# ENVIRONMENTAL ASSESSMENT (SCOTLAND) ACT 2005

# THE HIGHLANDS AND ISLANDS MARINE RENEWABLES INFRASTRUCTURE PLAN

## STRATEGIC ENVIRONMENTAL ASSESSMENT ENVIRONMENTAL REPORT ADDENDUM

## HIGHLANDS AND ISLANDS ENTERPRISE

## 19 AUGUST 2014

HIE
Highlands and Islands Enterprise
Iomairt na Gàidhealtachd 's nan Eilean

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# 1 INTRODUCTION

## 1.1 Purpose of the Environmental Report

1.1.1 At the request of Scottish Ministers, Scottish Enterprise (SE) and Highlands and Islands Enterprise (HIE) have led the development of the National Renewables Infrastructure Plan (N-RIP).[1]

1.1.2 The N-RIP's purpose is to support development of a globally competitive offshore renewables industry - wind, wave and tidal - based in Scotland, and to ensure that appropriate infrastructure is in place to support manufacturing, assembly and operations and maintenance. The N-RIP has been progressed in stages, and focused initially on offshore wind support.

1.1.3 HIE is now considering support for offshore marine (wave and tidal) energy. This work has focused on providing:

- the marine industry view on the infrastructure, quayside, water depth, fabrication facilities, craneage and marine resources that will be required by the marine energy industry; and
- a comprehensive list of ports, harbours and fabrication facilities around the Highlands and Islands of Scotland that could meet their manufacturing, assembly, testing, deployment and long-term operations and maintenance needs

1.1.4 A draft report – The Highlands and Islands Marine Renewables Infrastructure Plan (MRIP) - has been published for public consultation, which can be found online at www.hi-energy.org.uk from Tuesday 19 August 2014. The consultation will close on 14 October 2014, and comments should be received by that date (see Section 6).

1.1.5 Development on and/or use of sites identified in MRIP has the potential to generate significant environmental effects. In consequence, a strategic environmental assessment (SEA) has been undertaken.

1.1.6 This Environmental Report documents the assessment undertaken to date and has been prepared in accordance with the Environmental Assessment (Scotland) Act 2005.

## 1.2 Structure of the Environmental Report

1.2.1 This report sets out the results of the SEA, and is structured as follows:

- Following this introduction, Section 2 describes the MRIP, providing: background information, details of the plan, and information about its relationship with other plans, programmes and strategies;
- Section 3 describes the approach to and methods used in this SEA;
- Section 4 reviews baseline environmental characteristics, including environmental protection objectives;
- Section 5 provides a summary of the results of the assessment; and

[1] in fulfilment of the key action in the Scottish Government's Renewables Action Plan (June 2009)

- Section 6 sets out conclusions and next steps.

1.2.2 Supporting information is provided in the appendices.

# 2 MRIP

## 2.1 Background

2.1.1 As noted in Section 1, the purpose of the N-RIP is to support the development of a globally competitive offshore renewables industry - wind, wave and tidal - based in Scotland. The N-RIP has been progressed in stages, focusing initially on offshore wind support:

- Stage 1: development of a spatial framework of first-phase sites. This work was published in the N-RIP Stage 1 Report in February 2010[2]. This report reviewed Scottish port locations on the basis of offshore renewable industry needs. Best-fit locations against industry requirements for construction/installation and manufacturing supply chain use were identified for offshore wind. The Stage 1 report also identified some Scottish ports that had the potential to support and/or were already supporting the wave and tidal sector in the Pentland Firth and Orkney Waters area, and committed to taking forward future work to investigate priorities for investment to support the wave and tidal sector.
- Stage 2: development of investment plans for first-phase sites to support offshore wind, further development of funding approaches, and clarity on site investment needs. This work was published in the N-RIP Stage 2 report in July 2010[2]. Stage 2 also reviewed priorities for investment to support the wave and tidal sector in the Pentland Firth and Orkney Waters area. It set out some of the earlier industry thinking alongside plans for testing, demonstration and deployment, and concluded that there would need to be investment by port owners in various ports in order to have sites ready to take advantage of the up and coming opportunities. Sixteen locations with the potential to support wave and tidal activities, in terms of manufacturing, assembly, installation and operations and maintenance, were identified.

2.1.2 A strategic environmental assessment (SEA) was undertaken at the time of the Stage 2 work and the results of this SEA were published in the Environmental Report in August 2010[3]. The SEA focused on offshore wind support, as the wave and tidal energy sector was at an earlier stage of development and its requirements for port infrastructure were still evolving. In the light of this uncertainty, at that stage it was not possible to assess the potential environmental effects of port development in support of the wave and tidal energy sector. The Environmental Report made a commitment to undertake the necessary assessment work at a later date.

## 2.2 MRIP

2.2.1 HIE has progressed the work on the wave and tidal energy sector, building on the work undertaken in N-RIP Stages 1 and 2, and on recent work

[2] http://www.scottish-enterprise.com/your-sector/energy/energy-background/energy-reports/energy-renewable-energy-reports.aspx
[3] Available at http://www.hie.co.uk/growth-sectors/energy/n-rip.html

undertaken by The Crown Estate[4]. This study is a first step in the process of working to ensure that Scotland has the necessary infrastructure in place to capitalise on the economic development opportunities arising from wave and tidal energy development undertaken to meet the 2020 targets and fit with the Scottish Government's Energy Route map.

2.2.2 The key objectives of the study comprised:

- to provide device and project developers with an information resource on existing port and harbour infrastructure in the Highlands and Islands of Scotland to support project development and implementation; and
- to provide infrastructure providers with a clear view of current and emerging developer requirements to inform infrastructure and service development in support of the sector; whilst recognising that these requirements will change as this emerging industry continues to evolve.

The results of this work are reported in the MRIP. (The MRIP does not constitute a formal part of the N-RIP series, given the emerging nature of the marine renewables sector. Instead it describes a range of ports, harbours and other related infrastructure throughout the Highlands and Islands that could support the early development of the wave and tidal industry in Scotland.)

2.2.3 The MRIP has considered requirements for the following activities:

- manufacturing;
- assembly/construction and installation;
- operations and maintenance (O&M); and
- wet storage.

2.2.4 Manufacturing includes manufacture of the components of the wave and tidal devices, as well as the supporting plant (foundations and moorings, cabling, and electrical equipment)[4]. Manufacturing ports will have sufficient capacity to enable manufacture of major components and onward transportation to an assembly/installation site. Proximity to lease/development sites is not as critical to this function as is industrial capability. All the first-phase N-RIP sites in the HIE area fall into this category, along with a number of other ports and fabrication facilities.

2.2.5 Assembly/construction and installation includes the marshaling and pre-assembly of components to enable deployment to the development site. Typical activities would include unloading inbound components, assembling components, laying down products to ensure their availability when weather and vessel availability allows construction to proceed, and loading of components and partially assembled devices onto installation vessels. Closer proximity to the development site is desirable in order to maximise weather window availability.

[4] The Crown Estate. May 2011. Wave and tidal energy in the Pentland Firth and Orkney waters: How the projects could be built. Chapter 7.

## Table 1: Site and Vessel Requirements

| Site Requirements | Vessel Requirements |
|---|---|
| *Manufacturing* | |
| • Not less than 10ha development land or 2000m$^2$ of available buildings<br>• laydown space at or close to quayside<br>• >100m weight bearing quayside with >5m depth alongside<br>• Slipway<br>• Craneage >300t (possibly up to1,000t)<br>• Skills<br>• Labour market<br>• Road/rail connections | • Anchor handling and support tugs<br>• Cargo vessels with cranes<br>• Submersible barges<br>• DP heavy lift vessels<br>• Ballasted logistics barges |
| *Assembly/Construction and Installation* | |
| • >1ha laydown space<br>• 1,000m$^2$ of covered workspace<br>• >80m weight bearing quayside with 5 - 8m depth alongside<br>• Slipway<br>• Craneage capacity > 200t<br>• Supply of support vessels and personnel<br>• Able to accommodate tugs and other similar sized multipurpose vessels plus jack-up barges<br>• Pre installation test facilities | • Anchor handling and support tugs<br>• Cargo vessels with cranes<br>• Submersible barges<br>• Multi cats<br>• DP heavy lift vessels<br>• Jack-up barges<br>• Ballasted logistics barges<br>• ROV and diver support vessels<br>• Cable laying vessels |
| *Operations and Maintenance (O & M)* | |
| • Quayside lifting capacity<br>• >80m quayside<br>• >0.5ha laydown space at or close to quayside 2- 8m depth alongside<br>• >1,000m$^2$ local workshop facilities<br>• Office space (nominal integrated with workshop)<br>• Slipway<br>• Local skills base<br>• Mobile craneage | • DP vessels<br>• Multi cats with lifting capability<br>• Crew transfer ribs<br>• ROV and diver support vessels<br>• Cargo vessels |

2.2.6 For any significant activity requiring return of the device to port, it will be essential to have an O&M port facility available. This includes deployment of vessels to arrays to support planned and unplanned maintenance activities. O&M ports will typically require infrastructure such as reinforced quays, deep berths and reasonable storage areas, both wet storage (level and sheltered seabed) and dry. Proximity to the development site is key to enable deployment and retrieval of devices. Good supply links and personnel logistics are important.

2.2.7 Sites will also be required for refuge and/or wet storage of devices. Some technologies may also require basic O&M from small workboats, pontoons or floating piers.

2.2.8 Site requirements and the types of vessel envisaged for use at the different stages are identified in Table 1.

2.2.9 It is not yet possible to definitively recommend potential functions for individual ports in terms of the activities described in Paragraphs 2.2.3-2.2.8 and Table 1. Accordingly, an initial assessment of the Highlands and

Islands' port resource has been carried out to identify a broad spatial framework in support of the activities and requirements. The result is a proposed network of support sites, 50 in total (Figure 1; Table 2). Of these, 9 have the capacity to support manufacturing (3 sites have potential capacity); 15 could support assembly/ construction and installation (3 sites have potential capacity); 23 could support operations and maintenance (1 site has potential capacity). Eight sites could support all three functions. Twenty-five sites could support refuge / west storage/ unplanned maintenance.

2.2.10 The proposed network of support sites will be subject to review as developer requirements and installation techniques become clearer. The purpose of this consultation is to consult the industry, wider stakeholders and the general public for their views on these sites.

2.2.11 The MRIP identifies that the existing infrastructure appears to be adequate but that on-going work will be required to monitor developer requirements. There may also be a need for bespoke onshore facilities to support early stage array deployment and modest developments, and upgrades in specific ports where there is clear market demand.

2.2.12 For the purposes of this SEA, it has been assumed that:

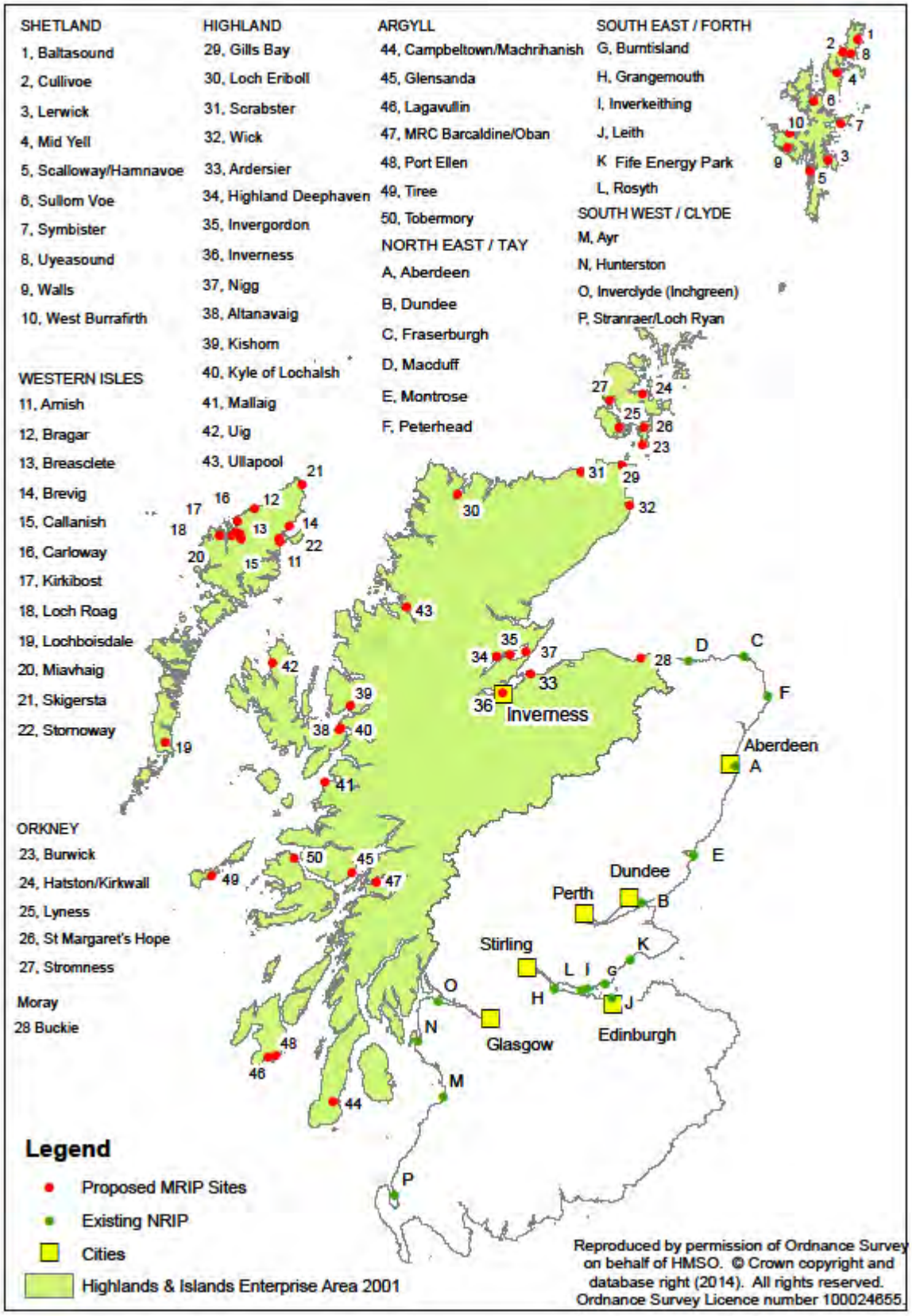
- the ports will not require to be upgraded - in terms of land reclamation, new quays and/or quay upgrading (strengthening, lengthening, etc), or dredging.
- buildings are likely to be required to support manufacture, assembly/construction and installation, and operations and maintenance activities. It has been assumed that existing buildings are to be re-used and/or any new buildings would be located within the footprint of the existing port.
- wet storage would take place in the port and/or its environs.

2.2.13 It is likely that the following consents would be required:

- a marine licence, for the wet storage of devices;
- planning permission, for any new buildings proposed in support of manufacturing, assembly, maintenance etc; and/or
- planning permission for change of use of an existing building (depending on its current use class).

2.2.14 It is unlikely that a harbour revision order is likely to be required, given that no new works to the harbours are envisaged.

## Figure 1: MRIP sites in the Highlands and Islands



## Table 2: Proposed network of support sites

| MRIP Port | Location | Included in Stage 2 SEA? | Indicative Function | | | |
|---|---|---|---|---|---|---|
| | | | Manufacturing | Assembly/ Construction & Installation | Operations & Maintenance | Refuge/ wet storage/ etc |
| **SHETLAND (10 sites)** | | | | | | |
| Baltasound | Unst | no | | | | |
| Cullivoe | Yell | no | | | | |
| Scalloway/Hamnavoe | South West Mainland | no | | | | Hamnavoe |
| Lerwick; includes Dales Voe | Mainland | no | | | | |
| Mid Yell | Yell | no | | | | |
| Sullom Voe | Mainland | no | | | | |
| Symbister | Whalsay | no | | | | |
| Uyeasound | Unst | no | | | | |
| Walls | West Mainland | no | | | | |
| West Burrafirth | West Mainland | no | | | | |
| **WESTERN ISLES (12 sites)** | | | | | | |
| Arnish; supported by Stornoway | Lewis | yes | | | | |
| Bragar | Lewis | no | | | | |
| Breasclete | Lewis | no | | | | |
| Brevig | Lewis | no | | | | |
| Callanish | Lewis | no | | | | |
| Carloway | Lewis | no | | | | |
| Kirkibost | Lewis | no | | | | |
| Loch Roag | Lewis | no | | | | |
| Lochboisdale | South Uist | no | | | | |
| Miavhaig | Lewis | no | | | | |
| Skigersta | Lewis | no | | | | |
| Stornoway; together with Arnish | Lewis | no | | | | |
| **ORKNEY (5 sites)** | | | | | | |
| Burwick | | no | | | | |
| Hatston/ Kirkwall | | no | Hatston | | | |
| Lyness | | no* | | | | |
| St Margaret's Hope | | no | | | | |
| Stromness (includes Copland's Dock) | | no | | | | |

| MRIP Port | Location | Included in Stage 2 SEA? | Indicative Function | | | |
|---|---|---|---|---|---|---|
| | | | Manufacturing | Assembly/ Construction & Installation | Operations & Maintenance | Refuge/ wet storage/ etc |
| **HIGHLAND (15 sites)** | | | | | | |
| *NORTH* | | | | | | |
| Gills Bay | | no | | | | |
| Loch Eriboll | | no | | | | |
| Scrabster | | no | | | | |
| Wick | | no | | | | |
| *EAST* | | | | | | |
| Ardersier | | yes | | | | |
| Highland Deephaven | | yes | | | | |
| Invergordon | | no | | | | |
| Inverness | | no | | | | |
| Nigg | | yes | | | | |
| *WEST* | | | | | | |
| Altanavaig | Isle of Skye | no | | | | |
| Kishorn | | yes | | | | |
| Kyle of Lochalsh | | no | | | | |
| Mallaig | | no | | | | |
| Uig | Loch Snizort, Skye | no | | | | |
| Ullapool | | no | | | | |
| **MORAY (1 site)** | | | | | | |
| Buckie | | no | | | | |
| **ARGYLL (7 sites)** | | | | | | |
| Campbeltown/ Machrihanish | | yes | | | | |
| Glensanda | Morvern | no | | | | |
| Lagavulin | Islay | no | | | | |
| MRC Barcaldine/ Oban | | no | | | | |
| Port Ellen | Islay | no | | | | |
| Tiree | | no | | | | |
| Tobermory | Mull | no | | | | |

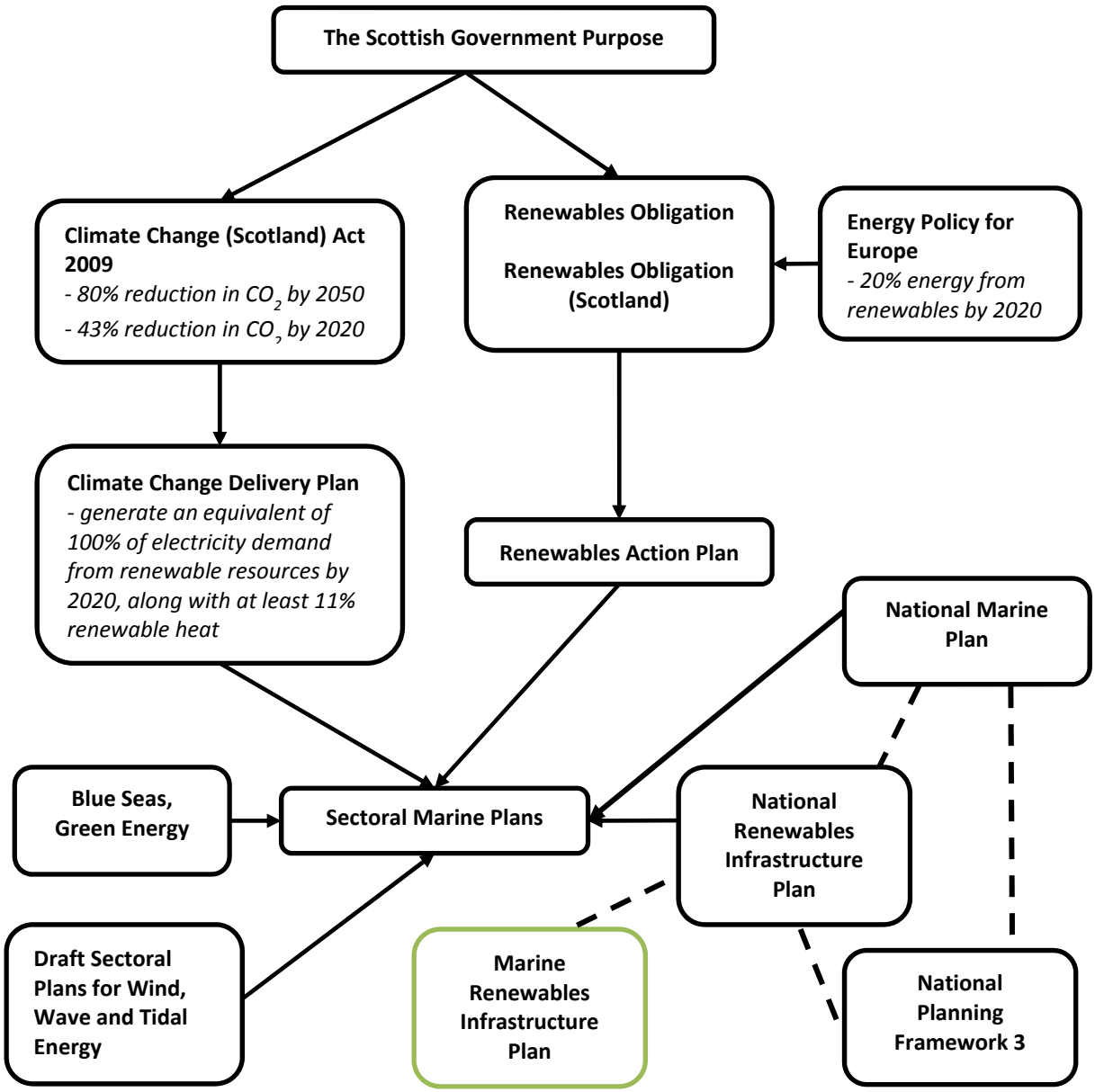
| | |
|---|---|
| | Possess capability |
| | Potential capability |

## 2.3 Relationship with other relevant plans, programmes and strategies

2.3.1 The development of offshore renewable energy is being taken forward in the context of European, UK and Scottish Government energy and climate change policy (Figure 2).

2.3.2 The offshore renewable energy industry (wind, wave and tidal) is viewed as being a key contributor to the achievement of these targets. In support of this, the Scottish Government has prepared Draft Sectoral Marine Plans for Offshore Wind, Wave and Tidal Energy in Scottish Waters. These plans, published for consultation in July 2013, represent Scottish Ministers' proposed spatial policy for the development of commercial scale offshore renewable energy at a national and regional level.

**Figure 2: EU, UK and Scottish Government energy and climate change policy**



# 3 THE STRATEGIC ENVIRONMENTAL ASSESSMENT

## 3.1 Introduction

3.1.1 As noted in paragraph 2.1.2, the SEA of the N-RIP focused on offshore wind support, as the wave and tidal energy sector was at an earlier stage of development and its requirements for port infrastructure were still evolving. In the light of this uncertainty, at that stage it was not possible to assess the potential environmental effects of port development in support of the wave and tidal energy sector.

3.1.2 The N-RIP Environmental Report made a commitment to undertake the necessary assessment work at a later date. This MRIP Environmental Report is intended to fulfil that commitment, in relation to the Highlands and Islands.

3.1.3 The SEA of MRIP has been undertaken by the Scottish Government's Environmental Assessment Team on behalf of HIE. The SEA builds on the assessment undertaken in 2010 for N-RIP Stage 2, which focused on offshore wind. The results are set out in this Environmental Report, which forms an addendum to the Environmental Report published in August 2010.

