney, Scrabster, Shetland	x	xx	x	xx Fishermen more likely to be male	x
	Consequential impacts to fish processors	xx	xxx	xxx Orkney, Scrabster, Shetland	x	xxx	x	xx	xxx Processors more likely to be female
Recreational boating	Increased deterrent to access in sites that are already challenging to navigate	0	xx	xxx Pierowall could be affected most, Bressay and Lerwick less so (xx)	0	xx	xx	xx	xx
Tourism	Reduction in expenditure	0	x	No specific settlements affected	x	x	x	x	x
Water sports – Sea Angling	Reduction in expenditure	xx	xx	xx	xx	xx	xx	xxx May be more likely to be involved in sea angling	x
Water sports	Spatial overlap between Draft Plan Option areas and water sport activity (sea kayaking)	0	x	No specific settlements affected	x	x	x	x	x

Impacts: x x x : significant negative effect  
x x : possible negative effects  
x: minimal negative effect, if any  
0: no noticeable effect expected  
Rules:  
Any impacts scored x under all of wind, wave and tidal are now scored xx  
Any impacts scored xx under wind, wave or tidal, plus x under other technology are now scored xxx  
Any impacts scored xxx under wind, wave or tidal, plus x or xx under other technology are now scored xxx+ (to indicate cumulative impacts may be greater)

**Table 6.16: Combined distributional analysis (income and social groups) for the North**

Sector	Impact	Income			Social groups				
		10% most deprived	Middle 80%	10% most affluent	Crofters	Ethnic minorities	With disability or long-term sick	Special interest groups	Other
Carbon capture and storage	Costs of additional cable crossings	xxx economic impacts could affect this group more than others	xx	xx	xx Unlikely to be employed in this industry (but may be for extra income)	xx	0 Unlikely to be affected, economic impacts likely to be small	0 None likely to be affected	xxx Local businesses that might otherwise have been involved
Commercial fisheries	Value of potentially lost landings	xxx	xxx	xxx	xxx Where fishing provides additional income	0	0 Unlikely to be employed in fisheries	xxx Pelagic, demersal sector xx Shellfish	xxx Vessels >15m xxx Vessels <15m
	Obstruction of navigation routes	x	x	x	xx Where fishing provides additional income	0	0 Unlikely to be employed in fisheries	xx Pelagic, demersal sector x Shellfish	xx Vessels >15m xx Vessels <15m
	Consequential impacts to fish processors	xxx	xxx	x	x	0	0	xx	x
Recreational boating	Additional fuel costs	0 Unlikely to own boat	x	x	x	x	x	xx Boat users	No other specific group identified
	Increased deterrent to access in sites that are already challenging to navigate	xx Where employed in this area	xx	xx	xxx May be more likely to have smaller boats	xx	xxx Could affect ability to support trips for disabled/sick	xxx Could mean they need to relocate to maintain level of access for recreational boating	xxx Potentially greater impact on less affluent sailors with smaller, less powerful boats without electronic aids. They may be more likely to look for alternative sailing sites if navigation risks increase
Tourism	Reduction in expenditure	x	x	x	x	x	x	x	No other specific group identified
Water sports – Sea Angling	Reduction in expenditure	xxx	xxx	xxx	xxx	xxx	xx Level of sea angling activity may be lower for sick	xxx Sea anglers will be most affected	No other specific group identified
Water sports	Spatial overlap between Draft Plan Option areas and water sports activity (sea kayaking)	x	x	x	x	x	x	xx Sea kayakers could have to change routes or look for alternatives	No other specific group identified
<p>Impacts:                      xxx : significant negative effect                      xx : possible negative effects                      x : minimal negative effect, if any                      0 : no noticeable effect expected</p> <p>Rules:                      Any impacts scored x under all of wind, wave and tidal are now scored xx                      Any impacts scored xx under wind, wave or tidal, plus x under other technology are now scored xxx                      Any impacts scored xxx under wind, wave or tidal, plus x or xx under other technology are now scored xxx+ (to indicate cumulative impacts may be greater)</p>									

