SEA ENVIRONMENTAL REPORT – COVER NOTE

PART 1

To:

SEA.gateway@scotland.gsi.gov.uk

or

SEA Gateway
Scottish Executive
Area 1 H (Bridge)
Victoria Quay
Edinburgh
EH6 6QQ

A Final Environmental Report is attached for:

A Sustainable Energy Strategy for Orkney

The Responsible Authority is:

Orkney Islands Council

PART 3

Contact name	**Eileen Summers**
Job Title	**Environment Officer (Policy)**
Contact address	**Department of Development Services** **Council Offices** **School Place** **Kirkwall** **Orkney** **KW15 1NY**
Contact tel. no	**01856 873535**
Contact email	**eileen.summers@orkney.gov.uk**

PART 4

Signature (electronic signature is acceptable)	**Eileen Summers**
Date	**6th May 2010**

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NON TECHNICAL SUMMARY

A Sustainable Energy Strategy for Orkney **is a high level strategic document which aims to address a number of the key issues which relate to energy in Orkney. These include climate change, our dependence on fossil fuels, fuel poverty and the potential for further development of renewable energy in Orkney.**

The Introduction presents the three aims of the Strategy:

1. **To ensure Orkney uses energy as efficiently as possible, and has a secure and affordable energy supply to meet its future needs.**
2. **To add value to Orkney's renewable energy resources, for the benefit of the local economy and local communities, and without damaging the environment.**
3. **To reduce Orkney's carbon footprint.**

Section 2, Background, highlights the importance of energy, our dependence on fossil fuels, in particular in an islands context, and introduces the importance of the energy industry within Orkney. The possible environmental impacts of climate change on the Orkney Islands are also covered.

Section 3 discusses the need for a sustainable energy strategy in a National and European Union context.

The remainder of the Strategy, presents a set of eleven Strategic Issues relating to the future of energy production and use in the Orkney Islands, and establishes how Orkney Islands Council as lead member of the Community Planning Partnership intends to address these issues. The eleven strategic issues are:

- **Level of renewable energy production in Orkney**
- **Electricity transmission**
- **Planning issues for renewable energy projects**
- **Community benefits**
- **Fuel poverty**
- **Energy efficiency and small-scale renewables**
- **Travel and transport**
- **Marine renewables**
- **Jurisdiction over marine projects**
- **The hydrogen economy**
- **Policy formulation and monitoring**

Assessment of *A Sustainable Energy Strategy for Orkney*

Section 4 proposes a set of four targets for future renewable energy development in Orkney, based on a 40% efficiency level. These are:

1. **Maintain the present level of installed renewables capacity. This is approximately 25MW, which is equivalent to around one half of Orkney's electricity consumption;**
2. **Electricity use equivalence within 5 years. This would require a doubling of present installed capacity to 50MW and active management of the existing National Grid connection;**
3. **Energy use equivalence within 10 years. This would require installation of a new 200MW grid connection.**
4. **For the longer term, total carbon emissions offset, which would include require further electricity generation to 230MW and active management of a new grid connection. To increase capacity beyond 230MW would require even further grid strengthening on the mainland, beyond what is currently planned.**

Maintaining the current level of renewable energy production would have no additional benefit to the SEA objective, Climatic Factors and is also unlikely to change the current level of impact on other environmental objectives.

Assessment of the three targets which represent increasing levels of electricity generation from renewable sources recognises that achievement of target 2 (50MW electricity from renewables) is likely to include additional development of on-shore wind technology. The Council's *Supplementary Guidance On-shore Wind Energy Development*, published in October 2008 illustrates, through its Spatial Policies, the level of constraint to on-shore wind development, and indicates Broad Areas of Search where further development, including projects of over 20MW, is likely to be supported in principle.
In order to overcome the spatial constraints to on-shore wind energy development and to achieve the desired level of electricity generation it is possible that developers may consider the installation of wind turbines of a much larger size than any currently located in Orkney.

A further alternative at this stage is the introduction of offshore wind energy development in relatively shallower areas of Orkney's coastal waters. This form of technology is at an advanced stage of development with a number of wind farms either already operational or under construction off the coast of mainland Britain.

It is also possible that development of marine tidal or wave energy may contribute to realization of the 50MW target. Marine renewables in Orkney are still at the prototype testing stage using the test facilities operated by the European Marine Energy Centre either at its wave energy site in the seas off Billia Croo to the west of Orkney or at its tidal energy test site in the Falls of Warness, off Eday. However progress to a more advanced stage within this time scale appears to be increasingly likely through establishment of a demonstration tidal site in the Pentland Firth which separates Orkney from the Scottish Mainland.

It is highly likely that further renewable energy development to installed capacities of 50-160MW and over will be achieved through development in the marine environment.

Linked to further development of renewable energy in Orkney is Section 5: Electricity transmission. Upgrading of the grid connection between Orkney and the Scottish Mainland would be necessary in order to progress renewable energy development beyond 50MW output. An underwater cable would be laid across the Pentland Firth and the onshore electrical infrastructure would include substations, overhead transmission lines and/or underground cables.
Here also, the likely environmental impact cannot be quantified without further information. The routes for these transmission lines will have to be carefully planned in order to avoid, minimise or offset negative environmental effects.

Section 6: Planning issues for renewable energy projects acknowledges the challenge of accommodating large-scale wind turbines into Orkney's low-lying topography and provides a brief outline of *Supplementary Guidance On-shore Wind Energy Development*.

Section 7: Community Benefit outlines a number of ways in which Orkney Islands Council will ensure that the benefits of on-shore wind energy developments are experienced by the wider community, as well as means by which the Council may consider investing in wind energy.

Sections 8: Fuel poverty and 9: Energy efficiency and small-scale renewables have similar aims and focus on the need to ensure that energy is used as efficiently as possible and to encourage the installation of small-scale renewables. Also introduced is the long term possibility of the establishment of a Council-run energy supply company which would offer advantageous prices.

Section 10: Travel and transport highlights Orkney's dependency on transport and in turn our reliance on fossil fuels to power our various means of transport and introduces the possibility of gaining funding to establish a demonstration project using alternative fuels. Measures already set out in the Local Transport Strategy for Orkney to encourage greater use of public transport and other alternatives to use of the private car are discussed as well as the importance of considering the need to travel when land allocations are considered during the forthcoming review of the Orkney Local Plan.

Section 11: Marine renewables confirms the Council's support for further development in the marine environment and highlights the importance of maintaining Orkney's role at the forefront

of this emerging industry. The possibility of incorporating tidal energy technology into fixed links is also suggested.

In Section 12: Jurisdiction over marine projects the Council confirms its intention to continue to make the case for local control of developments in the marine environment.

Section 13: The hydrogen economy introduces the possibility of developing the production of hydrogen gas, using electricity produced from renewable sources. This would reduce the need to export electricity and could largely replace fossil fuel use in Orkney.

Section 14: Policy formulation and monitoring reiterates the themes running through the Strategy – that energy development is crucial to Orkney's continuing development in terms of energy security, future economic development, energy pricing and climate change and states the Council's wish to continue to take a lead in these matters. The Council confirms that it will take a lead in the matters raised by this strategy through its Sustainable Energy Sub-committee and the Community Planning Partnership and in liaison with the Orkney Renewable Energy Forum. The role of the Orkney Renewable Energy Forum in providing an active energy network will be supported and strengthened.

Section 15: Appendix 1 sets out Orkney Islands Council's renewables investment guidelines.

Summary of positive effects

Overall *A Sustainable Energy Strategy for Orkney* is anticipated to result in major positive impact on Climatic Factors and minor positive impact on local air quality through its support for increasing levels of renewable energy development in Orkney.
Strategic Issues 3, 5, 6, 7, 9 and 10 are also anticipated to result in major positive impact on the Population and Human Health issues, for example through protection afforded to communities from inappropriate development; further promotion of energy efficiency and small-scale renewables technology; the emergence of new employment opportunities within Orkney; ongoing improvements to public transport; and public involvement in renewables through consultation and other stakeholder events,

Summary of negative effects

In terms of further development of renewables and the related electricity infrastructure, i.e. Strategic Issues 1,2,8 and 9, negative impact is likely with respect to Biodiversity, fauna and flora, Water, Soil, Landscape, Cultural Heritage and Material assets and it will be necessary to identify mitigation measures to avoid, reduce or offset these negative effects. However, without information relating to the location or scale of development it is not possible to accurately assess the scale of the effects.

Mitigation

Prior to further development of renewable energy in the marine environment surrounding Orkney, it will be necessary to prepare a Marine Spatial Plan in order to identify those areas where marine energy is most likely to be able to be accommodated as well as those where the level of constraint is such that development of marine renewable energy would be inappropriate. Strategic Environmental Assessment should be carried out in tandem with preparation of the Marine Spatial Plan.
At individual project level, there would be a requirement for each project to undergo Environmental Impact Assessment in order to identify likely environmental impacts and to suggest appropriate mitigation measures to avoid, reduce or offset any negative effects.
Other aspects of the Strategy which will require further assessment include:

- **planning the route for any new electricity transmission lines and related infrastructure; and**
- **the establishment of any industry for the manufacture of hydrogen gas.**

Monitoring

A Monitoring programme is identified which will monitor the effects of the Strategy.

Introduction

Purpose of this Environmental Report and key facts

As part of the preparation of *A Sustainable Energy Strategy for Orkney*, Orkney Islands Council is carrying out a Strategic Environmental Assessment (SEA). SEA is a systematic method for considering the likely environmental effects of certain PPS. SEA aims to:

- **integrate environmental factors into strategy preparation and decision-making;**
- **improve the strategy and enhance environmental protection;**
- **increase public participation in decision making; and**
- **facilitate openness and transparency of decision-making.**

SEA is required by the Environmental Assessment (Scotland) Act 2005. The key SEA stages are:

Screening	**determining whether the Strategy is likely to have significant environmental effects and whether an SEA is required;**
Scoping	**deciding on the scope and level of detail of the Environmental Report and the consultation period for the report – this is done in consultation with Scottish Natural Heritage, The Scottish Ministers (Historic Scotland) and the Scottish Environment Protection Agency;**
Environmental Report	**publishing an Environmental Report on the Strategy and its environmental effects, and consulting on that report;**
Adoption	**providing information on: the adopted Strategy; how consultation comments have been taken into account; and methods for monitoring the significant environmental effects of the implementation of the Strategy;**
Monitoring	**monitoring significant environmental effects in such a manner so as to also enable the Responsible Authority to identify any unforeseen adverse effects at an early stage and undertake appropriate remedial action.**

The purpose of this Environmental Report is to:

- **provide information on *A Sustainable Energy Strategy for Orkney*;**
- **identify, describe and evaluate the likely significant effects of the PPS and its reasonable alternatives; and**
- **provide an early and effective opportunity for the Consultation Authorities and members of the public to offer views on any aspect of this Environmental Report.**

INTRODUCTION (cont)

The key facts relating to *A Sustainable Energy Strategy for Orkney* are set out in Table 1 below.

Table 1: Key facts relating to *A Sustainable Energy Strategy for Orkney*

Name of Responsible Authority	**Orkney Islands Council**
Title of PPS	***A Sustainable Energy Strategy for Orkney***
What prompted the PPS (e.g. legislative, regulatory or administrative provision)	***A Sustainable Energy Strategy for Orkney* is a non-statutory document, but it is intended that it will guide the Council and other Community Planning partners in undertaking a wide range of actions in future years.**
Subject (e.g. transport)	**Energy**
Period covered by PPS	**The Strategy identifies renewable energy targets for the next ten years and beyond.**
Frequency of updates	**The Strategy will be subject to review on a 3-5 year basis.**
Area covered by PPS	**The administrative area of Orkney Islands Council**
Purpose and/or objectives of PPS	**Three linked overall aims of the strategy were endorsed by the Council and the Community Planning Steering Committee in 2006. These are designed to capture all the themes relevant to energy in Orkney:** • **To ensure Orkney uses energy as efficiently as possible, and has a secure and affordable energy supply to meet its future needs.** • **To add value to Orkney's renewable energy resources, for the benefit of the local economy and local communities, and without damaging the environment.** • **To reduce Orkney's carbon footprint.**
Contact point	**Shona Croy** **Assistant Director (Development Planning and Regeneration)** **Department of Development and Environment Services** **Orkney Islands Council** **School Place** **Kirkwall** **KW15 1NY** **Tel: 01856 873535** **Email: Shona.Croy@orkney.gov.uk**

SEA activities to date

Table 2 summarises the SEA activities to date in relation to *A Sustainable Energy Strategy for Orkney.*

Table 2: SEA activities to date

SEA Action / Activity	When carried out	Notes (e.g. comment on data availability, particular issues or any advice from the Consultation Authorities that has now been taken into account)
Screening to determine whether the Strategy is likely to have significant environmental effects		Screening was not necessary in this case as *A Sustainable Energy Strategy for Orkney* qualifies for SEA under Section 5 (3) (a) of the Environmental Assessment (Scotland) Act 2005.
Outline and objectives of the Strategy	*March 2008*	
Scoping the consultation periods and the level of detail to be included in the Environmental Report	*April 2008*	
Relationship with other Plans, Programmes and Strategies and environmental objectives	*April 2008*	
Environmental baseline established	*May 2008*	
Alternatives considered	*July 2008*	In this case the alternatives are presented as a set of targets, to be achieved over a period of ten years.
Environmental problems identified	*October 2008*	
Assessment of future of area without the Strategy	*November 2008*	
Environmental assessment methods established	*November 2008*	
Selection of Strategy alternatives to be included in the environmental assessment	*November 2008*	Rather than considering one Strategy alternative, a set of three possible targets are considered for the further development of the renewable energy industry in Orkney.
Identification of environmental problems that may persist after implementation and measures envisaged to prevent, reduce and offset any significant adverse effects	*November 2008*	
Monitoring methods proposed	*December 2008*	
Consultation timescales • Timescale for Consultation Authorities • Timescale for public	*December 2008*	A consultation deadline of 11th February 2009 was set for both documents.
Notification/publicity action	December 2008	
Consideration of consultation responses	June-July 2009	

A Sustainable Energy Strategy for Orkney and context

Outline and objectives of *A Sustainable Energy Strategy for Orkney*

Schedule 3 of the Environmental Assessment (Scotland) Act 2005 requires that the Environmental Report includes "*an outline of the contents and main objectives of the plan or programme*". The purpose of this section is to explain the nature, contents, objectives and timescale of the Strategy.

