

Marine Scotland



Draft Plan for Offshore Wind Energy
in Scottish Territorial Waters

marinescotland

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ISBN: 978-0-7559-9308-6

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Edinburgh
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APS Group Scotland
DPPAS10027 (05/10)

Published by Marine Scotland, May 2010

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1 Introduction

1.1 Background

- 1.1.1 The Scottish Government has made a commitment to generating 20% of all energy, and 50% of its electricity from renewable sources by 2020. This requires that the current capacity of 4 Gigawatts (GW) is doubled to 8GW.
- 1.1.2 To date, a large share of renewable energy generation in Scotland has been delivered by onshore wind and hydroelectricity schemes. However, the advancement of new technology and the natural characteristics of Scotland's marine environment - it has been estimated that we have 25% of Europe's offshore wind resource - means that there is considerable potential for offshore wind, wave and tidal energy developments in the coming years.
- 1.1.3 Forecast growth based on projects under construction, consented or in planning or scoping suggest that future capacity could extend beyond existing targets to 14GW overall, with more than 6GW in Scottish Territorial Waters (STW).
- 1.1.4 The large scale development of offshore wind represents one of the biggest opportunities for sustainable economic growth in Scotland for a generation. With the natural comparative advantage we have it is anticipated that offshore wind development could provide a huge economic success story for Scotland, with projected maximum investment in offshore wind of approximately £30bn in Scotland over the next decade, and the creation of upwards of 20,000 jobs by 2020. Scotland is also well placed to capture one third of the total UK supply chain market, potentially securing an additional £30bn of investment. Development and investment on this scale is similar to the emergence of Scotland's oil industry in the 1970s.
- 1.1.5 As a result, this Plan considers the potential of STW to accommodate offshore wind energy developments from a national perspective, making proposals for the short, medium and long term. For the purposes of the Plan, the short term means 2010-2010, medium term is 2020-2030 and long term extends beyond 2030.
- 1.1.6 Marine Scotland will review the Plan after 2 years, and update and revise it as appropriate after this period.

1.2 Preparation of the Draft Plan

- 1.2.1 This is a Draft Plan which has been developed in consultation with key stakeholders, including industry and environmental stakeholders. The Draft Plan has been fundamentally shaped by a Strategic Environmental Assessment (SEA) which has been undertaken in accordance with the Environmental Assessment (Scotland) Act 2005.
- 1.2.2 Development of the Draft Plan has extended beyond consideration of environmental effects to incorporate detailed consideration of technical constraints and opportunities for this type of development.

1.3 Overview of the Draft Plan

1.3.1 This is a Draft Plan, which is now being subjected to a period of consultation. As well as ensuring that stakeholders have a full opportunity to contribute to the Draft Plan itself, this consultation is also required to meet the obligations of the Environmental Assessment (Scotland) Act 2005 for early and effective engagement of the public and interested parties. Consultees are invited to comment on both the Draft Plan and its accompanying SEA environmental report. To maximise transparency and encourage further discussion, background information on the process of developing the Draft Plan is provided for consultees to consider further. This includes an explanation of how options for development have been identified and assessed.

1.3.2 The Draft Plan is structured as follows:

- Chapter 2 explains how the options for development were identified and describes each of them in more detail;
- Chapter 3 brings together and summarises the key findings from the environmental and technical assessment of the options;
- Chapter 4 sets out the Draft Plan for the short, medium and long term and associated recommendations for its implementation; and
- Chapter 5 describes the next steps in the process and sets out questions for consultees.

2 Draft Plan Options

2.1 Background

- 2.1.1 This section of the Draft Plan explains how the options for future development were identified and subsequently assessed. Much of this work was undertaken as an integral part of the SEA process. The Draft Plan has, however, also been developed in the light of technical as well as environmental considerations, to ensure that the interests of other marine users are taken into account, and that options are realistic and reasonable.
- 2.1.2 In 2009, The Crown Estate identified 10 areas where it was prepared to grant commercial leases for offshore wind energy developments. These areas collectively have generation capacity of around 6.4GW. When these areas were announced, the Scottish Government committed to undertaking SEA of Offshore Wind Energy in Scottish Territorial Waters. The resulting Draft Plan now encompasses the 10 areas, but also extends to cover all other areas of Scottish Territorial Waters (i.e. between 0-12 nautical miles offshore). This allows the Draft Plan to provide a strategic overview of where this type of development should and should not be progressed from a national perspective in the short, medium and long term.

2.2 Process for Identifying Options

- 2.2.1 In the first half of 2009, the Scottish Government commenced the SEA of the Draft Plan. In accordance with good practice in SEA, this work commenced early, long before the content of the Draft Plan had been defined. This allowed environmental considerations to be 'frontloaded' in the plan-making process, as opposed to reacting to development proposals.
- 2.2.2 Through SEA screening in Spring 2009, the Scottish Government determined that the Draft Plan as a whole could have significant environmental effects under the terms of the Environmental Assessment (Scotland) Act 2005, and that SEA was therefore required. At the same time, scoping was undertaken, including identification of relevant environmental baseline information, and exploration of environmental assessment methods. The combined SEA screening and scoping report was formally submitted in June 2009 to the SEA Consultation Authorities (Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (SNH) and Historic Scotland (HS),) for statutory consultation through the SEA Gateway. It was also informally made available to other stakeholders for comment.
- 2.2.3 The key issues arising from the responses to the SEA scoping report have been included in the SEA. Comments were also made on the scope of the Draft Plan itself, and there was agreement that it should extend beyond the 10 areas with Crown Estate exclusivity agreements to provide a longer term overview from a national perspective.

2.3 Analysis to Define the Draft Plan Options

- 2.3.1 To formulate the Draft Plan, a series of options was identified, where it initially appeared that feasibility for offshore wind energy development could be explored further. These were used to structure the SEA and the analysis of technical constraints. A number of criteria were used to identify appropriate options.

Short Term / 'Do Proposed' Option

- 2.3.2 Firstly, the 10 areas with Crown Estate exclusivity agreements were viewed as a short term option – otherwise termed the “Do Proposed” Option. The SEA and technical analysis therefore considered the implications of taking all 10 of these sites forward, both individually and together.

Consideration of the remainder of Scottish Territorial Waters

- 2.3.3 Secondly, mapping systems were used to consider where development could be technically feasible over the medium to long term. Also known as a “Do Maximum” option within the SEA, technically feasible areas (medium term options) were firstly identified through a broad analysis and sifting exercise. Recognising the pace of technological development, a series of technical issues were used to guide, rather than constrain, the scope of the Draft Plan options. Several considerations are relevant at this stage:

- **Wind resource.** The power output of a wind turbine is a function of the cube of the wind speed. To ensure that enough power is produced to justify the costs associated with development, wind speeds have to be at a suitable level. Only areas close (10-20km) to the coastline do not have wind speeds of 8 metres/sec or greater and the majority of STW currently has wind speeds which make this type of development economically feasible. It was concluded that the Draft Plan should not rule out any areas on the basis of wind speed.
- **Water depth.** The majority of offshore wind projects constructed to date have been in water depths of up to 20m, with a steel monopile construction for the foundation. Until recently, monopiles were only viewed as appropriate in water depths up to 25m, and then gravity bases or tripods or quadropods would be feasible until depths of up to 40-50m. Beyond this, jacket structures were considered to be more cost effective. However, more recently, vessel lifting capacity has increased, and floating structures have been trialled as a possible solution for development in deeper water. As a result, whilst it is likely that most offshore wind farms will continue to be constructed in water depths of less than 60m in the short term, as this Draft Plan relates to a longer time horizon, water depth has not been considered to be a development constraint.
- **Ports.** Ideally, the distance from construction port to the installation site should be as short as possible to reduce sea passage time and distance for materials and personnel. Scottish Enterprise and Highlands and Islands

Enterprise are in the process of preparing a National Renewables Infrastructure Plan (N-RIP), which is also being subjected to a SEA. The N-RIP Stage 1 Report sets out a provisional spatial framework for port facilities that are proposed to act as catalysts for the development of the offshore renewable energy industry.¹

- **Grid.** Connection to the electrical grid system is required to allow the energy generated to be exported. The distance from the development to a point where it can be connected into the existing grid needs to be minimised to reduce transmission losses and cost of installation. There are various projects ongoing or planned to improve the grid connections with specific regard to the development of renewables both on and offshore. Current grid capacity and connections were not therefore viewed as a constraint to development.

Further regional analysis to identify more specific medium term options

- 2.3.4 Having identified the overall scope of the Draft Plan as a whole, further analysis was undertaken to identify areas which could be suitable for development in the medium to long term.
- 2.3.5 This information was used to map zones of broad environmental sensitivity and technical issues within The Crown Estate's Marine Resource System (MaRS)². This uses a system of scoring and weighting of information to produce graduated maps of the least to greatest technical, and subsequently environmental, sensitivity. Scores were used to differentiate the relative importance of areas of a single sensitivity (e.g. value of fish caught in an area). Weighting was used to distinguish between the level of importance of each of the data sets. The datasets used at this stage are set out in **Table 2.1** and summarised in the paragraphs below.
- 2.3.6 In summary, the key steps in the process of identifying medium term options were as follows:
- **Step 1: Mapping of exclusions.** Constraints which preclude development were identified and the areas affected by them were discounted, as it would not be possible to site wind farms in these areas. This included sites which have been or are being used for other activities and as such are not available for further development, for example Ministry of Defence (MoD) munitions areas.³
 - **Step 2: Modelling environmental sensitivities.** Where datasets allowed, environmental sensitivities were mapped and compiled using MaRS. This included baseline information on biodiversity, landscape, cultural heritage

¹ <http://www.scottish-enterprise.com/nationalrenewablesinfrastructureplan.pdf>

² Note that whilst The Crown Estate kindly facilitated the mapping and interrogation process, the selection of datasets, scoring and weighting decisions were made by Marine Scotland and their contractor, in consultation with key stakeholders.

³ Each marine user will invariably have a view on the definition of exclusion zones and consensus on this can be elusive in the absence of prolonged consultation. The definition used for the modelling has been discussed with a wide range of stakeholders and is a practical approach to defining exclusions. Full details of the inputs to the exclusion zones are provided in Appendix A, to allow consultees to consider further alternative scenarios from their own perspective.

and material assets. This focused on designated sites and also took into account observed species locations and other sensitive sites. Simple weightings were applied to the information to provide scores. These were then totalled up to provide a national score and divided into bandings, which were shown in different colours on the environmental sensitivity mapping. The lowest scoring areas have the lowest level of environmental sensitivity.

- **Step 3: Modelling the potential technical constraints.** Potential technical constraints are generally man-made issues and could theoretically be moved or managed. In practice it is unlikely that more than one or two elements could be moved or managed in a given area, and as a result, areas with fewer technical constraints are more likely to be developed in the medium term. The MaRS system was used to identify areas with the least constraints, to allow a reasonable assessment of resource availability to be made. Weighting and scoring were again applied. As with the previous step, in the interests of practicality the selecting of datasets, scoring and weighting was carried out in consultation with stakeholders during pre-consultation workshops. The data reflect user activities including commercial fishing, aquaculture, shipping density, navigation (recreational yachting areas,⁴ ports, ferry routes, anchorages, places of refuge, traffic management measures) cables and pipelines, oil and gas installations, NATS radar interference zones, MoD and civil aviation radar buffer zones and marine renewables.
- **Step 4: Overlaying environmental sensitivities onto technical constraints.** The STW were divided into six regions to help structure the assessment, chosen purely on the basis of presentation of the maps. For each assessment area, the environmental sensitivities model was reviewed to identify the lowest categories of sensitivity. This was then shown as hatched areas on a series of maps – see **Figures 2.3 (a) to (f)**.
- **Step 5: Identifying least environmentally and technically constrained areas.** These areas were reviewed against the identified technical constraints, to identify medium term options that were considered to be most suitable for development. Simply overlaying the technical and environmental constraints does not consider the practical aspects of offshore wind development (e.g. need for sufficient area for development to be feasible). Similarly, it may underestimate constraints as a result of data limitations. During the consultation it became apparent that additional data on shipping and fishing would be relevant at this stage, and so further maps of Automatic Identification System (AIS) shipping and fish landings were reviewed against the overlay of environmental sensitivities and technical issues and used to refine the option boundaries.

2.3.7 **Table 2.1** summarises the datasets which were taken forward in the MaRS model at this stage. This is explained in more detail in **Appendix A**.

⁴ Note that the use of some datasets including yachting areas and their weighting may have initially over-emphasised their importance. This was given further consideration in the subsequent assessment.