## North East Region

- 6.3.15 The SEA identified that large scale development of wind energy through the Draft Plan Options and sites in the Moray Firth and Firth of Forth will have interactions with commercial and recreational boating and shipping. Residual impacts for displacement of some recreational activities may result, although these may not be significant if displacement can avoid cessation of activities. Appropriate exclusion zones around the technologies will assist in reducing collision risk.
- 6.3.16 As there are no wave or tidal Draft Plan Option areas in North East Region. The combined social impacts are therefore the same as those for offshore wind alone (covered in section 3.3.18 above).

## 6.4 Cumulative Effects and Synergies

- 6.4.1 The effects identified with cumulative Draft Plan Options within a single technology could be further amplified with several options for additional technologies. However, it may be the case that several sites with lower levels of occupancy could carry a lower risk of effects than for plan options with a single technology but a higher level of occupancy. Therefore there is difficulty in reaching certainty in identifying significant environmental effects. However key cumulative effects at the national level include:
- Effects on mobile species such as seals, fish, cetaceans, elasmobranchs, seabirds and diving birds, in particular, as a result of barriers to movement, and collision risk. Some species can travel great distances and could potentially be affected by several draft plan options and more than one type of device. The ongoing HRA of the plans and subsequent projects will help to consider in combination effects on species associated with European designations.
  - Potential for effects on marine habitats as a direct result of construction, but also through any alteration of the water environment such as turbidity, turbulence and changes in patterns of sedimentation.
  - Potential for cumulative effects on landscape and seascape character, including areas with characteristics of wild land.
  - Impacts on submerged archaeology, although mitigation is available in terms of locating devices. In addition there is potential for impacts on the setting of features of the historic environment, in particular, coastal designations and important sites inclusive of the Heart of Neolithic Orkney World Heritage Site (WHS).
  - Other environmental effects, including pollution and contamination risk, and effects on coastal areas may be more localised and less significant on a cumulative basis.
- 6.4.2 Table 6.17 presents summed discounted costs for wind, wave and tidal Draft Plan Option areas in all regions for those activities for which quantified cost

estimates have been made. These figures are aggregated from the regional level analyses presented in previous sections.

**Table 6.17: Present value (PV) costs for all technologies at a national level, £m (costs discounted over assessment period, 2012 prices, values rounded to nearest £0.01m)**

Activity	Description of Measurement	Scenarios		
		Low	Central	High
Carbon Capture and Storage	Costs of additional cable crossings	1.85	4.32	9.27
Commercial Fisheries	Loss of GVA associated with possible reduction in fish landings	1.37	3.26	6.99
Recreational boating	Additional fuel costs	0.05	0.72	0.97
Shipping	Additional fuel costs	4.87	66.02	141.87
Tourism	Reduction in expenditure	-	0.26	1.00
Water Sports - Sea Angling	Reduction in expenditure	-	-	0.92
<b>Total PV costs</b>		<b>8.14</b>	<b>74.58</b>	<b>161.02</b>

- 6.4.3 While there are uncertainties surrounding the cost estimates for tourism and sea angling and not all potential impacts to these sectors have been quantified, the scale of impacts identified does not suggest that there will be significant regional or national impacts associated with combined offshore wind, wave or tidal development within the Draft Plan Option areas for these activities.
- 6.4.4 At a national level, the combined impact of the commercial fisheries sector in terms of impacts to GVA as a result of potential reductions in landings is estimated to be less than 1% of total GVA and thus insignificant in a national context. At a regional scale, it is estimated that the greatest potential impacts will occur in North Region. No significant impacts for the fish processing sector have been identified either regionally or nationally, given the relatively small scale of potential impact to fish landings. Impacts may also occur to the commercial fisheries sector as a result of disruption to steaming routes to fishing grounds as a result of the location of offshore renewables arrays but it has not been possible to quantify these impacts. It is possible that export cable routes may also affect fishing opportunities in some locations, but it has not been possible to quantify these impacts.
- 6.4.5 Cost impacts to shipping interests are potentially more significant both in absolute terms (maximum annual cost impact of around £13.0m) and relative terms, although no specific figure is available for the value of shipping to the Scottish economy. For the tidal and wave sites, spatial planning can largely avoid significant impacts on commercial shipping and ferry routes, however reduced sea area availability for navigation will increase the density of traffic in other areas. This will have an increase in the potential encounter rate, and therefore an increase in marine risk. Changes in shipping patterns around development sites, specifically larger wind farm sites, will also affect