***A Sustainable Energy Strategy for Orkney* is 12 pages long and consists of the following sections:**

1. **Introduction to the Strategy**
2. **Background to energy issues in Orkney**
3. **Sustainable energy in a National and European context**
4. **Level of renewable energy production in Orkney**
5. **Electricity transmission**
6. **Planning issues for renewable energy projects**
7. **Community benefit**
8. **Fuel Poverty**
9. **Energy efficiency and micro renewables**
10. **Travel and transport**
11. **Jurisdiction over marine projects**
12. **The Hydrogen Economy**
13. **Policy formulation and monitoring**
14. **Related OIC strategies and other references**
15. **Appendix 1**

The introduction outlines the main reasons for preparation of *A Sustainable Energy Strategy for Orkney* – the rising cost of fossil fuels; growing interest in renewable energy; increasing concerns over climate change; and the need to reduce our carbon footprint.
It points out that this is a strategy for the whole community of Orkney and that its aims have been endorsed by the Community Planning Steering Group
These three overall aims are:

1. **To ensure Orkney uses energy as efficiently as possible, and has a secure and affordable energy supply to meet its future needs.**
2. **To add value to Orkney's renewable energy resources, for the benefit of the local economy and local communities, and without damaging the environment.**
3. **To reduce Orkney's carbon footprint.**

Section 2 expands upon the importance of energy in Orkney, from the importance over the last thirty years of the oil industry and the Flotta terminal to our heavy reliance on fossil fuels. As an island group, transport is an important issue and ferries and air travel are vital in maintaining links with mainland UK. Orkney's cool and damp climate also means that there is a need for space heating for a large proportion of the year and increasing fuel prices cause Orkney to have one of the highest levels of fuel poverty in Scotland.
Table 1 of the Strategy outlines Orkney's potential renewable energy resources in terms of MW installed capacity and level of acceptability of development (high, medium and low), showing that the levels of potential renewables development are substantial, particularly with respect to tidal energy.
The threats which the islands face from climate change are outlined, in particular rising sea temperatures and levels and the likelihood of increasingly strong storms. In view of these issues, Orkney has a stake in the reduction of global carbon emission as a means of mitigating climate change.

Section 3 discusses the need to develop renewable sources of energy in the National and European context and highlights the Scottish and UK Governments targets for renewable energy development and reductions in greenhouse gas emissions.

Section 4: Level of Renewable Energy production in Orkney discusses a range of targets that Orkney could aspire to achieve:

1. **Maintain present renewable energy capacity of 25MW, representing 50% of the electricity usage in Orkney;**
2. **Electricity usage equivalence, whereby renewable energy capacity would be increased to 50MW, requiring active management of the existing grid connection;**
3. **Energy use equivalence or 160MW of energy from renewable sources, combined with a greater reliance on electricity and diminished use of fossil fuels, requiring installation of a new 200MW grid connection;**
4. **Total carbon use offset, including non-energy activities, whereby the output of electricity from renewables increases to 230MW, requiring active management of a new grid connection; and**
5. **Achieving in excess of 1GW (1000MW) of renewable energy production for the long term, requiring further grid strengthening on mainland UK, beyond that which is planned. The Strategy states that this option should be an aspirational goal, capable of being considered as a definite target when the strategy is reviewed in 3-5 years.**

Section 5: Electricity Transmission explains how development of renewable energy in Orkney beyond the capacity of 50MW will depend on installation of a new 200MW grid connection. Scottish Hydro-Electric Transmission proposes to install a new sub-sea cable between the Dounreay substation in Caithness and Orkney. Current plans include two 132 kV sub-sea cables and associated infrastructure (overhead transmission lines and/or underground cables and substations on Orkney and the Scottish Mainland). The Scottish Government's draft National Planning Framework includes reinforcement of the sub-sea cable between Orkney and the Scottish Mainland as a "national development". The draft NFP also identifies a potential sub-sea cable running through the Pentland Firth, linking the east and west coasts of Scotland with potential European energy markets.

Section 6: Planning issues for Renewable Energy projects

As planning authority, the Council has a duty to develop a policy framework for renewable energy developments on land, taking into account the full range of planning issues raised by such developments, most obviously in the case of large-scale wind turbines. In parallel with *A Sustainable Energy Strategy for Orkney* the Council has published Supplementary Guidance On-shore Wind Energy Development which incorporates a spatial policy based on three different zones:

- **Broad Areas of Search, those areas of least constraint to on-shore wind energy development in Orkney, including such developments of 20MW or over;**
- **Areas of Significant Protection, including Natura 2000 sites, Ramsar Sites, Sites of Special Scientific Interest and the heart of Neolithic Orkney World Heritage Site and its Zones of Visual Influence; and**
- **Areas of Potential Constraint, including the World Heritage Site Buffer Zone; 2km Buffer Zones around towns, villages and rural settlements; Kirkwall Airport Safeguarding Area; Sites of Local Nature Conservation Interest; and Sites of Local Landscape Character.**

The Supplementary Guidance includes a set of nine Development Criteria, the requirements of which potential developers must fulfil before planning permission may be granted.

Section 7: Community Benefit sets out a number of ways through which local benefits from the development of renewables can be maximised. These are:

- **Annual payment of community benefit paid by the developer to community bodies or projects;**
- **Council equity participation in wind turbine projects whereby investment by Orkney Islands Council in a private or community owned project would earn a direct return for the Council, which could in turn be used for a variety of community projects. The Council established an investment fund of £2 million for this purpose in 2007;**

- **Community-owned wind turbines, whereby one or more turbines are developed by a community group, usually a not-for-profit development trust, with all surpluses being made available for other community projects in the locality.**
- **Local private investor-owned wind turbines whereby development is undertaken by a group of local investors – an investors club – with profits being distributed as dividends to members of the club. Council participation through equity investment is possible.**
- **Council-owned wind turbine project. One project is under investigation where the Council would act as sole developer of a renewable project, on land which it owns or could acquire. The investment fund of £2 million would probably be insufficient for this purpose, and further investment would mean higher financial risk, although the rewards could potentially be greater.**

Section 8: Fuel Poverty points out that Orkney has one of the highest levels of fuel poverty in Scotland and one of the aims of the Strategy is achievement of a secure and affordable energy supply. *A Sustainable Energy Strategy for Orkney* will be aligned with the Council's Fuel Poverty Strategy which is currently under review. Promotion of energy efficiency and small-scale renewables devices is recognised as a key mechanism for addressing fuel poverty. The Orkney branch of the Energy Efficiency Agency and Keep Orkney Warm have been brought together to form the Orkney Energy Agency which will provide advice on, and promotion and implementation of efficiency schemes.

Section 9: Energy Efficiency and Small-scale Renewables are seen as cost-effective ways of reducing energy consumption and carbon footprints. In Orkney the Energy Efficiency Agency is the main public sector centre of expertise, advice and assistance about energy efficiency and small-scale renewables. Orkney Islands Council is a signatory to the Government's Climate Change Declaration and is also a participant in the Carbon Trust's Carbon Management Programme with action plans for reducing its own carbon footprint. The Council has an Energy Officer who advises the Council on energy efficiency improvements to its own estate.

Section 10: Travel and Transport represents one of the principle demands for fossil fuels in Orkney. Alternative technologies to the fossil fuel-powered engine are currently underdeveloped and travel and transport represent a problem area in relation to achieving the overall objectives of the Strategy. Orkney therefore has a special interest in the development of transport methods which are not reliant on fossil fuels, especially through the use of hydrogen fuel cell technology or through the use of biofuels. A demonstration project linked to public or demand-responsive transport would be especially relevant in Orkney, e.g. a minibus powered by alternative fuels.
Through its Local Transport Strategy for Orkney, the Council is seeking to improve public transport and other alternatives to the private car, and to encourage their use for commuting and other journeys.
Planning has an important role in reducing the need to travel, by ensuring that land allocations for development are made in a way that minimises the need to travel, and enhances access by walking, cycling and public transport, by focusing development in areas close to facilities and amenities and on public transport routes. This issue is being addressed in the current review of the Orkney Local Plan.

Section 11: Marine Renewables The Resources Study, results of which are presented in Table 1 showed that the potential for marine resources, particularly tidal power, is much greater around Orkney than the potential for on-shore wind turbines. Marine energy may represent Orkney's principle contribution to renewables in the future and as the basis for a valuable leading-edge industry in the islands. The Stromness based European Marine Energy Centre, the marine energy testing and accreditation centre and Heriot Watt's International Centre for Island Technology, which is carrying out a research project into aspects of marine energy, give Orkney a lead in this area at the present time.
Tidal generation from new or fixed links between islands would have twin benefits for Orkney. The Draft National Planning Framework identifies the Pentland Firth and the seas to the west of Orkney as having considerable "marine potential".

Section 12: Jurisdiction over Marine Projects At present, renewable energy installations at sea of over 1MW capacity require permission from the Scottish Government, whilst the Council is the relevant planning authority for on-shore development of wind turbines other than developments of over 50MW which instead require consent from the Scottish Government under the Electricity Acts. The Council considers it an anomaly that, while planning control over marine fish farms is being transferred to local authorities, control of offshore renewable energy projects remains with the Scottish Government.
The Scottish Government intends to deliver a Marine Bill which will include a system of marine planning to enhance the sustainable use of the marine environment. The Bill raises the possibility of regional management of the marine environment.

Section 13: The Hydrogen Economy Development of the technology to produce hydrogen using electricity generated from renewable sources is seen as a way of phasing out the use of fossil fuels for transport in Orkney. This would contribute directly to reducing Orkney's carbon footprint and would provide a secure and local supply of energy, as well as a local market for energy produced in the islands. However, at present the technology is costly and substantial resources are being committed by governments and major energy companies to develop it further and reduce costs. A demonstration project in Orkney could increase technical knowledge and awareness and show how the technology may be applied.

Section 14: Policy Formulation and Monitoring The Council's desire to establish *A Sustainable Energy Strategy for Orkney* highlights the importance of energy to Orkney's development. The Council wishes to take a lead in matters of energy security, future economic development, energy pricing, climate change and other issues, promoting debate about, and awareness of, the issues, as well as engaging in national and regional policy debates. It will do this through its Sustainable Energy Sub-committee and the Community Planning Partnership and in liaison with the Orkney Renewable Energy Forum.
Monitoring is recognised as being essential to the understanding of issues and the development of policy. Although many organisations collect and hold information in the areas in which they hold a particular interest, there is no single focal point on Orkney for the monitoring of renewable energy developments. Orkney Renewable Energy Forum is an active network amongst those with an interest and involvement in energy matters and the Strategy considers that its work should be supported and strengthened.

Section 15: Appendix 1 sets out Orkney Islands Council's renewables investment guidelines.

Relationship with other Plans, Programmes and Strategies and their environmental protection objectives

Schedule 3 of the Environmental Assessment (Scotland) Act 2005 requires that the Environmental Report includes an outline of the Strategy's relationships with other relevant Plans, Programmes and Strategies, and how environmental protection objectives have been taken into account in the preparation of *A Sustainable Energy Strategy for Orkney*. This section covers these issues and describes the policy context within which the Strategy operates, and the constraints and targets that this context imposes on the Strategy.

Table 3 gives an outline of the Plans, Programmes and Strategies required to be taken into account during the preparation of *A Sustainable Energy Strategy for Orkney*. An extended version of Table 3 is presented as Appendix A of this report.

Table 3: A hierarchical List of Plans, Programmes and Strategies which are relevant to *A Sustainable Energy Strategy for Orkney*

International
SEA Directive 2001/42/EC (European Union, 2001)
UN Framework Convention on Climate Change & its Kyoto Protocol (1998)
UN Convention on Biological Diversity (1992)
Conservation of Wild Birds Directive (79/409/EEC)

Conservation of Natural Habitats and of Wild Fauna and Flora Directive (92/43/EEC)
Biodiversity: The UK Action Plan
Water Framework Directive (2000/60/EC)(WFD)
EU Sustainable Development Strategy 2001
The Renewables Directive: Directive on the Promotion of Electricity from Renewable Sources in the Internal Electricity Market (2001/77/EC)
European Climate Change Programme (ECCP II) 2005
EC Directive 1996/62/EC, Air Quality Framework
EU Thematic Strategy on Air Pollution 2005
Groundwater Directive 80/68/EEC (Expected to be revoked by the Water Framework Directive in 2013)
UK National
The UK Climate Change Act 2008
The Energy White Paper "Meeting the Energy Challenge" (May 2007)
The UK's Shared Framework for Sustainable Development (2005)
Securing the Future – Delivering the UK Sustainable Development Strategy (2005)
Scotland National
Changing Our Ways, Scotland's Climate Change Programme (2006)
The Climate Change (Scotland) Bill
A Marine Bill for Scotland
The Renewables Obligation (Scotland) or ROS
The Electricity Act 1989
The Electricity Works (Environmental Impact Assessment) Regulations 2000
The Food and Environmental Protection Act (FEPA) 1985
The Coast Protection Act (CPA) 1949
Town and Country Planning (Scotland) Act 1997
National Air Quality Strategy (2000) and Addendum (2003
The Water Environment & Water Services (Scotland) Act 2003
Scotland's Biodiversity *It's in Your Hands* (2004)
Meeting the Needs. Priorities, Needs, Actions and Targets for Sustainable Development in Scotland (2002)
Choosing our Future: Scotland's Sustainable Development Strategy (2005)
The Government Economic Strategy, The Scottish Government (2007)
The National Planning Framework for Scotland 1 & 2
SPP1 The Planning System
SPP2 Economic Development
SPP6 Renewable Energy
Planning Advice Note (PAN) 45 Renewable Energy Technologies
SPP7 Planning and Flooding
PAN 69 Planning and Building Standards Advice on Flooding
PAN 84 Reducing Carbon Emissions in New Development
NPPG13 Coastal Planning
PAN 53 Classifying the Coast for Planning Purposes
NPPG14 Natural Heritage
PAN 60 Planning for Natural Heritage
PAN 51 Planning, Environmental Protection and Regulation