Table 2.1: Exclusions, Sensitivities and Issues

Exclusions	Potential environmental Sensitivities	Potential Technical Issues
MoD Munitions Dumps	World Heritage Sites	Shipping Density
Surface Infrastructure	Wrecks	Sub-sea pipelines and infrastructure
Safety Zones Offshore Wells	Candidate Special Areas of Conservation (cSAC) and SACs	Helicopter Platform
Round 1 and 3 Wind farms		Helicopter Routes - North Sea
Electricity and Gas Interconnectors	Proposed Special Protection Areas (pSPA) and SPAs	Radar Interference Zones
Aquaculture Pending and Current Leases	National Scenic Areas (NSA) Seascapes	UK Civil Licensed Aerodrome Buffer (24 km) MoD Airfields (24 km Buffer)
Petroleum Industry's Active Pipelines	Bird Densities	MoD Practice and Exercise Areas (PEXA)
Cable on the UK's continental shelf	Cetacean Density	Anchorage Areas
Wind Farm Cables	Seabird Colony Reserves	Navigation Aids
Wave Lease for Portnahaven	Basking Shark Locations	Cables Not In Use
European Marine Energy Centre (EMEC) Wave and Tidal Power Leases	Seal Observation Locations (various species)	Disused Disposal Sites
Aggregate Dredging Licences	RSPB reserves	Royal Yachting Association Cruising Routes 2008
MoD Danger Areas	Important Bird Areas	Royal Yachting Association Racing Areas 2008
International Maritime Organisation (IMO) Routes	Local Nature Reserves (LNRs)	Royal Yachting Association Sailing Areas 2008
	National Nature Reserves (NNR)	Commercial Fishing Value
	Ramsar Sites	
	Sites of Special Scientific Interest (SSSI)	
	Fish spawning and nursery grounds	

- 2.3.8 In all, 30 areas were identified as having medium term potential for offshore wind development. The short term options are shown in **Figure 2.1** and medium term in **Figure 2.2**. The short and medium term options were subsequently assessed for their environmental and technical effects, including implications for other users of the sea.

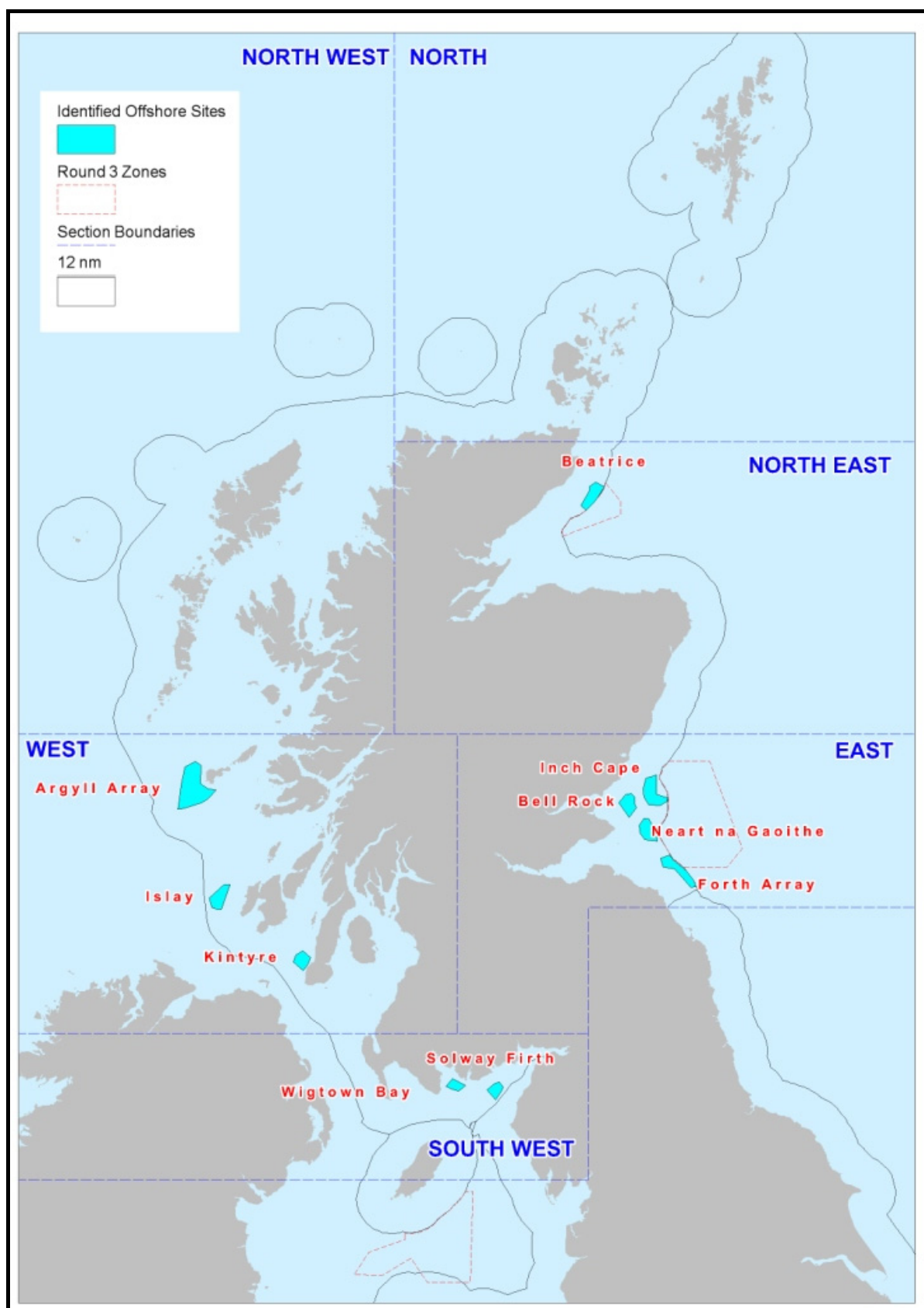


Figure 2.1 Short term options for offshore wind development in Scottish Territorial Waters

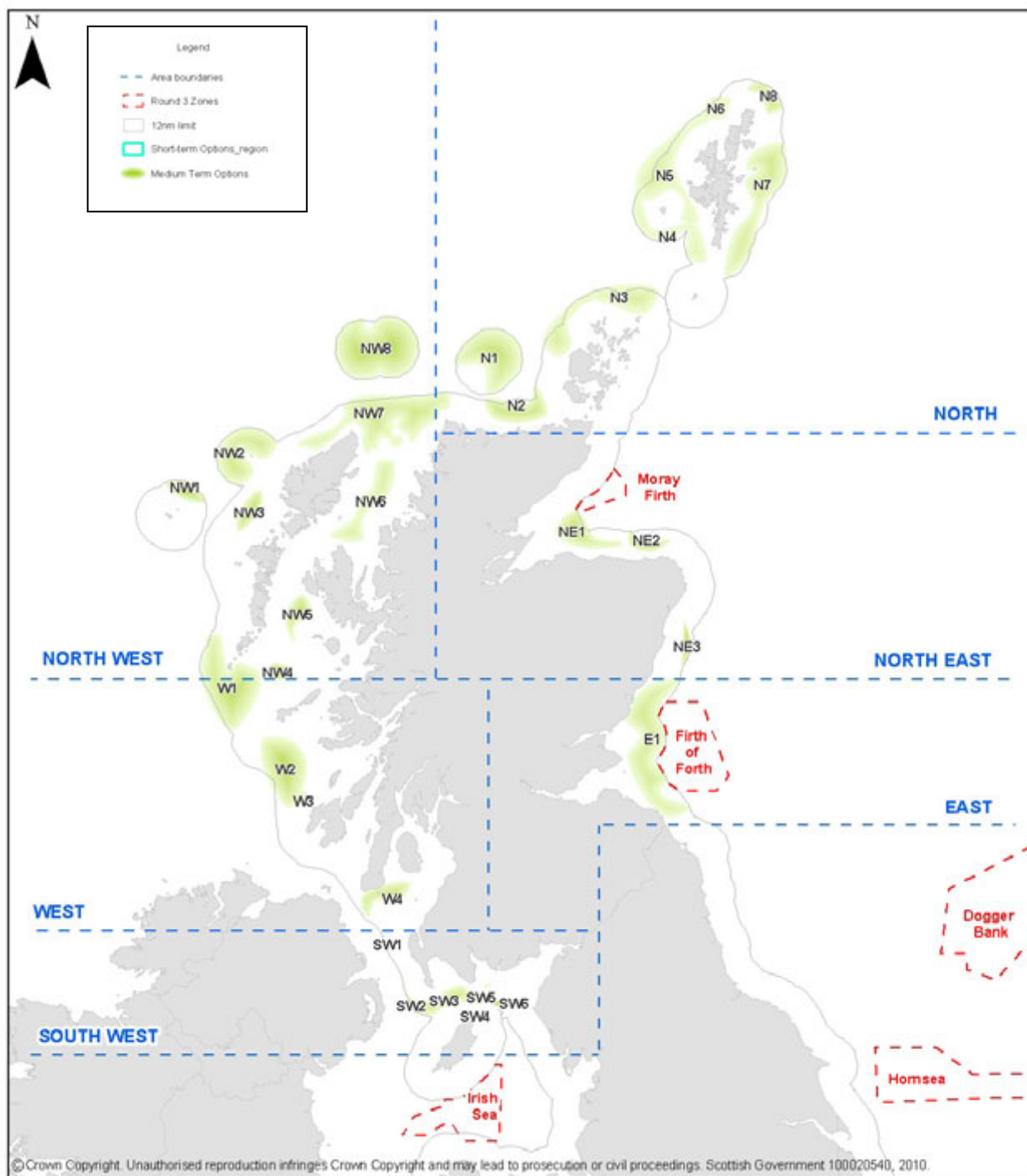


Figure 2.2 Medium term options for offshore wind development in Scottish Territorial Waters

2.4 Description of the Options

Short term options

2.4.1 These sites are:

- Solway Firth;
- Wigtown Bay;
- Kintyre;
- Islay;
- Argyll Array;
- Beatrice;
- Inch Cape;
- Bell Rock;
- Neart na Gaoithe; and
- Forth Array.

2.4.2 The sites vary in size from a maximum capacity of 280MW to 1500MW, with a total maximum capacity of 6 to 6.5GW.

Medium term options

2.4.3 The 30 medium term options collectively have a maximum size of 21,443km². The following paragraphs set out the options which have been identified within each of the regions.



Figure 2.3a: North

North

- 2.4.4 The exclusions within this region are associated mainly with cables and pipelines and with the MoD exercise area in Cape Wrath.
- 2.4.5 The environmental sensitivities identified in the broad brush assessment used for MaRS relate largely to the unique habitats and landscapes of these areas, many of which are designated. The majority of the Pentland Firth and Orkney Waters area has been the subject of a recently concluded Crown Estate leasing round for wave and tidal development. The three lowest categories are identified as hatching on **Figure 2.3a**.
- 2.4.6 Lerwick has the second largest fishing market in Scotland and is currently being developed to encourage more pelagic and white fish fishing vessels. In addition there is a fish market at Scrabster, where white fish and shell fish are landed.
- 2.4.7 Navigation between the islands and through the Pentland Firth is important to local communities and a range of industries. Ferries run through the area from Scrabster to Stromness and Gills Bay to St. Margaret's Hope. Orkney, Shetland and to a lesser extent Caithness support the oil and gas industries in the North Sea and oil fields being developed to the west of Shetland.
- 2.4.8 The main airports for the islands are Sumburgh and Kirkwall but there are landing strips on other islands. There is also an airport in Wick. The islands and the North of Scotland rely on helicopters used by the Coast Guard, Air Ambulance, the RAF and in future private contractors to provide emergency services and rescue services to remote communities. As a result there may be a need for helicopter de-icing in this area; and this would need to be established on a case by case basis through consultation with the appropriate authorities.

Options

- 2.4.9 No short term options for development were identified in this region. Medium term options are located away from the islands to minimise impacts on national landscape designations (e.g. NSAs) and outside areas likely to be required for helicopter de-icing. In addition navigational routes for ferries, shipping and fishing boats would ideally be avoided or alternative solutions identified to the satisfaction of interested parties.
- 2.4.10 The overlap of environmental and technical issues was utilised to identify a number of options that are most suitable for development in the medium term (**Figure 2.3a**). The area around the Fair Isles has not been identified due to the navigation routes and exclusions crisscrossing the area, leaving only small areas of low constraints which may not be practicable for development. There are also navigation issues through the Pentland Firth.
- 2.4.11 The following options were taken forward to the fuller environmental assessment of the medium term Draft Plan:

- N1 – Around Sule Skerry and Sule Stack avoiding the exclusion area. From the two models this is an area of low environmental sensitivity and technical constraints.
- N2 – Parallel to the Sutherland Coast Line. This area is smaller than that identified in the hatching on **Figure 2.3a**. This is to avoid the navigation routes running parallel to the north coast and westerly out of Stromness. Additional areas around here may be of low constraint but are small due to the navigation routes, hence less preferable for development.
- N3 – Around the north west corner of Orkney avoiding the most technically constrained areas.
- N4 – South west of Foula and Shetland Mainland. The two models show this as an area of low environmental sensitivity and potential technical constraints.
- N5 – North east of Foula and north west of the Shetland Mainland. The majority of this area is shown as hatching in **Figure 2.3a**, with one small section removed to avoid a constrained area close to shore to the west of Shetland Mainland.
- N6 – Area to the north west of Yell and Unst. This is an area of low environmental sensitivity and potential technical constraints.
- N7 – Large area to the west of Shetland Mainland. This is smaller than the hatched areas in **Figure 2.3a** to take account of the technical issues associated with radar and navigation close to the Shetland coastline. The option also sits within an area used by a key ferry service.
- N8 – Area to the north east of Unst. The hatched area in **Figure 2.3a** has been reduced due to the pipeline cutting through the area, leaving a small section to the west which is too small to be considered. The area to the east of the pipeline is larger and has low environmental sensitivity and potential technical issues according to the MaRS models.