greenhouse gas (GHG) emission values for different sea areas. This will depend on the route of the deviation, however it is expected that GHG emission values will be modified by affected routes.

- 6.4.6 The impact of renewable development sites on recreational boating is recognised as a deterrent (i.e. the prospect of increased danger which affects planned passages) and partly economic where the passage is attempted, but a deviation is encountered to avoid development areas. The effect of decisions not to navigate in these areas will be recognised in income from marina and leisure support facilities, and a long term disincentive for investment.
- 6.4.7 A number of potential impacts have been identified for competing offshore renewables technologies, both in relation to competition for space and cable land falls. The combined impact of these interactions is uncertain. It is possible that more commercially viable technologies such as offshore wind could out-compete wave and tidal developments and reduce opportunities for these technologies, although offshore renewables developers will be encouraged to co-operate on issues such as cable landfall.
- 6.4.8 Impacts to Carbon Capture and Storage (CCS) and Dredge Material Disposal sites only occur in one region and national impacts will therefore be no greater than the regional impacts to these activities.
- 6.4.9 The social impacts are not expected to be noticeable at the national level. The potential impacts on employment, access to services, health, culture and heritage and the environment could be locally noticeable, with the largest impacts likely to be associated with commercial fisheries, and on marinas if boat users choose to visit other areas of the coast or move their boats to marinas away from the search areas. In most cases, these impacts are also expected to be small and very localised and relate mainly to the knock-on effects of changes to jobs (either number or quality of employment). There are no significant impacts expected in terms of access to services, crime or education. Impacts on culture and heritage, environment and health are limited to loss of traditional fishing grounds, emissions to the environment (most of which will be offshore) and worry associated with increased costs or increased navigation risks.

## 6.5 Recommendations and Combined Mitigation Action Plan

- 6.5.1 Within the SEA Environmental Report are a number of recommendations to avoid and minimise the potential environmental effects of the plans. The plan does not determine the type of device to be constructed, nor does it state a preference for technology where Draft Plan Options overlap. Furthermore it does not set levels of occupancy or locations for development within the Draft Plan Options. Given this the recommendations of the SEA set out guidance for information to include in project level EIA to help focus assessments towards potentially significant issues in order to provide adequate mitigation. The table

below summarises key recommendations, mitigation and means of monitoring effects.