PAN 58 Environmental Impact Assessment
Scottish Executive Marine & Coastal Strategy (2005)
NPPG5 Archaeology and Planning
PAN 42 Archaeology – The Planning Process and Scheduled Monument Procedures
NPPG18 Planning and the Historic Environment
Scottish Historic Environment Policy 1, "Scotland's Historic Environment"
Scottish Historic Environment Policy 2. Scheduling: protecting Scotland's nationally important monuments
Passed to the Future
Memorandum of Guidance on Listed Buildings and Conservation Areas, Historic Scotland 1998
OIC Local Biodiversity Action Plan (2002)
OIC Local Biodiversity Action Plan (2008-2011)
Highlands and Islands Operating Plan 2008-2011
Orkney Islands Council Department of Harbours Safety Management System 2007
OIC Corporate Strategic Plan 2008 – 2013
The Orkney Local Plan (2004)
OIC Structure Plan (adopted 2001 and covering the 10-year period until 2011)
Orkney Environmental Strategy and Action Plan
Orkney Outdoor Access Strategy
Orkney Core Path Plan 2007
Orkney and Shetland Area Waste Plan 2002
OIC 2020 Community Plan (2007)
Orkney Islands Council Carbon Management Programme. Strategy and Implementation Plan

Analysis of these plans, programmes and strategies has highlighted the following environmental considerations which are relevant to *A Sustainable Energy Strategy for Orkney*:

- **Scotland's requirement to make an equitable contribution to the UK's obligation to reduce greenhouse gas emissions under the Kyoto Protocol, and the appropriate level of renewable energy which Orkney should aim to produce;**
- **The need to use energy efficiently and to reduce Orkney's carbon footprint;**
- **The duty of Orkney Islands Council to incorporate and implement appropriate biodiversity targets, and to ensure that the biodiversity, fauna and flora of Orkney is taken into account in fulfilling the objectives of the Strategy, in particular species and habitats which are afforded special protection, e.g. under Natura 2000 and European Protected Species;**
- **The need to ensure protection of water;**
- **The need to ensure that planning policies protect and, where appropriate, enhance the historic and natural heritage environment;**
- **The need to maintain a clean, healthy, safe, productive and biologically diverse marine and coastal environment when developing and operating marine renewable energy projects in the seas around Orkney;**
- **Orkney Islands Council's role in assisting in the promotion of development which is sustainable in the long term;**
- ***A Sustainable Energy Strategy for Orkney* should support the overarching vision for Orkney which is set out in Orkney's Community Plan, 2020.**

In a local context, *A Sustainable Energy Strategy for Orkney* supports a number of documents in the approved Orkney Structure Plan and the adopted Orkney Local Plan (2004). Those specific to renewable energy developments are:

- **Policy SP/U6 Renewable Energy (Structure Plan)**

- **Policy SP/U7 Wind Energy (Structure Plan)**
- **Policy LP/U7 Wind Power (Local Plan)**

The key objective of these policies is to encourage renewable energy developments where environmentally acceptable.

Relevant aspects of the current state of the environment

Schedule 3 of the Environmental Assessment (Scotland) Act 2005 requires that the Environmental Report includes a description of "the relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme", and "the environmental characteristics of areas likely to be significantly affected". This section aims to describe the environmental context within which the Strategy operates and the constraints and targets that this context imposes on the Strategy.

An Environmental Baseline of the Orkney Islands has been compiled and is presented as Appendix B.

Table 4 below presents a summary of the data collected and the relevant sources.

Table 4: Summary of data collected in compiling an environmental baseline of the Orkney Islands

DATA	SOURCE
Information on climate change	SNIFFER, 'A handbook of climate trends across Scotland', 2006 Climate Change: The UK Programme 2006
Information on carbon dioxide emissions	Scottish Executive, Key Scottish Environmental Statistics, 2007 Original information from 'Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2004'. AEA Technology, AEAT/ENV/R/2318
Local air quality data for Kirkwall	Orkney Islands Council Department of Environmental Health Scottish Pollutant Release Inventory (SEAP), www.sepa.org.uk
List of statutory and non-statutory designated natural heritage sites	Scottish Natural Heritage (SNH) www.snh.gov.uk Joint Nature Conservation Committee (JNCC) www.jncc.gov.uk Orkney Islands Council Local Plan www.orkney.gov.uk
RSPB reserves in Orkney	Royal Society for the Protection of Birds www.rspb.org.uk
European Protected Species	Scottish Natural Heritage (SNH) www.snh.gov.uk
Lists of Priority habitats and species in Orkney	Orkney Islands Council Local Biodiversity Action Plan 2002 and 2008-2011 www.orkney.gov.uk
Water quality data (freshwater and coastal) and Groundwater quality data	Scottish Environment Protection Agency (SEPA) www.sepa.org.uk
Information on rainfall in Orkney Information on areas at risk of flooding	SNIFFER, 'A handbook of climate trends across Scotland', 2006 www.sniffer.org.uk Indicative River and Coastal Flood Map (Scotland), SEPA, 2005
Soil types in Orkney	Scottish Natural Heritage Review No 100, Orkney Landscape Character Assessment, Land Use Consultants, Glasgow (1998) Changing Our Ways, Scotland's Climate Change Programme Scottish Executive (2006) Soil and Land Capability for Agriculture Maps (Orkney and Shetland) mapsales@macaulay.ac.uk
Data on Agricultural Land Use in Orkney during 2002	Scottish Agricultural Census 2001 - 2006

DATA	SOURCE
and 2005	
Information on contaminated land in Orkney	Orkney Islands Council Department of Environmental Health
Information on Landscape Character Assessment	Scottish Natural Heritage Review No 100, Orkney Landscape Character Assessment, Land Use Consultants, Glasgow (1998) Environmental Report for SEA of the Renewable Energy Planning Framework for Orkney, David Tyldesley and Associates. 2005
Listed buildings in Orkney	PASTMAP, www.historic-scotland.gov.uk
Orkney Scheduled Ancient Monuments	PASTMAP, www.historic-scotland.gov.uk/index/ancientmonuments/searchmonuments.htm
Gardens and Designed Landscapes	Inventory of Gardens and Designed Landscape www.historic-scotland.gov.uk/index/gardens.htm
Information on Conservation Areas	The Orkney Islands Council Development Plan (The Structure Plan (2001) and Local Plan (2004))
General health of the populations of Orkney and Scotland Life expectancy of residents of the Orkney Islands over the period 2000-2005	Scottish Executive National Census 2001 British Heart Foundation Website www.heartstats.org Scottish Executive and NHS Health Scotland healthy Living website www.InfoScotland.com
Population of Orkney (2006) Population trends in the Orkney Isles 1961 – 2001	General Register Office for Scotland Population (GROS) Estimates General Register Office for Scotland (GROS)
Source of aggregates and other minerals used in Orkney	Orkney Islands Council Roads Department
Current status of grid-connected onshore wind energy projects in Orkney	Department of Development Services, Orkney Islands Council 2008

The following summarises the likely gaps and/or unreliability of the SEA baseline data, and how they were minimised:

There are some gaps or other deficiencies, especially in respect of the links between land use planning and environmental issues relating to climatic factors, air quality and human health.

Air quality monitoring which is carried out by Orkney Islands Council re-commenced in August 2007 following an 18-month gap.

- **The results obtained during 2007-08 are similar to those of previous years and it can be assumed that any change during the intervening period was negligible. As it becomes available, future data will be incorporated in the monitoring programme of this SEA.**

Information about the extent and location of habitats of nature conservation importance, protected and other species listed as priority species in Biodiversity Action Plans may not be complete or up-to-date owing to the large and remote geographic area covered by the Plan and the dynamic nature of some of these resources.

- **Natura sites and SSSIs are periodically monitored by SNH through its Site Condition Monitoring programme. A further monitoring programme is currently underway for the Local Sites of Local Nature Conservation Interest, whereby most of the mainland**

sites and much of the linked South Isles sites have been covered. The North Isles and remaining South Isles still have to be visited.

- **Where development may take place in more remote locations of environmental sensitivity, it is likely that a full projects environmental impact statement will be required.**

There is no soil quality data available for the Orkney Islands.

- **If in future a soil monitoring programme is established, the resulting data will be used to monitor the environmental performance of the Strategy.**

Information about the extent and location of archaeological resources may be incomplete. Sensitive archaeological remains may extend beyond the confines of many ancient monuments and both arable and non-arable areas may contain sensitive and important monuments.

Population data for the Isles is based on Census data; the most recent information is from the 2001 Census.

Health data is fairly subjective and can only give an indication of peoples' perception of their own health. However, it is considered a useful indicator for the purposes of this report.

The following paragraphs describe the area of *A Sustainable Energy Strategy for Orkney:*

Orkney is an archipelago of around 70 islands and skerries which lies on latitude 59◦North, off the northern coast of Scotland, where the North Sea and the Atlantic Ocean meet. The islands of Orkney cover an area of 974 square kilometres, of which more than half is taken up by the Mainland, which is the group's largest island.

The strongly tidal Pentland Firth separates Orkney from the Scottish mainland and additional tidal 'sounds' and firths flow between its smaller islands and skerries. To the west, Orkney is open to the powerful swell waves of the Northern Atlantic Ocean.

For a number of years Orkney has been at the forefront of on-shore wind energy development and the islands now represent an important location for the emerging marine renewable energy industry.

Orkney has a rich and varied natural and cultural heritage, upon which much of its economy is based, and if the renewables industry is to develop further, the challenge will be to achieve this without causing adverse impact to the environmental, social and economic fabric of the islands.

Environmental problems

Schedule 3 paragraph 4 of the Environmental Assessment (Scotland) Act 2005 requires that the Environmental Report includes a description of existing environmental problems, in particular those relating to any areas of particular environmental importance. The purpose of this section is to explain how existing environmental problems will affect or be affected by *A Sustainable Energy Strategy for Orkney*, and whether the Strategy is likely to aggravate, reduce or otherwise affect existing environmental problems.

Environmental problems were identified through a variety of methods, e.g. from experience gained from work carried out on previous SEA Environmental Reports, discussions held with representatives from the Consultation Authorities, discussions held with members of Orkney Islands Council's Policy and Projects team and an analysis of the baseline data. Environmental problems that are relevant to *A Sustainable Energy Strategy for Orkney* are summarised in Table 5.

Table 5: Environmental problems relevant to *A Sustainable Energy Strategy for Orkney*

Problem	Supporting data (where available at this stage)	Implications for PPS
Climatic factors and local air quality Carbon dioxide emissions from the energy and transport sectors continue to rise. Both the UK and Scottish Governments are committed to increasing the amount of electricity which is generated within the UK from renewable sources. In order for Scotland to realise its targets in relation to renewable energy generation, a further shift in methods of generation will be required to produce a larger share from renewable sources.	Scottish Executive, Key Scottish Environmental Statistics, 2007	The Strategy will consider a range of possible options for the development in and around the Orkney Islands of projects which could harness and utilise energy from renewable sources. The generation of further electricity from renewable sources and subsequent reduction in emissions of greenhouse gases offers potential for positive environmental impact.
Biodiversity, fauna and flora Both climate change and increasing rates of development are leading to changes in species distribution and loss of habitat. There is potential for the development of renewable energy projects to impact negatively on the biodiversity and natural habitats of Orkney, including internationally, nationally and locally designated sites and protected species. Both direct and indirect effects should be considered as well as any cumulative effects. Decline of habitats and species may occur through fragmentation of the countryside. Habitat connectivity may become more important as climate change progresses (providing migratory routes for affected species).	Information relating to designated areas in the Orkney Islands – SAC, SPA, SSSI, Ramsar site, Sites of Local Nature Importance, Local Nature Reserve. Data relating to the recent pattern of decline in populations of the Common seal, *Phoca vitulina* in the coastal sea around Orkney. Marine benthic biotope data. Data relating to distributions and	In seeking to identify an appropriate level of development of sustainable energy, the Strategy must consider the potential impacts of such development on Orkney's natural heritage – its habitats and species.

Problem	Supporting data (where available at this stage)	Implications for PPS
	movement patterns of cetaceans. Seabird population data, relating to breeding success/failure rates and offshore populations. Data relating to fish spawning grounds. A number of areas, including coastal habitats, are designated or proposed as Sites of Local Nature Conservation Interest due to the faunal or floral assemblages which they support.	
Water Flooding is a problem in parts of Orkney and could be exacerbated by climate change. The effects of onshore and offshore renewable energy development on aquatic systems. These include short-term pollution effects due to construction projects and long term effects such as changes to hydrological conditions. Large scale marine projects may lead to localised changes to tidal flows and wave climates.	SEPA's indicative flood map Potential pollutants of concern include silt, cement, concrete, fuel, lubricating and shutter release oils, petrol, sewage and other waste materials.	In seeking to identify an appropriate level of development of sustainable energy, the Strategy must consider the potential impacts of such development on aquatic environments, both freshwater and marine.
Soil The effects of further on-shore renewable energy	SNIFFER, 'A handbook	In seeking to identify an appropriate level of development of sustainable energy, the Strategy must

Problem	Supporting data (where available at this stage)	Implications for PPS
developments on soils, e.g. peat which is a storage system for carbon which, when disturbed, releases carbon to the atmosphere and is also important in regulating water resources. Works involving excavation and soil disturbance result in loss of habitat and can also lead to the entry of increased suspended solids into watercourses. Potential effects of global warming may include rising sea levels and increased storminess, both of which may lead to increased coastal erosion. Soil erosion in general is primarily caused by wind and water and may be exacerbated should climate change progress.	of climate trends across Scotland', 2006 www.sniffer.org.uk OIC Department of Technical Services – information relating to coastal erosion in the Orkney Islands.	consider the potential impacts of such development on the soil environment.
Landscape The effects of renewable energy development on the seascapes and landscapes of the Orkney Islands, which include the Heart of Neolithic Orkney World Heritage Site and a National Scenic Area.	Orkney Landscape Character Assessments	In seeking to identify an appropriate level of development of sustainable energy, the Strategy must consider the potential impacts of such development on Orkney's landscapes and seascapes.
Cultural heritage The effects of renewable energy development on Orkney's historic environment and cultural heritage, which includes the Heart of Neolithic Orkney World Heritage Site and many Scheduled Ancient Monuments, Listed Buildings, underwater wrecks, onshore archaeological sites, further possible archaeological sites and the historic settings of all these sites.		In seeking to identify an appropriate level of development of sustainable energy, the Strategy must consider the potential impacts of such development on Orkney's cultural heritage.