3.1.4 The purpose of the SEA is:

- to gain an understanding of the environmental issues associated with the use of the named ports in support of the wave and tidal industry. The assessment has considered the use of each port, the potential environmental effects in light of the environmental characteristics of the port and its environs (including cumulative effects), and measures for the mitigation of these effects.
- to inform HIE of the potential high-level environmental issues and how these may be mitigated, and what this means in terms of forward planning, implications for consenting and construction timelines, and effects on project costs.
- to inform developers and decision-makers of these high-level environmental issues at this early stage, so that they can be integrated into project design and planning.

## 3.2 Assumptions

3.2.1 The SEA has focused on the effects arising from each of the following, at a strategic level:

- manufacturing of wave and tidal device components;
- onshore facilities to support assembly/construction and installation[5];
- operations and maintenance activities; and
- wet storage/refuge/unplanned maintenance of devices.

[5] The installation of wave and tidal devices at the offshore sites has been considered at a strategic level by the SEA of the draft Plans for Wind, Wave and Tidal Power in Scottish Marine Waters (available at http://www.scotland.gov.uk/Publications/2013/07/8702)

3.2.2 The N-RIP Stage 1 and 2 reports identified short- and medium-term ports and associated land that could support the offshore wind industry; the SEA assessed the effects of development such as:

- land reclamation, e.g. in support of laydown areas or new quays;
- new or upgraded quays, particularly in terms of lengthening and/or strengthening, both of which would require piling;
- capital dredging;
- re-use of existing land/facilities within the harbour to provide laydown areas; and
- demolition, re-use and/or construction of buildings, e.g. to provide manufacturing facilities.

3.2.3 The development assumed for each site is set out in the August 2010 Environmental Report.

3.2.4 The SEA of the MRIP is based on the following information:

- assumptions about the potential infrastructure development and/or enhancement required at each site;
- assumptions about the activities and facilities needed to support the activities at each site; and
- information about the baseline environmental characteristics of each site and its environs.

3.2.5 For potential infrastructure development, it has been assumed that all activities will use the infrastructure already in place at the ports and harbours. This includes the infrastructure assumed in the August 2010 Environmental Report (e.g. the proposed works at Ardersier) and any infrastructure which has been subject to the consenting process outwith the N-RIP (e.g. infrastructure upgrade at Invergordon, new harbour facilities at Ullapool, etc.).

3.2.6 The assumptions that have been made for each of the functions comprise the following:

- Manufacturing: within the existing port, re-use existing buildings, where possible, or provide new ones. No further infrastructure upgrade required. (Road and rail connections have been reviewed, and no need for upgrade has been identified.)
- Assembly/Construction & Installation: Within the existing port, re-use existing buildings, where possible, or provide new ones. No further infrastructure upgrade required. Wet storage of devices may be employed at these locations.
- Operations & Maintenance: Within the existing port, re-use existing buildings, where possible, or provide new ones. No further infrastructure upgrade required. Wet storage of devices may be employed at these locations.
- Refuge/Wet Storage/Unplanned Maintenance: For unplanned maintenance, it may be necessary to provide a portacabin (or similar)

within the existing port; re-use existing buildings if possible. No further infrastructure upgrade required.

3.2.7 The SEA has assumed three scenarios for wet storage:

a. The company that manufactures the devices cannot store them as it needs the laydown space, so the developer needs to move the devices to a wet storage site which is both close to the lease site and sheltered.

b. The developer wants to store the devices close to the lease site until the installation vessel they wish to use is available, which means they store them in the loch.

c. Refuge site needed when devices are being towed to the installation site and need to take shelter during bad weather (for a day or two) before resuming progress.

3.2.8 For the avoidance of doubt, the SEA has been based on:

- no new land reclamation;
- no new quays or additional quay upgrade;
- no dredging additional to that already undertaken (capital);
- possible new buildings or re-use of existing buildings; and
- possible new buildings (of a scale similar to a small portacabin) in support of unplanned maintenance (grouped with refuge/wet storage).

3.2.9 The SEA has assumed that wet storage of devices will be required for the refuge/wet storage/unplanned maintenance activities. It has also assumed that wet storage may be required as a part of assembly/construction and installation and O&M activities. For wet storage, this assessment has assumed that:

- all types of devices will require wet storage and that all forms of anchoring will be utilised.
- devices will not be operational, i.e. no rotating turbine blades etc.

3.2.10 The focus of the assessment of wet storage has therefore been on:

- identifying locations that should be avoided in the environs of the harbour, due to their environmental characteristics; and
- identifying groups who should be consulted prior to application for the marine licence.

3.2.11 At this stage, the exact location of wet storage is still to be determined. Accordingly, the site maps in the assessment tables (Appendices 1 – 8) focus on the harbour area and are indicative only. Potential wet storage sites for wave and tidal devices are not indicated on the maps, given the lack of information about the numbers involved, the types of devices, etc. The assessment has assumed that wet storage would take place in relatively close proximity to the harbour but not necessarily within it due to spatial constraints, issues of navigational safety etc.

3.2.12 A worst-case scenario has been assumed for wet storage, using the following criteria:

- Duration: a review of recent documents indicates that it takes two-four days to prepare an array site for mooring etc., and two days to install the device, a total of four-six days. The SEA has therefore assumed a wet storage duration of two weeks, building in a contingency of one week to allow for bad weather etc.
- Number of devices: it has been assumed that, given the amount of capital tied up in a device, the developer will want to install it as soon as possible to start generating electricity and income. The SEA has therefore assumed that there would never be more than two devices being wet stored at a site at any one time.
- Frequency: a review of recent documents to ascertain the maximum number of devices to be installed during the first phase of an array has identified fourteen Pelamis devices, i.e. (assuming that one device is wet-stored as a worst case scenario), fourteen occurrences for a period of two weeks each (28 weeks total).
- Device type: to support the landscape/seascape and visual components of the assessment, photographs of existing wave and tidal technologies have also been reviewed. The results are shown in Tables 5 - 7 (Section 5 of this report). From this, and in conjunction with other criteria, it has been assumed that the worst case scenario would be the visibility of devices such as Archimedes wave swing.

3.2.13 In general, it has been assumed that raw materials, components, turbines, etc. will be transported to and from the sites by sea. Road and rail connections to the manufacturing ports not already assessed were reviewed (i.e. Lerwick, Hatston, Lyness, Scrabster, Invergordon and Glensanda). Road and/or rail connections at Hatston and Scrabster would not require improvement; it has been assumed that materials to Lerwick, Lyness, Invergordon and Glensanda would be transported by sea.

3.2.14 As was the case with the N-RIP offshore wind SEA, the details of future development will become more certain as the industry evolves. These current assumptions about industry needs are based on N-RIP dialogue with the industry.

3.2.15 Effects have been considered in terms of whether they are positive or negative, and permanent or temporary. At this strategic level permanent effects are considered to be long-term and temporary effects to be short-term.

## 3.3 Alternatives

3.3.1 The proposed network of support sites is set out in Table 2. All of these are considered to be reasonable alternatives. The SEA has therefore taken all these sites to be the reasonable alternatives over the long term.

3.3.2 At this stage there is no absolute certainty regarding the time at which activities at the different sites may commence, as this is dependent on market interest. Accordingly, alternatives which would have involved different development schedules or types of devices have not been considered in this SEA.

## 3.4 Scope of the assessment

3.4.1 The assessment has considered all the environmental topics set out in Schedule 3 to the Environmental Assessment (Scotland) Act 2005, amended so that they are appropriate for a coastal/marine context:

- biodiversity, flora and fauna
- population and human health
- climatic factors
- water and the marine environment
- air
- soil, geology and coastal processes
- cultural heritage
- landscape/seascape
- material assets

3.4.2 Given the assumption that devices will not be operational during the wet storage stage, e.g. no rotating blades, fish have been scoped out of the assessment.

3.4.3 As noted in Section 3.2, the SEA has focused on the effects of manufacturing/assembly/O&M/wet storage. The effects of installation of devices at the offshore wave and tidal sites has been dealt with through Marine Scotland's SEA of the draft Plans for Wind, Wave and Tidal Power in Scottish Marine Waters (available at http://www.scotland.gov.uk/Publications/2013/07/8702).

## 3.5 SEA objectives

3.5.1 The MRIP sites have been assessed against SEA objectives (Table 3). These SEA objectives have been brought forward from the 2010 Environmental Report.

3.5.2 An SEA objective relating to material assets has been added to those in Table 3: "to avoid adverse effects on other users of and activities in the marine environment", in line with the policies set out in the draft National Marine Plan for Scotland.

## 3.6 Early consultation

3.6.1 The assessment has benefited from early consultation with the Consultation Authorities. The Environmental Assessment Team are grateful for their comments and advice.

**Table 3: SEA Objectives**

| SEA Topics | Assessment Objectives |
|---|---|
| Biodiversity, flora and fauna | • To protect and where appropriate enhance protected habitats.<br>• To avoid generating disturbance of key species.<br>• To safeguard marine and coastal ecosystems.<br>• To avoid adverse effects on coastal processes. |
| Population and human health | • To avoid adversely affecting recreational users.<br>• To avoid secondary adverse effects on health arising from air pollution and other nuisance effects. |
| Water | • To prevent deterioration and, where possible, restore and/or enhance water body status.<br>• To avoid pollution of the coastal and marine water environment.<br>• To identify sites that are at risk of flooding. |
| Climatic factors | • To reduce greenhouse gas emissions e.g. from vessels.<br>• To ensure that adaptation to climate change impacts is built into plans for future infrastructure. |
| Air | • To reduce air pollution from activities (including vessel movement) at ports. |
| Soil, geology and coast | • To avoid exacerbating coastal erosion.<br>• To remediate contaminated land where appropriate and/or feasible. |
| Cultural heritage | • To avoid damaging known and unknown coastal and marine archaeology.<br>• To avoid adversely affecting the historic environment. |
| Landscape | • To avoid adversely affecting landscape/seascape. |
| Material Assets | • To avoid adverse effects on other users of and activities in the marine environment |

## 3.7 Assessment results

3.7.2 The assessment results are set out in tables (see Table 4 for format) which provide the following information:

- site use;
- assumptions about potential activities;
- information about the environmental baseline on and in the environs of each site;
- information as to which environmental topics have been scoped out and why;
- a description of each identified environmental effect, potential mitigation, and residual effect. Effects are reported in terms of whether they are negative or positive, temporary or permanent, and construction or operational effects;
- other known or proposed development in the area (proposed development is considered to be that where a planning application has been made); and
- cumulative effects.

3.7.3 The tables are provided in Appendices2-7.

## Table 4: Assessment table

| | | | | |
|---|---|---|---|---|
| **SITE NAME** | | | | |
| **SITE USE –** | | | | |
| **POTENTIAL DEVELOPMENT** | | | | |
| **ENVIRONMENTAL BASELINE**<br>*Biodiversity, Flora and Fauna* –<br>*Population and Human Health* –<br>*Climatic Factors* –<br>*Water and Marine Environment* –<br>*Air* –<br>*Soil, Geology and Coastal Processes* –<br>*Cultural Heritage* –<br>*Landscape/Seascape* –<br>*Material Assets* –<br><br>**Issues Scoped Out:**<br>*Environmental Factor – Reason for scoping out* | | | | |
| **Environmental Receptor** | **Effect** | **Characteristic** | **Mitigation** | **Residual Effects** |
| | | | | |
| **OTHER DEVELOPMENT** | | | | |
| ***Cumulative Effects*** | | | | |
| **Implications for development** (including need, if any, for Habitats Regulations Appraisal). | | | | |

# 4 ENVIRONMENTAL BASELINE AND CONTEXT

## 4.1 Introduction

4.1.1 The purpose of this chapter is to:

- provide an overview, at the national level, of the environmental characteristics of the areas likely to be significantly affected. More detailed descriptions of the environmental characteristics of the sites and their environs are included in the assessment tables in Appendices 2-7;
- describe existing environmental pressures relevant to the plan; and
- summarise those environmental protection objectives relevant to the baseline environment and the plan. Details of the policy and legislation giving rise to these objectives are set out in Appendix 1.

## 4.2 Biodiversity, Flora and Fauna

4.2.1 The Scottish coast and waters are rich in biodiversity and include many areas which are designated for their international and national importance. Many designated Ramsar sites, Special Areas of Conservation (SACs), Special Protection Areas (SPAs) [6] and Sites of Special Scientific Interest (SSSIs) [7] have coastal and marine interests (Figure 6). Other designations, such as Marine Protected Areas (MPAs), highlight areas of conservation priority[8]. Others, such as the UK biodiversity action plan (UKBAP), also play an important role in identifying species and habitats as priorities for conservation action, including a wide range of important coastal habitats and species connected to marine or coastal areas[9].

4.2.2 Together, these areas provide protection for the many high quality and sensitive marine habitats and species around the coastlines of Scotland's islands and its mainland. Habitats of particular interest include sandbanks, sea caves, estuaries, mud flats, salt marsh, coastal lagoons, shallow inlets and bays and reefs, amongst others. Species of interest broadly include birds such as wildfowl and waders, cetaceans (e.g. bottlenose dolphin, etc.), other marine mammals (e.g. grey and common seal, etc.), elasmobranchs (e.g. basking sharks, skates and rays, etc.) and fish (e.g. Atlantic salmon, sea lamprey, etc.) amongst many others.

4.2.3 Marine Scotland is working with SNH and JNCC to identify possibly important inshore aggregations of waterbirds around the Scottish Coast. Such SPAs would recognise the important feeding areas in the open sea used by aggregations of waterfowl during the non-breeding season that are essential for the individual species survival. Further analysis will be undertaken before scientific advice is submitted to Scottish Ministers. JNCC is also undertaking

[6] SNH (2011) International Designations [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/international-designations/ [accessed 18/12/2013]
[7] SNH (2011) National designations [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/ [accessed 18/12/2013]
[8] http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork
[9] JNCC (undated) UK Biodiversity Action Plan List of Priority Species [online] Available at: http://jncc.defra.gov.uk/page-5717 [accessed 21/02/2013]

analyses to identify any important offshore areas for seabirds. This work is summarised in Figures 3 – 5.

4.2.4 In 2009 and 2010, both harbour (*Phoca vitulina*) and grey (*Halichoerus grypus*) seals were found on the coast of Fife and Tayside with injuries consisting of a single continuous curvilinear skin laceration spiralling down the body (referred to as "corkscrew injuries")[10]. A subsequent review of records identified that spiral wounds have been observed on both grey and harbour seal corpses at various locations around Scotland since 1985, and these have continued to be observed since 2010. The cause of these injuries is not definitively known, but is assumed to be due to seals being drawn through a ducted propeller. The implications for seal populations are unclear, but may be more serious for harbour seals than grey seals, given that the former are generally in decline. Harbour seal numbers have declined dramatically by over 50% in Shetland, Orkney and the east coast of Scotland – particularly the Tay and Eden Estuary SAC population - since 2001, with a smaller decline in the Outer Hebrides, whilst on the west coast and Inner Hebrides numbers have remained relatively stable. Grey seal numbers are relatively stable[11].

4.2.5 Cetaceans (whales, dolphins, and porpoises) are present in Scottish waters, and are European Protected Species. Harbour porpoises are the most abundant cetacean in inshore waters, being found all around the Scottish coastline. Bottlenose dolphins are found close inshore on both the east and west coasts, and less frequently on the north coast and in the northern isles. The Moray Firth supports the only known resident population of bottlenose dolphins in the North Sea, protected by the Moray Firth Special Area of Conservation.[12]

4.2.6 Otters are also European Protected Species. They are found throughout Scotland, with key regions being the west and north coasts and Western Isles, and Shetland and Orkney[13].

4.2.7 Four species of marine turtle are occasional visitors to Scottish waters: Leatherback, Loggerhead, Kemp's ridley, and Green, and are European Protected Species. Key pressures include bycatch in fishing gear, and effects from marine litter[14]. In consequence, they have been scoped out of this SEA.

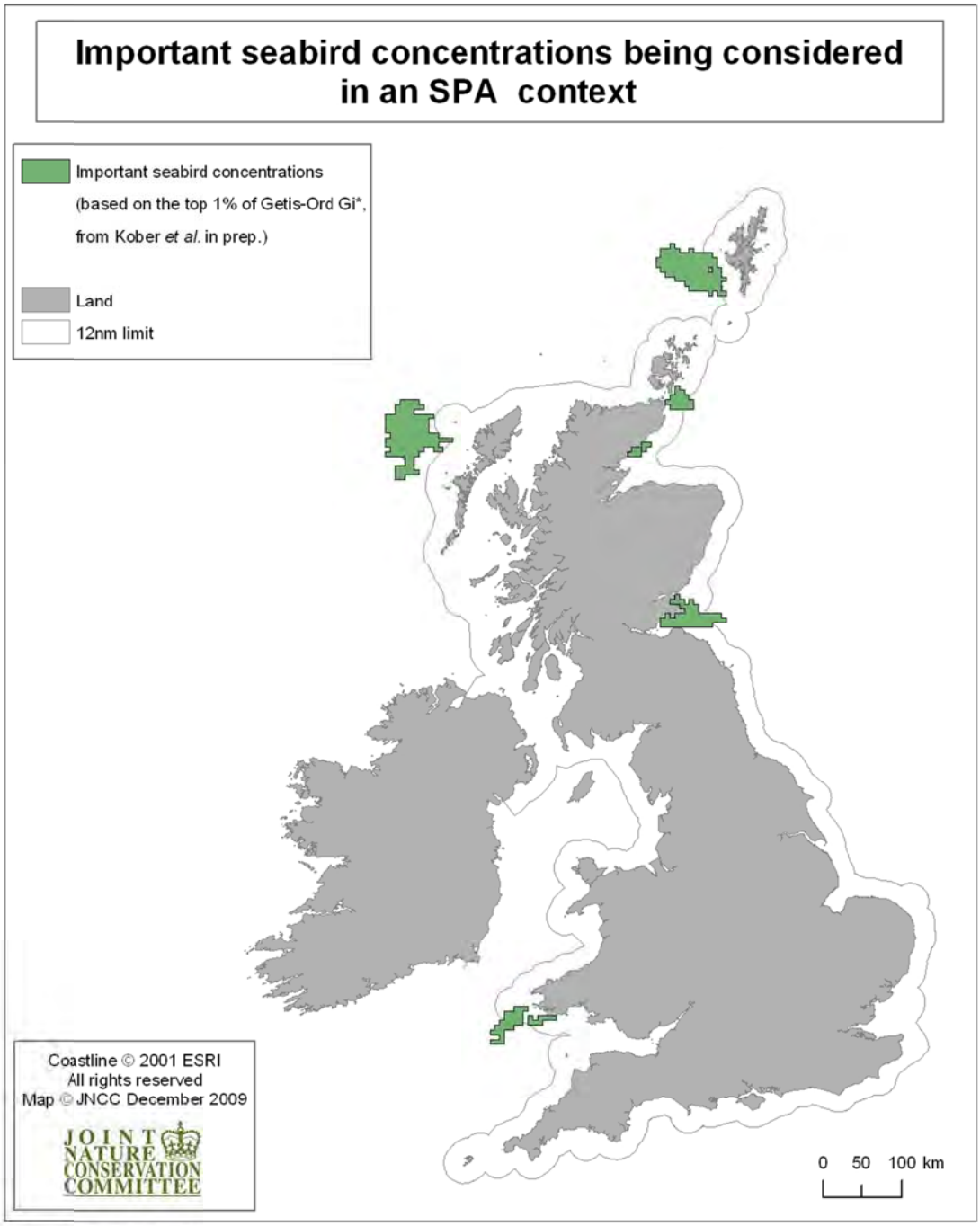
4.2.8 Basking sharks move closer to shore in summer, and pressures include bycatch in fishing nets, and disturbance from or impact by jet-skis, speed boats and other vessels.[15] The potential effects of MRIP activities on basking sharks are similar to those on cetaceans. In consequence, cetaceans have been used as a proxy for basking shark in this SEA.

[10] Sea Mammal Research Unit. April 2013. Current state of knowledge of the extent, causes and population effects of unusual mortality events in Scottish seals. Report to Scottish Government, pg 7. Available at http://www.smru.st-andrews.ac.uk/pageset.aspx?psr=152
[11] Marine Scotland. 2011. Marine Atlas.
[12] From http://www.snh.org.uk/pdfs/publications/naturallyscottish/whales.pdf
[13] http://jncc.defra.gov.uk/protectedsites/sacselection/species.asp?FeatureIntCode=S1355
[14] Marine Scotland. 2011. Scotland's Marine Atlas: Information for The National Marine Plan. Available at http://www.scotland.gov.uk/Publications/2011/03/16182005/58
[15] http://www.snh.gov.uk/about-scotlands-nature/species/fish/sea-fish/basking-sharks/

4.2.9 Pressures on coastal habitats and species stem from a range of sources including climate change, marine and coastal development, dredging, pollution, marine litter, fishing, invasive non-native species, other coastal and marine users (e.g. oil and gas, aquaculture, shipping, tourism and recreation, offshore developments, fishing). While the specific effects of these pressures and activities can vary greatly by location and differ by habitat and species affected, the potential for cumulative effects are of particular importance for biodiversity features.

*International and national legislation and policies aim to protect and conserve Scotland's habitats and species. Details of the various levels of legislation and policy that set environmental protection objectives are provided in Appendix 1.*

**Figure 3: Important Seabird Concentrations Being Considered in a SPA Context**[16]

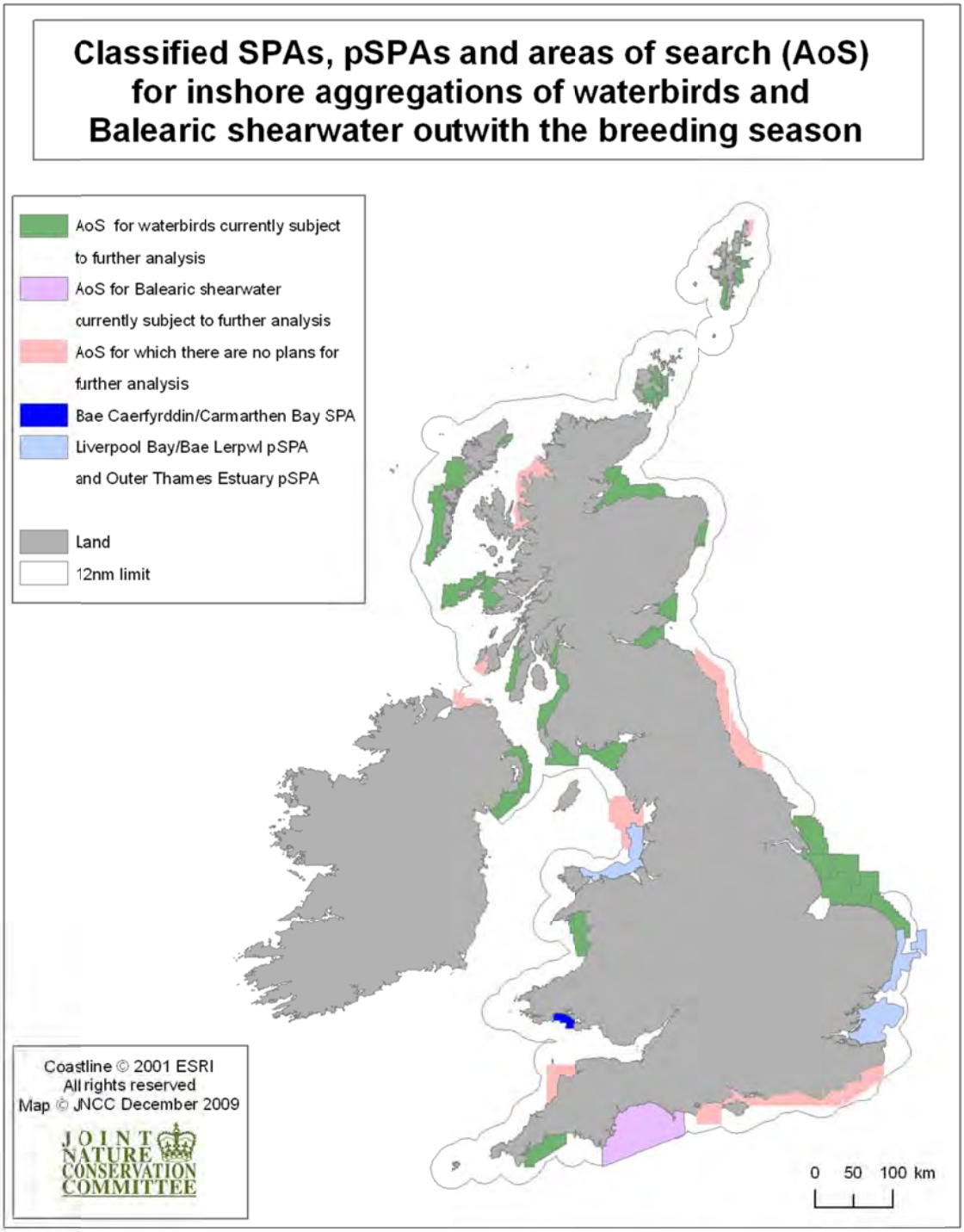



This map indicates areas identified as being important for seabirds from analysis of the European Seabirds at Sea (ESAS) database. These areas could potentially help in deciding where Special Protection Areas (SPAs) for seabirds might be placed. **Not all of these areas may be classified, and additional areas not shown on the map may also be considered.** At this stage (December 2009) JNCC is not in a position to confirm which areas will be further considered for SPA status or classified. JNCC advises the statutory nature conservation agencies on options for SPAs and the location of their boundaries, as well as the science underpinning that advice. The agencies (and JNCC beyond 12nm) then advise government on which areas might be further considered for classification.