**Table 6.18: Summary of SEA recommendations and monitoring**

Summary of potential effects	Recommendation and mitigation	Monitoring
<b>Biodiversity Flora and Fauna</b>		
<p>Potential for adverse effects on biodiversity as a result of collision injury, displacement and impacts on behaviour. Inclusive of the effects of noise during construction and operation.</p> <p>Direct and indirect loss of habitats from construction and operation of devices (inclusive of impacts on seabed sediment movement)</p>	<p>Project level EIA and HRA can help to determine the significance of effects on marine species and habitats.</p> <p>In some cases the timing of construction activity can avoid the greatest impacts on some species.</p> <p>Establish links between the results of any hydrodynamic and sediment modelling for individual projects and impacts on benthic species and habitats.</p> <p>Project EIA to demonstrate development is compatible with the conservation objectives of future MPA. Project HRA to demonstrate no adverse effect on the integrity of European designated sites.</p>	<p>Further research into potential collision risks, noise and displacement effects is required to better understand potential effects on fish species such as Atlantic salmon and other diadromous fish, cetaceans, seals, elasmobranchs and some bird species.</p> <p>EIA and monitoring of licenced projects to help improve the understanding of effects on species and habitats.</p> <p>Research and monitoring of to feed back into and inform the plan review process.</p>
<b>Population and Human Health</b>		
<p>Some potential for increased collision risk and displacement of recreational activity, particularly for near shore devices</p>	<p>Impacts could be reduced through appropriate design and use of navigational aids (marker buoys and lighting) in the vicinity of the infrastructure.</p> <p>Inclusion of offshore energy developments on navigational charts and potential for exclusion zones.</p> <p>Consultation with the recreation sector at project level.</p>	<p>Consultation with the recreation sector as projects are rolled out and will help to design developments that minimise effects on recreational activities.</p>
<b>Water and the Marine Environment</b>		
<p>Potential impacts on water quality from contamination associated with construction (vessels and seabed disturbance) and as a result of changes to turbidity and turbulence.</p>	<p>Pollution risks associated with installation, maintenance and decommissioning, reduced by inclusion as consideration in project design and operational standards.</p> <p>Establish links between the results of any hydrodynamic and sediment modelling for individual projects and potential for pollution and contamination.</p>	<p>Monitoring of pollution incidents associated with licenced projects to feed into the plan review process.</p>
<b>Marine Geology and Coastal Processes</b>		
<p>Changes to turbidity, sediment disturbance,</p>	<p>Establish links between the results of any hydrodynamic and sediment</p>	<p>EIA and monitoring of licenced projects to help</p>



Summary of potential effects	Recommendation and mitigation	Monitoring
<p>and loss of geology in placing devices may have secondary impacts on coastal processes (depending on the proximity of devices to more sensitive coastlines).</p>	<p>modelling for individual projects and coastal processes.</p> <p>Impacts could be reduced through appropriate location within a Draft Plan Option to limit the scale for any identified effects.</p> <p>Project design should include the use of scour protection around the base of foundations placed on or into the seabed.</p>	<p>improve the understanding of potential effects and feed into the plan review process.</p>
<b>Historic Environment</b>		
<p>Potential impacts on submerged archaeology and in some cases the setting of heritage features (depending on devices, location within a Draft Plan Option and the presence and status of the Historic feature)</p>	<p>Impacts could be reduced through appropriate array design to avoid historic features on the seabed.</p> <p>Project level EIA to establish effects on the setting of Historic features and minimise significant adverse effects through project design and location within Draft Plan Options.</p> <p>Where a relevant consideration, projects must demonstrate no significant adverse effects on the outstanding universal value of world heritage sites.</p>	<p>The EIA of licenced projects should be reviewed to help understand the scale of potential effects on features of the historic environment.</p>
<b>Landscape and seascape</b>		
<p>Potential for change to landscape and seascape, inclusive of cumulative effects and including areas with characteristics of wild land.</p> <p>The significance of effects will depend on the type of device, its location (e.g. near shore or further offshore), and the sensitivity of receptors.</p>	<p>Some residual change to seascape is inevitable but the avoidance of significance of effects should be a key consideration of project design and location within Draft Plan Options.</p> <p>In some cases (wave and tidal) the type of device planned for installation should reflect the site within the Draft Plan Option selected for development, for example devices with the most submerged components may be more suitable for near shore locations.</p> <p>Night time effects associated with lighting, particular in near shore areas and near sensitive receptors should be a key consideration of project design.</p> <p>The cumulative effects associated with massing of devices with other planned and existing offshore renewable energy developments, onshore components of developments and the capacity of landscapes to absorb change should</p>	<p>EIA and monitoring of licenced projects to help improve the understanding of the scale of effects, in particular to inform cumulative impact assessments as part of the ongoing plan review process.</p>

Summary of potential effects	Recommendation and mitigation	Monitoring
	<p>be considered in detail within visual impact assessment contained in project level EIA.</p> <p>Project EIA with National Scenic Areas (NSA) in their scope should avoid adverse effects on the integrity of the area or the qualities for which it has been designated.</p>	