Problem	Supporting data (where available at this stage)	Implications for PPS
Population and Human Health **Renewable energy development may impact upon on population levels in the islands and may also lead to possible changes to tourism, recreation and leisure facilities.** **Renewable energy development may impact upon the health and visual amenity of residents and visitors to Orkney.** **Fuel prices are consistently higher in Orkney than on mainland UK, a factor which acts negatively on economic and social development in the islands.** **Due to Orkney's climate, domestic households are heavy energy users for space heating throughout most or all of the year. This fact combined with the rising cost of fuel means Orkney has one of the highest levels of fuel poverty in Scotland.**		**In seeking to identify an appropriate level of development of sustainable energy, the Strategy must consider the potential impact of such developments on other industries and leisure facilities in the area, the population of Orkney and on human health.**
Material assets **The effects of renewable energy development on non-renewable resources in the County (e.g. sand and aggregates)**		**In seeking to identify an appropriate level of development of sustainable energy, the Strategy must consider the potential impact of such developments on the use of non-renewable material resources. It must also consider effects on agricultural land, public amenity land, buildings, transport and marine material assets.**
Cumulative effect **The cumulative effects should be considered of multiple renewable energy developments in and around Orkney, both onshore and offshore.**		**In seeking to identify an appropriate level of development of sustainable energy, the Strategy must consider the potential cumulative impact of such developments.**

Likely evolution of the environment without *A Sustainable Energy Strategy for Orkney*

Without *A Sustainable Energy Strategy for Orkney* it is considered that the likely future changes to the area would be as described below:

The position of Orkney Islands Council with regard to the scale of future renewable energy development both on land and in the marine environment would be less clear, and certain renewable energy developments might not progress. Whilst this would be unlikely to have a noticeable effect on the local air quality of the Orkney Islands, the value of individual developments becomes more significant when viewed as a contribution towards reducing overall consumption of energy from non-renewable sources and hence to reducing the emissions of gases that continues to influence air quality and climatic factors globally, nationally and locally. The benefits to population and human health, which could include the attraction of inward investment to remote locations, bringing about improved employment opportunities, and the possibility of more affordable fuel also might not be achieved.

It is possible that certain larger scale on-shore or marine renewable energy projects might not progress, in which case their potential impacts on biodiversity, fauna and flora, and the water and soil environments and on Orkney's landscapes/seascapes and cultural heritage would not occur. However, the Strategy also promotes energy efficiency and the more widespread use of micro-renewables, which are not considered to pose a significant risk to the environment, and without the Strategy the benefits of these factors might not be fully realised.

If *A Sustainable Energy Strategy for Orkney* were not implemented it is possible that certain renewable energy developments might not proceed and fewer raw materials such as aggregate and sand would be required for ancillary works such as construction of access routes and other infrastructure.

SEA Objectives

A set of objectives and environmental criteria has been identified which will be used as measures by which the environmental impacts of the Supplementary Guidance may be assessed. These are based on the objectives and environmental criteria which were originally identified for SEA of the *Renewable Energy Planning Framework for Orkney*[1] and which were drawn up from a detailed analysis of present policy and good practice documents at international and national levels and the historical evolution of the principles underpinning sustainable development. The following source references were used to draw up the environmental objectives and criteria:

- **HM Government, 2005, Securing the Future – Delivering UK Sustainable Development Strategy.**
- **Scottish Executive Development Department, key Scottish Environmental Statistics and NPPG6 Renewable Energy Developments (revised 2000) and PAN 45 Renewable Energy Technologies (revised 2002) and the other NPPGs, SPPs and PANs listed in Appendix A.**
- **European Commission, 2003, Implementation of Directive 2001/42 on the assessment of the effects of certain plans and programmes on the environment.**
- **European Commission, 2001, SEA and Integration of the Environment into Strategic Decision Making**
- **The Orkney Islands Council, 2001, The Orkney Structure Plan; 2004, The Orkney Local Plan.**
- **Scottish Executive Development Department, 2003, Environmental Assessment of Development Plans: Interim Planning Advice**

These objectives and environmental criteria are presented in Table 6 below.

[1] David Tyldesley & Associates, Renewable Energy Planning Framework for Orkney, 2005.

Table 6: Environmental objectives and criteria against which the strategic objectives and interventions of *A Sustainable Energy Strategy for Orkney* are tested

Environmental objective	Environmental criterion*	Most relevant issues in Schedule 2(6) of the SEA Regulations
1. To contribute towards the reduction of Scottish greenhouse gas emissions in line with Government targets	Is the strategic aim likely to significantly help to facilitate the generation of more renewable energy in appropriate locations or deter its development?	Climatic factors and local air quality, water, biodiversity, flora and fauna, population, landscape
2. To protect and where possible enhance air quality in line with national air quality standards	Is the strategic aim likely to result in significant environmental effects to local air quality in Orkney?	Local air quality, Human health
3. To protect biodiversity and specified habitats and species	Is the strategic aim likely to result in significant environmental effects on biodiversity, designated nature conservation sites and/or habitats and species that are identified in Biodiversity Action Plans?	Biodiversity, fauna and flora, water, landscape
4. Ensure that water resources, which include ground water, fluvial and coastal waters, are protected from adverse effects	Is strategic aim likely to result in significant environmental effects on the water environment, for example by causing water pollution or by impacting upon natural coastal, fluvial and marine processes?	Water, biodiversity, flora and fauna, population, climatic factors, material assets, cultural heritage, landscape
5. Safeguard soil quality and quantity	Is the strategic aim likely to result in significant environmental effects on the soil resource in Orkney?	Soil, biodiversity, fauna and flora, water
6. To protect landscape character and local distinctiveness and also to safeguard visual amenity and scenic value	Is strategic aim likely to result in significant environmental effect on landscape character and local distinctiveness?	Landscape, population, biodiversity, material assets
7. To safeguard cultural heritage resources and their settings through responsible design and siting of development	Is strategic aim likely to result in significant environmental effects on the historic environment, including the distinctive settlement pattern and cultural landscapes of Orkney?	Cultural heritage (including archaeological heritage), landscape, population, material assets
8. Protect and enhance human health and residential amenity	Is strategic aim likely to result in significant environmental effects on health of Orkney's inhabitants?	Population, human health
9. Improve the community environment and quality of life	Is the strategic aim likely to improve the community environment and quality of life in Orkney?	Population

Environmental objective	Environmental criterion*	Most relevant issues in Schedule 2(6) of the SEA Regulations
10. To promote sustainable and efficient use of natural resources and facilitate the use of energy from renewable sources	**Is the strategic aim likely to result in significant environmental effects on the current level of the material assets of the Orkney Islands?**	**Material assets**
11. Cumulative effects, environmental principle	**Is the strategic aim likely to result in significant cumulative environmental effects, e.g. is it likely to lead to development that could exceed environmental capacity? Would the precautionary principle be invoked and applied if necessary?**	**Climatic factors and local air quality, biodiversity, fauna & flora, water, soil, landscape, visual amenity, cultural heritage, human health & residential amenity, population, material assets**

***In applying the strategic aim, the question asked in each case is as follows:**
"Assuming the strategic aim was fulfilled is it likely to…….

Assessment of environmental effects and measures envisaged for prevention, reduction and offset of any significant adverse effects

Alternatives to which SEA has been applied

The alternatives to *A Sustainable Energy Strategy for Orkney* represent four targets for renewable energy production in Orkney, based on a 40% efficiency level:

Renewables Target 1: Maintain present production of energy from renewables

Current local renewable energy production is 25MW which is equivalent to around one half of Orkney's consumption of electricity. The option of maintaining the present level of electricity production from renewable energy sources would require no additional installation of renewable energy technology and, subsequently, no need for change to the electricity transmission infrastructure.

Renewables Target 2: Electricity use Equivalence

Orkney could aim to meet Government targets for renewables by linking production to local electricity usage and aspire to renewables production which was equivalent to 100% of its electricity consumption. This would require the generation of 50MW of electricity from renewables, i.e. double the current level of generation. This option would require the installation of additional renewable energy technology and active management of the existing National Grid connection.

Renewables Target 3: Energy Use Equivalence

In terms of the objectives of security and affordability of supply, a policy of energy use equivalence could be combined with greater reliance on electricity (for domestic heating systems, electrical vehicles, etc.) and diminished usage of fossil fuels. It seems likely that, in future, policy goals for renewables will increasingly be cast in terms of total energy usage, not just electricity consumption. Thus a further self-sufficiency goal might be to generate, from renewable resources, the energy equivalent of all forms of energy used in Orkney. This would mean Orkney was also compensating for its carbon emissions resulting from the use of fossil fuels. This would require an additional 135 MW above current installed renewable capacity, necessitating the installation of a new 200 MW cable under the Pentland Firth to transmit the electrical energy to the National Grid.

Renewables Target 4: Total Carbon Emissions Offset (including emissions resulting from non-energy activities)

To completely offset Orkney's carbon footprint (excluding that derived from the oil terminal at Flotta) would require a further 70MW of installed capacity, resulting in a total output of 230MW and could only be achieved with active management of a new 200 MW grid connection.

Assessment methods

The reasonable alternatives described above have been assessed against the range of environmental issues set out in Schedule 3 of the Environmental Assessment (Scotland) Act 2005. Comments from the Consultation Authorities (SNH, SEPA and The Scottish Ministers (Historic Scotland) have been taken into account regarding the methods, scope and level of detail in this Environmental Report.

Framework used to assess *A Sustainable Energy Strategy for Orkney* and its alternatives

A full environmental assessment has been undertaken of the Strategy, its aims and its alternatives against the SEA objectives and associated questions identified in Table 6, based on their predicted impact on the environmental baseline. The spatial (local/regional/national) and temporal (short/medium/long term) effects are considered as well as the type of effect: primary (direct or secondary (indirect). To increase the transparency and consistency of the

assessments, definitions of these are outlined in Table 7. For ease of understanding, a matrix is used to display the results of the assessment.

Table 7: Nature of impacts

Nature of impacts	Description
Short term	Duration of effects where short term may be less than one year
Medium term	Duration is likely to be between one to five years
Long term	Duration of effects is likely to be over five years
Permanent	The change is irreversible
Temporary	The change is reversible or the effect is for a limited duration
Direct	Arising as a result of the proposal itself
Indirect	Arising from effects associated with measures required to accommodate the proposal
Positive	Effect is beneficial to resources or receptors
Negative	Effect is detrimental to resources or receptors
Local	Effects are limited to a local geographical scale
Regional	Effects extend to Orkney as a whole
National	Wider national effects for Scotland

The purpose of SEA is to consider significant environmental effects rather than all possible effects. Significance is a function of magnitude and receptor sensitivity. In judging the significance, consideration will be given to the probability, duration, frequency and reversibility of the predicted impacts and a commentary on key findings will be provided. Table 8 sets out the methodology used for assessing significance. Where a judgement about significance is marginal or uncertain, the precautionary principle will be applied.

Table 8: Significance of impacts

Significance	Description
Major Positive Impact +	The change is beneficial and extremely noticeable in comparison to the baseline variations and could have far reaching consequences.
Minor Positive Impact +	The change is positive but limited in scale in comparison to the baseline variations.
Neutral (No Impact) 0	No change from baseline conditions
Minor Adverse Impact -	The change is adverse but limited in scale in comparison to the baseline variations.
Major Adverse Impact -	The change is adverse and extremely noticeable in comparison to the baseline variations and could have far reaching consequences.
Uncertain ?	There is insufficient information available or limited understanding of the likely effects or about the environmental resource or because the effect largely depends on the location.
Uncertain Positive ?/+	There is insufficient information available or limited understanding of the likely effects on the environment because the effect largely depends on the location; however it is considered that any effects are likely to be positive.
Uncertain Negative ?/-	There is insufficient information available or limited understanding of the likely effects on the environment because the effect largely depends on the location; however, it is considered that any effects are likely to be negative.

Due to the high level nature of *A Sustainable Energy Strategy for Orkney* in some instances there will be an element of uncertainty, either because there is insufficient information or limited understanding of the likely effects or about the environmental resource or because the effect will largely depend on the location. The evaluation will also highlight where effects are likely to be cumulative, synergistic or secondary, in line with SEA guidance. Assessment has been carried out of the objectives of *A Sustainable Energy Strategy for Orkney* and the results are presented in Table 9 below.

Table 9: Assessment of the objectives of *A Sustainable Energy Strategy for Orkney*

	ASSESSMENT CRITERIA										
	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Cumulative effects
Objective 1: To ensure Orkney uses energy as efficiently as possible, and has a secure and affordable energy supply to meet its future needs. ***Given increasing scarcity of fossil fuels globally, the resulting high process and possible restrictions on availability will exacerbate already high levels of fuel poverty in Orkney, with consequent effects on social welfare and health.***	+	+	?	?	?	?	?	+	+	?	+
	Comment: Increased energy use efficiency which leads to reduced energy usage is an action that can be effective without leading to negative environmental effects. **The realisation of a secure and affordable energy supply is a positive aim but there is potential for this to be achieved at the expense of significant negative impact to valuable and vulnerable features of Orkney's natural and cultural heritage.**										
Objective 2: To add value to Orkney's renewable energy resources, for the benefit of the local economy and local communities, and without damaging the environment. ***Orkney has very extensive renewable energy resources of wind, wave and tide, and developing these resources will help sustain the economy of the islands in the future***	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Cumulative effects
	+	+	?	?	?	?	?	+	+	0	+
	Comment: Careful assessment and planning of the design, format and distribution of renewable energy technology and incorporation of appropriate mitigation will be required to ensure that significant damage to the environment is avoided.										

	ASSESSMENT CRITERIA										
Objective 3: To reduce Orkney's carbon footprint ***Global warming makes it increasingly important that every community, no matter how small, makes a contribution to reducing carbon emissions.***	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Cumulative effects
	+	+	+	+	+	+	+	+	+	+	+
	Comment: Actions may be taken to reduce Orkney's carbon footprint which are effective without leading to negative environmental impact. These may be at the level of the individual or at an organisational level.										

Assessment was subsequently carried out of the eleven Strategic Issues which are set out in *A Sustainable Energy Strategy for Orkney* and the results are presented in Table 10 which is included as Appendix C to this report. The first of these Strategic Issues concerns four possible targets for the future of renewable energy development in Orkney and its coastal waters. The results of assessment of these targets are summarised in Table 11 below.

Table 11: Summary of findings of assessment of the four targets for renewable energy development presented in *A Sustainable Energy Strategy for Orkney*

	ASSESSMENT CRITERIA										
Target 1: Maintain present production of 25MW electricity from renewable sources – 50% electrical capacity.	**Climatic factors**	**Local air quality**	**Biodiversity, flora & fauna**	**Water**	**Soil**	**Landscape**	**Cultural Heritage**	**Population**	**Human health**	**Material assets**	**Cumulative effects**
	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Comment: This option represents baseline conditions with no further increase in the development of renewable energy in Orkney. No additional benefit to climatic factors would be gained and there would be no increase in impacts due to renewable energy technology on any of the remaining SEA environmental issues.										