Kober, K., Webb, A., Win, I., Lewis, M., O'Brien, S., Wilson, L.J., Reid, J.B. (in prep.) An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs. JNCC Report, No. 431.

[16] The Scottish Government (2010) Seabird Concentrations [online] Available at: http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/protectedareas/NATURA/seabirdconc (accessed 10/3/2014)

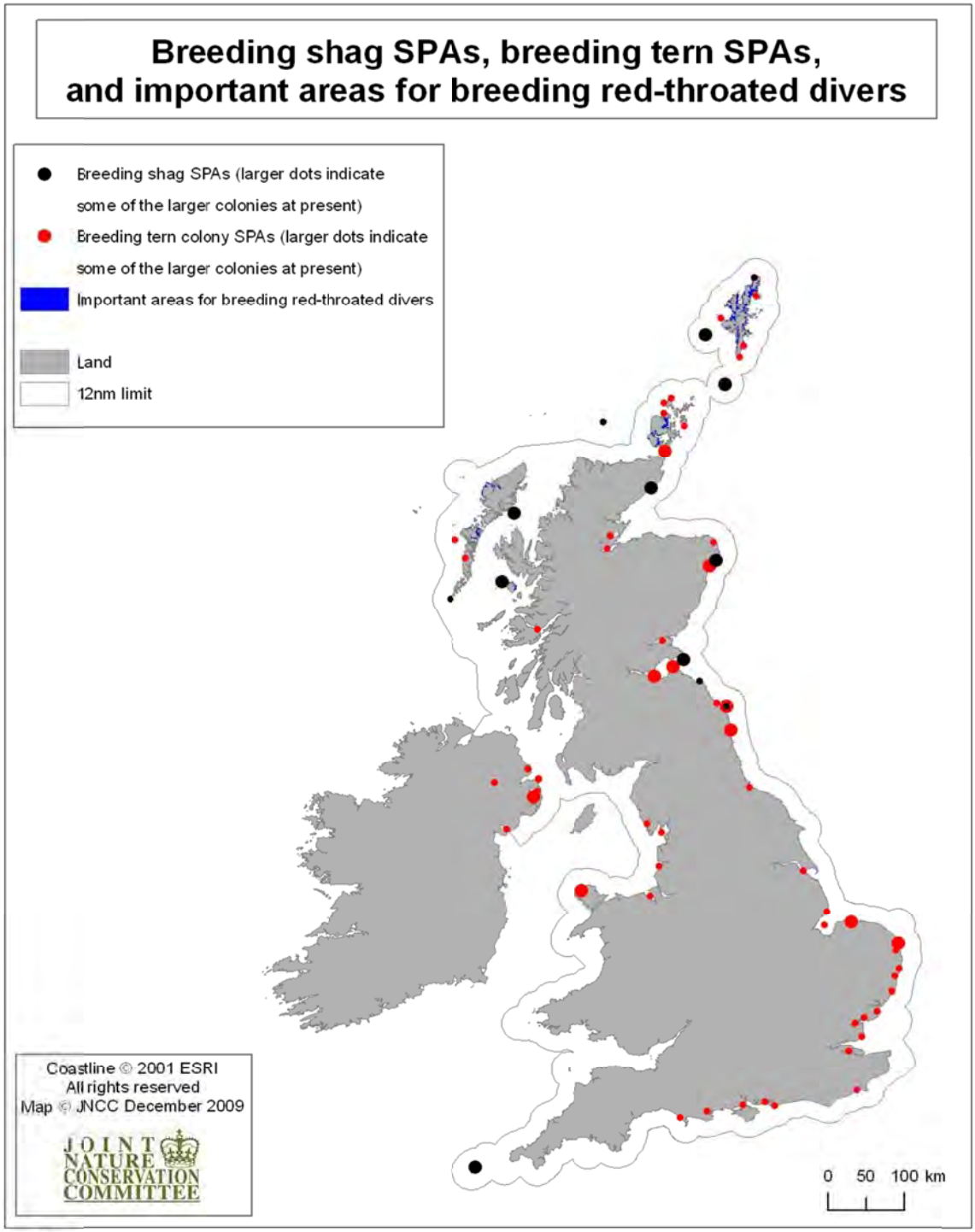
**Figure 4: Classified SPAs, pSPAs and Areas of Search (AoS)** for Inshore Aggregations of Waterbirds and Balearic Shearwater Outwith the Breeding Season17




This map indicates a classified Special Protection Area (SPA), potential SPAs (pSPAs) and areas of search (AoS) within which smaller areas might be considered for classification as SPAs. At this stage (December 2009) JNCC is not in a position to confirm which areas will be further considered for SPA status or classified. JNCC advises the statutory nature conservation agencies on options for SPAs and the location of their boundaries, as well as the science underpinning that advice. The agencies (and JNCC beyond 12nm) then advise government on which areas might be further considered for classification. When fully analysed, the scientific data on some of these AoS may show that further consideration is unwarranted or that not all of a particular AoS will merit further consideration as an SPA.

[17] The Scottish Government (2010) Inshore Bird Aggregations [online] Available at: http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/protectedareas/NATURA/inshore (accessed 10/3/2014)

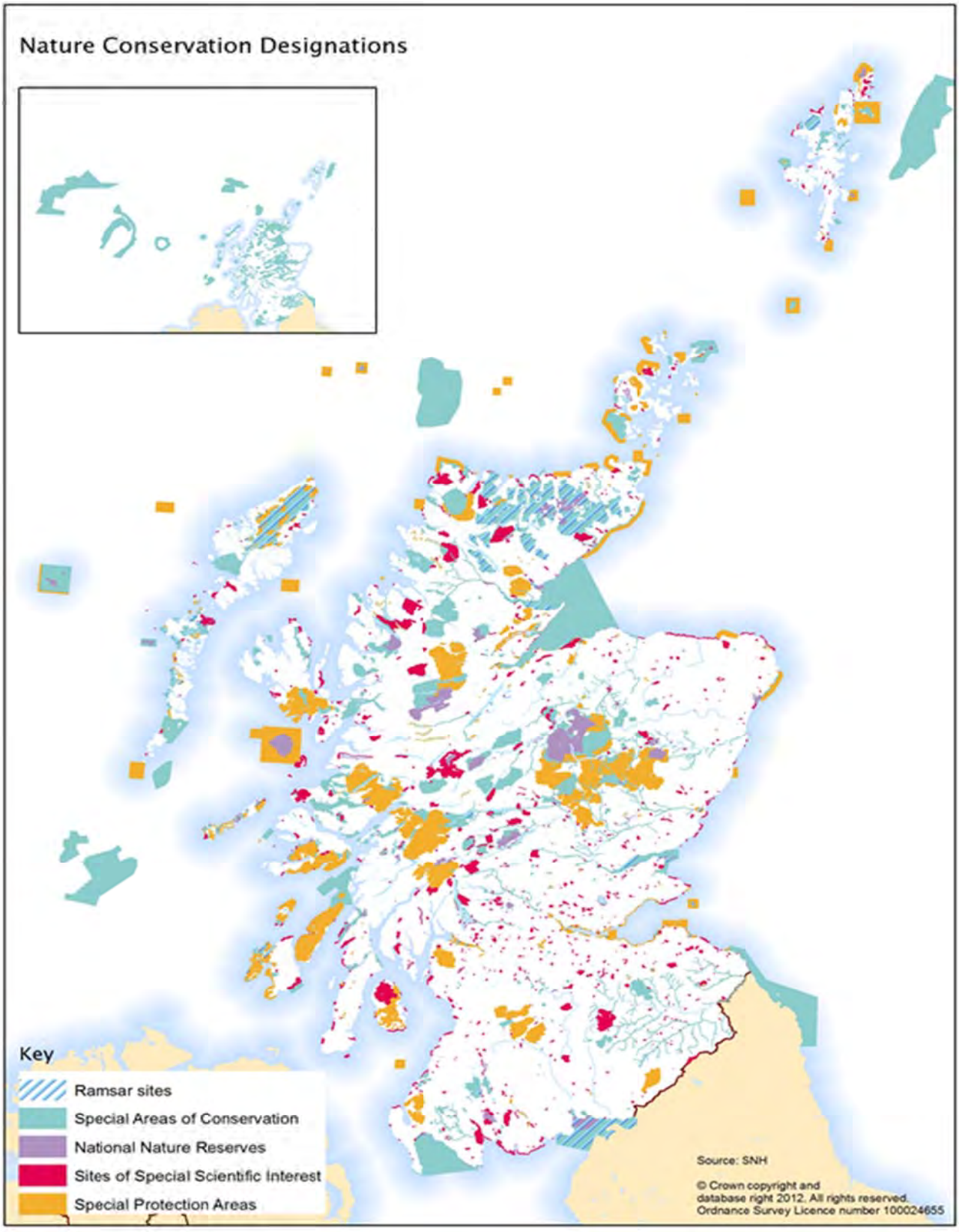
**Figure 5: Important Areas for Breeding Red-Throated Divers**
Breeding Shag SPAs, and Breeding Tern SPAs[18]




This map indicates all breeding tern and shag colony Special Protection Areas (SPAs) in the UK. Additional marine areas might be considered as SPAs for some of these colony SPAs, which may be extensions to the existing SPA and/or completely separate areas. Also shown are potentially important feeding areas near existing SPAs for breeding red-throated divers, some of which might be considered for classification. At this stage (December 2009) JNCC is not in a position to confirm which areas will be further considered for SPA status or classified. JNCC advises the statutory nature conservation agencies on options for SPAs and the location of their boundaries, as well as the science underpinning that advice. The agencies (and JNCC beyond 12nm) then advise government on which areas might be further considered for classification.

[18] The Scottish Government (2010) Breeding Areas [online] Available at: http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/protectedareas/NATURA/breedingSPAs (accessed 10/3/2014)

**Figure 6: Nature Conservation Designations in Scotland**



## 4.3 Population and Human Health

4.3.1 Scotland's coastline and waters are used for a variety of industrial and recreational activities including fishing, salmon and sea trout fisheries, recreational sea angling, sailing, cruising, surfing, paddle sports, bathing, recreational and wildlife tourism, amongst many others. While many activities in coastal and marine environments can be undertaken with little impact on others, there is the potential for conflicts between some activities. As a consequence, shared use and access to the marine environment for all users is a key concern. This is of particular note for communities with a strong reliance on coastal and marine-related industries as part of their local economy, for example, those on Scotland's islands and the north and west coasts with smaller populations located at greater distances from central services. The maintenance of shared use and access is also vital in ensuring the sustainability of Scotland's marine resources.

4.3.2 Scotland's ports and harbours play an important role in servicing offshore industries and transporting freight and passengers throughout Scotland. Many provide access to busy sea areas such as Clyde and Solway Firth/North Channel, the Minches and Malin Sea routes, while others are located in more populated areas such as Aberdeen, the Clyde and the Firth of Forth[19]. However, a large number are located in less populated and more remote areas, and play important roles at the community level.

4.3.3 The main risk to human health in the marine environment is from accidents as a result of vessel collisions with other craft and the presence of offshore structures. As shown in Figures 7 – 9, many parts of Scotland's coastline and marine waters are presently utilised for a wide range of activities and by a range of marine vessels. Recreational craft in particular utilise much of the Scottish coastline and coastal waters, with increasing concern expressed by the sector representatives in regard to safe navigation under increasing use of these areas.

4.3.4 These high levels of use have proven to be potentially hazardous with some 407 water-related fatalities having occurred in marine and inland waters in the UK in 2011. Of these, some 79 incidents occurred in coastal, shore or beach areas, 41 at sea, 30 in lochs, and 26 in ports or harbours. In breaking these down further, and excluding those in inland waters, some 37 related to sailing or boating, 11 to angling, 36 to swimming, 8 to diving and three to surfing activities[20].

4.3.5 Disturbance from noise has also been identified as a potential pressure to human health. High levels of noise exposure have been linked to health effects such as annoyance, cardiovascular and physiological impacts (e.g. ischaemic heart disease, hypertension, etc.), night time effects (e.g. impacts to sleep patterns, awakenings, sleep quality, next day and long term effects),

[19] Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government, pg. 172-175.
[20] National Water Safety Forum (2013) UK Water Related Fatalities 2011 – WAID Database Report [online] Available at: http://www.nationalwatersafety.org.uk/waid/info/waid_fatalincidentreport_2011.pdf (accessed 10/05/2013)

cognitive development in school children and hearing impairment[21]. The EU Directive for Assessment and Management of Environmental Noise (the Environmental Noise Directive) was developed in 2002, and has been transposed into Scottish Regulations[22]. The Scottish Government has produced noise maps in response to the Directive, including the reporting of Noise Exposure Statistics in relation to roads, railways, airports and industry in Scotland, although this is centred primarily on population centres such as Edinburgh, Glasgow and Aberdeen[23]. Refreshed Strategic Noise Action Plans (for Glasgow, Edinburgh, Dundee, Aberdeen, Dundee Airport and Transportation) were published in July 2014 in response to the Directive [24].

4.3.6 Many recreation opportunities, particularly those involving onshore and coastal tourism, also make an important contribution to improving human health as well as coastal economies. These potential health and economic benefits could be compromised if activities were displaced or discontinued. Tourism and recreation in relation to economic factors are considered further in the Material Assets section of this chapter.

*Environmental protection objectives for recreation relate to the shared use of the marine environment, and ensuring the continuation of marine and coastal activities, and the use of existing recreational assets (e.g. coastal footpaths, beaches, etc.). (see Appendix 1 for details).*

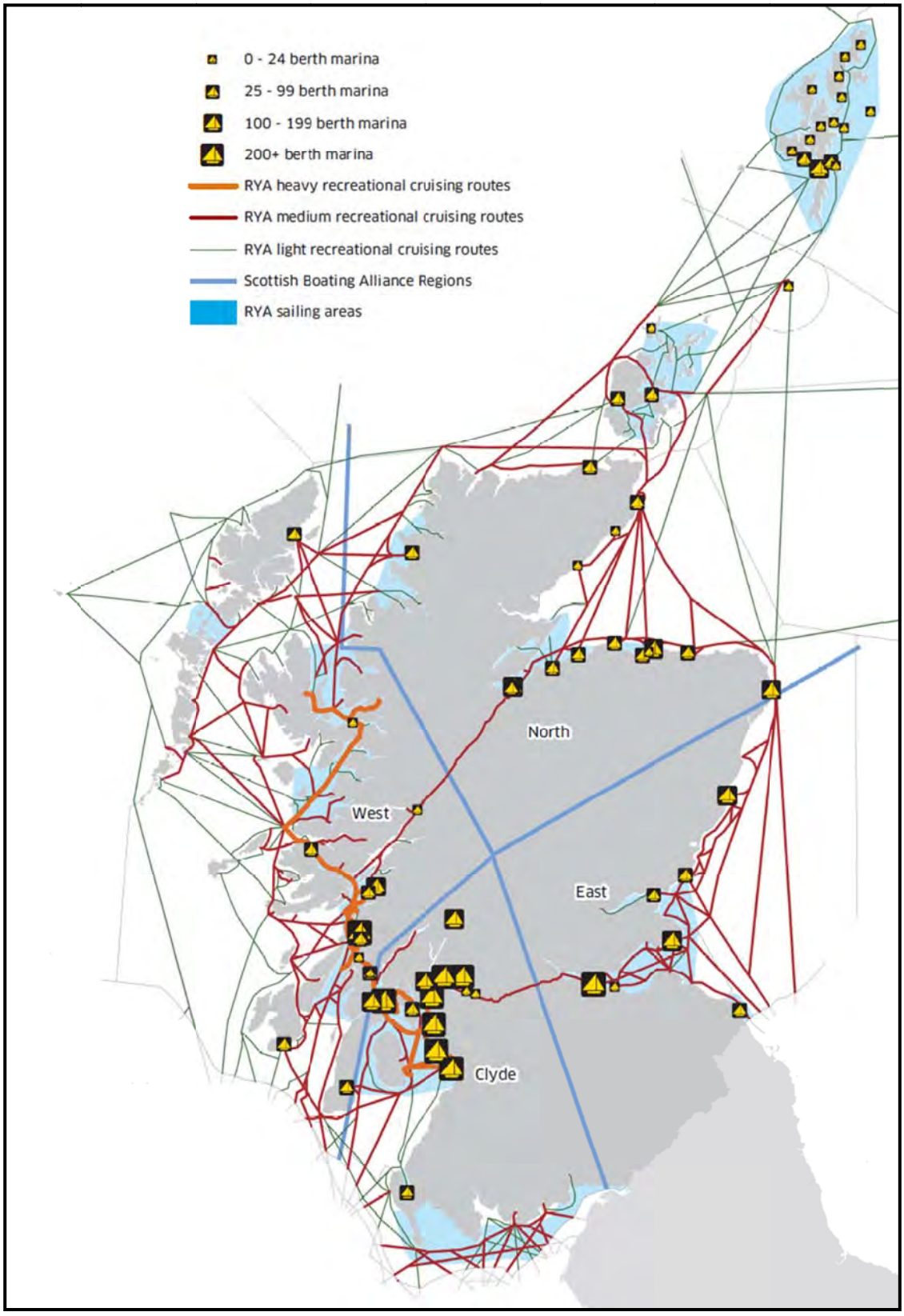
[21] Berry B.F. and Flindell I.H. (2009) Estimating Dose-Response Relationships Between Noise Exposure And Human Health Impacts In The UK [available at: http://archive.defra.gov.uk/environment/quality/noise/igcb/documents/executive-summary.pdf [accessed 20/12/2013]

[22] Scottish Government (2013) Environmental Noise Issues [online] Available at: http://www.scotland.gov.uk/Topics/Environment/waste-and-pollution/Pollution-1/Noise-Nuisance/17553 [accessed 20/12/2013]

[23] Scottish Government (2007) Scottish Noise Mapping [online] Available at: http://www.scottishnoisemapping.org/default.aspx [accessed 20/12/2013]

[24] Scottish Government (2013) Environmental Noise Issues [online] Available at: http://www.scotland.gov.uk/Topics/Environment/waste-and-pollution/Pollution-1/Noise-Nuisance/17553 [accessed 20/12/2013]

## Figure 7: Cruising routes and sailing areas[25]




[25] Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government, pg. 153.

**Figure 8: Surfing Locations**[26]

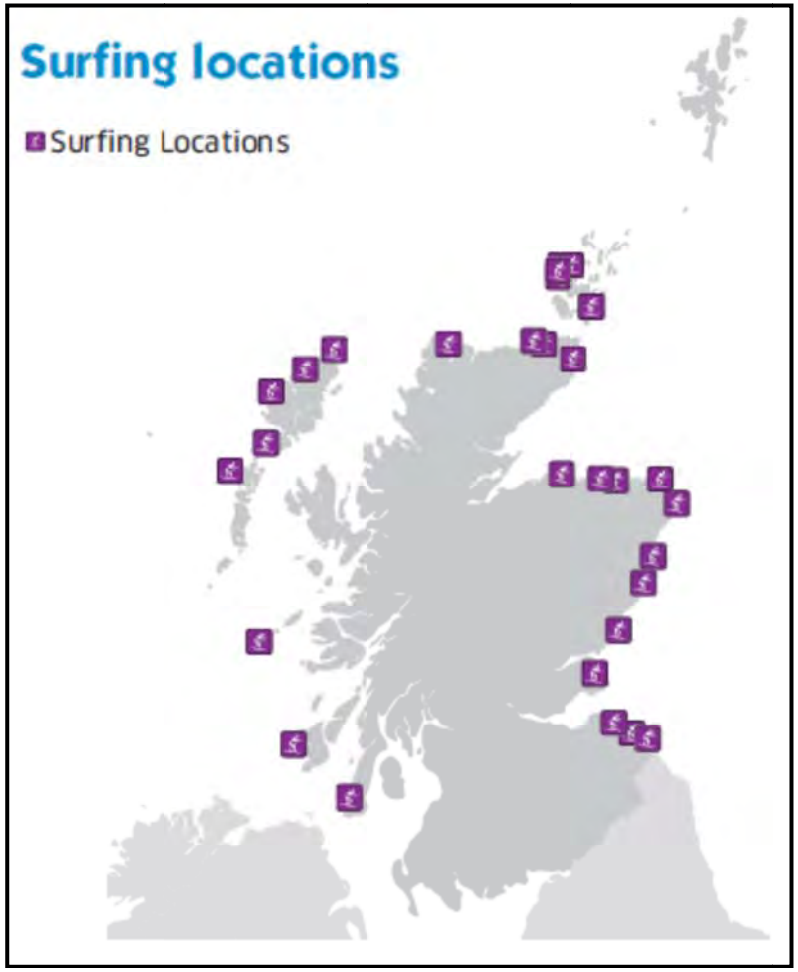
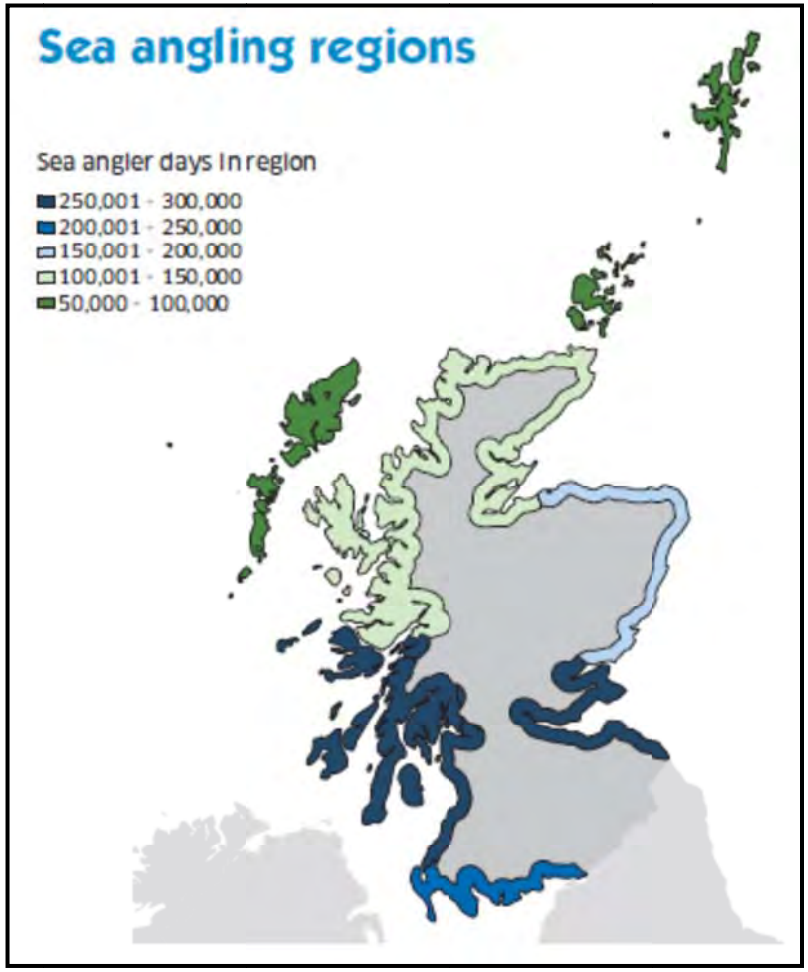



**Figure 9: Sea angling regions**[27]




[26] Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government, pg. 155.