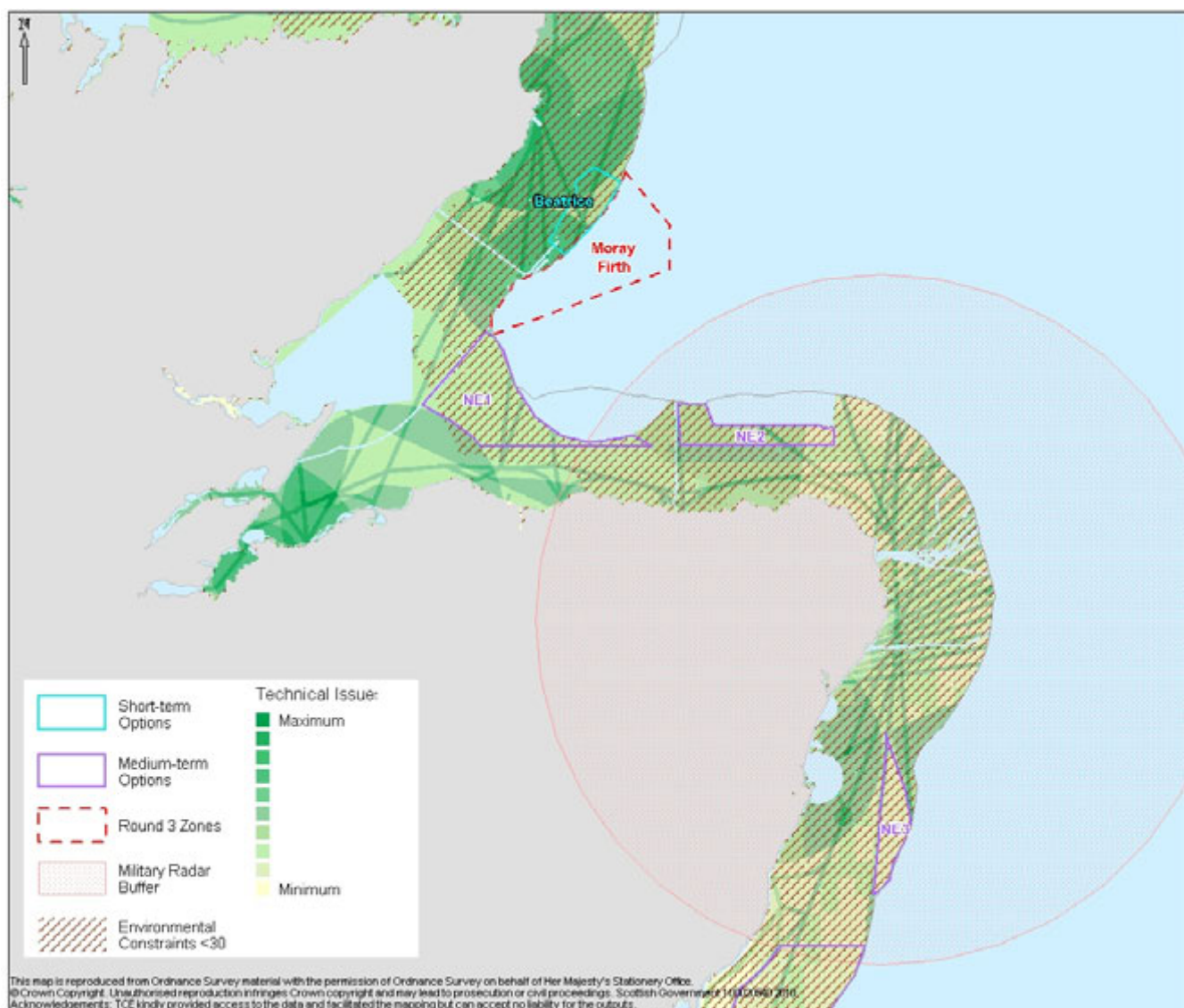


Figure 2.3b: North East

North East

- 2.4.12 There are a number of exclusions in this area, including:
- Cables and pipelines leading into the Aberdeenshire coastline;
 - A munitions dump off the Aberdeen coast;
 - MoD training area in the Dornoch Firth area; and
 - Exclusions associated with oil and gas infrastructure.
- 2.4.13 The environmental sensitivities identified in the broad brush assessment used for MaRS relate largely to the Moray, Cromarty and Dornoch Firths, which are areas of high biodiversity and visual value and as such have various designations associated with them.
- 2.4.14 Aberdeen is the main support base for the oil and gas industry in the North Sea; as such the harbour is one of the UK's busiest ports. North of Aberdeen is Peterhead, which has the largest of Scotland's fish markets; hence the vessel movements in this area are significant.
- 2.4.15 Oil and gas platform crews are flown from Aberdeen (Dyce) heliport to the rigs. Helicopters may need to de-ice when approaching land, which involves flying low above the sea. As well as Aberdeen (Dyce) and Inverness airports, there are RAF bases at Lossiemouth and Kinloss with associated radar systems.
- 2.4.16 The Moray and Cromarty Firth area is heavily utilised by shipping. Ferries running from Aberdeen to Shetland operate largely beyond the 12nm limit and similarly shipping routes to Europe are largely confined to the area around Aberdeen, before extending beyond STW. A ferry operates seasonally across the Cromarty Firth.
- 2.4.17 The Cromarty Firth currently plays an important role in the oil and gas industry and is likely to support the offshore wind industry in the future. Nigg has been identified as a priority for investment and development within Phase 1 of the National Renewables Infrastructure Plan.

Options

- 2.4.18 Beatrice is the only short term option identified for development in this area. The area to the north east of Aberdeen is constrained by navigation routes and helicopter routes although an initial review of **Figure 2.3b** shows there may be some potential in this area. Where the constraints split the area with potential into sections that may be too small to be considered for strategic development, then these areas are not considered further. The options identified are:
- NE1 - to the north of the Moray coastline avoiding the most technically constrained areas and away from the coast.

- NE2 - east of NE1 on the Moray coast, north of the main navigation routes.
- NE3 - to the east of Aberdeenshire, south and east of the main navigation (shipping and helicopter) routes.

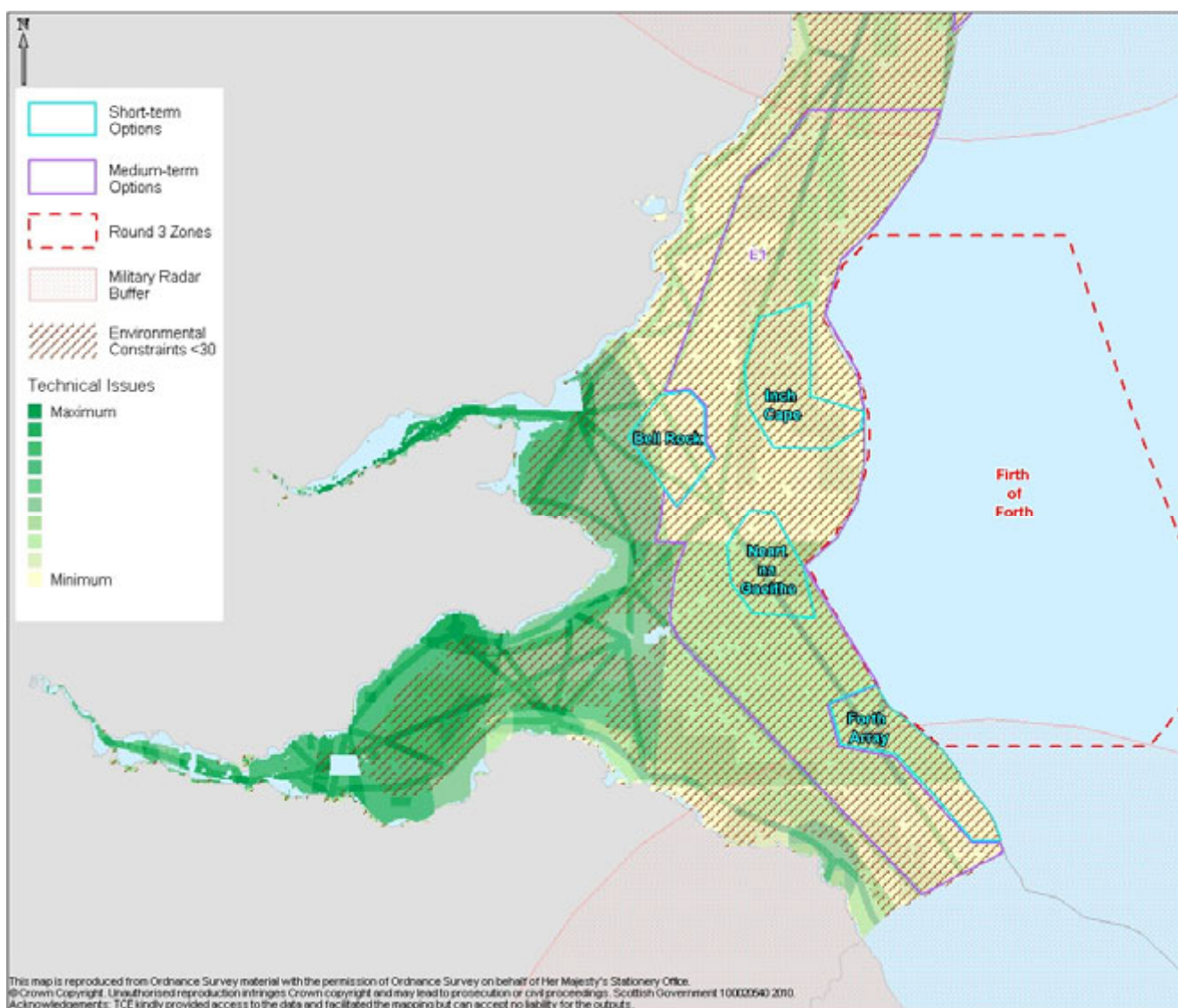


Figure 2.3c: East

East

- 2.4.19 There are no significant exclusions in this region.
- 2.4.20 The environmental sensitivities identified in the broad brush assessment used for MaRS relate largely to the presence of certain biodiversity conservation designations. In addition, there are numerous points of environmental constraint associated with ship wrecks. As ship wrecks are very localised, they do not prevent the siting of a wind development in an area as a whole, but could impact upon the specific turbine location. Hence, for the purpose of identifying medium term areas for development, they have not been considered as a strategic issue.
- 2.4.21 The Firth of Forth and Firth of Tay are heavily technically constrained with issues associated with the cities of Edinburgh and Dundee. The cities both have associated airports and harbours. Fife has military interests with the naval yard in Rosyth and RAF airbase in Leuchars. Industries on the east coast include oil and gas support services, large scale fabrication, fishing and tourism. The potential technical issues mapping (**Figure 2.3c**) shows constraints due to the presence of airports and associated radars. To the north and south of the Firths of Forth and Tay and further from the shore, there are fewer technical constraints identified.
- 2.4.22 Leith and Dundee are identified as priorities for investment within Phase 1 of the National Renewables Infrastructure Plan.

Options

- 2.4.23 All of the area away from the land in east region has been identified as Option E1. This avoids radar issues and areas of most dense shipping activities along the coastline and coming out of the major ports on the Forth, and the fishing ports of Fife.
- 2.4.24 Within the broader area of the medium term option E1, shown on **Figure 2.3c**, four short term options have already been identified for potential development: Bell Rock, Inch Cape, Neart na Gaoithe and Forth Array.