	ASSESSMENT CRITERIA										
Target 2: Self-sufficiency in electricity – increase production of electricity from renewable sources to 50MW.	+	0	? / -	? / -	-	? / -	? / -	? / + / -	?	? / -	?
Comment: Positive impact on climatic factors as additional renewable energy development offsets the total amount of electricity used in the islands. Local air quality is already good and is not anticipated to change significantly as a result of this level of increase in energy production from renewable sources. The increase in energy generated from renewable sources is expected to feature additional on-shore wind developments in Orkney but may also include development in the marine environment. The Council's *Supplementary Guidance On-shore Wind Development* will guide development to areas which are more likely to accommodate further development, hence impacts on the remaining SEA environmental issues should generally be neutral, however guidance has yet to be prepared for development in the marine environment. Minor adverse impacts are anticipated from the increased use of material resources such as sand and aggregate for wind turbine foundations and access roads. Cumulative effects are uncertain without further information.											
Target 3: Energy use self-sufficiency – increase production of electricity from renewable sources to 160MW.	+	+	? / -	? / -	? / -	? / -	? / -	? / + / -	? / +	? / -	?
Comment: Positive impact on climatic factors and potential for positive impact on local air quality as additional renewable energy development offsets or replaces the use of fossil fuels in the islands. Increasing renewable energy development on this scale may include further on-shore wind energy development but may also include development of technologies which utilise offshore wind and/or marine tidal and wave energy which may lead to adverse effects on the marine environment. Impacts on population would be mixed as further development of the renewables industry may bring increased employment, but widespread marine renewables technology also has potential to conflict with lifeline ferry services and other users of the sea. There may be benefits to human health through the provision of more affordable fuel. Cumulative effects are uncertain without further information.											
Target 4: Total carbon emissions offset – increase production of electricity from renewable sources to 230MW.	+	+	? / -	? / -	? / -	? / -	? / -	? / + / -	? / +	? / -	?
Comment: Positive impact on climatic factors and potential for positive impact on local air quality, especially in more built up areas as additional renewable energy development offsets and increasingly replaces the use of fossil fuels in the islands. Without adequate planning and mitigation, development on this scale is likely to result in adverse environmental effects.											

Target one represents maintenance of the current level of renewable energy development in Orkney, a situation which would preclude realisation of any further benefits to the islands in terms of addressing fuel poverty, achieving a more sustainable energy supply and the reduction of Orkney's carbon footprint. Target one is therefore not considered to be a viable alternative.
The alternative which has been selected for *A Sustainable Energy Strategy for Orkney* is that of a staged development of renewable energy to 50MW or electricity equivalence within 5 years, and 160MW or energy equivalence within 10 years.
Moving beyond this target to 230MW would require further grid strengthening on the Scottish mainland, beyond what is currently planned.

Summary of the environmental assessment of *A Sustainable Energy Strategy for Orkney*

***A Sustainable Energy Strategy for Orkney* is a high level strategic document which sets out how Orkney Islands Council intends to address current issues relating to energy in the islands. It affirms the Council's support for increasing levels of renewable energy development in Orkney and introduces an aspirational set of installed renewables capacity targets for the next ten years and beyond. The Council's proposals for addressing energy efficiency and fuel poverty are also stated in the document. *A Sustainable Energy Strategy for Orkney* will be one of the key overarching documents which will influence Council policy in relation to renewable energy development, future transport provision in the islands, guidance on sustainable methods of development and energy efficiency and also the Authority's own programme of development.**

The assessment process found that implementation of the actions relating to all eleven Strategic Issues would contribute towards major long-term benefits with regard to Climatic Factors. In particular, further growth of renewable energy development in Orkney and its coastal waters would make a significant contribution towards the targets set by the Scottish and UK governments in terms of both increasing the level of electricity production from renewable energy sources and lowering the country's greenhouse gas emissions.

Although Local Air Quality in Orkney is already good, if expansion of renewable energy development in the County were to enable a modal shift towards greater use of non-fossil fuels, for example in the transport sector, this would lead to significant reductions in emissions of air borne pollutants such as nitrous oxides and sulphur dioxide. Should the target of 230MW for proposed renewable energy development be achieved, these benefits may also prove significant at a national level, as energy could be exported from the county via an additional cable linking Orkney with mainland Scotland.

The Strategy acknowledges that due to the levels of constraint with regard to on-shore wind energy development in Orkney, further growth of renewable energy development in the County to levels of installed capacity of 50MW and over is more likely to be achieved in the marine environment, through the development of off-shore wind energy and marine tidal and/or wave energy projects. However the assessments highlight the need for the collection of further information, in terms of other users of the marine environment, the distribution and extent of marine habitats and species in Orkney's coastal waters and the design and proposed location of devices, before an informed assessment of likely impacts could be made.

Possible impacts upon Biodiversity, fauna & flora receptors include:

- **Loss of substratum due to device/array footprints and cable routes – affecting benthic habitats and shellfish areas;**
- **Increased barriers to movement, especially if arrays of renewable energy devices were to be clustered in constrained areas e.g. in narrows, channels, sounds and firths;**
- **Increased risk of collision with marine mammals and marine birds, fish, and vessels;**
- **Increased risk of potentially serious pollution incidents resulting from incidents involving vessels, in particular laden oil tankers or bulk carriers;**
- **Increased noise from the installation (for example piling) or operation of device arrays which may affect cetaceans and seals in particular; In some situations, high levels of noise could lead to the displacement of key species from the area, causing increased energetic costs, potentially disrupting breeding activities, and leading to increased pressure on habitats and populations in other locations.**
- **Increased risk of habitat exclusion (for marine birds, marine mammals and fish)**
- **Risk of damage to marine habitats (biotopes) and species which are important in a national and local context.**

Possible impacts on the Water SEA objective include:

- **Increased risk of accidental contamination from device failures or as a result of collision with vessels, for example a laden oil tanker or a bulk chemical carrier; and**

- **Changes to tidal flow and wave energy regimes.**

Possible impacts on the Soil SEA objective include:
- **Increased disturbance of the coastal environment and features where a number of cables are brought ashore and possible increased risk of coastal erosion.**

Potential impacts on the Landscape and Cultural heritage receptors include:
- **The visual and landscape effects of development of much larger on-shore wind energy devices than those currently deployed in the County; and**
- **Increased levels of intrusion by offshore renewables technology in sensitive seascapes.**

A number of impacts, both positive and negative would be possible in relation to the population and human health SEA objectives and these include:
- **Increased employment opportunities within an expanding renewable energy industry and its ancillary services;**
- **Possible availability of a more affordable energy supply;**
- **Improved connectivity, whether through the availability of a more affordable and less polluting fuel supply or the provision of fixed links between islands;**
- **Reduced requirement for energy use, e.g. for space heating, as a result of improvements to the design and insulation of buildings.**
- **Conflicting demands for space in the vicinity of existing transport routes for ferry services to and from Orkney and Shetland; and**
- **Possible long-term displacement of fishing grounds due to devices and cables.**

Possible impacts on the material assets SEA objective include:
- **Use of sand and aggregate for the construction of foundations for renewable energy devices and/or access tracks and other ancillary development in relation to renewable energy development sites.**

Cumulative effects

Situations could arise whereby a number of marine renewable device arrays would be installed in different coastal locations around Orkney at the same time. Under these circumstances there is potential for significant cumulative effects especially in terms of physical disturbance, habitat exclusion, increased barriers to movement for seals, cetaceans and fish by restricting the areas that are available for feeding, and routes used for migration. These factors could lead to long-term displacement of certain key species.

Due to the level of uncertainty associated with the clustering of device arrays it is not possible to quantify the cumulative effects in terms of effect significance. Likely effects will depend on the number and design of arrays, where they are located, and the size of the footprint of these arrays.

Although it is not possible to quantify the potential cumulative effects, the summary results of assessment of the Strategic Issues are presented in Table 12 in order to highlight the nature of the likely cumulative effects of implementation of all eleven Strategy Issues.

Table 12: Assessment of the Likely Cumulative Effects of *A Sustainable Energy Strategy for Orkney*

	Sections from *A Sustainable Energy Strategy for Orkney*											Potential cumulative impact of *A Sustainable Energy Strategy for Orkney*
SEA topic	4*	5	6	7	8	9	10	11	12	13	14	
Climatic factors	+	+	+	+	+	+	+	+	0	+	+	The cumulative impact is likely to be strongly positive.
Local air quality	+	+	+	0	0	0	+	+	0	+	+	The cumulative impact is likely to be positive.
Biodiversity	?/-	?/-	+	0	0	0	+	?/-	+	?	+	The cumulative impact is uncertain. Where negative effects are likely, more study is required.
Water	?/-	?/-	+	0	0	0	+	?/-	+	?	+	The cumulative impact is uncertain. Where negative effects are likely, more study is required.
Soil	?/-	?/-	+	0	0	0	+	?/-	+	?	+	The cumulative impact is uncertain. Where negative effects are likely, more study is required.
Landscape	?/-	?/-	+	0	0	0	+	?/-	+	?	+	The cumulative impact is uncertain. Where negative effects are likely, more study is required.
Cultural heritage	?/-	?/-	+	0	0	0	+	?/-	+	?	+	The cumulative impact is uncertain. Where negative effects are likely, more study is required.
Population	?/+/-	?	+	+	+	+	+	?/+/-	+	?	+	The cumulative impact is likely to be broadly positive but, where there is uncertainty or potential for negative impact, further study is required.
Human health	?/+	?	+	0	+	+	+	?/+	+	?	+	The cumulative impact is likely to be broadly positive but, where there is uncertainty, further study is required.
Material assets	?/-	0	0	0	0	0	+	?	+	?	+	The cumulative impact is uncertain. Where negative effects are likely, more study is required.
Interrelationship	?	?	+	+	+	+	+	?	+	?	+	Potential for positive interrelationships, through more efficient use of energy which is derived from sustainable sources. More information is required on how/where developments would proceed.

Please note that numbering of sections starts from 4, reflecting the headings for each section of the *Strategy*.
*** With regard to Section 4, the assessment for Target 3 (energy use equivalence) was used for the assessment of cumulative effects.**

Measures envisaged for the prevention, reduction and offsetting of significant adverse effects

Schedule 3 paragraph 7 of the Environmental Assessment (Scotland) Act 2005 requires an explanation of "the measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme." Table 13 sets out any environmental problems that are likely to remain on implementation of the PPS and summarises proposed measures for the prevention, reduction and offset of significant adverse effects.

Table 13: Measures envisaged for the prevention, reduction and offsetting of any significant adverse effects

SEA issue		Impact of PPS	Proposed measures for the reduction / prevention and offset of significant adverse effects
Climatic factors and Local air quality	Carbon dioxide emissions from the energy and transport sectors continue to rise. Both the UK and Scottish Governments are committed to increasing the amount of electricity which is generated within the UK from renewable sources In order for Scotland to realise its targets in relation to energy generation, a further shift in methods of generation will be required to generate a larger share from renewable sources.	Positive. The measures set out in the Strategy will contribute to the Scottish Government's target of 18% of the country's electricity to be generated from renewable sources by 2010, and 50% by 2020. It will also contribute towards meeting the UK Government's domestic target of reducing carbon dioxide emissions by 26% below 1990 levels by 2020, and its longer-term goal to reduce all greenhouse gas emissions by some 80% by around 2050.	N/A
Biodiversity, fauna & flora	There is potential for the development of renewable energy projects to impact negatively on the biodiversity and natural habitats of	*A Sustainable Energy Strategy for Orkney* may lead to further on-shore wind energy development in the County and the emergence of a marine	*Supplementary Guidance On-shore Wind Energy Development* was prepared in October 2008 for the purpose of protecting those areas which are sensitive to on-shore wind energy development and guiding prospective developers towards those areas which are more likely to accommodate

SEA issue		Impact of PPS	Proposed measures for the reduction / prevention and offset of significant adverse effects
	Orkney, including internationally, nationally and locally designated sites and protected species. Both climate change and increasing rates of development are leading to changes in species distribution and loss of habitat. Decline of habitats and species may occur through fragmentation of the countryside. Habitat connectivity may become more important as climate change progresses (providing migratory routes for affected species).	renewable energy industry in the seas around Orkney. The likely effects of marine renewable energy development on marine species and habitats are uncertain as any effects would be dependant on the location, scale and design of renewable energy development. Further information would also be required on the distribution and extent of marine species and habitat distribution around Orkney. Without mitigation, negative effects would be likely. Inappropriately sited marine energy developments could place additional pressures on species or habitats which are currently experiencing decline, possibly as a result of climate change. The measures set out in this Strategy which propose increased production and use of energy from renewable sources are not likely to be sufficient to reverse, or even halt, changes which are occurring due to climate	further development. The *SG* and the additional use of planning conditions are therefore considered to provide mitigation against possible adverse effects from additional on-shore wind energy development. The SG also highlights the requirement for Appropriate Assessment where it is considered that development would impact upon any Natura site. Prior to the development of offshore wind or marine wave and/or tidal energy technologies it will be necessary to prepare a Marine Spatial Plan for the marine environment surrounding Orkney. This process would bring together all existing environmental, social and economic information, for this area, highlighting the locations which would be most sensitive to marine renewable energy development and identifying those areas where further information is required. This will enable renewable energy development in the seas around Orkney to be directed to areas where it is most likely to be able to be accommodated. In formulating a Plan for the location of future marine development will be necessary to consider the likely effects on: • the distribution and extent of protected sites and their species; • usage of the area and routes routinely followed by cetaceans (which are European Protected Species); • seal breeding and haul-out sites; • benthic biotopes and assemblages; • fish spawning grounds; • presence of otter (also a European Protected Species) Strategic Environmental Assessment of the Marine Spatial Plan should be carried out in tandem with the Plan and should assist in the identification and assessment of likely environmental effects including cumulative effects. SEA should also propose measures to reduce, prevent and offset