6.5.2 The HRA also sets out the requirement for further project level HRAs as a means to mitigate potential for adverse effects on the integrity of European sites. Project assessment can also improve understanding of the impacts from key pathways and updated information can feed into the HRA within the plan review process. The information that will need to be supplied within the project-level HRAs includes:

- Updates on the location and status of new European/Ramsar designations;
- New information on interest feature sensitivities (in the context of the latest scientific understanding);
- Assessment of effects during survey, construction and operation phases of the project (including the in-combination effects with other extant proposals); and
- Proposed mitigation measures.

6.5.3 It should also be recognised that it may be necessary, as part of the project-level HRAs, to revisit the screening process that was undertaken for the Sectoral Plan HRAs. Depending upon the outcome of the project-level AA, there might be a need for alternative and/or additional mitigation measures to be identified to ensure that there is no adverse effect on the integrity of any European/Ramsar sites.

6.5.4 It should be emphasised that uncertainties associated with the sensitivities of European/Ramsar site features to individual projects will be addressed through project level HRA to demonstrate no adverse effect on integrity of these features. The Habitats Regulations and the case-law that informs their implementation place emphasis on developers demonstrating 'no adverse effect' using best available scientific knowledge and beyond reasonable scientific doubt. The process of ongoing research and feeding the results of targeted monitoring back into the assessment process will address these uncertainties.

6.5.5 Both the SEA and HRA also propose wider recommendations for the plan making process. The SEA indicates the potential for environmental effects associated with grid connections, but could not provide certainty on effects as grid connections are not defined in this plan or others. The socio-economic assessment includes broad assumptions on grid connections in order to gauge

the scale of potential effects although this is limited. It is therefore recommended that provisions should be made for the strategic planning of the marine grid in order consider potential effects arising from the provision of grid infrastructure, and that strategic assessment of potential environmental, economic and social effects is also undertaken.

- 6.5.6 The SEA and HRA have highlighted difficulties in providing certainty in the prediction of effects, reflecting gaps in knowledge surrounding the significance of interactions between renewable devices and environmental features. The assessments indicate that greater certainty on effects might only be informed through ongoing research and feedback from project level assessment and monitoring and that this needs to be scientifically sound to provide clarity.
- 6.5.7 It is recommended in the SEA that a co-ordinated approach to reviewing approved EIA and project monitoring should be developed. Furthermore, where uncertainty remains, further targeted research projects should be considered and continue to be commissioned. A co-ordinated and collaborative approach will help to direct future research to areas of value for plan making and development process. Furthermore, the SEA recommends that a plan review group should oversee these processes. The group could include a wide range of representatives but should include expertise for scientific accountability. The findings of research and project review should feed into the plan review cycle.
- 6.5.8 The HRA proposes a similar IPR process that is critical for providing assurances that the Sectoral Marine Plans will have no adverse effects on the integrity of designated European/Ramsar site. The HRA Cumulative Review and Plan Implementation Report sets out in detail the programme of activities that will be required for the IPR. The phased approach it details enables project-level assessments and the associated monitoring review work of initial projects inform regular reviews of the Plan and ongoing decision about project implementation. It is further proposed that the review process will be overseen by a stakeholder project steering group. Given that both the SEA and HRA suggest the formation of a group to oversee the review processes, it is recommended that a single group be constructed to conduct both these tasks.
- 6.5.9 The socio-economic assessment recognises that there is potential for economic impacts on some marine activities, of differing degrees. The assessment has not, however, taken into account predicted potential economic benefits associated with the manufacturing, construction and maintenance of offshore renewable energy installations.
- 6.5.10 Social impacts are expected to be noticeable only at the local level and not at the national level. The largest of these impacts may be associated with commercial fisheries, and some marinas. There are no significant impacts expected in terms of access to services, crime or education. As a result recommendations for specific mitigation measures have not been included. Communities are provided with the opportunity to consider the findings of the socio-economic assessment during this consultation.