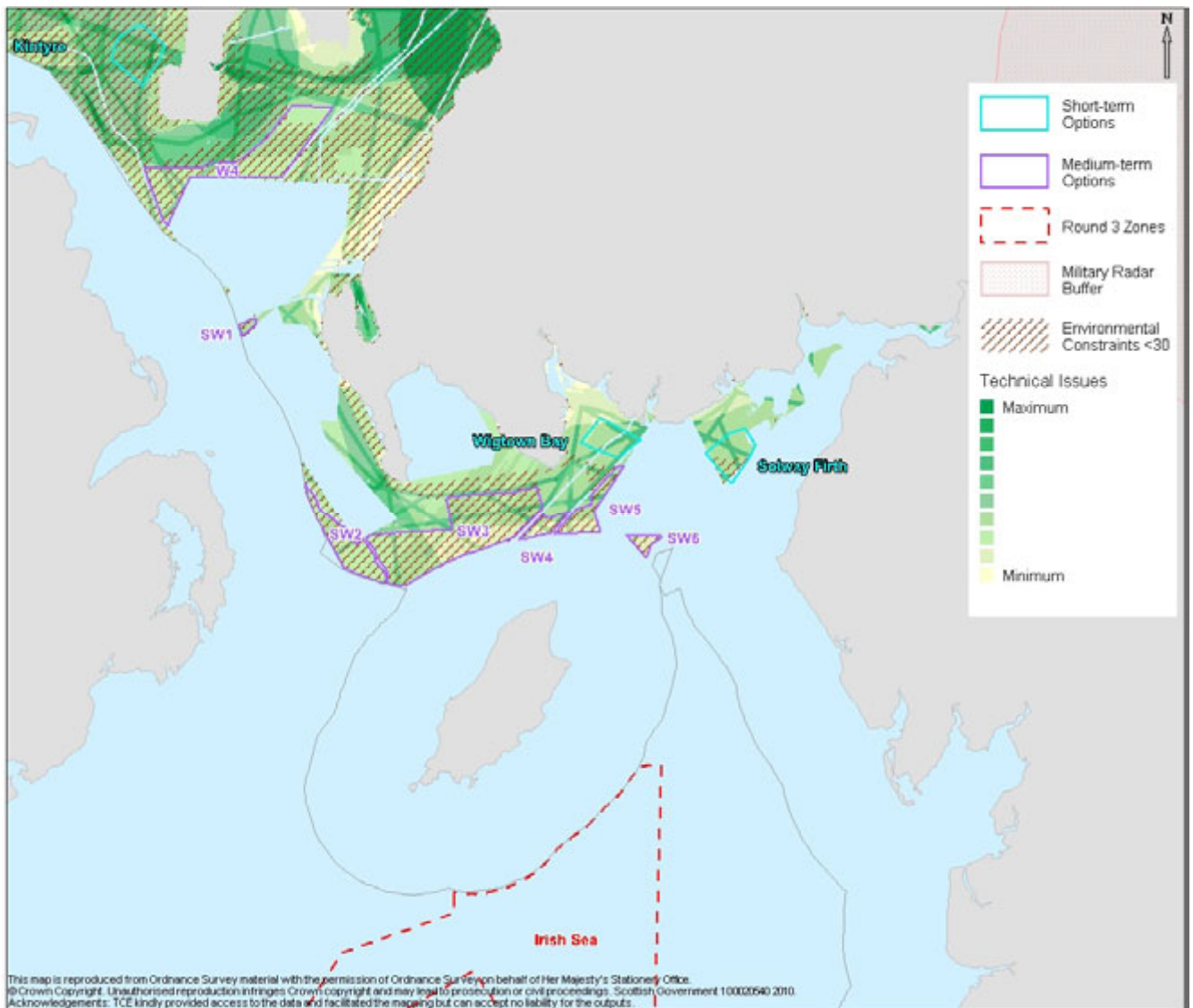


Figure 2.3d: South West

South West

- 2.4.25 The south west area includes MoD training areas and a munitions dump, removing a large area from potential development. In addition, there are cables running through the area.
- 2.4.26 The environmental sensitivities identified in the broad brush assessment used for MaRS relate largely to a number of discrete environmentally constrained areas.
- 2.4.27 The area is heavily utilised for sailing, fishing and navigation and as such has high shipping densities and designated RYA routes passing through it.

Options

- 2.4.28 There are two areas identified for short term development in this area: Wigtown Bay and Solway Firth. **Figure 2.3d** shows the proposed additional options for the medium term. The options avoid areas very close to shore and the main navigation areas. They are:
- SW1 - East of Port Patrick avoiding the exclusion areas.
 - SW2 – South west of the Mull of Galloway bounded by exclusion areas and the 12nm limit.
 - SW3 – East of SW2 to the south of Luce Bay.
 - SW4 - East of SW3 in an area with fewer environmental sensitivities between two exclusion areas.
 - SW5 – East of SW4 and south of Wigtown Bay in an area with fewer environmental sensitivities bounded by exclusion areas.
 - SW6 – South of Dundrennan and the MoD training exclusion area.

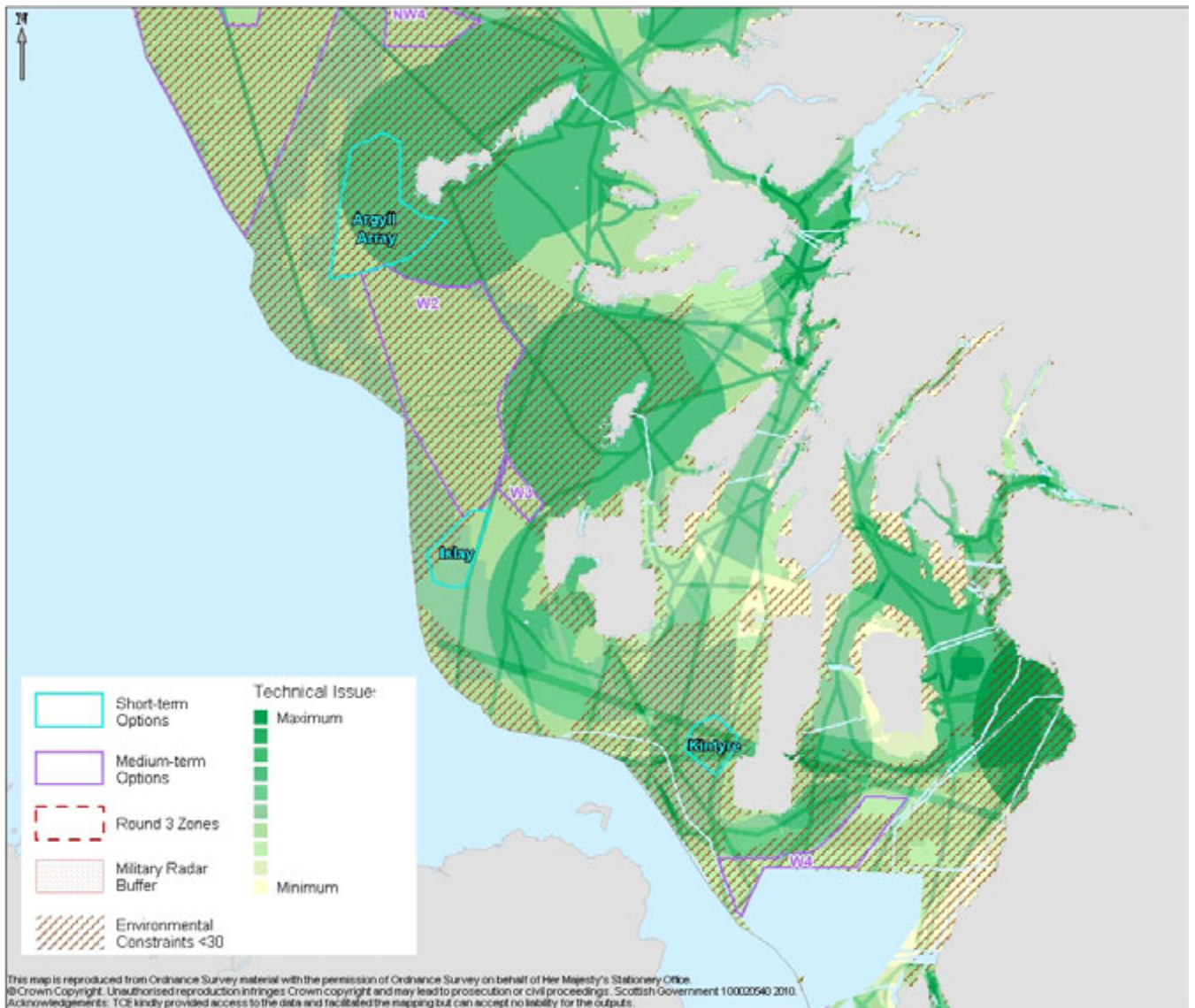


Figure 2.3e: West

West

- 2.4.29 Exclusions in the west are associated mainly with MoD training activities, cables and pipelines.
- 2.4.30 The environmental sensitivities identified in the broad brush assessment used for MaRS relate largely to sensitive areas in and amongst the islands and peninsulas associated with biodiversity, landscape and areas where wave and tidal energy are expected.
- 2.4.31 Some areas of the west coast of Scotland rely heavily on sea transportation and ship building still takes place on the Clyde. Airport radars and MoD activities result in a high number of technical constraints in this area, although the medium term options have been selected to avoid the Tiree radar station.

Options

- 2.4.32 There are three proposed short term sites for development in this area: Argyll Array, Islay and Kintyre. **Figure 2.3e** shows an additional four options to be considered for development in the medium term. These avoid areas of high potential technical constraints associated with navigation, radars and MoD activities.
- W1 – West of Coll and Tiree with fewer environmental sensitivities and avoiding shipping routes.
 - W2 – West of Mull and south of the Argyll Array site, avoiding radar, aviation, shipping and sailing routes to the north, west and south and landscape issues to the north.
 - W3 – North west of Islay in an area with fewer environmental sensitivities and avoiding shipping, radar, aviation and cable and pipelines.
 - W4 - South of the Mull of Kintyre in an area with fewer environmental sensitivities and avoiding shipping.

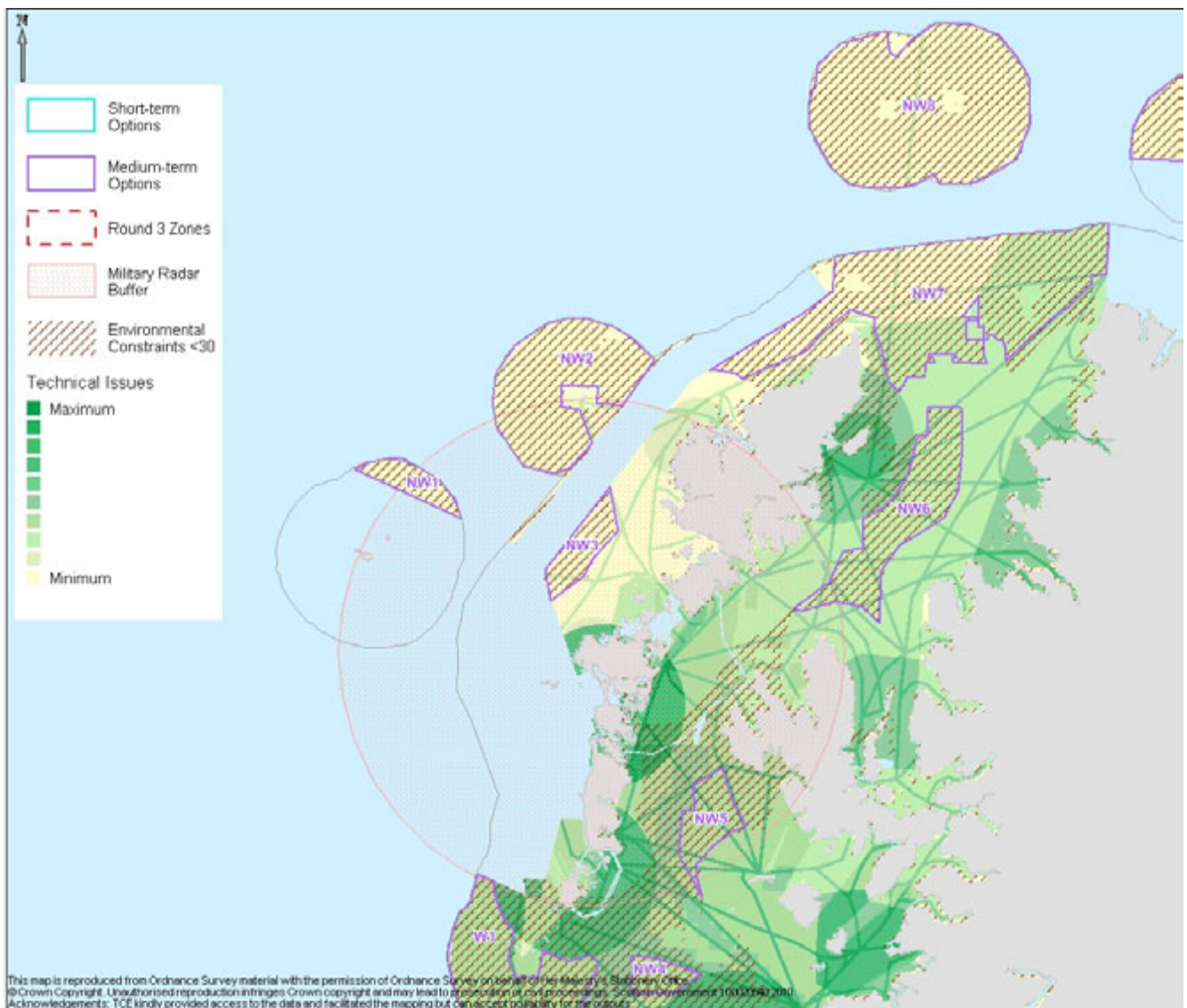


Figure 2.3f: North West

North West

- 2.4.33 There is an International Maritime Organisation (IMO) navigation route to the west of Lewis in which development is excluded. In addition there are MoD training areas to the west of Lewis and out to St Kilda.
- 2.4.34 The environmental sensitivities identified in the broad brush assessment used for MaRS relate largely to areas of high scenic value, which are designated as NSAs. Tidal streams in amongst the islands have been identified as being suitable for tidal energy development.
- 2.4.35 The island communities are serviced by ferries and, in the case of Stornoway, an airport. Similar to the north region, many remote communities rely on helicopters to provide emergency services. The presence of the IMO route and shipping approaching and leaving the route are particularly relevant. The MoD make use of deep water and remote areas to carry out training activities above and below the water surface (such as submarine training).