SEA issue		Impact of PPS	Proposed measures for the reduction / prevention and offset of significant adverse effects
		change. However they represent a significant positive contribution towards national efforts to reduce atmospheric levels of greenhouse gases.	any remaining significant adverse effects. Plans for the installation of individual renewable energy developments, including any development for the production of hydrogen gas, should be accompanied by a detailed Environmental Impact Assessment which would allow the identification of likely environmental effects, and propose mitigation measures to prevent, minimise or offset negative environmental impact.
Water	The effects of onshore and offshore renewable energy development on aquatic systems. These include short-term pollution effects due to construction projects and long term effects such as changes to hydrological conditions. Large scale marine projects may lead to localised changes to tidal flows and wave climates. Flooding is a problem in parts of Orkney and could be exacerbated by climate change.	*A Sustainable Energy Strategy for Orkney* may lead to further on-shore wind energy development in the County and the emergence of a marine renewable energy industry in the seas around Orkney. Increased risk of pollution through collision with passing shipping in particular laden oil tankers. The likely effects of marine renewable energy development on tidal flows and wave climates are uncertain as any effects would be dependant on the location, scale and design of renewable energy development. The measures set out in this Strategy which propose increased production and use of energy from renewable	*Supplementary Guidance On-shore Wind Energy Development* was prepared in October 2008 for the purpose of protecting those areas which are sensitive to on-shore wind energy development and guiding prospective developers towards those areas which are more likely to accommodate further development. The *SG* and the additional use of planning conditions are therefore considered to provide mitigation against possible adverse effects from additional on-shore wind energy development. Factors relating to protection of the water environment which should be addressed by A Marine Spatial Plan for Orkney include: • the need to carry out hydrological surveys of the seas around Orkney; and • the requirement to consult fully with other users of the sea, in particular Orkney Islands Council's Department of Harbours and Ferry operators such as Northlink Ferries, Orkney Ferries, Pentland Ferries and John o' Groats Ferries as well as local inshore fisheries associations. Plans for the installation of individual renewable energy developments, including any development for the production of hydrogen gas, should be accompanied by a detailed Environmental Impact Assessment which would allow the

SEA issue		Impact of PPS	Proposed measures for the reduction / prevention and offset of significant adverse effects
		sources are not likely to be sufficient to reverse or even halt changes to our climate which include the likelihood of increased risk of flooding in certain parts of Orkney. However they represent a significant contribution towards national efforts to reduce atmospheric levels of greenhouse gases.	identification of likely environmental effects, and propose mitigation measures to prevent, minimise or offset negative environmental impact.
Soil	The effects of further on-shore renewable energy developments on soils, e.g. peat which is a storage system for carbon which, when disturbed, releases carbon to the atmosphere and is also important in regulating water resources. Works involving excavation and soil disturbance result in loss of habitat and can also lead to increased suspended solids in watercourses. Potential effects of global warming may include rising sea levels and increased storminess, both of which may lead to increased coastal erosion.	*A Sustainable Energy Strategy for Orkney* may lead to further on-shore wind energy development in the County and the emergence of a marine renewable energy industry in the seas around Orkney. The likely effects of marine renewable energy development on the soil or underwater sediment environments are uncertain as any effects would be dependant on the location, scale and design of renewable energy development. There is potential for increased erosion to occur were electricity cables from marine renewable devices to be brought ashore in inappropriate	*Supplementary Guidance On-shore Wind Energy Development* was prepared in October 2008 for the purpose of protecting those areas which are sensitive to on-shore wind energy development and guiding prospective developers towards those areas which are more likely to accommodate further development. The *SG* and the additional use of planning conditions are therefore considered to provide mitigation against possible adverse effects from additional on-shore wind energy development. Factors relating to protection of the soil environment which should be addressed by A Marine Spatial Plan for Orkney include: • the possibility of increasing sea-levels as a result of climate change which in turn may lead to accelerated levels of coastal erosion around Orkney. This would have particular relevance to the selection of suitable landfall sites for marine electricity cables. Plans for the installation of individual renewable energy developments, including any development for the production of hydrogen gas, should be accompanied by a detailed Environmental Impact Assessment which would allow the

SEA issue		Impact of PPS	Proposed measures for the reduction / prevention and offset of significant adverse effects
	Soil erosion in general is primarily caused by wind and water and may be exacerbated as climate change progresses.	locations.	identification of likely environmental effects, and propose mitigation measures to prevent, minimise or offset negative environmental impact.
Landscape	The effects of renewable energy development on the seascapes and landscapes of the Orkney Islands, which include the Heart of Neolithic Orkney World Heritage Site and a National Scenic Area.	*A Sustainable Energy Strategy for Orkney* may lead to further on-shore wind energy development in the County and the emergence of a marine renewable energy industry in the seas around Orkney. The assessments presented in Appendix C highlighted that, in view of the terrestrial constraints to on-shore wind energy development, developers may submit applications to erect fewer but significantly larger on-shore wind turbines. These could result in negative effects on landscape and cultural heritage interests. Inappropriate siting of marine renewable energy developments which protrude above the sea surface could result in negative impact to the seascape and historic setting of sites such as Skara Brae which is part of the Heart of Neolithic Orkney World Heritage Site.	*Supplementary Guidance On-shore Wind Energy Development* was prepared in October 2008 for the purpose of protecting those areas which are sensitive to on-shore wind energy development and guiding prospective developers towards those areas which are more likely to accommodate further development. The *SG* and the additional use of planning conditions are therefore considered to provide mitigation against possible adverse effects from additional on-shore wind energy development. Orkney Islands Council is currently (December 2008) preparing Supplementary Guidance which will clarify its policy relating to development that would have an impact upon the Heart of Neolithic Orkney World Heritage Site and its wider landscape setting. Factors which should be addressed by A Marine Spatial Plan for Orkney include: landscape/seascape and cultural heritage issues which are relevant to the siting of developments and the selection of possible landfall sites for cables and related electricity transmission infrastructure. Plans for the installation of individual renewable energy developments, including any development for the production of hydrogen gas, should be accompanied by a detailed Environmental Impact Assessment which would allow the identification of likely environmental effects, and propose mitigation measures to prevent, minimise or offset negative environmental impact.
Cultural heritage	The effects of renewable energy development on Orkney's historic environment and cultural heritage, which includes the World Heritage Site and many Scheduled Ancient Monuments, Listed Buildings, underwater wrecks, onshore archaeological sites, further possible archaeological sites and the historic settings of all these sites.		

SEA issue		Impact of PPS	Proposed measures for the reduction / prevention and offset of significant adverse effects
		The additional electricity transmission infrastructure necessary to feed into an additional power connection to the National Grid has potential to impact upon landscape and cultural heritage in Orkney.	
Population	The effects of renewable energy development may impact upon population in terms of possible changes to tourism, recreation and leisure facilities.	The assessments presented in Appendix C highlighted that, in view of the terrestrial constraints to on-shore wind energy development, developers may submit applications to erect fewer but significantly larger on-shore wind turbines. These could result in negative effects on population and human health interests. Arrays of marine renewable devices may impact upon other users of the sea – e.g. ferry routes, sailing yachts, wind surfers, canoeists. Strategic Issues 5, 6 and 7 address the issues of Fuel Poverty, Energy Efficiency and Small-scale Renewables and Travel and Transport. In addition, Orkney Islands Council is in the process of preparing guidance on Sustainable Construction.	*Supplementary Guidance On-shore Wind Energy Development* was prepared in October 2008 for the purpose of protecting those areas which are sensitive to on-shore wind energy development and guiding prospective developers towards those areas which are more likely to accommodate further development. The *SG* and the additional use of planning conditions are therefore considered to provide mitigation against possible adverse effects from additional on-shore wind energy development. Factors which should be addressed by A Marine Spatial Plan for Orkney include • all existing users and uses of the marine environment; In order to expand and build upon Strategic Issues 5 and 6 on fuel poverty and energy efficiency & micro-renewables, Orkney Islands Council is currently preparing guidance on Sustainable Development which will bring together a wide range of information relating to sustainable construction methods, fuel efficiency and optimum insulation for buildings. Plans for the installation of individual renewable energy developments, including any development for the production of hydrogen gas, should be accompanied by a detailed Environmental Impact Assessment which would allow the identification of likely environmental effects, and propose mitigation measures to prevent, minimise or offset negative environmental impact.
Human health	The effects of renewable energy development may impact upon the health and visual amenity of residents and visitors to Orkney. Fuel prices are consistently higher in Orkney than on mainland UK, a factor which acts negatively on economic and social development in the islands. Due to Orkney's climate, domestic households are heavy energy users for space heating throughout most or all of the year. This fact combined with the rising cost of fuel means Orkney has one of the highest levels of fuel poverty in Scotland.		

SEA issue		Impact of PPS	Proposed measures for the reduction / prevention and offset of significant adverse effects
Material assets	Material assets The effects of renewable energy development on non-renewable resources in the County (e.g. sand and aggregates)	Sand and aggregate are likely to be used for renewable energy device foundations and for access tracks.	Orkney Islands Council intends to produce a Minerals Strategy which will address the sustainable supply of sand and aggregate. Plans for the installation of individual renewable energy developments, including any development for the production of hydrogen gas, should be accompanied by a detailed Environmental Impact Assessment which would allow the identification of likely environmental effects, and propose mitigation measures to prevent, minimise or offset negative environmental impact.
Cumulative effects	Cumulative effect The cumulative effects of multiple renewable energy developments in and around Orkney, both onshore and offshore.	There is potential for physical disturbance, habitat exclusion, increased barriers to movement for seals, cetaceans and fish by restricting the areas that are available for feeding, and routes used for migration. These factors could lead to long-term displacement of certain key species. The presence of multiple developments would increase the risk of collision between devices and the vessels which navigate through Orkney waters.	*Supplementary Guidance On-shore Wind Energy Development* was prepared in October 2008 for the purpose of protecting those areas which are sensitive to on-shore wind energy development and guiding prospective developers towards those areas which are more likely to accommodate further development. The *SG* and the additional use of planning conditions are therefore considered to provide mitigation against possible adverse effects from additional on-shore wind energy development. The SG requires the developer to address cumulative impact in the Environmental Impact Assessment of the development. Prior to the development of offshore wind, marine wave and/or tidal energy technologies it will be necessary to prepare a Marine Spatial Plan for the marine environment surrounding Orkney. This process should bring together all existing environmental, social and economic information for the area, highlighting the locations which would be most sensitive to marine renewable energy development and identifying those areas where further information is required. This will enable development of the marine renewable energy industry in Orkney to be directed to the most appropriate areas. Strategic Environmental Assessment of the Marine Spatial

SEA issue		Impact of PPS	Proposed measures for the reduction / prevention and offset of significant adverse effects
			Plan should be carried out in tandem with the Plan and should assist in the identification and assessment of likely environmental effects including cumulative effects. SEA should also propose measures to reduce, prevent and offset any remaining significant adverse effects. **Plans for the installation of individual renewable energy developments, including any development for the production of hydrogen gas, should be accompanied by a detailed Environmental Impact Assessment which would allow the identification of likely environmental effects, and propose mitigation measures to prevent, minimise or offset negative environmental impact.**

Monitoring

The following activities were undertaken to establish the monitoring approach: The SEA monitoring activities are based on the SEA Objectives.
The proposed SEA monitoring activities are set out in Table 14 below.

Table 14: Proposed SEA monitoring programme

SEA receptor	SEA Environmental Objective	Proposed Monitoring	Rationale	Target and Action	Data source
Climatic factors	To contribute towards the reduction of Scottish greenhouse gas emissions in line with Government targets	The level of renewable energy development in Orkney.	Increasing levels of renewable energy development will demonstrate progress towards meeting national targets.	The sustainable development and use of energy from renewable sources.	OIC Development Management
Air quality	To protect and where possible enhance air quality in line with national air quality standards	Changes in the levels of NO_2.	A significant modal change to electricity, especially for space heating could lead to localized improvements in air quality.	The sustainable development and use of energy from renewable sources	OIC Environmental Health (monthly)
Biodiversity, fauna & flora	To protect biodiversity and specified habitats and species.	Changes in monitored populations of protected species. Associated monitoring indicators of the Orkney LBAP. Areas of European or national designated sites affected by development.	It is important to maintain healthy and viable populations. European sites are key assets and, along with national sites, should be protected from development as a priority.	Appropriate LBAP indicators/targets should be incorporated into the monitoring framework. No change or increased areas of protection. If protected sites are affected, effective consultation with relevant authorities and developers will be required to determine the appropriate remediation / compensatory measures.	Local priorities, targets and indicators for monitoring - Orkney LBAP. SNH monitors designated international (Ramsar, SPA, SAC) and National (SSSIs) biodiversity sites through Site Condition Monitoring Surveys every six years.
Water	Ensure that water resources, which include ground water, fluvial and	Monitor the number of classified water bodies to	SEPA maintains records of local ecological and chemical river quality and changes to the data will demonstrate	Maintain or improve local water body conditions.	SEPA Water Quality Data Local priorities,

SEA receptor	SEA Environmental Objective	Proposed Monitoring	Rationale	Target and Action	Data source
	coastal waters, are protected from adverse effects.	distinguish changes to number or length classified as excellent or good quality. Number of areas designated as priority water habitats.	any beneficial or adverse effects associated with development.		targets and indicators for monitoring - Orkney LBAP.
Soil	Safeguard soil quality and quantity.	Number of renewable energy applications approved that will be developed on areas of peat.	Peat represents a valuable storage facility for carbon and deep layers of peat should be protected from development.	At the planning stage, advise that development should avoid areas with deep layers of peat.	OIC Development Management
Landscape	To protect landscape character and local distinctiveness and also to safeguard visual amenity and scenic value	Number of renewable energy applications refused due to their likely impact upon landscape.	Effects on the landscape character should be a key consideration of any detailed development proposal and maintaining a record of development effects and changes to Landscape Character Assessment will demonstrate need for action.	Maintain high quality landscapes and improve on the landscape where possible. Encourage proper consideration of landscape effects.	OIC Development Management
Cultural heritage	To safeguard cultural heritage resources and their settings through responsible design and siting of development	1. Number of renewable energy applications refused due to their likely impact upon cultural heritage resources 2. Number of applications consented where	This information will be useful in monitoring the effectiveness of the strategy and could form part of the overall policy formulation monitoring process which will seek to identify such implementation issues.	Maintain Orkney's valuable historic environment.	OIC Development Management

SEA receptor	SEA Environmental Objective	Proposed Monitoring	Rationale	Target and Action	Data source
		adverse effects are predicted, e.g. during EIA.			
Human health	Protect and enhance human health and residential amenity	Changes to the population profile, life expectancy and mortality causes.	Positive changes against baseline data could indicate healthier living conditions, e.g. due to better insulation and/or lower rates of fuel poverty.	Improved health conditions.	Census data General Register Office for Scotland.
Population	Improve the community environment and quality of life.	Estimated population of Orkney and its demographic profile.	Monitoring the number of people in the County will show if people are remaining in Orkney or moving here. This would indicate that it is a good place to stay and that employment opportunities are stable or improving.	Improved employment opportunities due to further development of the renewable energy industry in Orkney.	General Register Office for Scotland
Material assets	To promote sustainable and efficient use of natural resources and facilitate the use of energy from renewable sources	Progress of Supplementary Guidance on Minerals and Quarry Extraction.	The development of supplementary guidance will identify the most sustainable options for minerals extraction in future years.	Minerals extraction is undertaken with the minimum of adverse impact on other environmental receptors.	OIC Development Planning and Regeneration
Cumulative effects	To avoid, reduce or offset adverse cumulative effects on the environment.	Action taken to produce a Marine Spatial Plan for Orkney.	Preparation of a Marine Spatial Plan will be necessary in order to direct new renewables development to areas where it can be best accommodated without adverse impact on the environment and other users of the sea.	Development of a successful marine renewables industry which operates alongside other users of the sea and avoids causing adverse effects on the environment.	Scottish Government

Milestones in the development of the Strategy and its SEA

Table 15 lists milestones in the development of the Strategy and its SEA, and the dates when these were completed.