[27] Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government, pg. 155.

## 4.4 Water and the Marine Environment

4.4.1 In addition to supporting biodiversity features, Scotland's coastal and marine environments play an important role in supporting many coastal communities, and other marine users that depend on Scotland's estuaries, coastal and marine waters. As a consequence, negative impacts on water quality can have a detrimental impact on not just the habitats and species that reside in these areas, but also on the activities that use these waters and particularly those requiring high water quality (e.g. bathing, shellfish aquaculture, etc.).

4.4.2 There are a number of mechanisms in place for monitoring and managing the quality of our waters including the Water Framework Directive (WFD) [28,29], River Basin Management Plans (RBMP), Bathing Waters Directive[30] and, until December 2013, the Shellfish Waters Directive[31]. The WFD establishes a framework for the protection of transitional and coastal waters with the aim of ensuring that all aquatic ecosystems meet 'good status' by 2015. Some 97% of coastal waters and 86% of estuaries were classed as in 'good' or 'better' condition in 2012 [32].

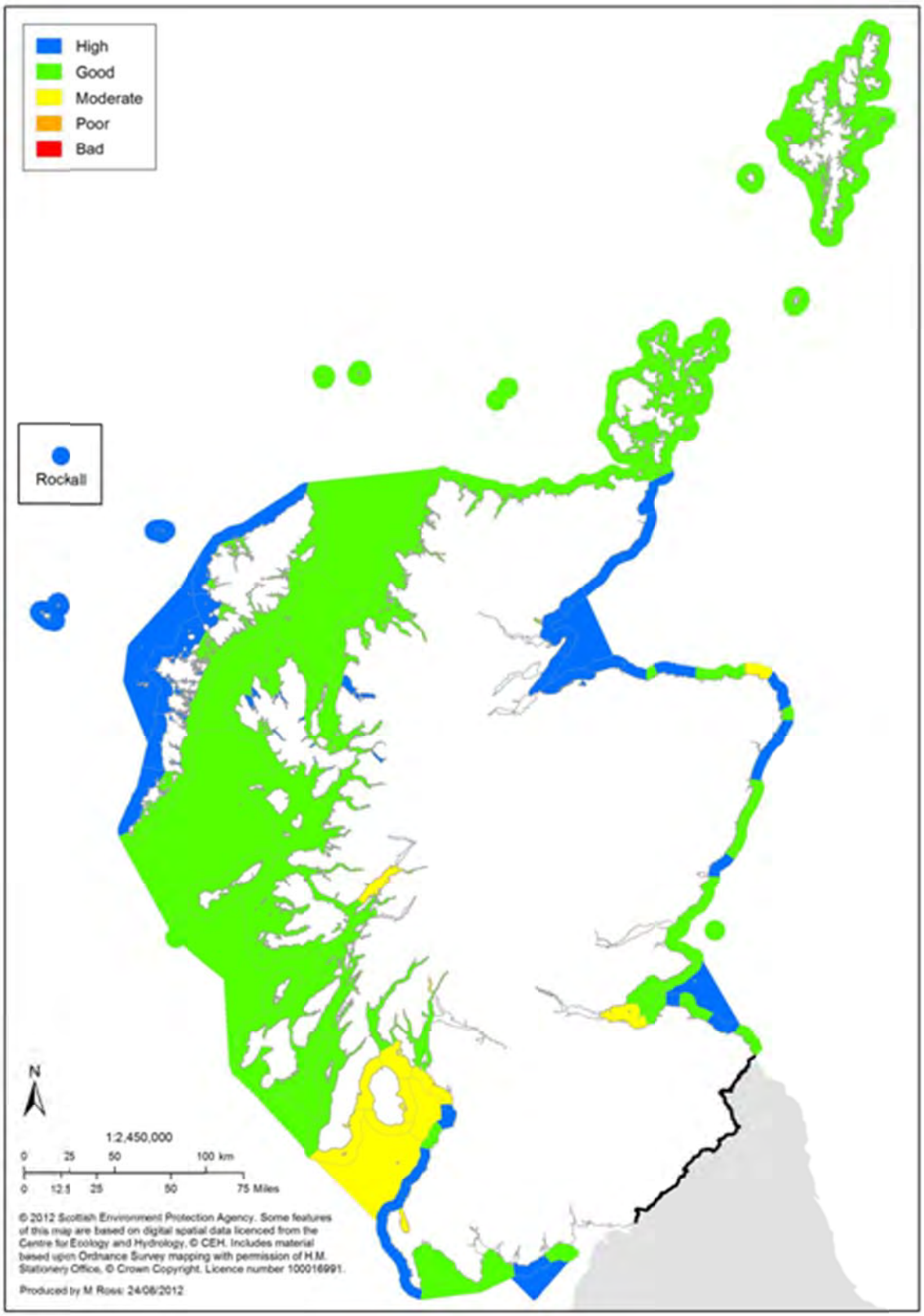
4.4.3 Some 84 coastal waters in Scotland have been designated 'shellfish growing waters' with these areas predominantly located on the west coast of the Scottish mainland and the islands [33]. In 2011, all designated sites met the minimum environmental quality standards (the 'mandatory' standard) set by the EC Shellfish Waters Directive.

4.4.4 The quality of Scotland's bathing waters, comprising 80 coastal and 3 inland waters, has steadily improved over recent years. In 2011, 95% of Scotland's bathing waters achieved the mandatory standard for bathing water quality, and of these, nearly half also met the more stringent guideline standard with only four waters (Sandyhills, Irvine, Lossiemouth East and Eyemouth) failing to achieve mandatory quality compliance. The 2011 monitoring report indicates that pollutants (e.g. bacteria and diffuse pollutants) from agricultural or urban runoff mobilised from heavy rainfall are the most likely causes of these exceedances.

4.4.5 Key pressures on the quality of the water environment include contamination as a result of marine activities (e.g. dredging), pollution from transport (e.g. ballast discharge, leaks and spills), and diffuse and point source pollution of coastal waters from land-based activities (e.g. agriculture, sewage, etc.).

[28] JNCC (2011) Council Directive 2000/60/EC establishing a framework for Community action in the field of water policy (Water Framework Directive), [online] Available at: http://jncc.defra.gov.uk/page-1375 [accessed 19/12/2013]
[29] European Commission (2012) The EU Water Framework Directive – integrated river basin management for Europe, [online] Available at: http://ec.europa.eu/environment/water/water-framework/index_en.html [accessed 19/12/2013]
[30] SEPA (2012) Bathing Water Reports [online] Available at: http://www.sepa.org.uk/water/bathing_waters/bathing_water_reports.aspx [accessed 19/12/2013]
[31] Scottish Government (2013) Shellfish Waters [online] Available at: http://www.scotland.gov.uk/Topics/Environment/Water/15561/ShellfishWaters [accessed 18/12/2013]
[32] SEPA (2013) Classification [online] Available at: http://www.sepa.org.uk/water/monitoring_and_classification/classification.aspx [accessed 18/12/2013]
[33] Scottish Government (2013) Shellfish Waters [online] Available at: http://www.scotland.gov.uk/Topics/Environment/Water/15561/ShellfishWaters [accessed 19/12/2013]

**Figure 10: Coastal and Transitional Waters Classification[34]**




[34] Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government.

## 4.5 Climatic Factors

4.5.1 Climate change is a major issue in both a national and global context. Changes in climate are predicted to lead to a range of effects including increases in water temperatures and sea levels, changes in wave heights, increases in frequency of extreme weather events (e.g. storms and flooding) and changes to coastlines.

4.5.2 Since 1961, average temperatures in all parts of Scotland have risen for every season [35] and over the last three decades, sea-surface temperatures around the UK coast have risen by around 0.7ºC [36]. At the same time, our seas are becoming more saline and acidic, particularly those to the north and west of Scotland, as increasing amounts of atmospheric carbon dioxide are absorbed at the sea surface. There is clear indication that the effects of climate change are already affecting the marine environment[37], and this is also likely to increase the vulnerability of some habitats and species to added pressures in the future[38].

4.5.3 Climate change mitigation forms a key focus of Scottish Government policy based upon reducing greenhouse gas (GHG) emissions, improving energy and heat efficiency, and decarbonising industries (e.g. the shipping, electricity and heat generation sectors, etc.). Through programmes such as the Scottish Climate Change Adaptation Programme[39], the Scottish Government is committed to improving resilience and adapting to the effects of climate change, including those effects that are predicted to arise regardless of the success of future action.

4.5.4 Pressures such as the vulnerability of Scottish ports, harbours and coastal areas have been identified, due in part to effects such as increased risk of storm surges and sea level rises. Additional pressures may also arise from increased service demand associated with global shipping and increases in population and demand. Further changes in the natural environment due to climatic factors are also expected, particularly for coastal and marine areas, and mitigation and adaptation to change will likely be required to minimise impacts and prevent the loss of some species and habitats.

*Climate change policy aims to reduce greenhouse gas emissions to the atmosphere, and to improve adaptation to the predicted effects of climate change. Details are provided in Appendix 1.*

[35] Sniffer (2006) A Handbook of Climate Trends Across Scotland, [online] Available at: http://www.sniffer.org.uk/files/5513/4183/8003/CC03_1_Handbook.pdf [accessed 8/2/2013]
[36] UKCIP (2011) Recent Climate Trends [online] Available at: http://www.ukcip.org.uk/essentials/climate-trends/ [accessed 8/2/2013]
[37] Marine Scotland (2011) Scotland's Marine Atlas: Information for The National Marine Plan, pg 189.
[38] JNCC (2010) Biodiversity and Climate Change – a Summary of Impacts in the UK [online] Available at: http://jncc.defra.gov.uk/page-5145 [accessed 14/12/2012]
[39] The Scottish Government (2013) Scottish Climate Change Adaptation Programme [online] Available at: http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/adaptation/AdaptationProgramme [accessed 18/12/2013]

## 4.6 Air

4.6.1 Established air quality objectives set out in the EC Directive[40] are transposed into the UK Air Quality Strategy[41] and Scottish regulations. In general terms, we have seen major changes in air quality in Scotland, the UK and Europe over the past few decades, with significant improvements and reductions in pollutant levels. However, there are still parts of Scotland where objectives for pollutants such as nitrogen dioxide ($NO_2$), sulphur dioxide ($SO_2$) and particulates ($PM_{10}$) continue to be exceeded. Locally, some 33 Air Quality Management Areas (AQMAs) have been put in place across the Scotland by local authorities to address specific areas where air quality objectives are not, or are likely not to be, achieved. These AQMAs are predominantly located in urban areas and largely result from transport emissions, although other sources such as emissions from industry, domestic heating and the energy sector have also been identified as sources of reduced air quality in some areas[42]. AQMAs have been identified in or near to several existing N-RIP sites including Aberdeen, Dundee, Grangemouth and Leith. No AQMAs have been declared in the HIE area.

4.6.2 Air pollutants can have a range of effects on biodiversity, ecosystem services (e.g. agriculture) and also contribute to climate change. Of particular concern are the serious repercussions that air pollution and emissions can have for many aspects of human health, including impacting on the quality of life directly by the inhalation pathway, via secondary impacts from pollutants in the food-chain, or in produce for consumption[43]. For example, particulates and Nitrous Oxides ($NO_x$) have been linked to respiratory illnesses such as respiratory infections, heart disease, reduced lung function, lung disease and can contribute to cardiovascular illnesses[44]. Research has shown that air pollution reduces average life expectancy and often leads to premature deaths[45].

*Air quality legislation and policy aims to achieve air quality objectives established to improve human health, improve quality of life and help to protect the environment. Details are provided in Appendix 1.*

[40] EC (2005) Communication From The Commission To The Council And The European Parliament, EU Thematic Strategy on Air Pollution [online] Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0446:FIN:EN:PDF [accessed 2/8/2013]
[41] SEPA (undated) Air Quality Strategy [online] Available at: http://www.sepa.org.uk/air/ambient_air_quality/uk/air_quality_strategy.aspx [accessed 19/12/2013]
[42] DEFRA (2012) Summary AQMA Data [online] Available at: http://aqma.defra.gov.uk/aqma/tables.php [accessed 29/07/2013]
[43] JNCC (2011) Air Pollution - Nitrogen Deposition and the Nature Directives [online] Available at: http://jncc.defra.gov.uk/page-1426 [accessed 29/07/2013]
[44] World Health Organisation Air quality and health, 2008, available at http://www.who.int/mediacentre/factsheets/fs313/en/index.html (Accessed on 28/08/2012)
[45] House of Commons Environmental Audit Committee (2010) 'Air Quality, Fifth Report of Session 2009 – 10 Volume 1, http://www.publications.parliament.uk/pa/cm200910/cmselect/cmenvaud/229/229i.pdf (Accessed on 28/08/2012)

## 4.7 Marine Geology and Coastal Processes

4.7.1 The protection of Scotland's geodiversity interests is, in the main, currently focused on terrestrial geodiversity, although the suite of Marine Protected Areas includes geological and geomorphological features in both territorial and offshore waters.

4.7.2 The current protection framework for the terrestrial environment consists of the recognition of geodiversity features through the establishment of UNESCO Geoparks (i.e. North West Highlands Geopark and Shetland Geopark) and SSSIs. SSSIs are the primary statutory mechanism for geodiversity protection underpinned by the Geological Conservation Review (GCR) undertaken by the JNCC, and while having a terrestrial focus, include many with coastal features. Many of these sites are also designated as SPAs or SACs[46]. Other sites, such as Scotland's National Parks, National Nature Reserves and Local Nature Conservation Sites (e.g. Local Geodiversity Sites (LGS) or Regionally Important Geological and Geomorphological Sites (RIGS)), also contain features of geological and geomorphological interest.

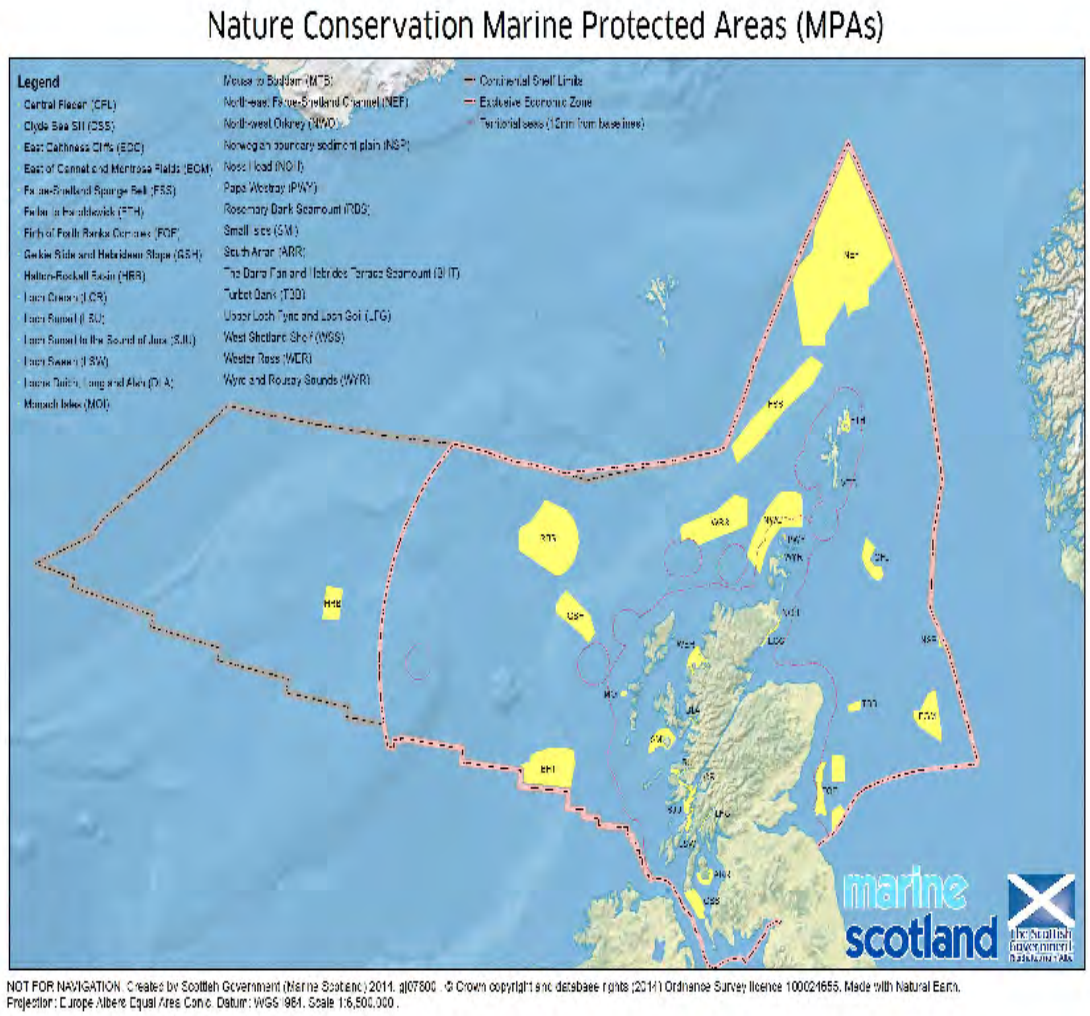
4.7.3 The geodiversity features protected by the MPAs in territorial waters include Marine Geomorphology of the Scottish Shelf Seabed (sand banks, sand ribbon fields, sand wave fields and banks of unknown substrate) and Quaternary of Scotland (landscape of areal glacial scour, glaciated channels/troughs, megascale glacial lineations, moraines, Seabed Fluid and Gas Seep pockmarks, Submarine Mass Movement slide scars, meltwater channels, rock basins, and streamlined bedforms).

4.7.4 Coastal change is considered to be the main pressure on coastal soils and sediments. Much of the Scottish landscape and coastline was initially formed through the processes of glacial erosion and deposition[47] and it continues to change through coastal processes such as wave action, sediment movement, erosion and accretion[48]. The 2004 Eurosion survey of Scotland's coastline reported that it comprises predominantly (Figure 12):

- hard coasts - consisting of rocks and cliffs (70%);
- soft coasts considered potentially susceptible to erosion impacts - consisting of unconsolidated gravels, sand and silts (29%); and
- artificial coasts such as harbours and sea walls (less than 1%)[49].

[46] SNH (2013) Protecting our geodiversity [online] Available at: http://www.snh.gov.uk/protecting-scotlands-nature/safeguarding-geodiversity/protecting/ [accessed 20/8/2013]
[47] Gordon JE, Lees G, Leys KF, MacFayden CCJ, Puri G, Threadgould R and Kirkbride V (2002) Natural Heritage Zones: Earth Sciences, [online] Available at: http://www.snh.gov.uk/docs/A337648.pdf [accessed 05/04/2013]
[48] SNH (2001) Natural Heritage Futures – Coasts and Seas, [online] Available at: www.snh.gov.uk/docs/A306281.pdf [accessed 04/04/2013]
[49] SNH (undated) information on coastal erosion [online] Available at: http://www.snh.gov.uk/about-scotlands-nature/rocks-soils-and-landforms/coasts/erosion/ [accessed 04/04/2013]

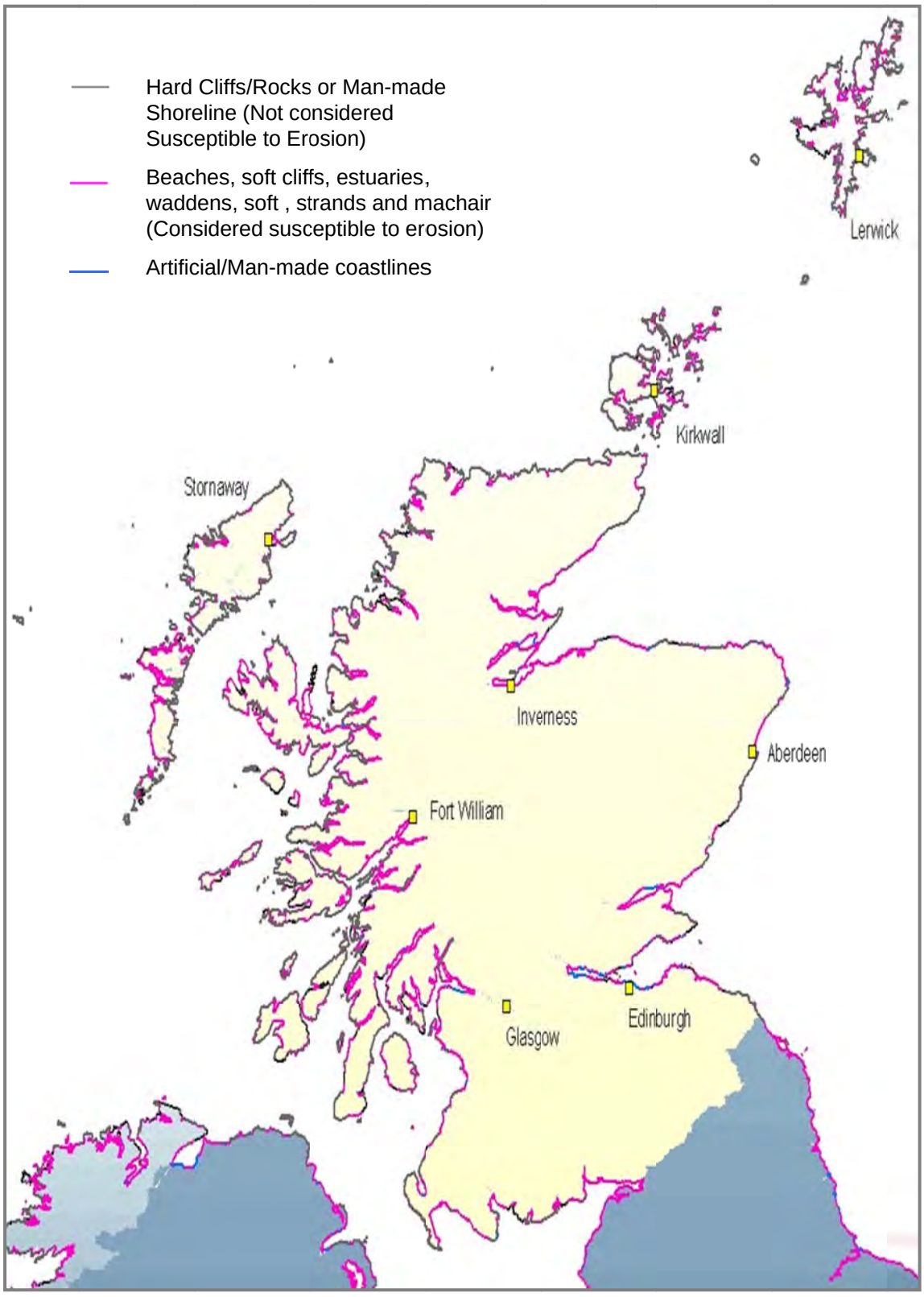
**Figure 11: Marine Protected Areas[50]**




4.7.5 The erosional portion of coastlines largely consists of beaches, sand dunes, conglomerates/soft-rock cliffs, machair and marshes with muddy sediments[51]. Coastal erosion is estimated to be affecting around 12% of Scotland's coastline [52], with areas such as the east coast from Montrose to Dunbar, the Firth of Clyde, the Inner Moray Firth, Orkney, Shetland and the Western Isles identified as being under particular pressure (Figure 13). The identification of these issues has prompted the development of coastal protection plans in these areas [53].