Options

- 2.4.36 The options identified for development in this area and shown in **Figure 2.3f** are:
- NW1 - North of St Kilda away from the MoD training exclusion zone.
 - NW2 - Around the Flannan Isles in an area with fewer environmental and technical constraints.
 - NW3 - West of Harris in an area with fewer environmental sensitivities and technical issues.
 - NW4 - West of Muck between navigation routes in an area with fewer environmental sensitivities.
 - NW5 - West of Skye avoiding the main shipping densities which run north-south in this area. There may be sailing and ferry routes which cross this area which would be relevant considerations at the project level but may not impact upon the broader strategic feasibility of this option.
 - NW6 - An area between the Isle of Lewis and the Sutherland Coast has fewer environmental sensitivities. There is a ferry and further sailing routes which cross this area, which may impact upon the siting of turbines but may not necessarily impact upon the strategic feasibility of this option.
 - NW7 - An area north of the region between Durness and Lewis which has fewer potential technical issues.
 - NW8 - An area around Sula Sgeir and Rona with fewer technical and environmental constraints.

2.5 Options Taken Forward for Assessment

- 2.5.1 The 10 short term options and 30 medium term options were taken forward for detailed environmental assessment and further technical consideration. The findings from this assessment are set out in Section 3, and the Draft Plan has taken them into account.
- 2.5.2 The remainder of STW outwith the exclusion areas and short and medium term options are considered as potentially suitable for development in the long term, but have not been subjected to a fuller assessment at this stage.
- 2.5.3 Smaller areas that are suitable for test and demonstration sites, including existing sites, have been scoped out of the Draft Plan and its environmental assessment.

3 Summary of the Environmental and Technical Assessment of Short and Medium Term Options

3.1 Background

- 3.1.1 Section 2 described how technical and environmental matters were used to identify 30 medium term options in addition to the 10 short term options which have Crown Estate exclusivity agreements.
- 3.1.2 These options, which were considered to be practically feasible and offer the least constraints to offshore wind energy development, were subsequently assessed against the SEA objectives, making use of available environmental baseline information relating to relevant indicators. It is not the role of the SEA to define areas for development in the medium to long term, but to inform decisions on the content of the Draft Plan. However, the Draft Plan preparation process has allowed the findings to be fully built into its early development.
- 3.1.3 In addition to the environmental considerations within the SEA, further evaluation of technical, social and economic issues was undertaken to inform the Draft Plan. This was also based on testing the options against agreed objectives.
- 3.1.4 The following paragraphs summarise the findings from the assessment of short and medium term options from the Draft Plan. It should be noted that this is a strategic level assessment, and that further work at the regional or project level could produce further or different results. This high level assessment and Draft Plan should therefore be viewed as a starting point in a longer term process of development planning and assessment.

3.2 Short Term Options

- 3.2.1 Overall, the SEA and technical analysis highlighted a range of environmental effects arising from the 10 sites.
- 3.2.2 All of the sites will provide benefits in relation to climate change mitigation and these will be potentially significant. Development of all the sites will maximise the potential for offshore wind energy to make a substantial contribution to renewable energy generation in Scotland, thereby helping to mitigate greenhouse gas emissions arising from the energy sector as a whole. Significant levels of economic development can also be expected from the sites, individually and collectively.
- 3.2.3 All of the sites have the potential for significant effects on biodiversity, including Natura 2000 sites. Key receptors potentially affected by short term options include bottlenose dolphins, harbour porpoise, white-beaked dolphin, grey seals, harbour seals, resident and migratory birds, wildfowl and waders. Cumulative

adverse effects could arise as a result of the increased number of physical barriers to fish movements / migration during construction, multiple noise sources particularly affecting marine mammals and increased collision risk. Positive cumulative effects could also arise from the creation of new reef habitats, new substrate and the potential to act as fish aggregation devices. All of the sites could have adverse or beneficial effects on spawning grounds for BAP fish species.

- 3.2.4 Several of the sites could have significant effects on areas of high landscape or seascape character: Solway Firth, Wigtown Bay, Kintyre, Islay and the Argyll Array. This is not viewed as being of sufficient concern at this stage to result in the removal of any sites from the Draft Plan, but mitigation will be required including more detailed environmental assessment at the project level. The Solway Firth and Wigtown Bay options could also have significant effects on National Scenic Areas. As a result of their relative proximity to the coastline, Bell Rock, Solway Firth, Wigtown Bay, Kintyre, and the Argyll Array have the potential for more significant effects on visual amenity.
- 3.2.5 In terms of population and health, development in most of the sites could affect existing RYA cruising routes or sailing areas. Most of the sites are also within areas of greatest importance for marine and coastal recreation. As a result, the short term options as a whole have the potential for significant effects on this aspect of population and human health, requiring strategic and project level mitigation.
- 3.2.6 The assessment identified potential for adverse effects on cultural heritage arising from the Bell Rock and Argyll Array options which would require mitigation. Other sites could affect non-designated features including archaeology and will therefore require further investigation at the project level.
- 3.2.7 All of the sites have the potential for effects on water, geology, sediments and coastal processes. However, these are uncertain and can only be defined at the regional or project level.
- 3.2.8 Within the technical analysis, consideration has been given to the potential effects of the development of the short term options on commercial fishing. All of the sites, except Solway Firth, Wigtown Bay and Kintyre lie completely or partially within spawning areas for one or more of the following commercial fish species: mackerel, plaice and sandeel. All of the sites lie completely or partially within nursery areas for one or more of the following species: plaice, whiting, herring, cod and saithe. In terms of disturbance or displacement of fishing activity, the most significant effects are predicted at Inch Cape, Bell Rock, Neart na Gaoithe, Forth Array and Kintyre, where over 800 tonnes of nephrops are caught and recorded. Further investigation and mitigation will therefore be required at the project level to avoid any unacceptable impacts on commercial fish species and fishing activities.
- 3.2.9 The technical analysis also revealed potential technical difficulties arising from the interaction of this type of development with radar zones. Inch Cape, Neart na Gaoithe, Forth Array, Beatrice, Solway Firth, Wigtown Bay, Kintyre, Islay and Argyll Array lie within high or medium NATS Radar areas. Beatrice, Argyll Array

and Kintyre lie within a 17km suggested buffer zone for civil aviation aerodromes.

3.3 Medium Term Options

- 3.3.1 As with the short term options, all of the medium term options will provide benefits in relation to climate change as well as significant opportunities for sustainable economic development across Scotland. The extent to which this can be achieved without raising insurmountable technical and environmental challenges has therefore formed the central consideration in development of the Draft Plan.
- 3.3.2 It is important to note that, at this stage, all of the medium term option raise potentially significant issues in relation to Natura 2000 sites. Effects on European Protected Species (EPS) are largely uncertain, although the SEA has noted that particularly significant effects have been identified from the options in the north region. Wildlife more generally could be significantly affected by nearly all the medium term options, with more major issues arising from these options when taken together, compared with the short term options.
- 3.3.3 Most of the medium term options have potentially significant repercussions for seascape character, requiring further consideration from a national perspective. In the east, this could take the form of relatively minor effects from short term options, which could become more significant as the plan proceeds into the medium term. In some other regions there appears to be greater seascape capacity to absorb this type of development without incurring significant individual or cumulative adverse effects, specifically the options within the north region. In the west and south west, options in both the short and medium term are more likely to have significant effects and these would be compounded cumulatively as developments proceed over the short to medium term. Impacts on nationally designated landscapes are particularly concentrated in medium term options in the north west. As with short term options, visual amenity impacts are largely defined by the proximity of the options to the shore.
- 3.3.4 Effects of the medium term options on yachting areas varies in different parts of the country. In the north, these effects are largely uncertain at this stage, but some effects are currently expected from the options in the south west, requiring consideration of the use of alternative routes or areas. From a national perspective it appears that whilst most of the short term options could be taken forward with minor to moderate effects which would be reduced following mitigation, when additional effects from the medium term options are added, there is potential for more significant effects overall as the Draft Plan is progressed into the medium term. Clearly this would be a greater challenge in the scenario where all of the medium term options are implemented in addition to the short term sites.
- 3.3.5 Effects of the medium term options on marine and coastal recreation also vary between regions. Effects would be relatively minor in the north, and the lack of short term options in this area suggests that cumulative effects over time could

also be relatively low from the Draft Plan overall. At the other end of the scale, medium term options in the west region would have relatively significant effects and this would compound already potentially significant issues arising from the Argyll Array and Kintyre in the short term. Issues also arise from the sites in the north east region.

- 3.3.6 Some of the medium term options would have relatively minor or moderate effects on cultural heritage. However, two options in the north west raise potential for more significant environmental effects and have therefore been considered further within the proposed plan set out in Section 4.
- 3.3.7 Virtually all of the medium term options raise technical challenges that would need to be resolved to allow the Draft Plan to be progressed in a sustainable way. From a national perspective the cumulative effects on commercial fisheries and fishing activity underline the need for further action to resolve issues as far as possible. Further work to explore this in more detail including liaison with the fishing sector will therefore be essential as the Draft Plan progresses in both the short and medium term. This has been considered further in the formulation of the Draft Plan as a whole.
- 3.3.8 The technical analysis also showed that navigation and anchorage issues vary in different parts of the country. There is potential for significant effects from most of the short term options and this would be compounded also by many of the medium term options. There are some exceptions to this, including most of the medium term options in the north region and two of the sites in the south west. As with fishing, this is considered to be a potentially nationally significant issue requiring further work and liaison with shipping interests in both the short and medium term.

3.4 Summary of the Regional Level Assessment of Environmental and Technical Issues

- 3.4.1 The analysis has also considered how technical and environmental issues may combine within different regions within STW. This has helped to further define areas which, from a national perspective, may have greater or lesser capacity to accommodate this type of development in the medium and longer term.

North

- 3.4.2 In the **north** region, options are likely to have significant impacts on biodiversity, notably on cetaceans, seals and migratory birds. N2 and N3 lie within an area that is heavily used as a shipping route, suggesting that navigation issues will need to be resolved to facilitate development.
- 3.4.3 Options N1, N3 and N7 are close to medium and high sensitivity seascapes. All options apart from N1 have the potential to generate moderate adverse visual impacts on land-based receptors on the coastline. Sites N1, N2 and N3 may also be visible from the Heart of the Neolithic Orkney WHS on Orkney Mainland. This area is also considered to be important for recreation. Two designated

wrecks, protected under the Protection of Wrecks Act 1973, lie within the footprint of option N7 and would require further consideration to ensure that they and their exclusion zones are not affected.

- 3.4.4 The medium term options N1, N2 and N3 all lie in an area of estimated mine fields, as noted in the Marine Renewables SEA. These areas of potential hazard will need further consideration to determine their potential implications for offshore wind development. Options N4 and N7 are close to a high NATS radar area. Options N4, N5 and N7 are close to or within one 30km and one 17km suggested exclusion zone for Civil Aviation Aerodromes and are within the Sumburgh Control Area (air space restricted zone).
- 3.4.5 There are nursery areas or spawning grounds for saithe, mackerel and whiting, all BAP marine fish species, surrounding various options in this area. Saithe and sandeel nursery areas and sandeel spawning grounds also surround all the development sites of this area. Various Shellfish Growing Areas are located in this region. Interaction with fishing is likely to be an important issue for all options in the north. N4 and N5 are both close to or partially within areas of high demersal fish landings (over 150 tonnes live weight) and moderate nephrops landings (30-100 tonnes). N4 and N5 have high demersal, pelagic and static gear fishing effort. N6, N7 and N8 are in areas of high and highest demersal fishing effort. N1, N2 and N3 are in areas of high demersal (excluding beam trawling) effort and static gear effort.
- 3.4.6 The region as a whole is important for shipping and navigation and options will lie in or adjacent to high traffic areas. Pentland Firth shipping traffic is particularly high in the region of N2, and N3 is also in an area with high levels of activity, spanning the route between the north west Orkney Islands and the Shetland Isles. Further investigation would therefore be required if these options were taken forward in the Draft Plan. All other options are located in regions of low-moderate shipping with occasional hotspots of high vessel activity (indicated by AIS tracking), suggesting that development could more feasibly be accommodated subject to effective project level mitigation.

North East

- 3.4.7 In the **north east**, options are likely to have significant impacts on biodiversity, notably on cetaceans, seals and migratory birds. NE1, NE2 and NE3 are close to spawning grounds and nursery areas for several BAP marine fish species, particularly cod, herring, saithe and whiting.
- 3.4.8 All options are currently predicted to have minimal impacts on nationally designated landscapes, but could have potentially moderate adverse impacts on medium sensitivity seascapes. NE1 lies 3km from the coastline, potentially generating more major visual impacts than the other options.
- 3.4.9 In terms of disruption to operation of strategic infrastructure assets, NE1 is partially within an MoD Safeguarding Consultation Zone and NE1 and NE2 are also close to an Air Force department area. NE3 is in a high NATS radar area.