Table 15: Development of *A Sustainable Energy Strategy for Orkney* and its SEA.

Milestone activity	Publication dates
Screening	Screening was considered unnecessary as the Strategy qualifies under Section 5(3) of the Environmental Assessment (Scotland) Act 2005.
Scoping Report	22 April 2008
Scoping Statutory Consultation	22 April – 27 May 2008
Environmental Assessment	August - September 2008
Environmental Report and Draft Strategy	August - September 2008
Public and Statutory Consultation	23 December 2008 – 11 February 2009
Formal adoption of *A Sustainable Energy Strategy for Orkney*	29 September 2009
Post Adoption Statement and Final Environmental Report	29 April 2010

STRATEGIC ENVIRONMENTAL ASSESSMENT OF *A SUSTAINABLE ENERGY STRATEGY FOR ORKNEY*
APPENDIX A: Table 3 Relevant plans, programmes and strategies (PPS) and environmental protection objectives

TABLE 3.1: REVIEW OF INTERNATIONAL AND EUROPEAN POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
UN Framework Convention on Climate Change & its Kyoto Protocol	Energy Act 2004 The UN Framework Convention on Climate Change was established in 1992 as an international framework to agree strategies to reduce emissions of greenhouse gases in relation to their impact on global climate. It sets targets for reduction in emissions of CO_2 and other greenhouse gases. The Kyoto Protocol established a timetable for reduction in the emissions of these gases as well as a framework for sequestration of carbon by vegetation.	Climatic factors In order to achieve a reduction in emissions within Scotland, the Scottish Government has identified a target for 18% of the country's electricity to be generated from renewable sources by 2010 and 50% by 2020. The Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce.
UN Convention on Biological Diversity (1992)	The Wildlife & Countryside Act 1981 (as amended) The objectives of this Convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.	Biodiversity, flora & fauna, water In promoting further development of renewable energy projects, the Strategy should take into account the need to promote the conservation of biological diversity.
Conservation of Wild Birds Directive (79/409/EEC) Conservation of Natural Habitats and of Wild Fauna and Flora Directive (92/43/EEC)	The Wildlife & Countryside Act 1981 (as amended) The Conservation (Natural Habitats & c.) Regulations 1994 The Nature Conservation (Scotland) Act 2004 Conservation and management of, and human interactions with, wild birds in Europe. The protection of natural habitats and certain species of wild plants and animals.	Biodiversity, flora & fauna, water The Strategy must take into account the potential impact of development of renewable energy projects, both on land and in the marine environment, on the habitats and species of sites designated due to their natural heritage value.
Water Framework Directive (2000/60/EC)(WFD)	The Water Environment (Controlled Activities) (Scotland) Regulations 2005 The Water Framework Directive establishes a new legal framework for the protection, improvement and sustainable use of surface waters, transitional waters, coastal waters and groundwater across Europe.	Water, Biodiversity. fauna & flora, Human health The Strategy must take into account the potential impact of development of renewable energy projects on the biological and chemical quality of aquatic environments, including groundwater.

*** Climatic factors; Local air quality; Biodiversity, fauna & flora; water; soil; geology; landscape; cultural heritage (including architectural and archaeological heritage); population; human health; material assets; inter-relationship between these issues; secondary and cumulative effects.**

TABLE 3.1: REVIEW OF INTERNATIONAL AND EUROPEAN POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
EU Sustainable Development Strategy 2001	The Wildlife & Countryside Act 1981 (as amended) The Conservation (Natural Habitats & c.) Regulations 1994 The Environmental Protection Act 1990 Environment Act 1995 Pollution Prevention and Control Act 1999 The strategy has identified seven key challenges, one of which relates to climate change and the need to secure sources of clean energy.	Biodiversity, fauna & flora, water, soil, cultural heritage, health, population and material assets The Strategy should address the environmental, social and economic aspects of the development of renewable energy projects.
The Renewables Directive Directive on the Promotion of Electricity from Renewable Sources in the Internal Electricity Market (2001/77/EC)	Electricity Regulations 2003 (Statutory Instrument 2003 No.2562) The purpose of this Directive is to promote an increase to the contribution of renewable energy sources to electricity production in the internal market for electricity and to create a basis for a future Community framework. It requires that each country adopts national targets for renewables that are consistent with reaching the commission's target of 22% of electricity from renewables set out in the EU White Paper 2 "Energy for the Future: Renewable Source of Energy 1997".	Climatic factors A Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce.
EC (SEA) Directive 2001/42/EC	The Environmental Assessment (Scotland) Act 2005 Defines the criteria under which an SEA must be conducted. Aims to contribute to the integration of environmental considerations into the preparation and adoption of plans with a view to promoting sustainable development by ensuring that an environmental assessment is carried out.	Climatic factors, Local Air Quality, Biodiversity, flora & fauna, water, soil, landscape, cultural heritage, population, human health and material assets, secondary, synergistic & cumulative effects The Directive states that an environmental assessment must be implemented for plans and programmes relating to town and country planning in accordance with Annexes I and II of the Directive 85/337/EEC (The Environmental Impact Assessment Directive).
European Climate Change Programme (ECCP II) 2005	Aims to deliver the EU Kyoto Protocol commitment to reduce greenhouse gas emissions to 8% below 1990 levels by 2008-2012.	Climatic factors The Strategy will seek to identify how much renewable energy Orkney should aim to produce. Increased use of non-fossil fuels would enable a reduction in greenhouse gas emissions.

TABLE 3.1: REVIEW OF INTERNATIONAL AND EUROPEAN POLICY

EC Directive 1996/62/EC, Air Quality Framework	**Energy Act 2004** **Outlines the objectives for ambient air quality monitoring, assessment and management and includes four daughter directives detailing limit values for specific pollutants. The first (1999/30/EC) specifies limits for SO_2, NO and No_x, particulate matter and lead. The second (2000/69/EC) addresses carbon monoxide and benzene. The third (2002/3/EC) relates to ozone and the fourth (2004/107/EC) deals with arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.**	**Climatic factors, Local Air Quality** **A Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce. Increased use of non-fossil fuels would enable a reduction in emission of the pollutants specified in the Directive.**
EU Thematic Strategy on Air Pollution 2005	**The Air Quality Limit Values (Scotland) Regulations 2003** **Aims, by 2020, to cut the annual number of premature deaths caused by air pollution-related diseases by 40% from the 2000 level, and reduce the areas of forests and other ecosystems suffering damage from airborne pollutants and ground level ozone pollution.**	**Climatic factors, Local Air Quality** **A Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce. Increased use of non-fossil fuels would enable a reduction in emission of air-borne pollutants.**
Groundwater Directive 80/68/EEC (Expected to be revoked by the Water Framework Directive in 2013)	**The Groundwater Regulations 1998** **The prevention of pollution or over-abstraction of groundwater.**	**Water.** **The Regulations list substances which, based on toxicity, persistence or potential for bioaccumulation, either should not be allowed to enter the groundwater or should only be permitted for discharge subject to prior investigation. The potential for producing substances on these lists should be considered in the Strategy.**

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
The UK Climate Change Act 2008	The Energy Act 2004 Two key aims of the Act are: • to improve carbon management and help the transition towards a low carbon economy in the UK; and • to demonstrate strong UK leadership internationally	Climatic factors A Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce. Increased use of non-fossil fuels would enable a reduction in greenhouse gas emissions.
Changing Our Ways, Scotland's Climate Change Programme (2006)	Scotland's Climate Change Programme demonstrates how Scotland will deliver carbon savings from devolved policy measures and reduce its vulnerability to climate change.	
The Climate Change (Scotland) Bill	The provisions set out in Part I of Scotland's Climate Change Bill create the statutory framework for greenhouse gas emissions in Scotland by setting a 50% reduction target for 2030 and an 80% reduction target for 2050. To help ensure the delivery of these targets, the Bill requires that the Scottish Ministers set annual targets, in secondary legislation for Scottish emission from 2010 to 2050.	
The Marine Bill for Scotland	One of the aims of the Marine Bill for Scotland is to create a strategic marine planning system that will clarify our marine objectives and priorities for the future, and direct decision-makers and users towards more efficient, sustainable use and protection of our marine resources.	Climatic factors, Local Air Quality, Biodiversity, flora & fauna, water, soil, landscape, cultural heritage, population, human health and material assets The Bill will introduce a new licensing regime for development in the marine environment which will include renewable energy development.

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
The Energy White Paper "Meeting the Energy Challenge" (May 2007)	The Energy Act 2004 This White Paper sets out the UK Government's international and domestic energy strategy to respond to changing circumstances, address the long term energy challenges we face and to deliver its four energy policy goals: • to put ourselves on a path to cutting CO_2 emissions by some 60% by about 2050, with real progress by 2020; • to maintain the reliability of energy supplies; • to promote competitive markets in the UK and beyond; • to ensure that every home is adequately and affordably heated.	Climatic factors, Local air quality, Human health A Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce. Increased use of non-fossil fuels would enable a reduction in greenhouse gas emissions.
	The Energy Act 2004 Prior to the introduction of the Energy Act there was no comprehensive statutory framework for offshore renewable energy beyond the 12 nautical mile limit of the territorial sea. Following the introduction of the Energy Act 2004, a new regime for renewable energy sources was introduced. This provides for the designation of 'renewable energy zones' in which rights under Part V of the UN Convention on the Law of the Sea may be exercised to exploit water or wind energy. The Act applies the system of consents under the Electricity Act 1989 to these zones.	Climatic factors A Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce. Increased use of non-fossil fuels would enable a reduction in greenhouse gas emissions.

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
The Renewables Obligation (Scotland) or ROS	The Electricity Act 1989 The Renewables Obligation (Scotland) is the Executive's main policy instrument for delivering more renewable electricity generating capacity in Scotland. The ROS creates an incentive for the development of new renewable electricity generating capacity by requiring licensed suppliers to supply increasing proportions of electricity from renewable sources.	Climatic factors A Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce. Increased use of non-fossil fuels would enable a reduction in greenhouse gas emissions.
	The Electricity Act 1989	Climatic factors, Biodiversity, fauna & flora, Water For any marine energy installation greater than 1 MW, a development consent/license must be obtained from the Scottish Government under Section 36 of the Electricity Act 1989.
	The Electricity Works (Environmental Impact Assessment) Regulations 2000	Climatic factors, Biodiversity, fauna & flora, Water The environmental effects of all proposals for consent under Section 36 of the Electricity Act must be assessed under these Regulations, and the required and agreed level of information presented in the form of an Environmental Statement.
	The Food and Environmental Protection Act (FEPA) 1985 FEPA licenses are required to protect the marine ecosystems, human health and minimise nuisance and interference to other legitimate users of the sea.	Biodiversity, fauna & flora, Water, Human health A license must be obtained, for all marine developments, in respect of their impact/effect on the seabed, under Section 5 of FEPA 1985
	The Coast Protection Act (CPA) 1949	Biodiversity, fauna & flora, Water A license must be obtained, for all marine developments, in respect of their impact/effect on the seabed, under Section 34 of the Coast Protection Act 1949.

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
	Town and Country Planning (Scotland) Act 1997	**Climatic factors, Local Air Quality, Biodiversity, flora & fauna, water, soil, landscape, cultural heritage, population, human health and material assets** **Consent for onshore works must be obtained under the Town and Country Planning Act 1990 either from the relevant Local Planning Authority or from the Scottish Executive, via deemed planning permission under the Electricity Act 1989.**
National Air Quality Strategy (2000) and Addendum (2003)	**The Air Quality Limit Values (Scotland) Regulations 2003** **The aim is to protect people's health and the environment and therefore the strategy includes improvement and protection measures for ambient air quality. Health based standards and objectives are given for the eight main air pollutants (benzene, 1,3 butadiene, carbon monoxide, lead, nitrogen dioxide, particles and sulphur dioxide). Performance monitoring measures are included alongside requirements for local authorities to declare Air Quality Management Areas where air quality standards are low.**	**Climatic factors, Local Air Quality, Human health** **A Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce. Increased use of non-fossil fuels would enable a reduction in emission of air-borne pollutants.**
The Water Environment & Water Services (Scotland) Act 2003	**The Water Environment (Controlled Activities) (Scotland) Regulations 2005**	**Biodiversity. fauna & flora, Water, Human health** **A Sustainable Energy Strategy for Orkney must take into account the potential impact of development of renewable energy projects on the biological and chemical quality of aquatic environments, including groundwater.**

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
Scotland's Biodiversity *It's in Your Hands* (2004)	Nature Conservation (Scotland) Act 2004 The Wildlife & Countryside Act 1981 (as amended) The Conservation (Natural Habitats & c.) Regulations 1994 'Scotland's Biodiversity: It's in your hands' sets out a vision for the future health of our biodiversity, and maps out a 25 year framework for action to conserve and enhance biodiversity for the health, enjoyment and well-being of the people of Scotland. Its vision is: *'It's 2030: Scotland is recognized as a world leader in biodiversity conservation. Everyone is involved; everyone benefits. The nation is enriched.'*.....and its aim is: *'To conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future.'* This aim is underpinned by four objectives: • to halt loss of biodiversity and continue to reverse previous losses through targeted action for species and habitats; • to increase awareness, understanding and enjoyment of biodiversity in all our urban, rural and marine environments through better planning, design and practice; • To develop an effective management framework that ensures biodiversity is taken into account in all decision making; and • To ensure that the best new and existing knowledge on biodiversity is available to all policy makers and practitioners.	Biodiversity, fauna & flora, water, soil, landscape, population, human health, In promoting further development of renewable energy projects a Sustainable Energy Strategy for Orkney should take into account the need to promote the conservation of biological diversity.
Biodiversity: The UK Action Plan	The UK Action Plan developed national strategies for the conservation of habitats and species in the UK. Includes action plans for the conservation of 391 species, 45 habitats and local biodiversity action plans	