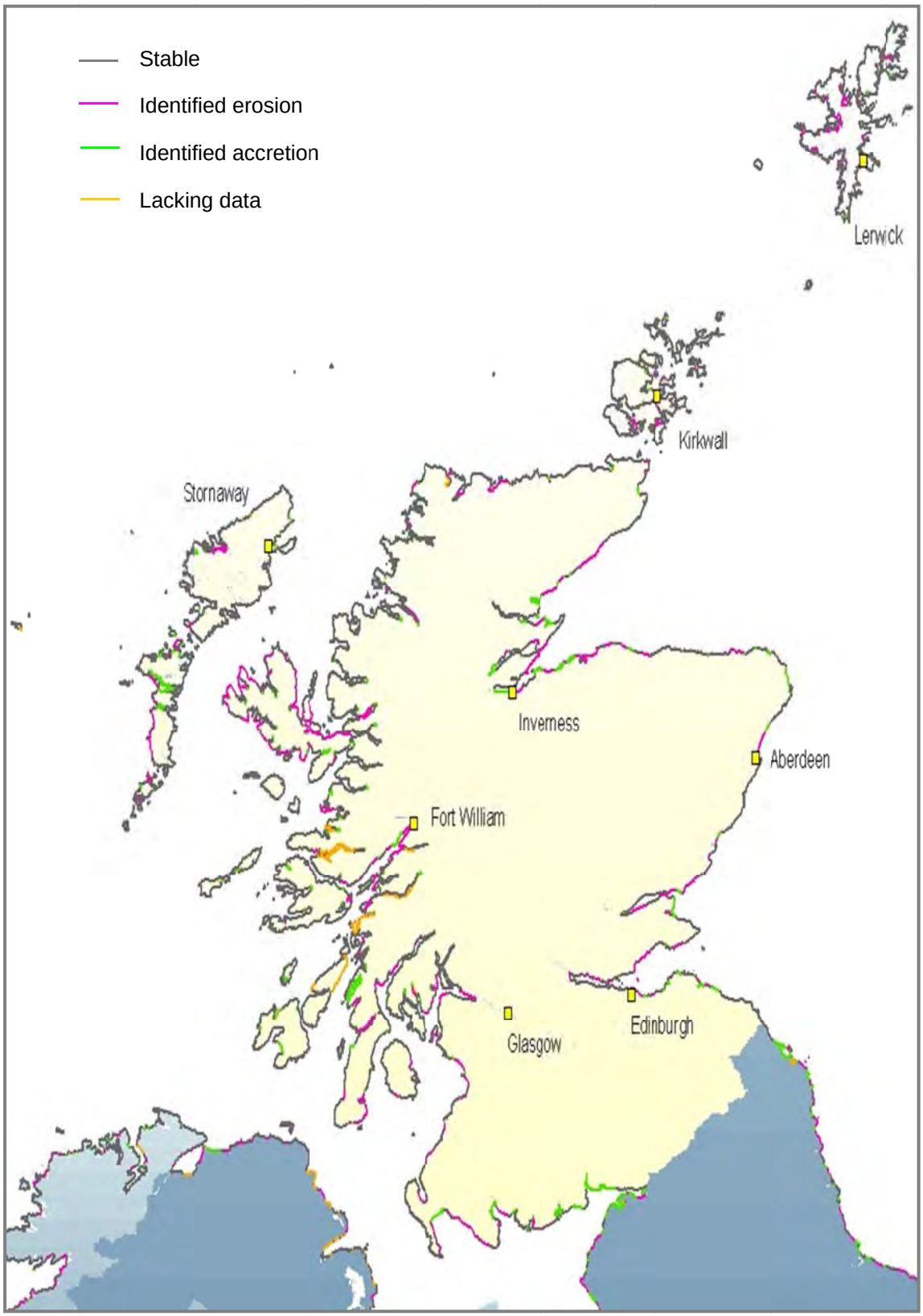
[50] http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork
[51] European Commission (2004) Eurosion: Living with Coastal Erosion in Europe – Sediment and Space for Sustainability – Results for the Eurosion Study, [online] Available at: http://www.eurosion.org/reports-online/reports.html (accessed 04/04/2013)
[52] SNH (2012) Coastal Erosion [online] Available at: http://www.snh.gov.uk/about-scotlands-nature/rocks-soils-and-landforms/coasts/erosion/ [accessed 28/06/2013]
[53] SNH (2001) Natural Heritage Futures – Coasts and Seas, [online] Available at: www.snh.gov.uk/docs/A306281.pdf *[accessed* 28/06/2013*]*

## Figure 12: Eurosion Coastal Survey and Erosion Potential[54]




[54] Eurosion (2004) Reports Online [online] Available at: http://www.eurosion.org/reports-online/index.html (accessed 7/3/2014)

**Figure 13: Eurosion Coastal Erosion Survey 2000[55]**




[55] Eurosion (2004) Reports Online [online] Available at: http://www.eurosion.org/reports-online/index.html (accessed 7/3/2014)

4.7.7 While natural wave action, tidal currents and drainage have typically been the main drivers of coastal erosion, human activities have also played a significant role in coastal erosion in recent times. Practices such as land reclamation and the construction of infrastructure such as harbours, jetties and marinas, can affect coastal processes by restricting the movement of coastal sediments[56], potentially increasing the vulnerability of an area to erosion. While such impacts are likely to be site-specific, additional pressure on wider coastal areas are expected to increase in the future, due to the effects of climate change such as rising sea levels, the frequency and intensity of storm events, and increased wave heights[57].

*Environmental protection objectives in this area relate to soils and marine sediments in the context of habitat protection, extending to the prevention of increased coastal erosion of valued features (e.g. vulnerable coastlines such as mud flats, salt marsh, dunes, etc.). See Appendix 1 for details.*

## 4.8 Cultural Heritage

4.8.1 A wide range of historic built and archaeological sites can be found on the foreshore and seabed around Scotland, ranging from the remains of ships and aircraft lost at sea, to sites such as historic piers, lighthouses and other structures located at the coastal fringe. It is estimated that there may be around 38,000 historic features around Scotland's coast. Some of these are protected through recognition as World Heritage Sites, scheduled monuments and wrecks, gardens and designed landscapes, archaeological remains, listed buildings, conservation areas and Historic Marine Protected Areas (HMPAs) [58]. For many of these sites, particularly those near to the coast, the sea and the coastline can be integral parts of their setting, and in many instances, provide a key element in how they are experienced, understood and appreciated.

4.8.2 Whilst many have been recorded, it is thought that many historic sites remain unreported as archaeological sites. These may include sites that are known locally and remain unreported or sites that have not yet been discovered [59]. For example, there are extensive coastal and marine areas around the Orkney and Shetland Islands, the east and north west coasts of Lewis, and the coastal regions of North Uist, Benbecula and South Uist that have been identified as potentially having submerged archaeology of interest.

4.8.3 Along much of Scotland's coastline, many archaeological and historic sites are considered to be at risk from a range of man-made pressures including anchoring, commercial fishing, dredging and disturbance from marine or

[56] Marine Climate Change Impacts Partnership (2010) Coastal erosion and Coastal Geomorphology, [online] Available at: http://www.mccip.org.uk/annual-report-card/2007-2008/marine-environment/coastal-erosion.aspx [accessed 28/06/2013]
[57] SNH (2010) Climate Change at the Coast, [online] Available at: http://www.snh.gov.uk/about-scotlands-nature/rocks-soils-and-landforms/coasts/climate-change/ [accessed 28/06/2013]
[58] Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government, pg. 156.
[59] Scape Trust (undated) Shorewatch [online] Available at: http://www.scapetrust.org/html/shorewatch.html [accessed 28/06/2013]

coastal construction. Sites in or at the coastal fringe, particularly those near to the shoreline, may also be under pressure from factors such as coastal development and changes in coastal processes. These pressures are likely to increase in the future with the predicted effects of climate changes.

*The overall aim of historic environment legislation and policy is to protect and, where appropriate, enhance the historic environment. See Appendix 1 for details.*

## 4.9 Landscape and Seascape

4.9.1 Scotland's seascapes are highly valued, with diverse character and widely perceived scenic quality. Features such as machair plains, cliffs, dunes and sandy beaches, islands, sea lochs and firths, and rocky headlands can be found along many coastlines. Many of Scotland's National Scenic Areas (NSAs; Figure 14) include coastal elements, particularly those located on the west coast, Orkney, Shetland and the Western Isles. The development of Local Landscape Designations in many parts of Scotland further demonstrates the value of landscapes and seascapes at the local level.

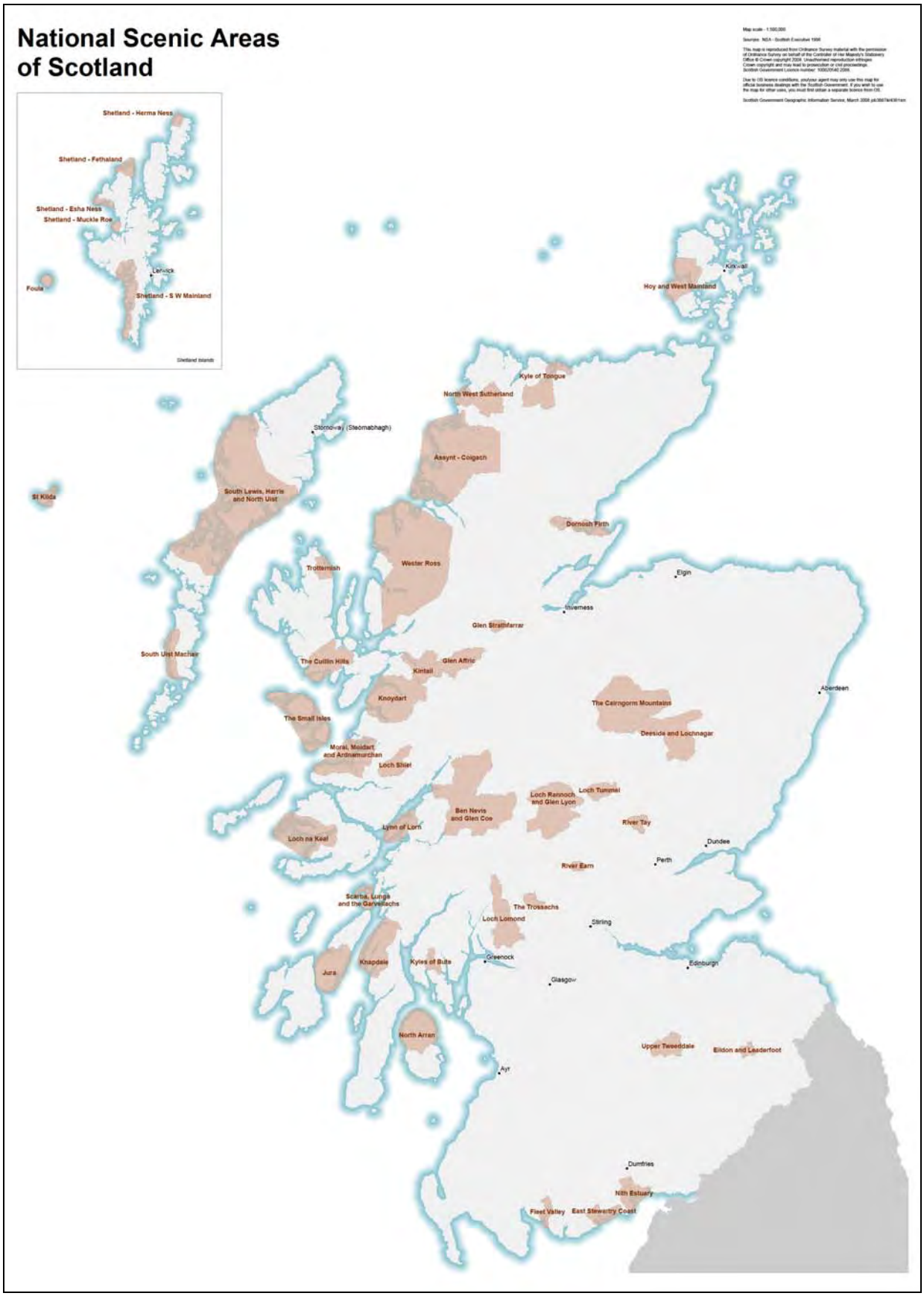
4.9.2 Although there are many settlements on the coast, less than 15% of the length of Scotland's coastline has been developed. Much of the coast has a natural character and some areas provide a sense of wildness, particularly those in the west, north and north-west of the Scottish mainland. However, these coastlines generally remain accessible and there is an on-going commitment to improve public access [60].

4.9.3 Pressures such as coastal and offshore development, the likely effects of climate change (e.g. changes to coastal processes, coastal erosion/accretion) and associated cumulative effects have been identified with the potential to affect coastal landscapes and seascapes. There is also the potential for these pressures to increase in the future, particularly those associated with climate change (e.g. rises in sea level, storm events, erosion/deposition, etc.), and the likelihood of increased competition for marine and coastal use and offshore and coastal development in the future.

*Environmental objectives aim to protect Scotland's landscape and seascape from inappropriate development or development that will have secondary effects, e.g. increased coastal erosion. Details are provided in Appendix 1.*

[60] Scottish Government (2010) Offshore Wind Strategic Environmental Assessment Environmental Report, 2010 [online] Available at: http://www.scotland.gov.uk/Resource/Doc/312161/0098588.pdf [accessed 14/02/2012]

## Figure 14: National Scenic Areas in Scotland



## 4.10 Material Assets

Overview

4.10.1 Scotland's marine environment plays an important role in supporting a wide range of marine sectors, and as a consequence, a significant role as a foundation for much of Scotland's economic output. The marine sector also plays a vital role in providing employment opportunities for many coastal communities, particularly those in areas such as Shetland, Orkney, the Western Isles and Scotland's north-east [61]. The presence of a wide range of users of the marine and coastal environment demonstrates the shared use and competition for these resources, including:

- Finfish and shellfish aquaculture sites on the west coast, Shetland, Orkney and the Western Isles.
- Fishing activities inshore and further offshore throughout Scotland's waters.
- Offshore wind, wave and tidal renewables located around Scotland's coastlines.
- Offshore oil and gas.
- Recreational activities such as cruising, yachting, sea angling, surfing, paddle sports, tourism (i.e. coastal, marine and wildlife) and diving.
- Shipping and ferry services.

Vessels

4.10.2 Fishing vessels, recreational vessels and ferry services (Figure 15), in particular, utilise many of the small ports and harbours located around the Scottish coastline. Shipping in general utilises both Scottish ports and Scottish waters (Figure 16). In many instances, these facilities and the sectors that utilise them provide important benefits and services (e.g. ferry services providing access to more remote communities, etc.). Inshore fisheries vessels also regularly use inshore and coastal waters for their fishing activities, many of which are likely to be located in both open and sheltered waters in the vicinity of these ports and harbours. As such, pressures in the form of the potential for displacement of these activities from accessing port facilities and nearby waters (e.g. wet storage of devices) has been identified. The benefits that these activities provide could be compromised if they were displaced or discontinued.

Tourism and Recreation

4.10.3 Scotland is renowned for recreation opportunities offered by its coastal environment. Tourism and recreation make a significant contribution to the Scottish economy. This can be particularly important in rural areas and

[61] Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government, pg. 143.

islands where other opportunities for income generation is limited and employment seasonal.

4.10.4 Participation in sea kayaking in Scotland has increased significantly in recent years, with kayak surfing also rapidly gaining in popularity. Participants often seek secluded unspoilt marine environments which they value highly as a resource. Sea kayaking now takes place throughout Scotland but key areas include the west coast and islands, the East Lothian coast and the Moray Firth. It is recognised that there is a lack of quality data on the location of kayaking sites/routes within Scotland (consultation on MRIP may assist in improving existing data).

4.10.5 Scotland possesses a number of high quality surfing breaks and open water conditions which have attracted many national and international surfing and windsurfing competitions. A survey by the Scottish Surfing Federation in 2012 estimated that there are over 1500 regular surfers and a further 8500 non-regular surfers residing within Scotland. As Figure 8 shows, surfing spots can be found on the East Lothian coast, Aberdeenshire coast, Moray Firth, northern Highlands, the Orkney Islands and the Western Isles. Thurso is considered to be one of the best surfing spots in the UK.

4.10.6 Pressures in the form of the potential for disturbance and/or displacement of marine recreational users during construction and operation/maintenance of MRIP sites has been identified. The benefits that these activities provide could be compromised if they were displaced or discontinued.

Marine aggregates

4.10.7 Historically, the marine aggregate extraction industry has been small in Scotland, largely due to an adequate supply of terrestrial aggregate and a lack of suitable and readily accessible resources. At present, only two marine aggregate extraction sites are located in Scottish waters.

4.10.8 The first and largest is Middlebank, in the Firth of Forth, licensed for the extraction of up to 6 million cubic metres over 10 years, although with only one extraction to date of nearly 130,000 tonnes (86,260 $m^3$) for use as in-fill in the Leith Western Dock Reclamation Project in 2005. The second area is located in the Firth of Tay, although this region has not been used for several years. However, it is estimated that the Firth of Tay site could supply some 66,000 $m^3$ a year[62].

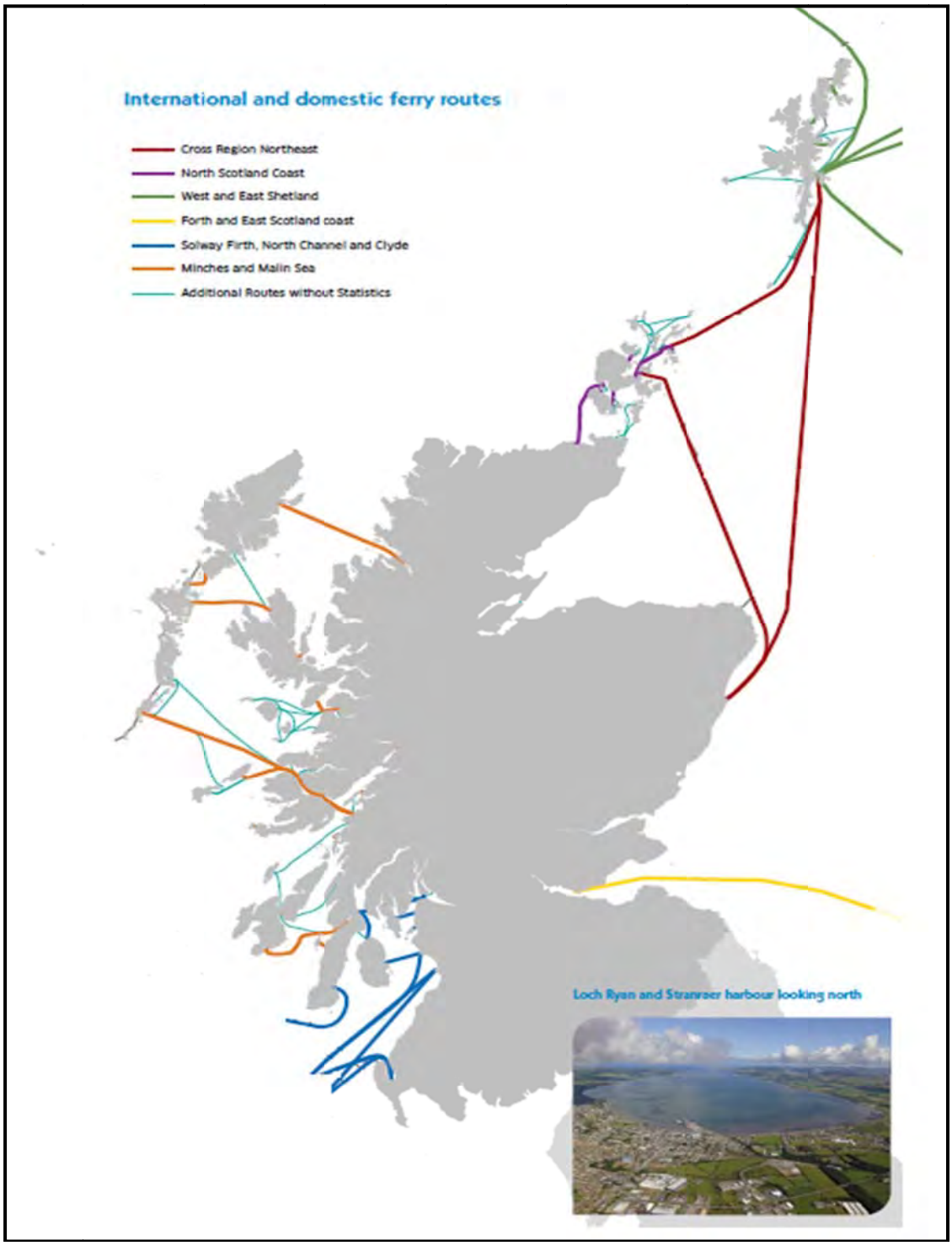
Dredging disposal

4.10.9 In the past, a wide range of materials has been disposed of at sea (e.g. industrial wastes, colliery mine-stone and sewage sludge). This situation has gradually changed and now only the disposal of dredged material from ports, harbours and marinas is currently permitted. In 2009, there were

[62] Scottish Government (2011) Scotland's National Marine Plan, Interim Sustainability Appraisal Report [online] Available at: http://www.scotland.gov.uk/Publications/2011/03/21114728/22 (accessed 04/04/2013)

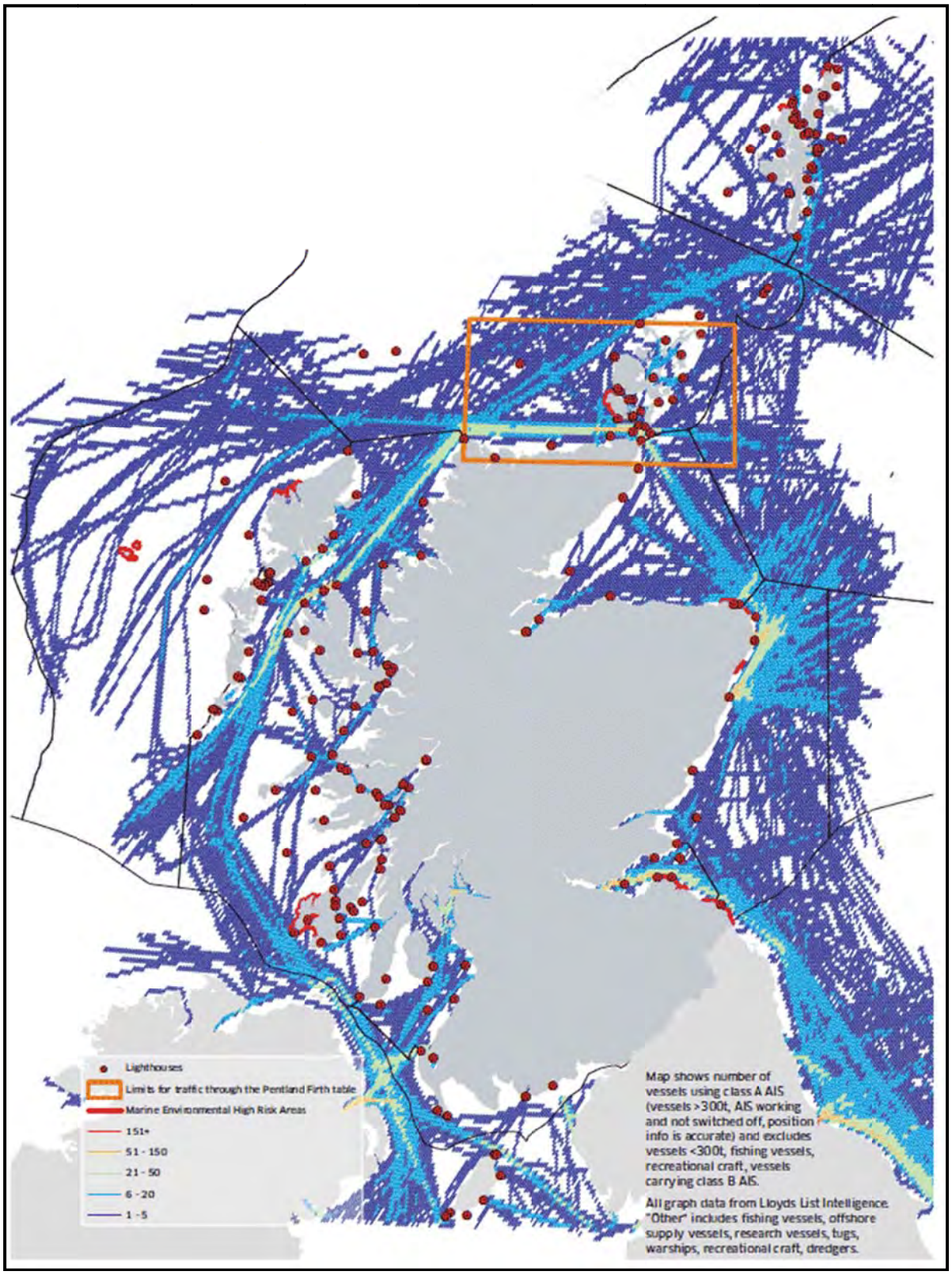
some 66 open sites designated and routinely used for marine disposal within Scotland, with a further 50 sites either closed or disused[63].