- 3.4.10 In terms of commercial fisheries, NE1, NE2 and NE3 are close to spawning grounds for cod, plaice, whiting, mackerel and sandeels and nursery areas for herring, plaice, whiting, saithe and sandeels.
- 3.4.11 All options within this region lie in or immediately adjacent to areas of high or very high vessel activity (indicated by AIS tracking).

East

- 3.4.12 Development of the single medium term option in the **east** region could have significant impacts on biodiversity, notably on cetaceans, seals and migratory birds. Spawning grounds and nursery areas for BAP marine fish species are located in the footprint of the works, notably nursery areas for cod, herring, whiting and saithe. Offshore wind development in this area is also likely to have major visual and seascape impacts due to its relative proximity to land and nationally designated landscapes.
- 3.4.13 Parts of Option E1 lie within a high NATS Radar area and the northern part borders the 30km buffer zone around Aberdeen (Dyce) airport. The option lies completely or partially within spawning areas for the following commercial fish species: mackerel, plaice, whiting and sandeels and within nursery areas for plaice, whiting, cod, saithe and sandeels. Overall, interaction with fishing is likely to be an important issue in the east region as a whole given current catch levels. E1 also lies partially or wholly within or close to areas of moderate or high vessel activity (indicated by AIS tracking).

South West

- 3.4.14 Options within the **south west** are likely to have significant impacts on biodiversity, notably on cetaceans, seals and migratory birds. There are spawning grounds and nursery areas for BAP marine fish species in the footprint of the works, notably nursery areas for whiting.
- 3.4.15 All options lie within medium or high sensitivity seascapes that may be affected by offshore wind development. However, development of SW1, 2 and 6 could have the least visual impacts on coastal receptors. In particular, Option SW2 is the only option in the south west which would be unlikely to adversely affect a nationally designated landscape.
- 3.4.16 However, SW2 also lies within the footprint of Beaufort Dyke Munitions Disposal Site which is likely to pose a key constraint to development. Further, SW1, SW2, SW3, SW4 and SW5 lie within an area where munitions are likely to migrate along the seabed. All SW options (with the exception of SW1) lie within a medium or high NATS radar area.
- 3.4.17 SW1 and SW6 lie within commercial fish spawning grounds; and all options (except SW1) lie within nursery grounds for commercial fish species. However, the SW areas lie outside of major fishing grounds with low levels of catches recorded in the area, and their development may therefore be expected to have

more limited effects on commercial fishing activity than some of the other medium term options within other regions.

- 3.4.18 All of the south west options lie within moderate or high density shipping routes, and impact on navigation is likely to be a key issue requiring further exploration within this region.

West

- 3.4.19 In the **west**, medium term options are likely to have significant impacts on biodiversity, notably on cetaceans, seals and migratory birds. There are spawning grounds and nursery areas for BAP marine fish species in the footprint of the works, notably nursery areas for cod and saithe.
- 3.4.20 Importantly for this region, all options lie within medium or high sensitivity seascapes that are vulnerable or fragile to offshore wind development, and W1, W3 and W4 could have significant visual impacts on coastal receptors due to the distance to the coastline.
- 3.4.21 Technical constraints vary within this region. None of the medium term options lie within areas where munitions are likely to migrate or within a buffer zone for a civil aviation aerodrome or meteorological radar zone. However, W1, W2 and W3 lie within high NATS radar areas, and Option W4 lies within a medium NATS radar area, therefore potentially presenting a risk to air traffic control. W4 lies in close proximity to a port and may affect shipping en route to or leaving that port. However, economic benefits associated with construction and operation of the wind farm may also reasonably be expected as a result of this proximity.
- 3.4.22 All of the options in the west (except W3) lie completely or partially within spawning areas including mackerel, plaice and sandeels. Furthermore, all sites (except W1) lie completely or partially within nursery areas including cod, whiting, saithe and sandeels. Overall, the west region is important for fishing and the options will have a range of effects on a number of different demersal target species and fishing methods. In particular, W4 is located in an important fishing area, potentially displacing fishing effort. W1 and W4 are located in moderate to important fishing areas and W2 lies within an area heavily fished with static fishing gear, and so disruption may be anticipated at least during the construction period. W1, 2 and 4 fall in areas where a high number of commercial fishing vessels over 15m length are recorded (2005-2007).
- 3.4.23 Moderate to high density shipping routes pass through all options, and so further consideration and mitigation of effects on navigation and shipping would be required.

North West

- 3.4.24 In the **north west** region, medium term options are likely to have significant impacts on biodiversity, notably on cetaceans, seals and migratory birds. All options lie close to or within spawning or nursery grounds for various BAP fish species, particularly cod, mackerel, saithe and whiting.

- 3.4.25 All options lie within medium-high or high sensitivity seascapes that are vulnerable to offshore wind development, and NW1 lies within 7km of St Kilda NSA and WHS, with the potential for significant adverse effects on national and international designations. Visual amenity from Loch Druidibeg National Nature Reserve/ UNESCO Biosphere Reserve may also be affected by new offshore developments. NW8 is the only option to not adversely affect a nationally designated landscape or adversely impact on visual amenity within this region. This area is also considered to be important for recreation. The region, particularly NW6, is of importance for EPS, including cetaceans, seals and migratory birds.
- 3.4.26 The medium term options NW1, NW2 and NW3 all lie wholly or partially within areas where munitions are likely to migrate along the seabed. These areas of potential hazard will need further consideration to determine their potential implications for offshore wind development. NW3 and NW5 are within a high NATS radar zone.
- 3.4.27 All of the north west options lie within or close to spawning or nursery areas for commercial and BAP fish species. NW1 is further away from most spawning and nursery areas but could still lie partially or wholly within mackerel spawning grounds. All options are likely to affect important fishing areas. NW4 and NW5 lie close to or within areas of high demersal and nephrops fish landings. NW3 and NW7 are within areas of high static gear fishing. NW6 is within an area of high static gear fishing and nephrops fishing. NW7 is also close to or within an area of high demersal fishing effort. NW8 is close to or within a high demersal fishing activity area and moderate pelagic, static gear and nephrops/shrimp fishing areas. NW1 and NW2 are located in low to moderate fishing effort areas for all fisheries.
- 3.4.28 The volume of ships using the Minch and the deep water shipping route west of the Outer Hebrides suggests that navigation issues are likely to be a key challenge within this region. More specifically, NW2 and NW3 are either side of a deep water shipping route west of the Outer Hebrides. NW6 and NW5 are in a high density shipping route through the Minch and passing to the west of Skye. Other options are in areas of moderate shipping activity with occasional hotspots of high activity. There is an IMO route designated in this area which directs vessels away from the constraints of the Minches to an agreed route to the West of the Outer Hebrides. A key ferry route passes through NW6.

3.5 Conclusion

- 3.5.1 This summary of the environmental and technical issues arising from the Draft Plan as a whole and the regions within it, suggests the need for further consideration of the suitability of some of the medium term options to accommodate this type of development. In addition, whilst many of the issues can only be fully resolved at the project level, this national-level Draft Plan provides an opportunity to give strategic consideration to mitigation measures which could be applied to ensure that the Draft Plan avoids major adverse impacts in the short, medium and long term. These considerations have been used to inform the identification of a series of proposals and commitments which are set out in Section 4.

4 Proposed Draft Plan

4.1 Background

- 4.1.1 The previous sections of this report have explained how short and medium term options for the Draft Plan were identified and subsequently assessed.
- 4.1.2 As noted in the previous section, whilst offshore wind development throughout Scottish Territorial Waters could play a significant role in climate change mitigation and sustainable economic development, it also raises challenges for the environment and other users of the sea. Having taken these findings into account, Scottish Ministers have identified priorities and proposals which together now form a Draft Plan for action. Consultee views on the Draft Plan are now being sought.

4.2 Draft Plan in the Short Term

- 4.2.1 **The Draft Plan firstly proposes that all 10 short term sites are progressed as soon as possible, to ensure that the potential for offshore wind to contribute to climate change mitigation is maximised.** Table 4.1 sets out the sites, their extent and developers, and they are shown in Figure 4.1:

Table 4.1 Short Term Options

Name of Option	Company with exclusivity agreement	Approximate area sq. km
Solway Firth	E.ON Climate & Renewables UK Developments	61
Wigtown Bay	Dong Wind (UK) Ltd	51
Kintyre	Airtricity Holdings (UK) Ltd	69
Islay	Airtricity Holdings (UK) Ltd	94
Argyll Array	Scottish Power Renewables	361
Beatrice	Airtricity Holdings UK Ltd SeaEnergy Renewables Ltd	121
Inch Cape	NPower Renewables Ltd SeaEnergy Renewables Ltd	150
Bell Rock	Airtricity Holdings UK Ltd Fluor Ltd	93
Nearr na Gaoithe	Mainstream Renewable Power Ltd	105
Forth Array	Fred Olsen Renewables Ltd	128

- 4.2.2 All of the sites will be subjected to the normal licensing and consenting regimes as required. Helping to inform this process, the environment and technical assessment of the Draft Plan has raised a number of challenges which require

further consideration at the project level. Whilst assessments at the project level may vary from the findings set out here, it is expected that analysis will provide a good indication of the types of mitigation which will be required within each of the development areas.

- 4.2.3 From a national perspective, Habitats Regulations Appraisal screening has demonstrated that **a strategic level Appropriate Assessment of the sites, individually and in-combination, is required.** This is currently being progressed on behalf of Scottish Ministers. This will need to establish that the development of the short term options can be achieved without generating adverse effects which will impact on the integrity, individually or in-combination with other activities, of Natura 2000 sites. This will form the basis for more detailed regional and project level appropriate assessment as required, and it is recommended that it focuses on the follow likely significant effects:

- disturbance to marine mammals;
- effects on seal breeding colonies;
- disturbance effects on foraging seabirds and their habitats;
- disturbance and barrier effects on migrating mammals, fish and birds – where appropriate addressing specific life cycle stages – e.g. salmon; and
- disturbance effects on spawning and nursery grounds of BAP fish species (can be combined with assessment for cumulative effects on commercial fish species).

- 4.2.4 In terms of further environmental issues, development of the short term options will also require an Environmental Impact Assessment (EIA). Taking into account the findings from the SEA of the Draft Plan, it is suggested that **EIA at the project level is used to resolve *inter alia* the following key issues:**

- More detailed assessment of effects on biodiversity, flora and fauna generally will be required at the project level. Habitat losses should be minimised at the project level, and the benefits of new habitat creation maximised. As detailed in the SEA environmental report, construction activities should be subject to 'soft start' and timed to avoid sensitive periods for species and habitats. This should take into account more detailed cumulative and in-combination effects identified at the project level. The footprint should be managed to minimise impacts on sensitive receptors including seabed habitats. Projects should, where possible, select low noise and minimal vibration installation technologies or use noise attenuation technologies as appropriate.
- At the project level the design and location of the wind farms should be optimised to avoid or minimise landscape and seascape effects. The selection of medium term options detailed later in the Draft Plan has taken into account potential cumulative effects. In the case of the most sensitive options noted above, project level planning, assessment and mitigation, and consultation with the relevant authorities should be used to reduce the effects. Developers should work with the public to improve their perception and understanding of the developments e.g. providing information, signage and viewing points. Project level planning and assessment may have the

capacity to reduce potential significant effects for specific sites and features.

- Developers are required to liaise with relevant organisations and interest groups to provide information on new navigation hazards. At the project level, there will be a need to involve relevant recreational users and their representative organisations to deliver acceptable solutions. Whilst mechanisms already exist to ensure safety, further consideration will be needed to establish the cost and time implications of potential re-routing measures at the project level.
- It appears at this stage that water and geology should not be viewed as a constraint to development of all of the sites at present. However, best practice during construction should prevent and control spillages and discharges of harmful substances to the marine environment. The SEA environmental report sets out more specific recommendations for further studies.

4.2.5 In addition to purely environmental constraints, the technical assessment has also shown that further work is required to reach agreement on how the collective development of the short term options can be achieved without generating significant adverse effects on other users of Scottish Territorial Waters for a variety of activities. In particular, given the uncertainties arising from the assessment at this stage:

- **Further assessment and liaison with the commercial fisheries sector will be required on a regional basis and at the project level.** Project level design should seek to minimise the footprint of the construction and decommissioning works to minimise effects on commercial fisheries. Given the importance of this issue Scottish Ministers will facilitate additional studies to better understand the inshore fisheries, effects of displacement of effort on finfish and shellfish stocks and the potential for the fishing industry to adapt to any new opportunities that may be provided by the conservation or habitat creation effects associated with offshore structures. This should inform a comprehensive study on the potential interaction of offshore wind development with the fishing industry, including its effects on spawning grounds, nursery areas and fishing vessels. This study should also consider potential impacts on the life-cycles of migratory fish.
- At the project level, further liaison with stakeholders will be required to avoid flight paths, radar coverage and navigational routes. **This should be supported by additional comprehensive studies that explore the interaction of offshore wind development with the shipping industry.** The objective of this work would be to fully understand the potential impacts on navigation, rights of innocent passage, commercial and carbon implications, and robust and equitable mitigation measures that are potentially available. This work could most effectively be progressed on a regional basis, and prioritised in areas where effects have been identified as potentially most significant in this analysis, such as the Firths of Forth and Tay.