- 6.5.11 However, as part of the baseline review that informed the socio-economic assessment, a Data Gaps Analysis Report has been produced<sup>16</sup>. Within this report, specific data gaps were identified where the absence of suitable baseline data was perceived to compromise the preparation of regional scale impact assessments for future sectoral plans for offshore wind or wave and tidal energy.
- 6.5.12 Marine Scotland has already commissioned a number of specific studies to address particular gaps in socio-economic data to inform future marine planning and the development of sectoral plans. In addition, a number of actions have been identified as possible ways in which to fill these gaps. The Data Gaps Analysis Report describes possible methodologies and approaches for taking forward medium and high priority actions. Marine Scotland will continue to progress the development of such evidence as and where required as part of the plan review process.

## 6.6 Achieving a Sustainable Approach

- 6.6.1 The following section sets out the policy response to the recommendations of this SA. The draft plans provide an initial opportunity to incorporate guidance for their implementation that takes account for the sustainability issues identified.
- 6.6.2 The SA has set out a number of issues relating to each technology at the regional and national scale. In some cases recommendations have been made for projects which may emerge within the Draft Plan Option. The draft plans include a requirement that where necessary project level assessments should give consideration to the issues identified, and in the assessments, at the scoping stage for project level environmental assessments. Furthermore in each of the draft plans for each technology and each of the relevant regions, the key sustainability issues for consideration are listed.
- 6.6.3 The recommendation within the SEA and repeated in this SA, for a strategic planning exercise to cover the grid, and to be supported by a SA process, such as undertaken for this round of plans, is supported within the text of the draft plans.
- 6.6.4 Recommendations from the SEA, HRA, and socio-economics to structure a formal plan review process that is informed by the monitoring of licenced projects, ongoing research and assessment is supported within the draft plans. The draft plans suggest that a Sectoral Plans Review Group is established to oversee the implementation of the plan. The group is to help facilitate strategic monitoring and research in order to increase knowledge of national and regional issues and to address gaps in knowledge, including those identified in the SEA, HRA and socio economic assessment.

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<sup>16</sup> Scottish Government (2012) Socio-economic Baseline Review Methodology and Data Gap Analysis for Offshore Renewables in Scottish Waters [online] Available at: <http://www.scotland.gov.uk/Publications/2012/12/4944> (Accessed 3/7/2013)

- 6.6.5 An effective review group would help to provide greater clarity in regards to the significance of the effects of the plans, and enable any assumptions relating to Plan Options and growth scenarios to be revisited within the plan review process.
- 6.6.6 Views on the draft plans and the assessment reports as part of this consultation are now sought. These will help to inform the development of final plans, and to establish membership of the Sectoral Plans Review Group and any additional issues this group will need to focus on.

## 7 Next Steps

### 7.1 Timescale for the Assessment

7.1.1 Consultation on the Plans, this report and the technical assessments is now open. At the end of the consultation process the views of stakeholders and the public on the plans and assessment work will be analysed. In light of the comments the Plans will be reviewed, updated and finalised. If significant changes are made to the Draft Plan Options the SEA and socio-economic assessments will be reviewed in order to consider whether any further work will be required.

7.1.2 The HRA will continue throughout the development of the plan and at the point of adoption an updated and final HRA Record will be available. Alongside this a Post Adoption Statement detailing:

- How sustainability considerations have been integrated into the plans;
- How the sustainability appraisal and technical reports have been taken into account;
- How consultee opinions have been taken into account;
- The reasons for choosing the plan or programme as adopted, in the light of the other reasonable alternatives considered; and
- Measures to be used to monitor the significant effects of the plan.

7.1.3 The production of a Post Adoption Statement fulfils the requirements of the Environmental Assessment (Scotland) Act 2005 and will be available alongside the final plans. At this stage the plans are anticipate to be adopted in early 2014.