**Figure 15: International and Domestic Ferry Routes[64]**




[63] Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 176
[64] Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government, pg. 173.

**Figure 16: Shipping Traffic**
Number of vessels in a given area during 1st week January 2010 based on Maritime and Coastguard Agency AIS data[65]




[65] Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government, pg. 175.

# 5 ENVIRONMENTAL EFFECTS/ MITIGATION

## 5.1 Background

5.1.1 The SEA has assessed 50 sites in total for their potential environmental effects. These sites (Table 2) comprise:

- 9 to support manufacturing (3 sites also have potential capacity);
- 15 to support assembly/ construction and installation (3 sites also have potential capacity);
- 23 to support operations and maintenance (1 site has potential capacity); and
- 25 to support refuge / west storage/ unplanned maintenance.

5.1.2 The results of the SEA for each site are provided in the assessment tables in Appendices 2 – 7.

5.1.3 The results of the SEA show that, dependent on the way site activities are planned, there is the potential for significant adverse environmental effects at each location. Many of these potential effects may be avoided and/or reduced at the project planning and design stage, if appropriate measures are integrated into the process.

5.1.4 Accordingly, the purpose of this section is to:

- provide an overview, at the national level, of the potential environmental effects of the MRIP and its activities;
- identify the measures which could be implemented to avoid and/or reduce potential adverse effects;
- describe the residual environmental effects; and
- highlight areas of uncertainty where additional considerations may be needed.

5.1.5 An overview of effects, by environmental topic, is provided in Section 5.1. Section 5.2 sets out potential cumulative effects.

5.1.6 It is worth noting that none of the MRIP sites involves construction of a new port. Virtually all are already in use for a variety of activities, including as ferry terminals and in support of fishing, recreational and cargo vessels, and cruise liners. Use of these ports to support the offshore marine energy industry may result in an increased intensity of activity, but none of it would constitute a wholly new activity other than wet storage, i.e. storage of devices in the water until they are ready to be taken/towed out to the offshore energy site for installation.

## 5.2 Common Issues - Assumed Mitigation

5.2.1 During the SEA, a number of potential environmental effects were identified which require to be acknowledged in the SEA, but are likely to be mitigated by port operators and/or industry at the project level as a routine part of port operations and/or manufacturing. These are issues with which port owners

are familiar, and are not specific to the potential offshore renewables use. They are discussed in the following paragraphs.

5.2.2 Activities at ports, by their nature, have the potential to give rise to adverse effects on water quality/ecological potential, for example as a result of accidental spills of oil and/or chemicals. As well as affecting water quality, spills can affect the ability of water to support aquatic organisms, including fish, and coastal habitat and the species which use it. For the purposes of this SEA, we have assumed that ports and vessels will work to avoid spills and will implement contingency plans should spills occur[66]. We have also assumed that manufacturers will comply with the conditions of their CAR licences and employ "good housekeeping" in their facilities. Accordingly, these effects have not been included in the assessment tables.

5.2.3 Construction and operational activities at ports can give rise to dust, with consequent effects on local residents and biodiversity interests (including species and habitats). For the MRIP this could include, for example, dust arising from the storage of aggregates as part of concrete production. As with water quality, for the purposes of this SEA we have assumed that port operators will ensure that mitigation measures will be built into construction and operation (e.g. dust suppression systems) such that these effects can be avoided and/or reduced. Accordingly, these effects have not been included in the assessment tables.

5.2.4 The discharge of ballast water has the potential to adversely affect water quality and/or ecological potential, through the discharge of oil and/or the accidental introduction of invasive non-native species (Fisheries Research Services, 2006). This is an issue for the MRIP, given that vessels will be involved in transporting raw materials and components, in construction/ installation activities, and in operations and maintenance. The International Maritime Organization (IMO) agreed the *International Convention for the Control and Management of Ships' Ballast Water and Sediments* in 2004. This convention regulates the discharge of ballast water and will come into effect between 2009-2016, depending on the characteristics of the individual vessel. The SEA has therefore assumed compliance with this convention, and has not included such effects in the assessment tables.

5.2.5 The increase in activity at ports may result in increased foul water discharges. However, as such discharges require to be licensed[67], the SEA has assumed that effects on water quality will be dealt with at the site level. Equally, we have assumed that atmospheric emissions from manufacturing of wave and tidal device components will require to be licensed, and will be dealt with at site level. Accordingly, these effects have not been included in the assessment tables.

5.2.6 One issue which will be clearer at project level is the contribution of nitrogen oxides ($NO_x$) emissions (from vessels undertaking operations and maintenance activities) to total Scottish emissions of $NO_x$, as well as to local pollutant loadings. Mitigation, in terms of emission reduction, has already begun through the implementation of IMO requirements, e.g. MARPOL

[66] See, for example, Forth Ports plc's website: http://www.forthports.co.uk/ports/aboutus/csr/
[67] under the Water Environment (Controlled Activities) (Scotland) Regulations 2005

Annex VI. Monitoring of $NO_x$ is undertaken by Local Authorities and, to date, emissions from ports have not been identified as a major contributor to the $NO_x$ concentrations which have led to the declaration of AQMAs. However, shipping is a major contributor to $NO_x$ emissions overall in Europe, and this issue will need to be kept under review as the numbers of vessels using Scottish ports increase.

## 5.3 Biodiversity, Flora and Fauna

5.3.1 The SEA identified the following potential effects on biodiversity, flora and fauna:

- potential loss of and/or damage to benthic habitats from wet storage of devices, e.g. through abrasion from anchors.
- disturbance and/or displacement of birds through wet storage of devices, from the presence of devices in the water, e.g. interference with flight path by components which extend above the water surface; disturbance during O&M through noise, human presence, vessel movement, etc.
- disturbance and/or displacement of seals from haul out sites, etc. through wet storage of devices.
- risk of corkscrew injuries to seals from slow-moving vessels with certain types of ducted propeller or those using dynamic positioning.
- disturbance of otters through noise, human presence; potential loss of habitat through wet storage of devices
- loss of habitat, e.g. saltmarsh, mudflat, sandflat, through wet storage of devices, with knock-on adverse effects on birds through loss of e.g. feeding habitat
- collision risk, disturbance (including noise) and/or displacement of cetaceans through vessel movement; entanglement in mooring lines (e.g. minke whale); displacement through wet storage of devices.

5.3.2 Key issues for biodiversity, flora and fauna identified in this SEA that will require further consideration are detailed in the following sections.

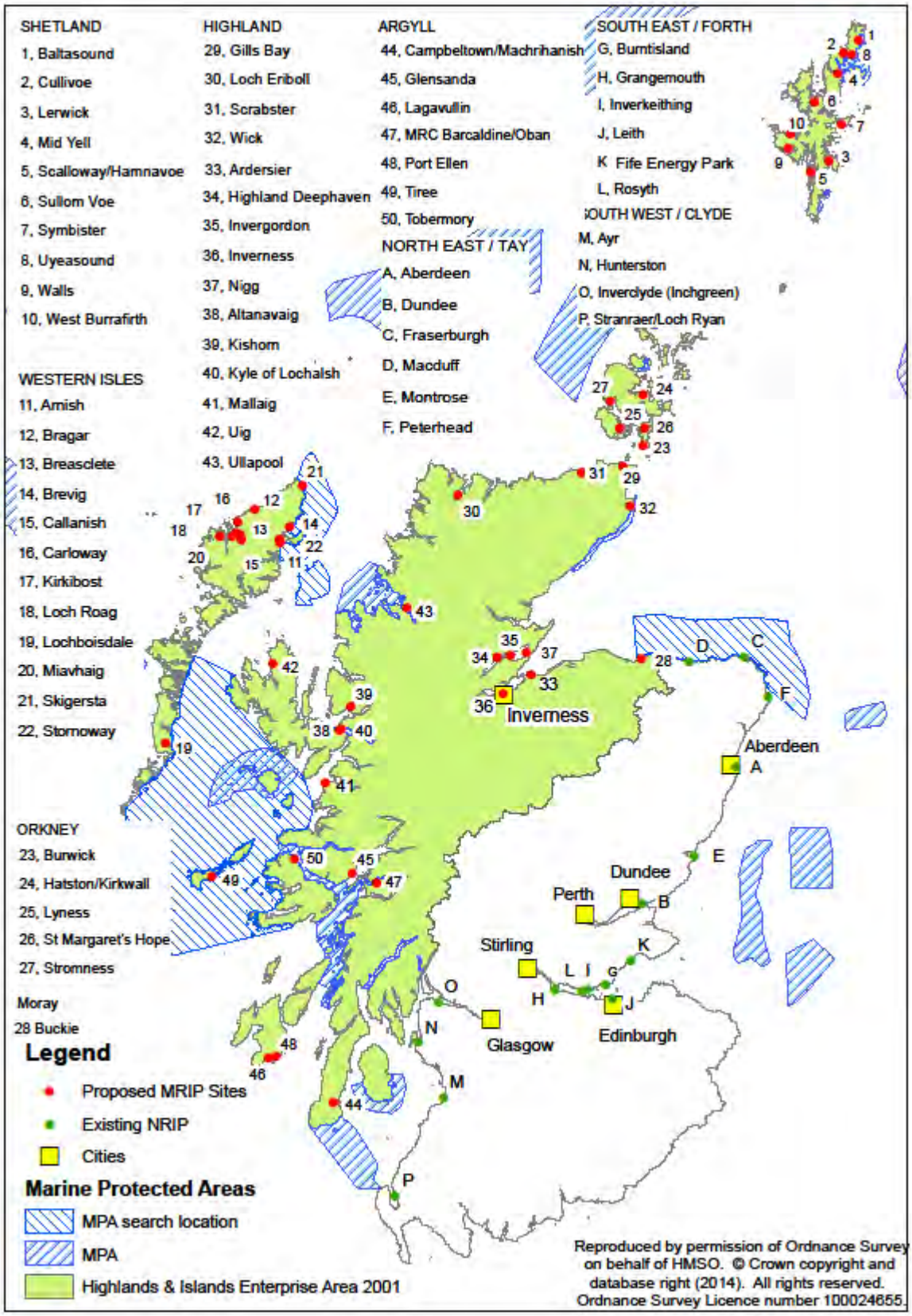
<u>Benthic Habitat</u>

5.3.3 The wet storage of wave and tidal devices will involve anchoring devices (that are under tow to the installation site) to the seabed, albeit temporarily. As noted in paragraph 3.2.9, the SEA has assumed that all forms of anchoring will be utilised. Where barges are used to transport devices, anchoring of the barges will also be required.

5.3.4 The use of anchors is likely to result in abrasion of benthic habitat, with concurrent loss of species of flora and fauna. This is an issue in particular where benthic habitat is a qualifying interest of Special Areas of Conservation or of Marine Protected Areas (MPAs). The relative location of MRIP sites and MPAs is shown in Figure 17.

5.3.5 The results of the assessment show that loss of benthic habitat, affecting SACs or MPAs, could be an issue for the following MRIP sites:

## Figure 17. MRIP sites and Marine Protected Areas



- Wick (Noss Head MPA)
- Altanavaig (Lochs Duich, Long and Alsh MPA)
- Glensanda (Loch Creran MPA; Lochs Duich, Long and Alsh MPA)
- Kyle of Lochalsh (Lochs Duich, Long and Alsh MPA)
- Mallaig (Skye to Mull MPA search location)
- Ullapool (Wester Ross MPA)
- Baltasound, Cullivoe, Mid Yell, Uyeasound (Fetlar to Haroldswick MPA)
- Brevig, Skigersta (Eye Peninsula to Butt of Lewis MPA search location)

5.3.6 The key mitigation measure is to avoid wet storage on these sites. If wet storage is to take place at these MRIP sites, then suitable alternative locations must be identified and surveyed. Early engagement with SNH is essential.

Birds

5.3.7 The disturbance and/or displacement of birds from wet storage sites is a potential issue for MRIP. In particular, such effects are an issue for red-throated diver, given that this species does not tend to acclimatise easily to change. These potential effects of wet storage also apply to other bird species; however, given their sensitivity, red-throated divers have been utilised as a proxy in this SEA to indicate worst-case effects.

5.3.8 In the UK red-throated diver breeds only in Scotland and Northern Ireland. They mainly breed (between April and August) on small pools in open peat moors; those near the coast will forage for fish in nearby inshore waters, while those further inland feed mainly in large, valley bottom lochs[68]. Outwith the breeding season (November-March) they move to coastal waters, particularly subtidal sandbank habitat and shallow waters (generally less than 20 m below chart datum) where they feed on fish such as Atlantic herring and sprat.

5.3.9 Red-throated divers are listed in Annex 1 of the Birds Directive as requiring special conservation measures. Scottish SPAs for breeding red-throated diver comprise:

- Caithness and Sutherland Peatlands (Highland)
- Foula (west of Mainland Shetland)
- Hermaness, Saxa Vord and Valla Field (Unst, Shetland)
- Hoy (Orkney)
- Lewis Peatlands (Lewis)
- Mointeach Scadabhaigh – centred on Loch Scadabhaigh, largest freshwater body in North Uist
- Orkney Mainland Moors (Orkney)
- Otterswick and Graveland (Yell, Shetland)

[68] from JNCC Seabirds at Sea Team http://jncc.defra.gov.uk/page-4192

- Ronas Hill – North Roe and Tingon (North Roe, Mainland Shetland)
- Rum

5.3.10 There are also concentrations of red-throated diver in West Burrafirth, Fetlar, Blackpart & Gutcher (Yell), but these sites have not been selected as SPAs. Additional important areas for breeding red-throated diver have been identified by JNCC (Figure 18). The only SPA in Scotland for non-breeding red-throated diver is the Firth of Forth.

5.3.11 There is evidence that red-throated diver appear not to habituate to disturbance and/or displacement from vessels (Furness and Wade 2012, p21)[69]. Disturbance and/or displacement from feeding areas can result in a loss of condition for individuals, with a potential increase in mortality. Work by Natural England, as part of a wider process to renew existing marine aggregate extraction licences, has raised queries over the level of disturbance to red-throated diver arising from the activity of aggregate dredging vessels in and adjacent to the Outer Thames Estuary SPA. In combination with wind farm developments within the region, Natural England feels that disturbance effects arising from aggregate extraction may be significant, and is working on the basis that the birds will be disturbed within a 2 km radius around a vessel[70].

5.3.12 The following MRIP sites have the potential to disturb and/or displace breeding red-throated divers, through wet storage of devices and associated vessel movements:

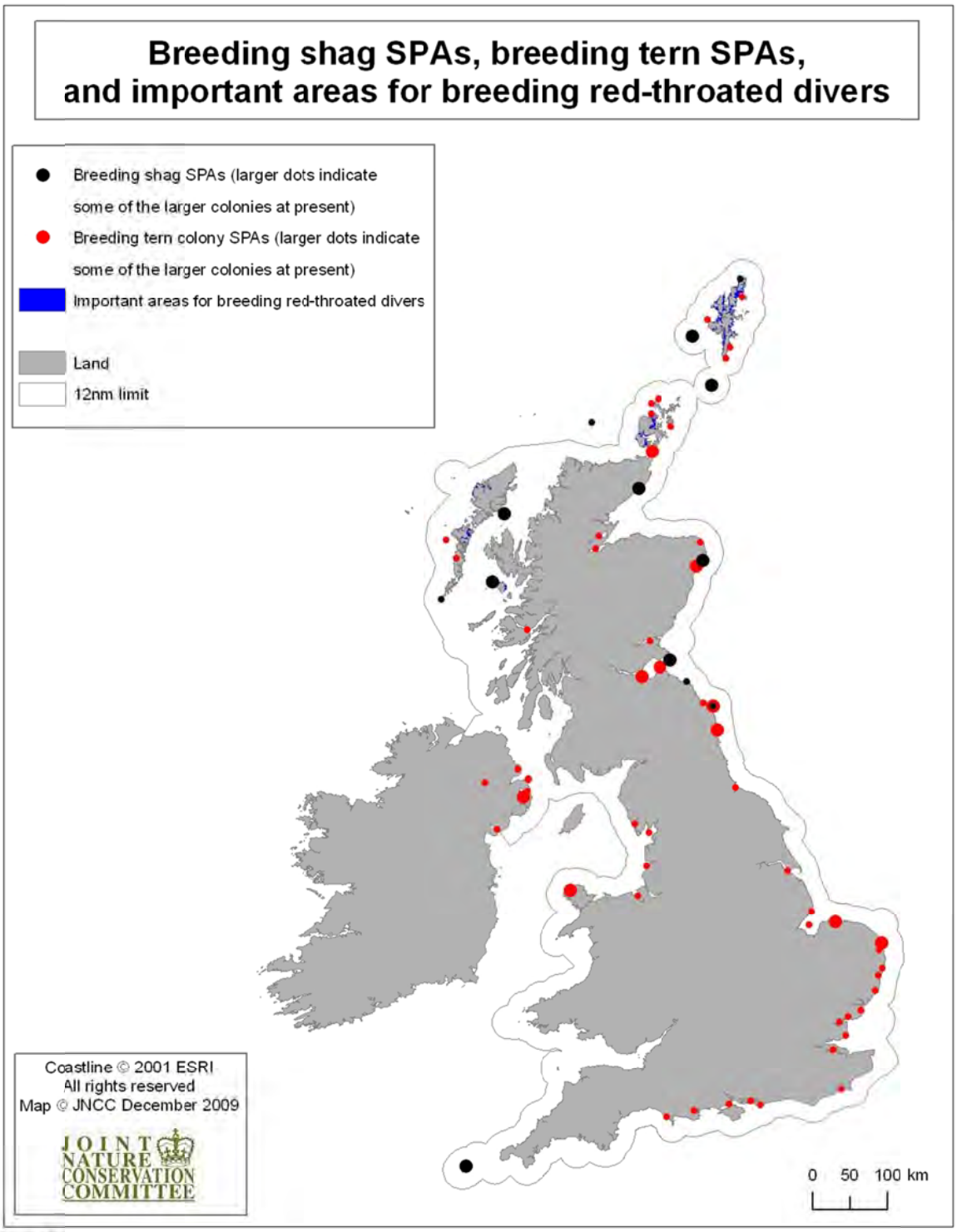
- Shetland: Baltasound, Cullivoe, Mid-Yell, and Uyeasound
- Western Isles: Bragar, Breasclete, Brevig, Callanish, Carloway, Kirkibost, Loch Roag, Miavhaig, Stornoway (O&M)
- Orkney: Hatston, Kirkwall, Lyness, Stromness (O&M at these sites)
- Highland: Gills Bay and Wick (O&M), Loch Eriboll (wet storage)

5.3.13 Given their coastal location, many of the MRIP sites are located in the environs of Special Protection Areas, and therefore may affect birds. Details are provided in the assessment tables in Appendices 2-7.

5.3.14 The effects of disturbance and/or displacement from wet storage and/or associated vessel movements are likely to be temporary, depending on location, duration and frequency of storage activities. However, mitigation measures will be required, for example, storage activities and vessel movements should be timed to avoid periods of sensitivity for the species potentially affected, e.g. April to August for red-throated divers. It is likely that pre-storage bird surveys will be required as part of the marine licensing process, to identify areas important to birds e.g. for feeding, roosting, breeding, etc. In all cases, early engagement with SNH is essential. Assuming that mitigation measures are implemented, it should be possible to avoid adverse environmental effects.

[69] from Marine Space website: http://www.marinespace.co.uk/news/red-throated-diver-and-vessel-traffic-%E2%80%93-investigating-realistic-combination-disturbance-effects
[70] from Marine Space website: http://www.marinespace.co.uk/news/red-throated-diver-and-vessel-traffic-%E2%80%93-investigating-realistic-combination-disturbance-effects

**Figure 17: Important areas for breeding red-throated divers[71]**




This map indicates all breeding tern and shag colony Special Protection Areas (SPAs) in the UK. Additional marine areas might be considered as SPAs for some of these colony SPAs, which may be extensions to the existing SPA and/or completely separate areas. Also shown are potentially important feeding areas near existing SPAs for breeding red-throated divers, some of which might be considered for classification. At this stage (December 2009) JNCC is not in a position to confirm which areas will be further considered for SPA status or classified. JNCC advises the statutory nature conservation agencies on options for SPAs and the location of their boundaries, as well as the science underpinning that advice. The agencies (and JNCC beyond 12nm) then advise government on which areas might be further considered for classification.

[71] JNCC (2009) Breeding shag SPAs, breeding tern SPAs and important areas for breeding red-throated divers.