- 4.2.6 In addition to this, Scottish Ministers plan to take additional action in the short term to further support the sustainable development of offshore wind energy in Scottish Territorial Waters. Whilst this strategic level assessment of development opportunities is considered to be robust and a useful starting point for the Draft Plan, it is acknowledged that **there remain further uncertainties and data gaps that need to be addressed at the national level, if a sustainable approach is to be delivered.**
- 4.2.7 To achieve this, also in the short term, protocols will be developed by Marine Scotland for data collection, timely access to the scientific community, regulators and industry, and storage and management of the data. These data are to be used to further the understanding of impacts associated with offshore wind energy, protect Scotland's natural and commercial resources and develop industry best practice.
- 4.2.8 As part of this, the following additional strategic level studies will be undertaken to target the most significant issues arising from the Draft Plan:
- Additional research is required to establish the extent to which marine mammals and certain fish species respond to industrial marine noise, allowing frameworks to be developed to assess the population consequences of acoustic disturbance and the potential benefits of different mitigation techniques.
 - Further work is required to identify and assess in more detail the likely scheduling and duration of key disturbance activities (e.g. piling) during construction, operation and decommissioning of offshore wind farms. This is needed to determine impacts on seasonal movements of species more accurately.
 - Additional survey work is required to better understand the broad-scale movement patterns of certain seabirds in order to more accurately assess cumulative effects into the medium term and the extent to which activities at sites may affect qualifying features of Natura 2000 sites and other protected sites.

4.3 Draft Plan in the Medium Term

- 4.3.1 The Draft Plan has used the assumption that all 10 short term options are progressed, with cumulative effects arising from further development beyond this. Table 4.2 sets out a summary of the key issues arising from each of the medium term options.

Table 4.2 Indicative summary of key environmental and technical issues

	Cetaceans	Birds	Seals	Fish	Radar / CAA	Commercial fishing	Cultural heritage	Visual	Landscape / seascape	MoD	Wave and tidal	Mines / munitions	Recreation	Shipping / navigation
N1														
N2														
N3														
N4														
N5														
N6														
N7														
N8														
Beatrice														
NE1														
NE2														
NE3														
Inch Cape														
Bell Rock														
Near na Gaoithe														
Forth Array														
E1														
Solway Firth														
Wigtown Bay														
SW1														
SW2														
SW3														
SW4														
SW5														
SW6														
Kintyre														
Islay														
Argyll Array														
W1														
W2														
W3														
W4														
NW1														
NW2														
NW3														
NW4														
NW5														
NW6														
NW7														
NW8														

Proposed exclusions

- 4.3.2 The environmental and technical analysis of the 30 medium term options, taking into account the potential compounding effect of the short term options in each area, has suggested that at this stage a small number of individual medium term options may be less suitable for development. These are highlighted in red in Table 4.2. Whilst most areas are likely to benefit from

environmental mitigation and technical solutions at the project level, Scottish Ministers have identified areas of particular sensitivity at this stage, where it is considered appropriate to delay development until issues can be resolved, possibly in the longer term:

- **Options N2 and N3** (and parts of N1) are within an area of estimated historical mine fields. This presents major technical issues which may prove difficult to overcome. As a result, they have been removed from the list of medium term options.
- **Option SW2** is located on Beaufort's Dyke munitions site in the south west. Again, the option has therefore been excluded from the medium term plan for technical reasons.
- **Option NW1** is within 7km of St. Kilda World Heritage Site. Given the sensitivity of the seascape and environment in this area, the SEA has recommended that the option is removed from the Draft Plan at this stage. **Option NW3** has also been excluded from the Draft Plan as a result of its potential impact on the inter-relationship between St. Kilda and the Western Isles.

Regional prioritisation

4.3.3

Scottish Ministers are therefore currently of the view that these individual medium term options are removed from the Draft Plan. In addition, further consideration has been given to whether all or only some of the regions should be progressed in the medium term, in order to provide further prioritisation of development opportunities. Analysis of shipping routes, including areas recognised by the IMO, and consideration of important areas for commercial fishing from a national perspective, suggests that it may be reasonable to give further consideration to whether developments in the following regions are assigned a lower priority or possibly deferred until the longer term:

- The **north west** region is an area with multiple environmental sensitivities including concentrations of Natura 2000 sites and importance for a number of EPS including cetaceans, seals and migratory birds. Compounding this, several of the sites have potential to directly or indirectly affect IMO designated shipping routes or areas which have been designated for safeguarding, including a right of innocent passage in the Minch, ferry routes and areas of national significance for commercial fishing activity. Whilst IMO areas have been generally avoided as part of the selection of options, approaches have not. In addition to statutory designations, from a national perspective the area is important for tourism that is focused on the quality of the natural environment and it contains significant concentrations of wild land which have a close relationship with coastal and marine areas. The exception to this is Option NW8 where constraints appear to be relatively limited and medium term development is more likely to be feasible

- The **north** region as a whole or in part, in addition to options N2 and N3, presents potentially significant challenges in relation to shipping and fishing with the areas surrounding Orkney and Shetland being recognised by the IMO as areas to be avoided by certain vessels. In addition, the SEA has shown that there is considerable environmental sensitivity within these areas.

4.3.4 **Consultee views on whether development in these or other regions or individual options within them should be deferred to the longer term are now being sought as part of the consultation process.** This could help to prioritise activity closer to the areas which are to be progressed in the shorter term, potentially creating economies of scale for development and opportunities to link with prioritised infrastructure investment.

Options to be progressed in the medium term

4.3.5 Taking into account the assessment findings, in the medium term, it is therefore proposed that development is prioritised in the following 25 areas:

Table 4.3 Priorities for medium term development

Area	Medium Term Option	Approximate area (sq. km)
North	N1	1671
	N4	776
	N5	1079
	N6	222
	N7	1729
	N8	300
North-East	NE1	387
	NE2	170
	NE3	131
East	E1	2022
South-West	SW1	7
	SW3	354
	SW4	24
	SW5	55
	SW6	16
West	W1	1491
	W2	1039
	W3	57
	W4	253
North-West	NW2	1278
	NW4	156
	NW5	324
	NW6	914
	NW7	2554
	NW8	2531

4.3.6 These medium term options should be given further consideration. Given the level of uncertainty within the assessment at this stage, further work across all

of the sites will be required to confirm their suitability for offshore wind energy. This should include the following:

- Action taken on the basis of findings of the Habitats Regulations Appraisal for this Draft Plan. All of the options could have impacts on biodiversity requiring mitigation, and there is a requirement to avoid adversely impacting Natura 2000 sites and their qualifying features. Going beyond this, the summary above shows that cetaceans, seals and birds remain key areas of concern. A national level study or set of regional studies should therefore be progressed following on from short term survey work identified above, which identifies the overall capacity of these species to tolerate development throughout Scottish Territorial Waters.
- The SEA has also shown that all of the options could affect BAP fish species. As noted for the short term options, further research is needed to better define the impacts of development activities on fish species. This work should be used to inform further review of the medium term options. Should development of any specific options or regions prove particularly problematic, some of these medium term options (or parts thereof) should be removed from the Plan.
- Landscape impacts are a nationally significant issue, and are likely to become more apparent and significant as cumulative effects from short term together with the first medium term options begin to emerge. The inclusion of NSAs within the broad selection of options has ensured that the effects of the medium term options on these areas have been taken into account in the Draft Plan. However, the review of the Plan after 2 years should consider this position in order to ensure that the in-built mitigation has been effective. Much more detailed assessment will be required at the project level, regardless of the content of the Draft Plan.
- Potential impacts on recreation have not been viewed as a reason to exclude any of the options. However, tourism and recreation make a major contribution to Scotland's economy, and it is vital that the scale of development does not exceed the capacity of coastal and marine areas in terms of visitor amenity and enjoyment. Further liaison with recreation stakeholders should help to establish whether the proposed scale of development is acceptable at this stage.
- Nearly all of the options raise challenges for the commercial fishing sector, and there appears to be insufficient information at this stage to be able to identify where effects may be more or less significant. Further liaison with the fishing sector will therefore be undertaken during the consultation period for the Draft Plan, and Scottish Ministers are committed to removing options or even regions, where there is evidence that offshore wind development would result in irreconcilable environmental and technical challenges.

- Similarly, effects on shipping could arise from all of the options, and at this stage it has not been possible to identify where areas need to be excluded on the basis of their effects on internationally, nationally, regionally or even locally important routes. Further liaison with the shipping sector will therefore be undertaken during the consultation period, to establish whether any further refinement of the medium term options is appropriate.

4.3.7 This approach assumes that site specific technical issues and the broader issues identified above can be resolved. The additional detailed mitigation measures and requirements for further survey, research and evaluation work identified in the SEA environmental report will also provide a further indication of whether or not the identified options require particular consideration within the proposed 2 year review period.

4.3.8 It is expected that Plan will evolve over time and that some sites are likely to prove more feasible for development than others. It is also anticipated that this inclusive approach may require refinement on the basis of the findings of the strategic Appropriate Assessment and other national and regional environmental studies.

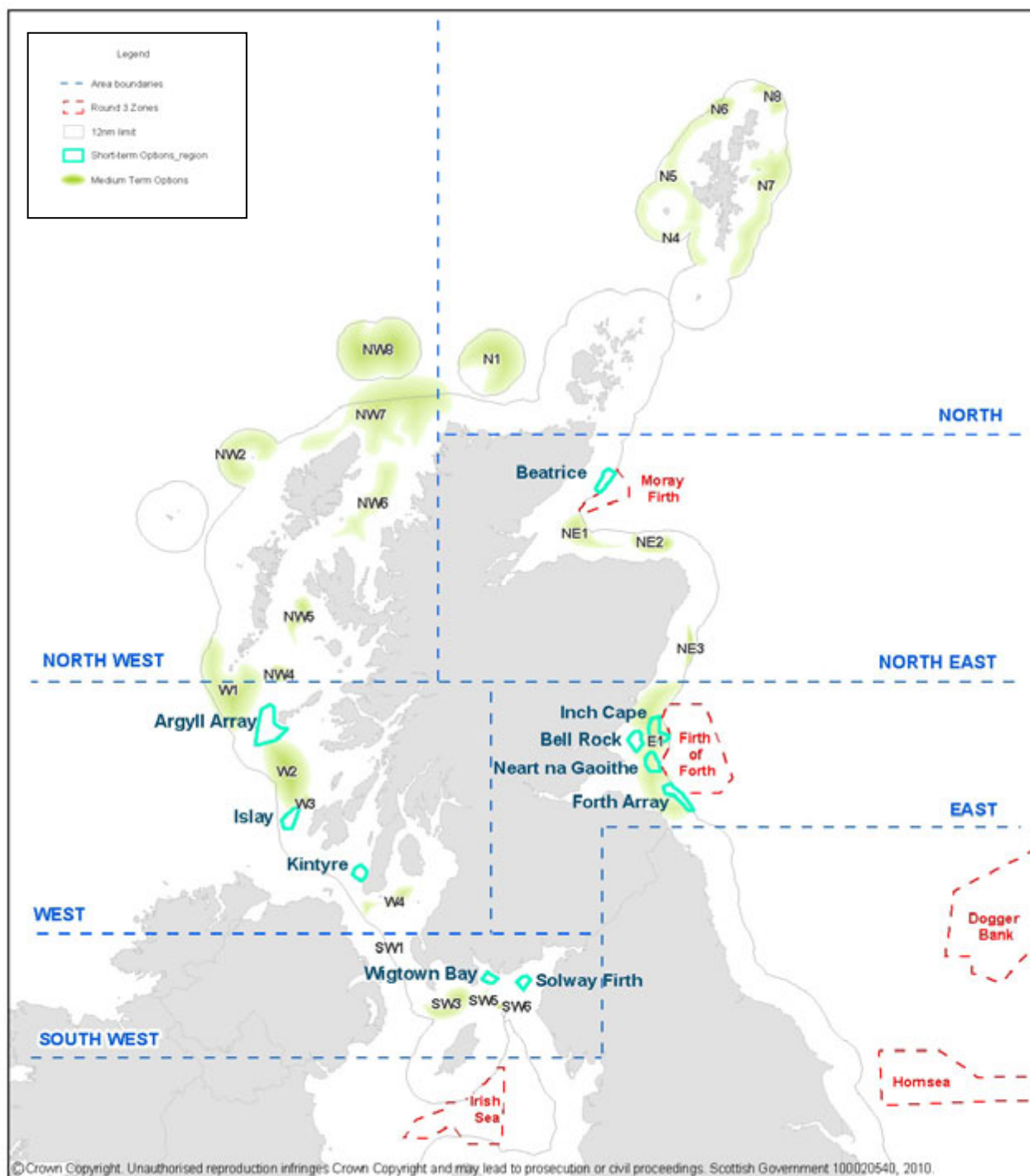


Figure 4.1 Combined Short and Medium Term Options Included in the Draft Plan

4.4 Draft Plan in the Long Term

- 4.4.1 The long term options relate to all other parts of STW beyond the short and medium term options identified above, including the individual medium term options where significant development constraints have been identified. It is proposed that, in the long term, scope for development in these remaining areas should be explored further.
- 4.4.2 It is important to note that some of the short or medium term options identified in the Draft Plan may not be progressed or could move into the long term, given that there are many issues requiring further consideration before development can take place.
- 4.4.3 The long term view will also be informed by emerging monitoring and review of the Plan. It will be important that, as other renewable technologies including wave and tidal power are developed further, the need for and relative life-cycle emissions reductions of offshore wind energy development are reviewed.
- 4.4.4 At this stage, it is not possible to predict the level and pace of development which will arise from any future iterations of the Plan in the longer term.