### 7.2 Details of the Consultations

7.2.1 Consultation on the draft plans, this Sustainability Appraisal and the technical assessments, is now open and will run for a period of 16 weeks through to the 13<sup>th</sup> Novemeber. Consultees are able to view the key documents:

- on the Scottish Government website;
- at the Scottish Government office at Victoria Quay, Edinburgh; and
- at the Scottish Parliament, Edinburgh.

7.2.2 Only written representations to the documents can be considered, however there are three ways consultees will be able to respond:

- Follow the 'Consultation Response' button on the consultation web page <http://www.scotland.gov.uk/consultations>;
- Email to [offshorerenewableenergy@scotland.gsi.gov.uk](mailto:offshorerenewableenergy@scotland.gsi.gov.uk) ; or

- Post to Offshore Renewables Team, Marine Scotland, 1A(S), Victoria Quay, Edinburgh, EH66QQ.

7.2.3 Throughout the 16 week consultation period, Marine Scotland will be holding a series of open meetings for stakeholders and members of the public to raise awareness of, and encourage further discussion on the Draft Plans and this Sustainability Appraisal. Locations and timings are available on the Scottish Government website.

7.2.4 While Marine Scotland will seek to capture all the views expressed during the workshops, formal representations will not be accepted verbally. These will only be accepted in writing, as outlined above.

#### ***Stakeholder events***

7.2.5 Marine Scotland will engage with key national stakeholders in a series of sectoral workshops throughout July to October 2013. These will focus on the key sectoral interests including:

- Environment
- Shipping and Navigation
- Ports and Harbours
- Recreation and tourism
- Renewables and grid industry
- Fishing, fisheries management and aquaculture

7.2.6 Marine Scotland will contact key stakeholders in the coming months regarding the arrangements for these workshops.

#### ***Public events***

7.2.7 Marine Scotland will hold a series of open events to engage with members of the public throughout August and September 2013. These will take the form of an afternoon drop in session, followed by an evening presentation to provide more in-depth information for those who are interested in the detailed aspects of the Plans and their assessments. These events will:

- outline the consultation process and how to provide a response;
- raise awareness of the Draft Plans that have been developed;
- set out how the Initial Plan Options, RLG and consultation have been used to identify options for the planning process;
- explain how we have assessed the economic, social and environmental impact of these options; and
- outline how the Draft plans will be used.

7.2.8 The events will be advertised nationally (online and in the press) and locally using local press and existing networks and organisations, where possible. Consultees will not be required to sign up in advance or sign in on the day.

## 7.3 Questions for Consultees

7.3.1 In order to facilitate the consultation process, readers are invited to focus their responses on the following consultation questions. However, responses are not limited to these questions and additional comments are welcomed

1. Do you have any views on the findings and recommendations of the Sustainability Appraisal? Do you think that all the social, economic and environmental effects (positive and negative) have been identified? Are there other issues that we should be taking into account in the preparation of the Final Draft Plans?
2. The SEA has identified a range of potential effects from the Draft Plans. Measures for the mitigation of these effects have been identified in the SEA environmental report. Do you have a view on these findings? Do you think that the proposed mitigation measures will be effective? Do you have any additional suggestions?
3. The Socio-economics Report has identified a range of potential impacts on existing sea users. Do you have a view on these findings? Do you think that the proposed mitigation measures will be effective? Do you have any additional suggestions?
4. Do you have any further technical or environmental information you think we should take into account as we refine the Draft Plans?
5. The Plans, once implemented, will be reviewed to take account of actual development and increasing knowledge of development factors. It is proposed that a Sectoral Plan Review Group be established to help inform this process. How often should the plans be reviewed and why? Who should sit on the review group and why? How often should this group meet? What should the group focus on?
6. Do you consider that the Draft Plans presents a set of practical options? (Also see other detailed plan related questions listed in the draft plans document).
7. Do you have views on the scale and pace of development that could be sustainably accommodated in Scottish Waters, taking into account the findings from the technical assessments?
8. Have we got the balance right in the Draft Plans, between tackling climate change, maximising opportunities for economic development and dealing with environmental and commercial impacts?





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