Seals

5.3.15 Most of the sites have potential designated haul-out sites for harbour and grey seals in their environs. Of the seven UK SACs where grey seals are a qualifying feature, six are wholly or partially in Scotland (Figure 19):

- Berwickshire and North Northumberland Coast (Northumberland; Scottish Borders)
- Faray and Holm of Faray (Orkney Islands) - second-largest breeding colony in the UK
- Isle of May (Fife) - the largest east coast breeding colony of grey seals in Scotland and the fourth-largest breeding colony in the UK
- Monach Islands (Western Isles) - largest breeding colony in the UK
- North Rona (Western Isles) - third-largest breeding colony in the UK
- Treshnish Isles (Argyll and Bute)[72]

5.3.16 Seven of the eight UK SACs where harbour seals are a qualifying feature are wholly in Scotland (Figure 20):

- Ascrib, Isay and Dunvegan (Highland) - one of the larger discrete colonies of harbour seals in the UK
- Dornoch Firth and Morrich More (Highland)
- Eileanan agus Sgeiran Lios mór (isle of Lismore) (Argyll and Bute)
- Firth of Tay & Eden Estuary (Angus; City of Dundee; Fife; Perth & Kinross)
- Mousa (Shetland Islands) - one of the largest groups of in Shetland
- Sanday (Orkney Islands)
- South-East Islay Skerries (Argyll and Bute)
- Yell Sound Coast (Shetland Islands)[73]

[72] http://jncc.defra.gov.uk/ProtectedSites/SACselection/species.asp?FeatureIntCode=s1364
[73] http://jncc.defra.gov.uk/protectedsites/sacselection/species.asp?FeatureIntCode=S1365

**Figure 18: Grey seal SACs in the UK**

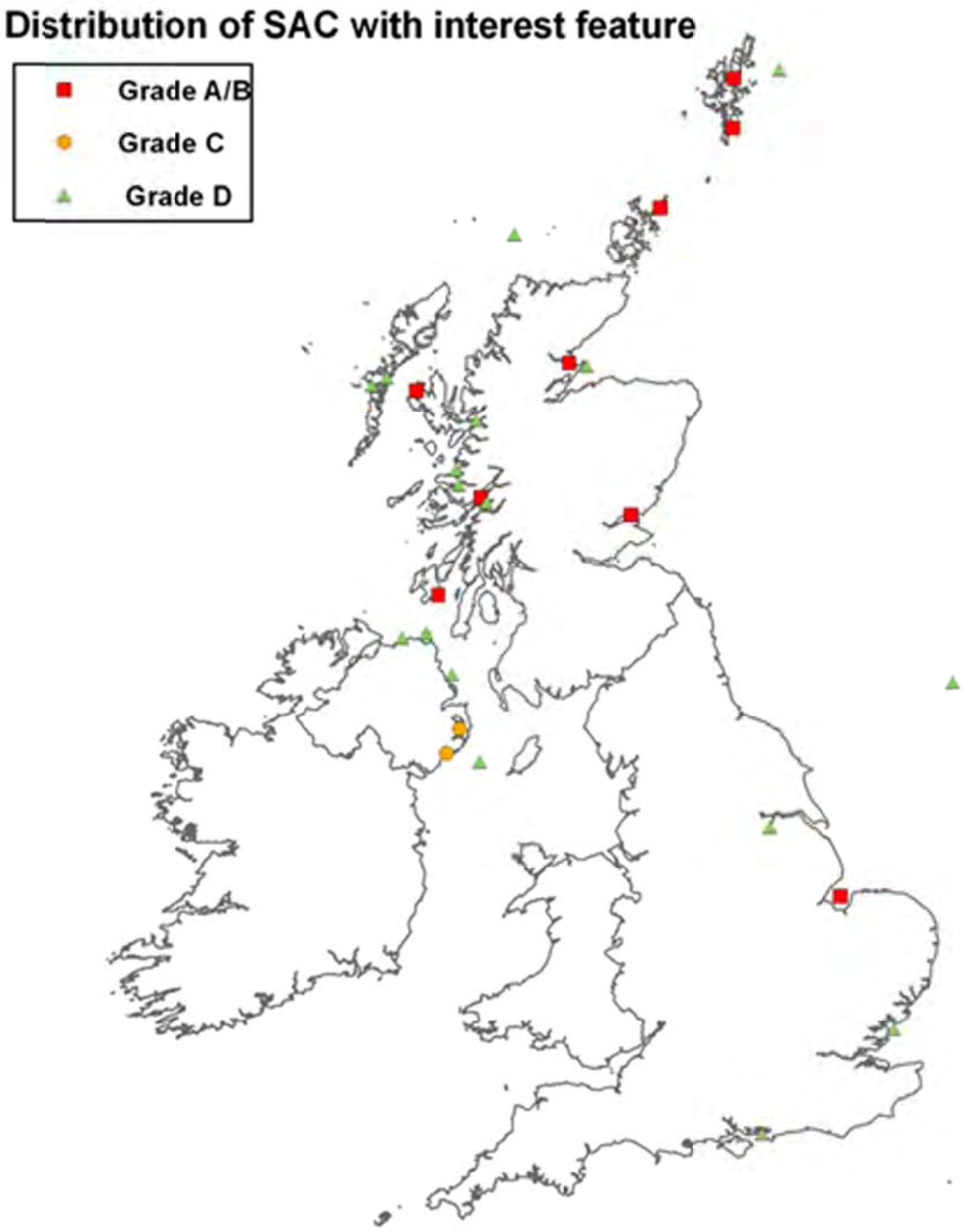


**Figure 20: Harbour seal SACs in the UK**

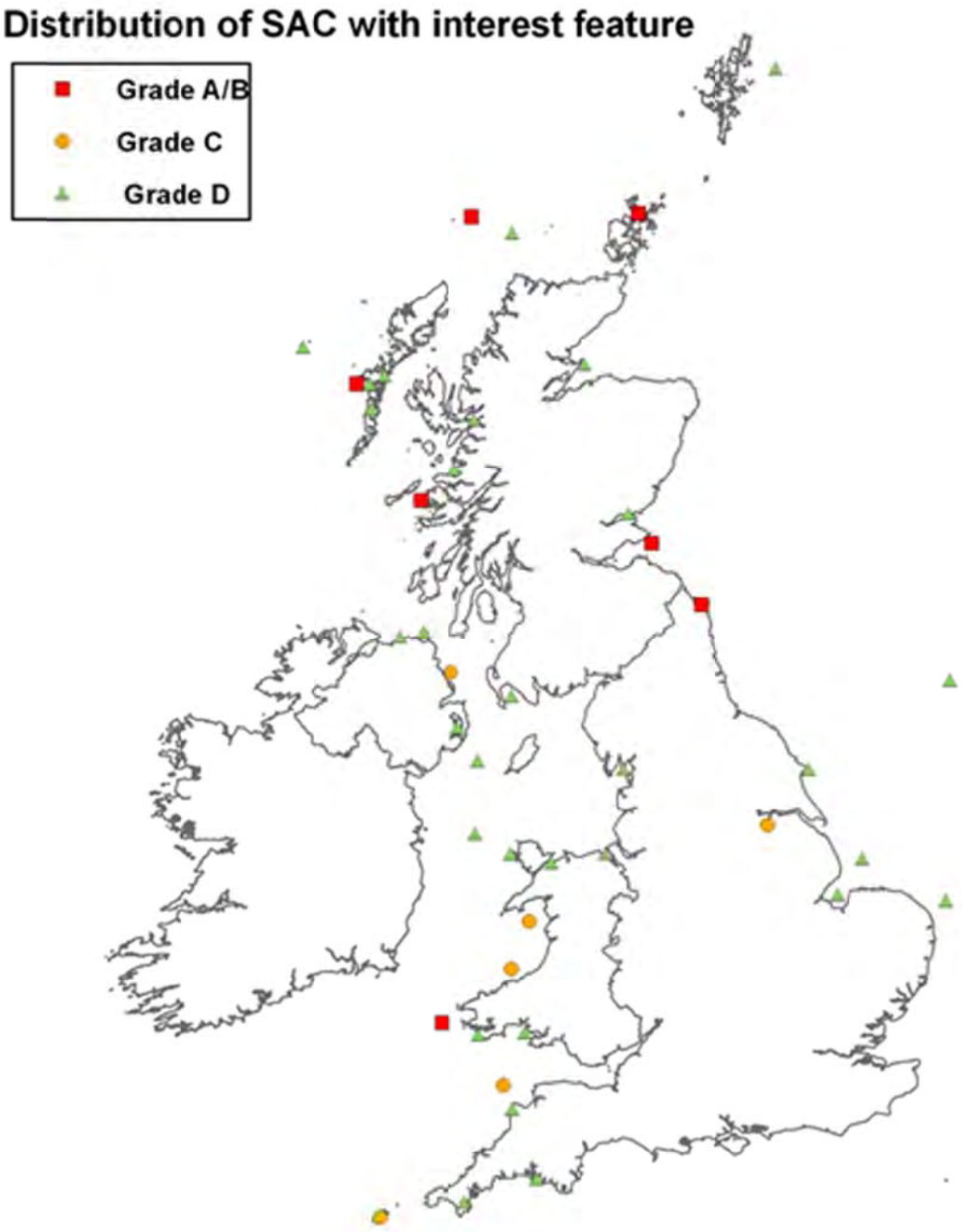
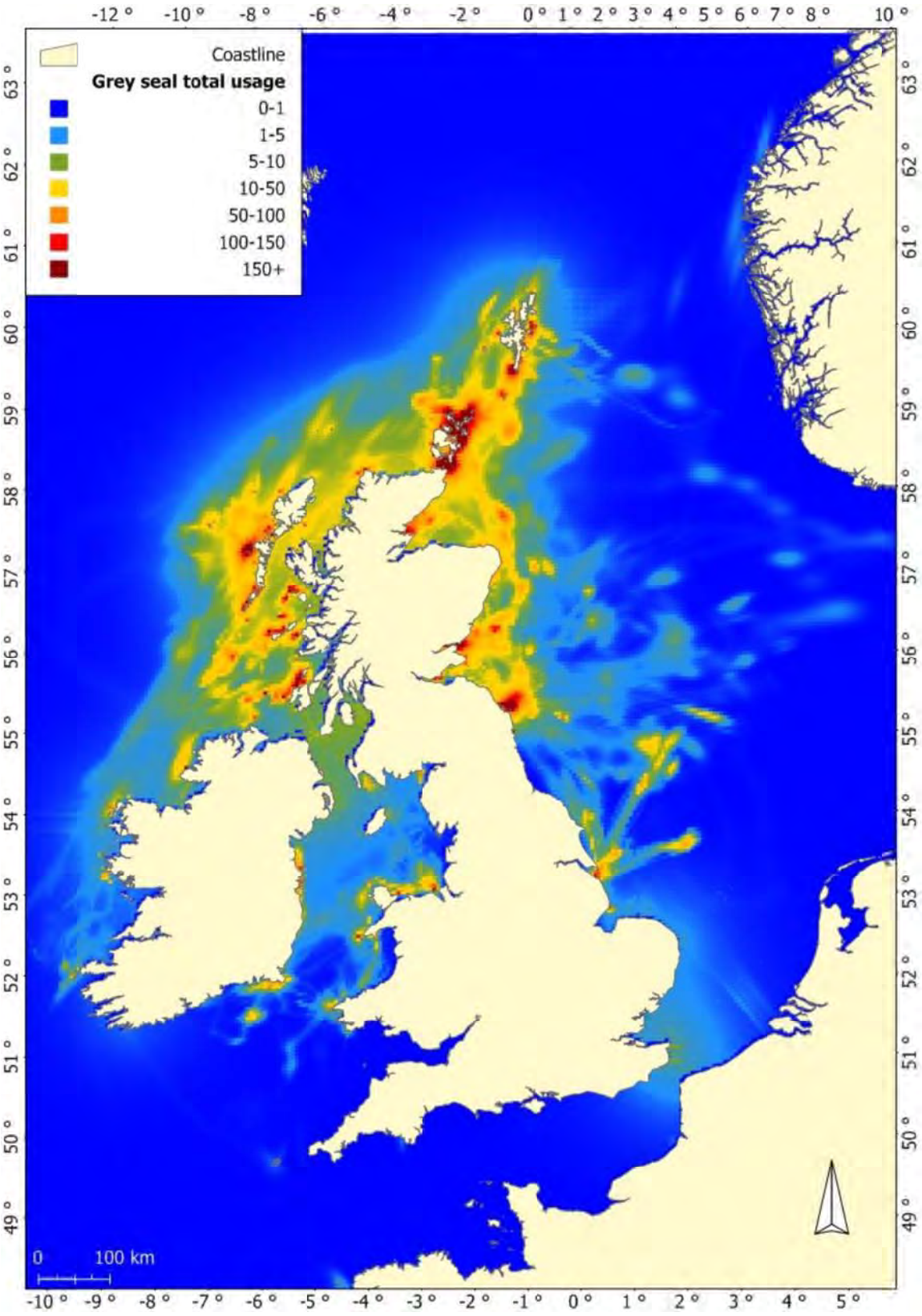
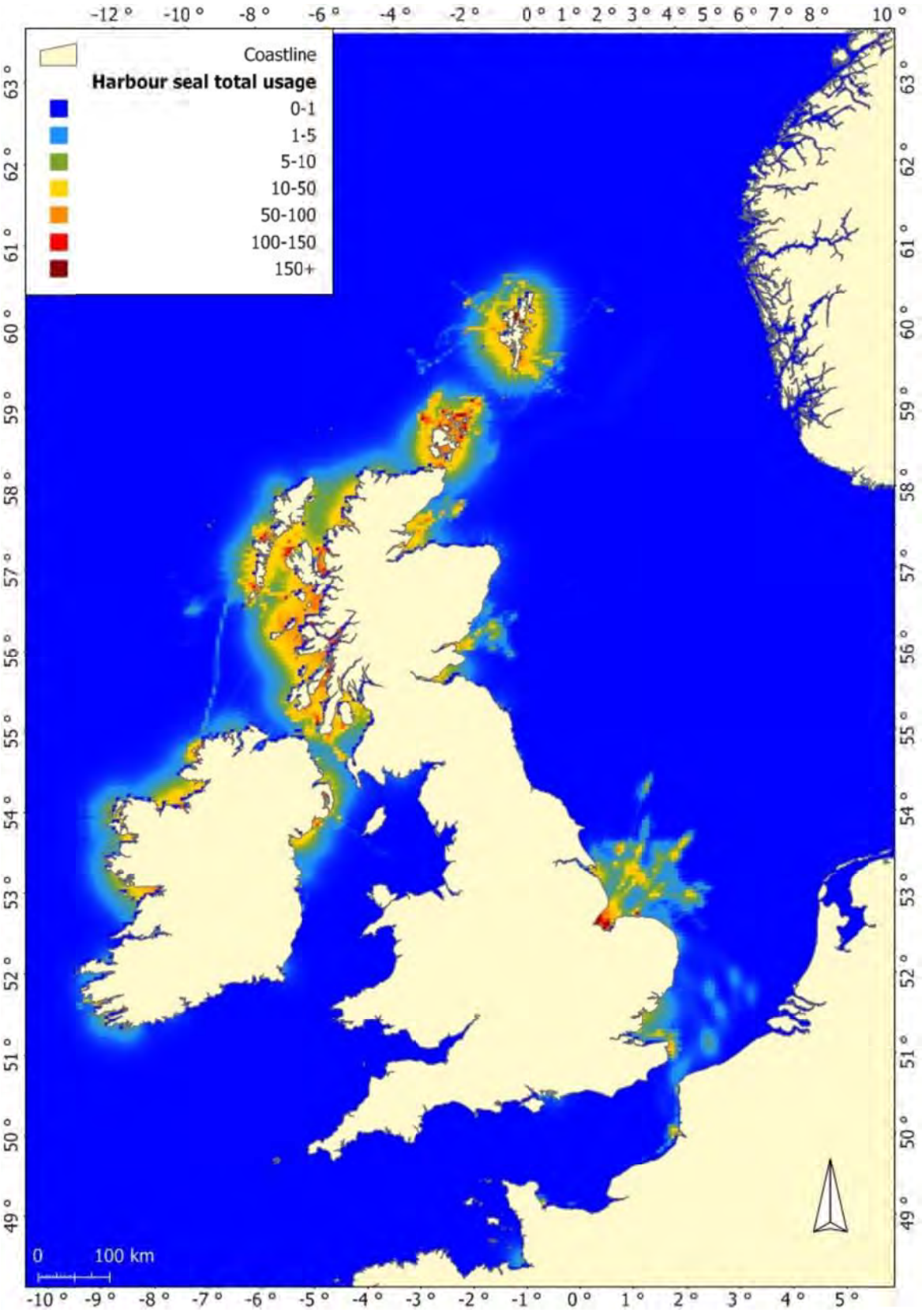


**Figure 21: Grey seal usage (sea and coast)** [74]




[74] The Scottish Government (2013) Grey and harbour seal usage maps [online] Available at: http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/seal-density (accessed 7/3/2014)

**Figure 19: Harbour seal usage (coast and sea)**[75]




[75] The Scottish Government (2013) Grey and harbour seal usage maps [online] Available at: http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/seal-density (accessed 7/3/2014)

5.3.17 Harbour seal is a qualifying feature, but not a primary reason for site selection, in the Sound of Barra SAC. In general, waters in the environs of most of the MRIP ports appear to be well-used by both harbour and grey seals[76].

5.3.18 There is a risk of disturbance and/or displacement of seals from haul out sites and other areas, through vessel movement and wet storage of devices. There is also a risk of corkscrew injury (resulting in death) to grey and harbour seals from slow-moving vessels with certain types of ducted propeller or those using dynamic positioning. The death of individual harbour seals may affect overall population numbers/ viability, given that this species is generally in decline in Shetland, Orkney, the east coast of Scotland (particularly in St Andrews and the Firth of Tay[77]) and the Western Isles. At this stage the cause of corkscrew injuries has not been definitively identified; until this happens, it is recommended that O&M and wet storage activities should employ mitigation measures such as avoiding use of vessels with ducted propellers for slow-speed activities (e.g. manoeuvring), avoiding using vessel routes passing seal SACs when accessing harbour areas, and avoiding the storage of devices near seal haul out locations, particularly during breeding season (i.e. June to July for harbour seals, September to December for grey seals) and during moulting times. Assuming mitigation is implemented, significant adverse environmental effects may be avoided.

5.3.19 Nearly all MRIP sites, irrespective of function, have the potential for corkscrew injuries to seals. This relates to the increase in vessel movements in waters used by seals.

<u>European Protected Species – cetaceans</u>

5.3.20 In general it appears that cetaceans are likely to be passing through waters in the environs of the MRIP ports. These species may be adversely affected through vessel movements (acoustic disturbance, collision risk). There is also potential for them to become entangled in temporary anchoring lines for wet storage of devices, particularly minke.

5.3.21 Acoustic disturbance, collision risk and/or potential displacement would be additional to that already occurring; at this stage it is not possible to predict the increase in vessel numbers and it is therefore difficult to predict whether such increases would be such that there would be a significant increase in the probability of such impacts occurring.

5.3.22 At this stage, therefore, potential mitigation is limited to the following:

- avoid cetacean habitat and migration routes, where these are known
- use high-visibility mooring lines, to prevent entanglement

[76] SMRU (2013) Marine Mammal Scientific Support Research Programme MMSS/001/11, Grey and harbour seal usage maps [online] Available at: http://www.scotland.gov.uk/Resource/0043/00437053.pdf [accessed 5/12/2013]

[77] Current state of knowledge of the extent, causes and population effects of unusual mortality events in Scottish seals. Sea Mammal Research Unit Report to Scottish Government April 2013. Available at http://www.smru.st-andrews.ac.uk/pageset.aspx?psr=152

5.3.23 Assuming that mitigation is implemented, it should be possible to avoid adverse environmental effects.

Bottlenose dolphins

5.3.24 The Moray Firth in north-east Scotland supports the only known resident population of bottlenose dolphin *(Tursiops truncates*) in the North Sea. Dolphins are present all year round and range widely in both the Moray Firth and up and down the east coast of Scotland.

5.3.25 Vessel movements associated with manufacturing, assembly, O&M and wet storage of devices have the potential to affect bottlenose dolphins, through disturbance from vessel noise and from collision risk. In addition, there is the potential for collision with stored devices. The magnitude of risk will depend on the location of vessel movements and wet storage locations. Known "hot spot" areas used by bottlenose dolphins should be avoided. The timing of vessel movements and wet storage should be discussed with SNH. Assuming that mitigation is implemented, significant environmental effects could be avoided.

Otters

5.3.26 In the assessment tables presented in Appendices 2-7, otters are considered where they are a qualifying feature of an SAC or where existing data highlights their presence at/near to a specific site. However, otters will potentially be present at/near all sites considered in this assessment.

5.3.27 The SACs where otter is a qualifying feature, and where otter from these sites may interact with MRIP sites, comprise:

- Caithness and Sutherland Peatlands (Highland)
- Inverpolly (Highland)
- Loch nam Madadh (Western Isles / Na h-Eileanan an Iar)
- River Dee (Aberdeenshire)
- River Spey (Highland; Moray; Perthshire)
- Sunart (Highland)
- Yell Sound Coast (Shetland Islands)

5.3.28 Dornoch Firth and Morrich More SAC (Highland) is located over 15 km north of the MRIP sites in the Moray and Cromarty Firths and, given this distance, it is unlikely that otters from this SAC would be affected by wet storage.

5.3.29 SACs where otter is a qualifying feature, but not a primary reason for site selection, and where otter from these sites may interact with MRIP sites, comprise:

- Hascosay (Shetland Islands)
- Kinloch and Kyleakin Hills (Highland)
- Lewis Peatlands (Western Isles / Na h-Eileanan an Iar)
- Loch Moidart and Loch Shiel Woods (Highland)

- Mòine Mhór (Highland)
- South Uist Machair (Western Isles / Na h-Eileanan an Iar)
- Tayvallich Juniper and Coast (Argyll and Bute)

5.3.30 Otters may be adversely affected through disturbance (noise, physical presence of devices and human presence) during wet storage activities. These effects are likely to be temporary but, depending on the duration and frequency of storage, may be medium-term. Early discussion should be held with SNH. Devices should not be stored on or near habitat used by otters. It is likely that otter survey will be required as part of the marine licensing process, to ascertain where otters and wet storage activities may interact, so that these can be avoided. Assuming that mitigation is implemented, significant environmental effects should be avoided.

## 5.4 Population and human health

5.4.1 Most MRIP sites have residential populations adjacent to or in the environs of the harbour. There is likely to be increased boat traffic due to the movement of devices, which could result in noise and disturbance to local residents. However, given existing levels of vessel movements, this effect is unlikely to be significant.

5.4.2 Manufacturing, assembly and/or O&M sites are likely to give rise to additional noise during site operations. For those in proximity to residential areas, this could give rise to noise disturbance to residents. All M RIP sites identified as suitable for these functions have the potential to cause noise disturbance to local residents, apart from Sullom Voe, Hatston, Glensanda and Lyness. Given the nature of existing activities in these harbours, and the fact that at least some of this work will be undertaken in buildings rather than out in the open, it is unlikely that this will add significantly to existing noise levels. However, it is recommended that noise assessments are undertaken for these activities and that the results are consulted on, at an early stage, with residential neighbours. It is likely that these ports already have site protocols and/or good neighbour agreements in place. Should the noise assessments indicate that annoyance and/or disturbance is likely, then site protocols, good neighbour agreements, etc should be employed to specify conditions for controlling noise and/or disturbance. Assuming that mitigation is implemented, it should be possible to avoid significant environmental effects.

## 5.5 Air

5.5.1 No ambient air quality issues have been identified.

5.5.2 There is likely to be increased boat traffic due to the movement of devices, which could result in increased atmospheric emissions. However, given existing levels of boat movements, these additional emissions are unlikely to result in significant effects.

## 5.6 Climatic factors

5.6.1 Most MRIP sites are within an indicative 200-year flood zone which means that they are at risk of flooding from the sea. This is a permanent issue given the long-term impacts of climate change. Port owners will need to ensure that they employ suitable design measures at some point in the future to increase defensibility and mitigate the adverse effects of potential sea level rises.

5.6.2 There is likely to be an increase in greenhouse gas (GHG) emissions due to vessel movements associated with harbour and wet storage operations. Vessel operators may wish to implement energy- and fuel-efficiency measures to reduce fuel consumption, which would also have a beneficial effect in reducing consequent GHG emissions. It is likely that emissions from vessels would continue but these are unlikely to contribute significantly to those from the existing Scottish fleet.

## 5.7 Water and the marine environment

5.7.1 The wet storage of devices has the potential to adversely affect water and the marine environment, through:

- increased turbidity arising during anchoring of devices to or storage directly on the seabed. This would have localised, temporary adverse effects on water quality in general and on shellfish growing waters in particular. Developers should consider whether there are anchoring methods which would not result in increased turbidity. Assuming mitigation is implemented, significant adverse environmental effects may be avoided.
- temporary morphological effects through introduction of devices into the water body. These effects are likely to be localised and temporary, and no mitigation measures have been proposed.

## 5.8 Soil, geology and coastal processes

5.8.1 Wet storage of devices has the potential to affect coastal processes, through changes to patterns of erosion and accretion resulting from the presence of devices in the water. This would mainly affect shoreline characterised by saltmarsh, mudflats, sandflats, machair, and sand dunes. These effects could range from temporary to permanent, depending on storage location, duration and frequency. Devices should be stored away from these areas. Assuming that mitigation is implemented, adverse environmental effects could be avoided.

5.8.2 The movement of vessels also has the potential to affect coastal processes, by increasing wave action and thereby exacerbating existing erosion processes. *Scotland's Marine Atlas* identifies erosion from vessel wash as a

pressure for coastal habitats. Research indicates[78] that the factors affecting vessel wave wake and the potential for coastal erosion include:

- Vessel type, size, weight, and hull design and shape - can greatly affect wave wake generation by a vessel and the subsequent impacts of the wake on surrounding waterways.
- Vessel speed - higher speeds typically increase vessel wake, and restrictions in specific waterways have been introduced in Denmark, Sweden, New Zealand (Marlborough Sounds) and Australia (Gordon River),[79] amongst others. These restrictions target vessels with known wave wake characteristics, and are intended to minimise the effects of coastal erosion.
- Distance of the vessel from the shoreline - wave crests diverge and there is typically dispersion of wave energy into the subsequent waves with distance, indicating that the closer a vessel moves to the shoreline, the larger the likely wave impacts.
- Depth of water - as water depth decreases, waves typically become less dispersive and wave height becomes larger.
- Extent of the natural currents and waves on the waterway – the effects of wash wake will typically be larger in sheltered and reasonably calm waters in comparison to waters with larger natural wind waves.