4.5 Further Consideration of Options

- 4.5.1 No decision has been made on the final content of the Draft Plan at this stage. In accordance with the requirements of the Environmental Assessment (Scotland) Act 2005, consultees are now invited to share their views on the Draft Plan and the reasonable alternatives which have been considered within its preparation.

5 Next steps: questions for consultees

- 5.1.1 This Draft Plan and SEA environmental report are subject to a 12 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 Wind Consultation
Marine Scotland
Policy and Planning
Area 1-A South
Victoria Quay
Edinburgh
EH6 6QQ
Tel: 0131 244 1617

- 5.1.2 Submissions regarding the Draft Plan and accompanying SEA environmental report are being invited from the public and interested stakeholder organisations. Responses in writing should be sent to the above address, or emailed to offshorewindconsultation@scotland.gsi.gov.uk by **16 August 2010**.
- 5.1.3 Following the completion of the consultation period, the Draft Plan will be reviewed by Marine Scotland (taking account of submissions received) and revised as appropriate, and a final version will be formally adopted.
- 5.1.4 A Post-Adoption SEA Statement will be prepared to document the process and demonstrate how issues raised during consultation have been addressed by the final Plan. Once the final Plan has been published, the monitoring framework set out within the SEA environmental report will be expanded to incorporate further detail on monitoring of key technical issues, and will be used to assess the impacts of the implementation of the Plan.
- 5.1.5 It is proposed that the Plan is reviewed every two years and updated and revised as appropriate after this period.
- 5.1.6 In order to facilitate the consultation process, readers are invited to focus their responses on the following questions. However, responses are not limited to these questions and additional comments are welcomed.

1. *Does the mapping of exclusion zones, environmental issues, and technical issues provide a reasonable basis for modelling the options?*
2. *Do you have any further technical or environmental information you think we should take into account as we refine the Draft Plan?*
3. *Do you consider that the Draft Plan presents a set of practical options?*
4. *Should any options be removed from the Draft Plan?*

5. *Are there other options we should consider in the medium or long term?*
6. *How can the Draft Plan be improved? What should be taken forward differently and why?*
7. *Do you have views on the scale and pace of development that could be sustainably accommodated in STW, taking into account the findings from the SEA and the technical assessment?*
8. *Have we got the balance right in the Draft Plan, between tackling climate change, maximising opportunities for economic development and dealing with environmental and commercial impacts?*
9. *The Plan, once implemented, will be reviewed to take account of actual development and increasing knowledge of development factors. How often should this be done and why?*
10. *The SEA has identified that there could be significant adverse effects, from the Draft Plan as a whole, on Scotland's landscapes and seascapes. 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?
11. *Do you have any other views on the findings of the SEA? do you think that all the environmental effects (positive and negative) have been identified? Are there other issues that we should be taking into account in the preparation of the Draft Plan?*
12. *The Draft Plan has identified environmental and technical issues in the north and north west regions of Scotland, in particular. It may therefore be reasonable to give further consideration to these regions.*

Do you think that development in these or other regions, or individual options within them, should be given lower priority or perhaps deferred to the longer term?

Appendix A:

Detailed Description of the Mapping to Identify Options

Mapping of Potential Environmental Issues

Where data sets allowed, environmental sensitivities were mapped and compiled utilising MaRS to identify areas of greater and fewer constraints. Environmental sensitivities mapped included information on biodiversity, landscape, cultural heritage and material assets. For the purpose of modelling, scores and weights have been applied to the information. A simple approach has been taken to this to aid transparency. Where a feature is either present or not, e.g. a Site of Special Scientific Interest, then a score of 100 was applied. Some data sets represent a range of information and have values attributed to them, e.g. the value of fish caught in an area. In these cases the linear scoring between 0 and 100 was applied to reflect their relative distribution.

There were 3 categories of weighting for the environmental modelling:

- Legally Designated;
- Known to be Present; and
- Other Information.

The 'Legally Designated' sites were weighted as 1000 in recognition that these areas have been identified in statute as important and requiring some degree of protection. Hence they are most likely to have implications on wind farm development locations.

The 'Known to be Present' data sets are those where there is confidence in the data provided, and the data is for something that could have implications for wind farm development but does not have the same legal status. These were weighted at 750.

The 'Other Information' category is for information where, although useful in determining the potential environmental constraints on an area, there is a lower level of confidence that the dataset is complete or provides a full picture. An example is the Bearded Seal; observations where data has been collected from fixed points, although providing an interesting insight, do not provide information about the whole area. It has hence been weighted at 250. This low weighting means that it showed up on the mapping but was unlikely to make a significant difference to the output of the assessment.

The scores and weights were multiplied to provide a weighted score for each sensitivity. These were then totalled up for all the sensitivities to provide a total score for a given geographical area. The total scores were split into ten bandings which are represented by ten colours on the environmental sensitivity mapping; the lowest scores have the least environmental sensitivities.

Landscape/Seascape

The only data set utilised was National Scenic Areas (NSA) scored at 100. NSAs are specifically designated because of their scenic appeal, hence anything that will impact upon the landscape and seascape around them will impact upon the quality of the site.

Hence, less than 8km from the coast was identified as High influence, 8-13km was Medium influence, 13-35km was Low influence and greater than 35km was not impacted; scores of 90, 60 and 30 respectively were applied to reflect the reduction in influence. The buffer distances were set in alignment with the work carried out by Scott et al⁵ which recognises that impacts closer to the site are greater hence lower weightings at greater distances.

As NSAs are legally designated sites, the weighting applied was 1000.

It could be argued that visual impacts are greater in large populated areas or that rural (unspoilt) landscapes would be more affected by offshore wind. Due to the subjectivity associated with mapping the areas most affected, only areas designated as NSA have been considered within the environmental modelling as these have been formally recognised for their landscape value.

No buffers to take into account landscape/seascape issues have been added to areas designated for their cultural heritage or biodiversity attributes. Inclusion of buffers could lead to areas being inappropriately removed from consideration. Any significant issues at a particular option have been addressed by the SEA.

Cultural Heritage

The datasets utilised were:

- World Heritage Sites;
- Wreck Points; and
- Wreck Regions.

Wreck Points were surrounded by a 500m buffer to address the fact that a wreck is not a point: depending on the size of the vessel and how much it has broken up, the wreck may cover a sizeable area. The 500m buffer takes account of this and allows for some inaccuracy in the positioning, utilising a precautionary principle.

Wreck Regions & World Heritage Sites are clearly bounded areas and as such were not afforded any buffer. All three data sets were scored as 100.

The World Heritage Site and Wreck Points are legally designated and as such were weighted at 1000; the wreck region was weighted at 750 as it is 'known to be present'.

Biodiversity

The datasets utilised for biodiversity were:-

- JNCC Sea Bird Atlas

⁵ K.E.Scott, C. Anderson, H.Dunsford, J.F. Benson, R. MacFaflane, An Assessment of the sensitivity and capacity of the Scottish Seascape in Relation to Windfarms, 2005

- JNCC Cetacean Atlas
- Candidate Special areas of conservation (cSAC)
- Local Nature Reserves (LNR)
- National Nature Reserves (NNR)
- Proposed Special Protection Areas (PSPA)
- RAMSAR sites
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- Sites of Special Scientific Interest (SSSI)
- Important bird Areas in the UK
- Seabird Colony Reserves
- Cetacean Observations

Designated areas (SPA, SSSI, SAC, RAMSARs, LNR and NNR) were included along with the proposed and candidate areas (cSAC; pSPA). It is recognised that the reasons for site designation and hence the potential for offshore wind to have an impact upon them varies. However, it was deemed appropriate to include them all within the model, recognising that they would be considered in more detail during the SEA and AA processes. These were all scored at 100 and weighted as 1000 due to their legal designations.

It is noted that some SSSIs are designated for their geological features rather than their flora and fauna. These have not been differentiated, as they would be scored and weighted the same way irrespective of the reasons for designation.

The JNCC Sea Bird Atlas and Cetacean Atlas provide numbers of birds/cetaceans in the area per year. The data was therefore split into 10 bands utilising a linear scale, with the lowest band scoring 10 points and the highest 100 points to reflect the utilisation of the areas by birds/cetaceans. They were all weighted at 750.

Seabird Colony Reserves and Important Bird Areas were scored at 100 and weighted at 750 as, although they are recognised as being important and have a potential to be impacted, they are not legally designated sites.

Observation data is available for basking Sharks and a range of marine mammals including Bearded, Common, Harp and Grey Seals. The data collection technique does not provide full coverage of Scottish Territorial Waters, as observations are carried out from fixed points on a grid. The data on marine mammals is provided as point locations, not areas. A 250m buffer was added to the points to provide an area where species have been observed. The information has been included in the mapping and scored at 100, but due to the uneven coverage of the data it was weighted at 250.

Population and Health

RYA Cruising Routes, Racing and Sailing Areas could all be affected by windfarm developments and as such are recognised as technical constraints. They were scored at 100 and weighted at 1000.

Material Assets

The datasets utilised for assessing other technical issues⁶ were:

- Commercial fishing values;
- Commercial Fish Species and Spawning Grounds;
- Tidal sites identified in the Scottish Marine SEA; and
- Oil Fields.

The commercial fishing values utilises the mean annual value of fishing activity within UK waters from 2004 to 2007, and is a combination of VMS and Non-VMS Gear Classes. The values were split linearly into 10 bands, with the lowest scoring 10 and the highest scoring 100. They were all weighted at 750.

The commercial fish species and spawning grounds were those identified by CEFAS for cod, herring, whiting, plaice, sole and nephrops. These were scored at 100 and weighted at 750.

The Marine SEA identified areas most suitable for tidal developments. These areas are limited and an important material asset to Scotland. They were scored at 100 and weighted at 750.

Oil has played an important role within the UK economy for a number of decades, and as such assets were scored at 100 and weighted at 750.

Technical Issues

Potential technical constraints are all man-made issues and could theoretically be moved or managed. In practice it is unlikely that more than one or two could be moved or managed in a given area, hence areas with fewer technical constraints present are more likely to be developed. The MaRS model was used to identify areas with the least constraints, to allow a reasonable assessment of resource accessibility to be made. All datasets were weighted at 1000, and scored out of 100.

The datasets utilised were:

- Shipping Density;
- Offshore Helicopter Platform Safety Zones ;
- Helicopter Main Routes;
- Radar Interference Zones;
- UK Civil Licensed Aerodrome;
- MoD Airfields;
- MoD Practice Areas;
- Anchorage Areas;
- Navigation Aids;
- Cable not in use;
- Disused Disposal Sites;

⁶ These were originally included in the SEA, as part of frontloading the Draft Plan.

- Royal Yachting Association (RYA) Cruising Routes 2008;
- RYA Racing Areas 2008; and
- RYA Sailing Areas 2008.

Shipping Density based on AIS data and modelling carried out by Anatec for The Crown Estate was utilised to give an indication of the importance of areas to navigation. The data was split into 10 bands linearly. The lowest density scored 10 and the highest 100; all were weighted at 1000.

Offshore Helicopter Platforms have a 6nm safety buffer around them; these have been identified as a technical constraint, scored at 100 and weighted at 1000.

There are recognised helicopter routes mainly servicing the oil and gas industry in the North Sea. Due to the potential safety implications of them flying over wind farm sites the routes were afforded a 500m buffer and were scored at 100 and weighted at 1000.

Radar interference zones of high and medium impact associated with wind turbines of a height of 140m have been identified by the British Wind Energy Association, and these were included in the technical mapping. High interference areas were scored as 70 and low at 30; all were weighted at 1000.

Civilian and MoD airfields have a 24km safety buffer around them; this was recognised as a technical constraint, scored at 100 and weighted at 1000.

MoD practice areas not identified as exclusions were included within the technical model, scored at 100 and weighted at 1000.

Anchorage areas identified by SeaZone Solutions Ltd were noted as technical considerations and were scored at 100 and weighted at 1000.

Navigation aids are a point on the map and as such were provided with a buffer of 100m, recognising that they will need some space around them to be effective. They were scored at 100 and weighted at 1000.

Cables not in use are not an exclusion as they could be removed, but they are a technical issue that would need to be addressed. They were therefore included with a 100m buffer, recognising that some room will be required to ensure an avoidance of any interaction with a development. They were scored at 100 and weighted at 1000.

Developments could be carried out in the vicinity of disused disposal sites if appropriate management were applied, and hence were not considered to be an exclusion. However, they may pose significant technical challenges and hence were scored at 100 and weighted at 1000.



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APS Group Scotland
DPPAS10027 (05/10)

ISBN: 978-0-7559-9308-6

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