5.8.3 At present there is little or no evidence of vessels affecting coastal and/or seabed erosion in Scotland, apart from work done on the fast ferry link between Scotland and Northern Ireland, at Loch Ryan. Although there is likely to be increased vessel traffic due to the movement of wave and tidal devices, given the existing levels of vessel movements, these additional movements are unlikely to result in significant effects.

## 5.9 Cultural heritage

5.9.1 Manufacturing, assembly and O&M activities will all take place within existing harbours, using existing infrastructure, and are therefore unlikely to give rise to adverse effects on the site and setting of historic environment features. The exception to this would be sites where new buildings may be required, and there are historic environment features such as Scheduled Monuments or Listed Buildings within the harbour itself. In such cases, discussions should be held with Historic Scotland and the Local Planning Authority as part of project planning and design.

5.9.2 Wet storage of devices which are on or break the water surface are unlikely to affect the setting of Scheduled Monuments or listed buildings. However, there are several harbours where Scheduled Monuments are in or adjacent to the harbour, and where wet storage of devices could significantly affect

[78] Jonason O (1993) Ferry Wake Study – Final Report, Washington State Transportation Centre, [online] Available at: www.wsdot.wa.gov/Research/Reports/300/331.1.htm

[79] Department *of* Primary Industries, Water *and* Environment Resource Management and Conservation Division (2005) Revised wave wake criteria for vessel operation on the lower Gordon River, J. Bradbury, 11 August 2005, [online] Available at: *www.dpiw.tas.gov.au/inter.nsf/webpages/ljem-6hztab?open*

the setting of the monument. In these locations, developers should avoid wet storage of devices in these areas:

- Callanish, to avoid affecting the setting of the standing stones at Callanish.
- Lagavullin, to avoid affecting the setting of Dunivaig Castle.

5.9.3 Many of the waters in the environs of the MRIP sites contain wreck sites. Wet storage of devices on these wreck sites would destroy their historic features, a permanent effect. Developers should avoid wet storage on wreck sites. Where this is not possible, they should undertake survey and recording of wrecks and their features prior to storage taking place. This should be discussed at an early stage with Historic Scotland and the Local Planning Authority as part of project planning and design. Assuming that mitigation is implemented, significant environmental effects should be avoided or reduced.

## 5.10 Landscape/ seascape and visual effects

5.10.1 Many of the MRIP ports have residential communities or scattered residential properties nearby. Manufacturing, assembly and O&M activities are unlikely to give rise to adverse visual effects, with the exception of new building construction. This effect, which would be permanent, would depend on the location of the building within the port and its design features, e.g. whether it would be significantly different in height from existing buildings or infrastructure such as cranes. Developers should discuss these issues with the Local Planning Authority and SNH at an early stage in project planning and design. Assuming that mitigation is implemented, significant adverse landscape/seascape and visual effects could be avoided.

5.10.2 During wet storage, some wave devices (e.g. Pelamis, Oyster) will sit on the surface of the water and will be visible, particularly in light of navigational requirements (colour and light: navigational requirements are identified in Marine Guidance Notes produced by the Maritime and Coastguard Agency – MGN 371 (M+F) and MGN 372 (M+F)[80]). However, the SEA has assumed that other devices (e.g. Archimedes wave swing, horizontal axis tidal devices) will be significantly above the water surface during wet storage, prior to installation. Tables 5 and 6 illustrate these devices.

5.10.3 Storage of devices which are on or break the water surface may have adverse landscape/seascape and visual effects. Several of the MRIP ports are in the environs of National Scenic Areas. It is unlikely that storage would affect the special qualities of National Scenic Areas, given the temporary nature of wet storage and, in general, the distance of the wet storage sites from the NSAs. However, wet storage could give rise to local landscape/seascape and/or visual effects, given that most residents have local views over the sea and coastal areas. These effects have the potential to be significant, given the nature of the devices assumed in the worst-case scenario, but are likely to be local and temporary in nature. Developers

[80] available from https://www.gov.uk/offshore-renewable-energy-installations-impact-on-shipping

should undertake landscape and visual assessment[81] and, where necessary, should locate devices away from areas with such overall views. Discussions with the Local Planning Authority and SNH should be held at an early stage in project planning and design. Assuming that mitigation is implemented, the potential for significant adverse effects should be reduced. In some locations, developers will need to ensure that alternative locations would not result in adverse effects on biodiversity, e.g. benthic features in MPAs.

[81] using the advice set out in SNH's guidance document *The siting and design of aquaculture in the landscape: visual and landscape considerations,* available from http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=113

**Table 5: Wave Devices**

| | | |
|---|---|---|
| Attenuator: Pelamis<br>  | Oscillating wave surge convertor<br>Aquamarine Power Oyster<br>  | Oscillating wave surge convertor<br>Aquamarine Power Oyster<br>  |
| Wave Dragon Overtopping device<br>  | Seabed point-absorbing wave energy<br>Archimedes wave swing<br>  | point-absorbing wave energy: Aquabuoy<br>  |

**Table 6: Tidal Devices**

| Horizontal axis turbine | Horizontal axis turbine |
| --- | --- |
|  |  |

**Table 7: Wave/Tidal Devices Under Tow**



## 5.11 Material assets

5.11.1 Wet storage of devices in or near the MRIP ports could affect a number of material assets:

- harbour access
- fishing grounds
- tourism and recreational interests
- aquaculture interests
- other interests (e.g. Geoparks)

5.11.2 These are discussed in the following paragraphs.

Harbour access

5.11.3 Wet storage of devices could affect:

- navigational safety, through potential for vessels to collide with stored devices, e.g. fishing vessels, vessels servicing aquaculture sites, etc.
- access to the harbour and, where present, ferry terminals, through stored devices blocking access.

5.11.4 Collisions could result in the injury and/or death of human beings; oil and/or chemical spills, affecting water quality and harbour operation; etc. Restricting access to the harbour could displace harbour users and require ferries to be re-routed, and result in inefficient operation of the harbour and/or ferry terminal, neither of which accord with the policies in the draft National Marine Plan for Scotland.

5.11.5 Mitigation measures include:

- Ensure that wet storage sites are located away from harbour accesses.
- Ensure that wet storage site are appropriately lit and/or marked.
- Liaise with the Maritime and Coastguard Agency (MCA), Harbour Authority and other vessel operators to agree storage area locations and navigable channels.

5.11.6 Assuming that mitigation measures are implemented, such significant adverse effects should be avoided.

Fishing grounds

5.11.7 The wet storage of devices could result in disturbance of and/or displacement from local fishing grounds. This would result in the temporary loss of fishing grounds during storage operations, with consequent adverse socio-economic and community effects. It could also result in the intensification of fishing effort elsewhere, which could affect stocks and/or benthic interests, depending on the target species, type of gear, etc.

5.11.8 Developers should ensure that wet storage of devices avoids local fishing grounds. Discussions should be held with the relevant Inshore Fisheries

Group and/or local fishermen at an early stage in project planning and design. Assuming that mitigation is implemented, such adverse effects could be avoided or reduced.

Tourism and recreational interests

5.11.9 The wet storage of devices could block recreational cruising routes and/or displace vessels from moorings/anchorages. This would result in the temporary loss of such recreational areas during storage operations, with concomitant local economic loss.

5.11.10 Developers should ensure that wet storage sites are located away from these areas. Discussions should be held with the Royal Yachting Association Scotland at an early stage in project planning and design. Assuming that mitigation is implemented, such adverse effects could be avoided or reduced.

Aquaculture interests

5.11.11 The wet storage of devices could result in damage to existing aquaculture infrastructure, in the event of devices breaking loose from their moorings, with the permanent loss of equipment and/or facilities.

5.11.12 Storage sites will need to be located away from aquaculture sites. Developers should liaise with The Crown Estate and the Local Planning Authority to obtain information about aquaculture interests and with aquaculture operators to agree a suitable distance. Assuming mitigation is implemented, the risk of significant adverse effects should be reduced.

Geopark Shetland

5.11.13 A Geopark is a territory which has outstanding geological heritage, and uses that heritage to provide sustainable economic benefits to the area. The European Geoparks Network was established in 2000 to protect geodiversity, promote an understanding of geological heritage and support sustainable development through geological tourism and education. Geopark Shetland became a member of the European and UNESCO Global Geoparks Network in 2009[82]. It recognises the significant role that the geology of the islands plays in the landscape experience, which is often evident at the coast.

5.11.14 Short-term anchorage or storage of devices directly on the seabed is unlikely to result in significant adverse effects on features of importance to the Geopark designation, and would therefore have no concomitant economic effects. No mitigation is therefore proposed.

[82] Shetland Amenity Trust (2013) Geopark Scotland [online] Available at http://www.shetlandamenity.org/about-geopark-shetland [Accessed 25/10/13]

## 5.12 Cumulative effects

5.12.1 There is potential for cumulative adverse effects from wet storage on:

- Loch Roag
- Moray and Cromarty Firths
- Firths of Forth and Tay
- red-throated diver (Shetland/Orkney)
- fishing grounds
- recreational vessel routes

5.12.2 Each of these is discussed in the following paragraphs.

Loch Roag

5.12.3 Wet storage is proposed at several sites in Loch Roag: Breasclete, Callanish, Carloway, Kirkibost, Miavhaig and Loch Roag itself. In consequence, the following cumulative adverse effects may occur:

- disturbance/displacement of birds, particularly red-throated diver. This area is an important one for breeding red-throated diver (see Figure 18). Although the harbours are relatively distant from one another, it is not clear whether they are sufficiently physically separated to prevent cumulative disturbance and/or displacement of red-throated diver. HIE should have discussions with SNH at this early stage, to explore the need for additional bird survey information and whether there is a maximum number of wet storage sites that can be accommodated in Loch Roag overall.
- corkscrew seal injuries. The evidence suggests that the grey seal population is stable and that the harbour seal population in the Western Isles is in decline, although not as seriously as on the east coast of Scotland. There is therefore potential for cumulative adverse effect on the harbour seal population. HIE should have discussions with SNH at this early stage, to explore the need for additional harbour seal survey information and whether there is a maximum number of wet storage sites that can be accommodated in Loch Roag overall.

5.12.4 Adverse cumulative effects on otters and the NSA are not anticipated. The harbours are sufficiently distant from one another that otters could find alternative habitat; the distance between the harbours and from the NSA means that significant cumulative effects on landscape/seascape are unlikely.

5.12.5 There are several harbours where Scheduled Monuments are in or adjacent to the harbour, and where wet storage of devices could significantly affect the setting of the monument. At Callanish, there is potential for cumulative effects on the Scheduled Monument from wet storage at Callanish, Breasclete and within Loch Roag, should this be in the local environs. It has been recommended that wet storage at Callanish harbour should be avoided, to avoid affecting the setting of the standing stones. The location of

wet storage at Breasclete and within Loch Roag should also be chosen to avoid cumulative adverse effects on the setting of the standing stones.

5.12.6 Loch Roag supports aquaculture, fishing and recreational interests:

- There are four shellfish farms and one finfish farm in East Loch Roag between Breasclete and Great Bernera. Elsewhere there are numerous aquaculture sites: 2 finfish and 1 shellfish off the east coast of Great Bernera, and 4 finfish and 22 shellfish in West Loch Roag (most of these within the Shellfish Growing Waters). In 2005, Loch Roag supported almost one-quarter of the Western Isles aquaculture tonnage[83].
- The waters around East and West Loch Roag support demersal fishing, scallop divers and prawn (trawling) and shellfish (static gear) fishing.
- The loch is used by both fishing and leisure vessels[84]. A RYA light recreational cruising route runs up the west coast of the Western Isles.

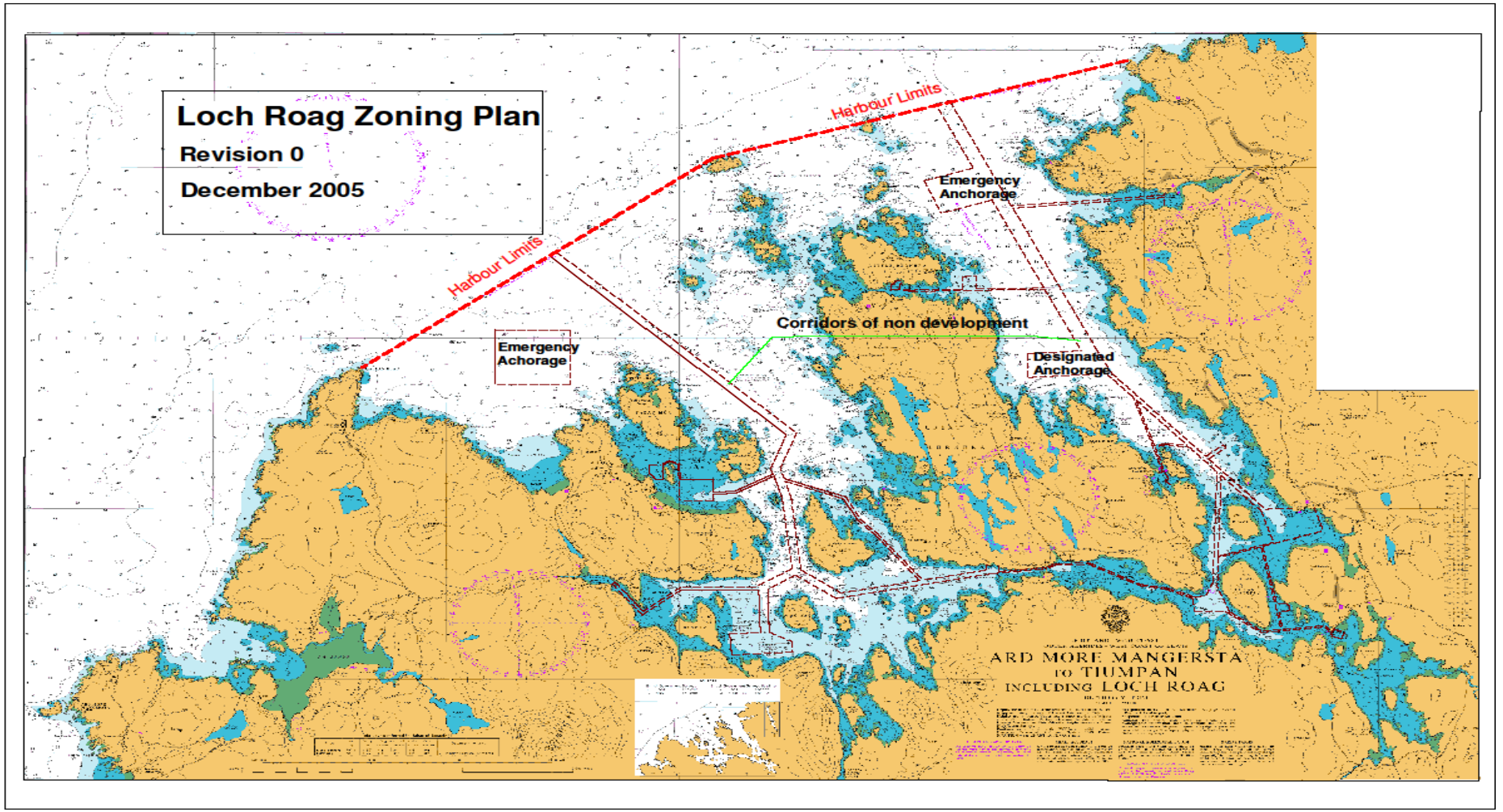
5.12.7 In consequence, there is potential for cumulative adverse effects:

- effects on navigational safety
- possible disturbance and/or displacement of fishing from local grounds
- possible disturbance and/or displacement of recreational sailing
- possible damage to existing aquaculture infrastructure

5.12.8 The Loch Roag Zoning Plan[85] (Figure 23) identifies a designated anchorage in East Loch Roag to the north of Loch Riosaigh, two emergency anchorages (one in East Loch Roag and one in West Loch Roag) and several corridors of non-development in East and West Loch Roag. HIE should hold discussions with the Harbour Master at this early stage in the MRIP process, to ascertain whether there are suitable locations for wet storage of devices, given the requirements of the zoning plan, and whether there is a maximum number of wet storage sites that can be accommodated in Loch Roag overall. Should these discussions identify suitable locations, these should be followed by discussion with navigation, fisheries, recreational and aquaculture interests to ensure that their activities are taken into account in the siting process and to avoid adverse effects. Stakeholder groups include the Maritime and Coastguard Agency, Inshore Fishery Groups, local fishermen, The Crown Estate, Comhairle nan Eilean Siar (as Local Planning Authority), aquaculture operators, and the Royal Yachting Association Scotland. In this way, cumulative adverse effects on these material assets could be avoided.

[83] Western Isles Aquaculture Association. December 2005. A proposed rationale for the ratification of the Site Optimisation Plan for salmon farming in Loch Roag, Lewis, Western Isles.
[84] http://www.ports.org.uk/port.asp?id=487
[85] available at http://www.cne-siar.gov.uk/harbourmaster/lochroag.asp

**Figure 20: Loch Roag Zoning Plan[86] (Comhairle nan Eilean Siar)**




[86] Comhairle nan Eilean Siar (2005) Harbour Master Loch Roag Zoning Plan (ICZM) [online] Available at: http://www.cne-siar.gov.uk/harbourmaster/lochroag.asp (accessed 7/3/2014)

Moray and Cromarty Firths

5.12.9 Wet storage of devices and vessel movements, including those during O&M activities, has the potential to disturb bottlenose dolphin.

5.12.10 Vessel movements associated with manufacturing, assembly, O&M and wet storage of devices have the potential to affect bottlenose dolphins, through disturbance from vessel noise and from collision risk. In addition, there is the potential for collision with stored devices. The magnitude of risk will depend on the location of vessel movements and wet storage locations. Known "hot spot" areas used by bottlenose dolphins should be avoided. The timing of vessel movements and wet storage should be discussed with SNH. Assuming that mitigation is implemented, significant environmental effects could be avoided.

Corkscrew injuries to seals

5.12.11 Wet storage of devices, in particular vessel movements, have the potential to increase the risk of corkscrew injuries to seals. This is a potential cumulative adverse effect from sites in Shetland, Orkney, the Moray Firth and the Western Isles.

5.12.12 The death of individual harbour seals may affect overall population numbers/ viability, given that this species is generally in decline in Shetland, Orkney, the east coast of Scotland (particularly in St Andrews and the Firth of Tay[87]) and the Western Isles. At this stage the cause of corkscrew injuries has not been definitively identified; until this information is available, it is recommended that O&M and wet storage activities should avoid using vessels with ducted propellers for slow-speed activities, e.g. manoeuvring, particularly during breeding season – June to July for harbour seals, September to December for grey seals. Assuming mitigation is implemented, significant cumulative adverse environmental effects may be avoided. Early discussions should be held with SNH.

5.12.13 The death of individual grey seals may also affect population viability.

Red-throated diver: Shetland and Orkney[88]

5.12.14 In Orkney, O&M activities at Stromness, Hatston, Kirkwall and Lyness have the potential to disturb and/or displace red-throated diver, through wet storage of devices. Two components of the Orkney Mainland Moors SPA lie between Stromness and Hatston/Kirkwall; Hoy SPA lies between Stromness and Lyness. Orkney is an important area for breeding red-throated diver (see Figure 18). Although the harbours are relatively distant from one another, they do not appear to be sufficiently physically separated to prevent cumulative disturbance and/or displacement of red-throated diver.

[87] Current state of knowledge of the extent, causes and population effects of unusual mortality events in Scottish seals. Sea Mammal Research Unit Report to Scottish Government April 2013. Available at http://www.smru.st-andrews.ac.uk/pageset.aspx?psr=152

[88] potential cumulative effects on red-throated diver in the Western Isles are discussed in paragraph 5.12.3

HIE should have discussions with SNH at this early stage, to explore the need for additional bird survey information and whether there is a need for mitigation, e.g. through the scheduling of activities or avoiding wet storage of devices at particular times of the year.

5.12.15 In Shetland, wet storage activities at Baltasound, Cullivoe and Uyeasound have the potential to disturb and/or displace red-throated diver. Two components of the Hermaness, Saxa Vord and Valla Field SPA lie on the west side of Unst. Shetland is an important area for breeding red-throated diver (see Figure 18). Although the harbours are relatively distant from one another, they do not appear to be sufficiently physically separated to prevent cumulative disturbance and/or displacement of red-throated diver[89]. HIE should have discussions with SNH at this early stage, to explore the need for additional bird survey information and whether there is a need for mitigation, e.g. through the scheduling of activities or avoiding wet storage of devices at particular times of the year.

Fishing grounds

5.12.16 Wet storage of devices has the potential to cumulatively adversely affect inshore fishing grounds. Early discussions should be held with Inshore Fishing Groups and local fishermen.

Recreation Vessels

5.12.17 Wet storage of devices has the potential to cumulatively adversely affect sea kayaking routes by disturbing and/or displacing users. Many popular sea kayaking trips/routes take place around island groups such as the Western Isles, Orkney and Shetland which will potentially be host to several MRIP sites in various locations throughout the island groups. Consultation with stakeholders such as the Scottish Canoe Association, amongst others, is recommended for sites located in proximity to recreational activities.

## 5.13 Consultation

5.13.1 On receipt of an application for a marine licence, Marine Scotland consults on a statutory basis with the following organisations:

- Scottish Natural Heritage
- Scottish Environment Protection Agency
- Maritime and Coastguard Agency
- Northern Lighthouse Board

5.13.2 Other non-statutory organisations and/or stakeholders consulted comprise:

- Association of Salmon Fishery Boards
- Chamber of Shipping
- The Crown Estate

[89] We have assumed that Mid-Yell, and the Otterswick and Graveland SPA, are sufficiently distant from Baltasound, Cullivoe and Uyeasound to avoid cumulative adverse effect.

- Defence Infrastructure Organisation
- Health and Safety Executive
- Historic Scotland
- Inshore Fishery Groups
- Local Planning Authority
- Marine Safety Forum
- Royal Yachting Association
- Royal Society for the Protection of Birds
- Scottish Fishermen's Federation
- Scottish Fisherman's Organisation
- Scottish Wildlife Trust
- Transport Scotland
- Whale and Dolphin Conservation

5.13.3 The assessment has highlighted that other marine activities are likely to be taking place in and around many of the ports and harbours, including ferry movements, commercial fisheries, recreational sailing, etc. Wet storage of devices may therefore conflict with many of these activities, for example resulting in displacement of fishing from fishing grounds, or affecting access to existing moorings/anchorages.

5.13.4 Developers may therefore wish to consult with these bodies (in accordance with the policies in the draft National Marine Plan) to ensure that such conflict is avoided. For example, developers would benefit from consulting with local fishermen through the Inshore Fishing Group and other organisations to identify locations of static and/or mobile fishing grounds, to ensure either that these are avoided or that suitable compensation measures are established.

# 6 Next Steps

## 6.1 The Consultation

6.1.1 The MRIP draft report and accompanying environmental report addendum have been published at http://www.hi-energy.org.uk.

6.1.2 The industry, wider stakeholders and general public are now invited to provide their views on:

- the infrastructure assumptions and the long list of potential ports and harbours; and
- the Environmental Report addendum.

6.1.3 Please send written comments (by email) to HighlandsandIslandsMRIP@scotland.gsi.gov.uk or (by post) to The Scottish Government, Environmental Assessment Team, Area 2H South, Victoria Quay, Edinburgh, EH6 6QQ.

6.1.4 The documents are available for viewing at the same address, or Highlands and Islands Enterprise, Fraser House, Friar's Lane, Inverness IV1 1BA. If you require further information or a copy of the documents please contact the above email address or telephone 0131 244 7650.

6.1.5 The consultation will run from 19 August to 14 October 2014. Comments should be received by 14 October 2014.

## 6.2 Analysis of Responses

6.2.1 Once comments are received they will be subject to analysis and used to finalise the HIE MRIP.