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
The UK's Shared Framework for Sustainable Development (2005) **Securing the Future – Delivering the UK Sustainable Development Strategy (2005)** **Meeting the Needs. Priorities, Needs, Actions and Targets for Sustainable Development in Scotland (2002)** **Choosing our Future: Scotland's Sustainable Development Strategy (2005)**	**The Wildlife & Countryside Act 1981 (as amended)** **The Conservation (Natural Habitats & c.) Regulations 1994** **The Nature Conservation (Scotland) Act 2004** **The Water Environment & Water Services (Scotland) Act 2003** **The Water Environment (Controlled Activities) (Scotland) Regulations 2005** **The Environmental Protection Act 1990** **The Air Quality Limit Values (Scotland) Regulations 2003** **Energy Act 2004** **Priorities identified for immediate action are:** • **sustainable production and consumption;** • **climate change and energy;** • **natural resource protection and environmental enhancement; and** • **sustainable communities** **Priorities outlined for Scotland include:** • **<u>Resource use</u>: to understand where our materials come from, how they are replaced, what happens to the community which supplied them, how they were brought to our use and how they went to their next use.** • **<u>Energy</u>: To generate more energy and use more power from renewable sources.**	**Biodiversity, flora & fauna, water, soil, landscape, cultural heritage, population, human health and material assets** **A Sustainable Energy Strategy for Orkney should address the environmental, social and economic aspects of the development of renewable energy projects.**
The Government Economic Strategy The Scottish Government, 2007	**The Government Economic Strategy sets out how the Government will support businesses and individuals and its purpose is: *"to focus the Government and public services on creating a successful country, with opportunities for all of Scotland through increasing sustainable economic growth."***	**Climatic factors, Biodiversity, flora & fauna, water, soil, landscape, cultural heritage, population, human health and material assets** **A Sustainable Energy Strategy for Orkney will provide a strategic view of the future development and use of renewable energy in Orkney.**

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
The National Planning Framework for Scotland 1 & 2	Town and Country Planning (Scotland) Act 1997 Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 The National Planning Framework encourages renewable energy generation and anticipates future upgrades to the electricity generation network, including the network to Orkney. The NFP 2 provides further support for the development of renewable energy, and identifies the Orkney link transmission route reinforcement and the potential for establishing a sub-sea super grid network through the Pentland Firth. The new Framework will guide Scotland's spatial development to 2030, setting out strategic development priorities to support the Scottish Government's central purpose of promoting sustainable economic growth.	Climatic factors A Sustainable Energy Strategy for Orkney will seek to identify how much renewable energy Orkney should aim to produce. Increased use of non-fossil fuels would enable a reduction in greenhouse gas emissions.
SPP1 The Planning System	Town and Country Planning (Scotland) Act 1997 Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 SPP1 provides an overview of the current land use planning system in Scotland and presents the key principles and the Executive's priorities for the system to guide policy formulation and decision making towards the goal of sustainable development.	Biodiversity, flora & fauna, water, soil, landscape, cultural heritage, population, human health and material assets The planning system is important as a means of integrating policies and decision making through its influence over the location of development and other changes in the way land is used.
SPP2 Economic Development	Town and Country Planning (Scotland) Act 1997 SPP2 focuses on four themes where planning can contribute to economic development: • Providing a range of development. • Securing new development in sustainable locations – to improve integration between transport and locations for development and to encourage more sustainable forms of development. • Safeguarding and enhancing the environment. • Promoting a dialogue between councils and business.	Biodiversity, flora & fauna, water, soil, landscape, cultural heritage, population, human health and material assets In making provision for economic development and considering development proposals, planning authorities should seek to minimise adverse effects on the natural and built heritage, consistent with national planning policies in SPPs/NPPGs.

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
SPP6 Renewable Energy and Planning Advice Note (PAN) 45 Renewable Energy Technologies	Town and Country Planning (Scotland) Act 1997 The intention of SPP6 is to facilitate successful achievement of the Scottish Government's 2020 target for renewable energy generation and beyond. PAN 45 supports the policies in SPPG 6 by providing information and advice on the technologies for harnessing renewable energy for electricity generation.	Climatic factors, biodiversity, fauna & flora, water, soil, landscape, cultural heritage, material assets SPP6 provides a framework for planning to encourage, approve and implement renewable energy proposals with a focus on fulfilling targets for renewable energy generation. It emphasizes the importance of community engagement and steering development to appropriate sites. SPP6 also states that the existence of natural heritage designations and other constraints should not be incompatible with the need to encourage smaller-scale wind development.
SPP7 Planning and Flooding and PAN 69 PAN 84 Reducing Carbon Emissions in New Development	The central purpose of SPP7 is to prevent further development which would have a significant probability of being affected by flooding or which would increase the probability of flooding elsewhere. PAN 69 makes recommendations in relation to new development and climate change. PAN 84	Climatic factors, biodiversity, fauna & flora, water, soil; A Sustainable Energy Strategy for Orkney should highlight the potential impacts to island communities of changes to our climate which are likely to occur in future.
NPPG13 Coastal Planning and PAN 53 Classifying the Coast for Planning Purposes	Town and Country Planning (Scotland) Act 1997 NPPG13: • sets out how planning can contribute to achieving sustainable development and also maintaining and enhancing biodiversity on the coast; • highlights the need to distinguish between policies for the developed, undeveloped and isolated coast; • indicates how planning authorities would respond to the risk of erosion and flooding in the coastal zone; • outlines policy guidance for developments which may require a coastal location; and • identifies the action to be taken by planning authorities in their development plans and in development control decisions.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, material assets A Sustainable Energy Strategy for Orkney should address the need to manage pressures on the coast which relate to the development of renewable energy projects in order to minimize negative impact on the coastal environment.

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
NPPG14 Natural Heritage and PAN 60 Planning for Natural Heritage	Town and Country Planning (Scotland) Act 1997 NPPG14 gives guidance on how the Government's policies for the conservation and enhancement of Scotland's natural heritage should be reflected in land use planning.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage PAN 60 provides advice on how development and the planning system can contribute to the conservation, enhancement, enjoyment and understanding of Scotland's natural environment and encourages developers and planning authorities to be positive and creative in addressing natural heritage issues.
PAN 51 Planning, Environmental Protection and Regulation	Town and Country Planning (Scotland) Act 1997 The central purpose of this Planning Advice Note (PAN) is to support the existing policy on the role of the planning system in relation to the environmental protection regimes.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, population, human health material assets PAN 51 summarises the statutory responsibilities of the environmental protection bodies, as well as informing these bodies about the planning system.
PAN 58 Environmental Impact Assessment	Town and Country Planning (Scotland) Act 1997 This PAN provides information and advice on: • the legislative background to EIA; • EIAs in Scotland; • the process of environmental impact assessment ; • environmental studies and statements; • the evaluation of environmental information by the planning authority; and • implementation through the planning decision.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, population, human health, material assets PAN 58 relates specifically to environmental impact assessment for development projects authorised under planning legislation.
Scottish Executive Marine & Coastal Strategy (2005)	The Energy Act 2004 The Nature Conservation (Scotland) Act 2004 The Water Environment & Water Services (Scotland) Act 2003 Scottish Executive's vision is of a clean, healthy, safe, productive and biologically diverse marine and coastal environment, which is managed to meet the long-term needs of nature and people.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, population, human health material assets The Marine and Coastal Strategy aims to provide a strategic analysis of existing marine activities and provision of a better understanding of environmental capacity, spatial planning issues, current pressures and how the marine environment can be managed in the future.

TABLE 3.2: REVIEW OF NATIONAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
NPPG5 Archaeology and Planning PAN 42 Archaeology – The Planning Process and Scheduled Monument Procedures	The Ancient Monuments and Archaeological Areas Act 1979 The Protection of wreck Act 1973 The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 As part of its intention to work towards sustainable development, the Government seeks to encourage the preservation of our heritage of sites and landscapes of archaeological and historic interest, so that they may be enjoyed today and passed on in good order to future generations. Planning authorities and all parties involved in development should regard archaeological remains as a finite and fragile resource and should safeguard the integrity of the setting of archaeological sites.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage The key environmental objective of the legislation and policy framework is '*to protect and, where appropriate, enhance the historic environment'.* This objective will be taken into account in a Sustainable Energy Strategy for Orkney.
NPPG18 Planning and the Historic Environment		
Scottish Historic Environment Policy 1, "Scotland's Historic Environment" (Historic Scotland's policy for the sustainable management of the historic environment.)		
Scottish Historic Environment Policy 2. Scheduling: protecting Scotland's nationally important monuments		
Passed to the Future		
Memorandum of Guidance on Listed Buildings and Conservation Areas, Historic Scotland 1998		

TABLE 3.3 REVIEW OF LOCAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
OIC Corporate Strategic Plan 2008 - 2013	The Corporate Strategic Plan focuses on how it will improve services within Orkney and provides a link between the decisions which are made in the council chamber, the everyday work of the Council, and the community. The key priorities of the Plan are: • Care for our older and other vulnerable people • Sustainable communities • Planning and affordable housing • Transport networks • Schools and community facilities • Improved services and facilities through increased joint working	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, population, human health, material assets Resolving major planning issues such as renewable energy, minerals and housing in the countryside is a constant challenge to the Council, balancing economic and environmental concerns. A Sustainable Energy Strategy for Orkney will present the Council's strategic view of how further development of renewable energy in Orkney should progress.
OIC Structure Plan (adopted 2001 and covering the 10-year period until 2011)	Town and Country Planning (Scotland) Act 1997 Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 The Orkney Islands Council Structure Plan sets out the strategic framework for the development of land in the County over the 10-year period.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, population, human health, material assets A Sustainable Energy Strategy for Orkney will contribute to the review of the Orkney Development Plan.
The Orkney Local Plan (2004)	Town and Country Planning (Scotland) Act 1997 Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 The Orkney Local Plan sets out a detailed framework for the development of land in the County over the period 2004 - 2007 The Local Plan together with the Orkney Structure Plan, form the Orkney Development Plan.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, population, human health, material assets A Sustainable Energy Strategy for Orkney will contribute to the forthcoming review of the Orkney Development Plan.

TABLE 3.3 REVIEW OF LOCAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
OIC 2020 Community Plan (2007)	Town and Country Planning (Scotland) Act 1997 Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 Nature Conservation (Scotland) Act 2004 The Wildlife & Countryside Act 1981 (as amended) The Conservation (Natural Habitats & c.) Regulations 1994 The Water Environment & Water Services (Scotland) Act 2003 The Environmental Protection Act 1990 The Air Quality Limit Values (Scotland) Regulations 2003 Energy Act 2004 The community plan for Orkney, Orkney 2020 articulates the vision of the Orkney Community Planning Framework and its three advisory groups. The ideal for Orkney is: *'to have a place within a caring community, living in a healthy environment, supported by a thriving economy'.*	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, population, human health, material assets A Sustainable Energy Strategy for Orkney will be a strategy for the whole community of Orkney. Community Planning, which brings together all agencies and organisations, provides an appropriate 'host' for the Strategy and the overall aims of the Strategy have been endorsed by the Community Planning Steering Group. The aims of A Sustainable Energy Strategy for Orkney are: • to ensure Orkney uses energy as efficiently as possible, and has a secure and affordable energy supply to meet its future needs; • to add value to Orkney's renewable energy resources, for the benefit of the local economy and local communities, and without damaging the environment; and • to reduce Orkney's carbon footprint.
Orkney Islands Council Carbon Management Programme. Strategy and Implementation Plan	Energy Act 2004 This document aims to identify the environmental and commercial risk to Orkney Islands Council resulting from the use of energy and fuels in the Council's day to day operations. The Carbon management Programme will allow the Council to identify robust baseline data for current CO2 production and set realistic targets to progress to a low carbon operation.	Climatic factors, Local Air Quality, Biodiversity, flora & fauna, water, soil, landscape, cultural heritage, population, human health and material assets Data from the Carbon Management Programme will help inform the final Sustainable Energy Strategy for Orkney.

TABLE 3.3 REVIEW OF LOCAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
OIC Biodiversity Action Plan (2002)	Nature Conservation (Scotland) Act 2004 The Wildlife & Countryside Act 1981 (as amended) The Conservation (Natural Habitats & c.) Regulations 1994 The objectives of the Plan are to maintain and, where practicable, to enhance: • the overall population and natural ranges of native species and the quality and range of wildlife habitats and ecosystems; • internationally and nationally important and threatened species, habitats and ecosystems; • species, habitats and managed ecosystems that are characteristic of Orkney or are perceived to be of local importance; • the biodiversity of natural and semi-natural habitats where this has diminished over recent decades; and: • to increase public awareness of, and involvement in, conserving biodiversity; and • to identify priorities for habitat and species conservation in Orkney and set realistic targets and timescales for these.	Biodiversity, fauna & flora, water, landscape, population, human health A Sustainable Energy Strategy for Orkney should take into account the need to promote the conservation of biological diversity.
Highlands and Islands Operating Plan 2008-2011	HIE has a key role to play in helping to achieve the overall purpose of the Government Economic Strategy in the Highlands and Islands: *"To focus the Government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth."*	Biodiversity, fauna & flora, water, landscape, cultural heritage, population, human health, material assets A Sustainable Energy Strategy for Orkney should address the environmental, social and economic aspects of development of renewable energy projects.
Orkney Islands Council Department of Harbours Safety Management System 2007	The Port Marine Safety Code 2006 Sets out the duties of Orkney Islands Council's Department of Harbours as they relate to the management of port marine safety and the Port Marine Safety Code	Biodiversity, fauna & flora, water, population, human health In addressing the development of marine renewable energy projects, A Sustainable Energy Strategy for Orkney should consider issues relating to navigation and safety in the marine environment of the Orkney Islands.

TABLE 3.3 REVIEW OF LOCAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
Orkney Environmental Strategy and Action Plan	Nature Conservation (Scotland) Act 2004 The Wildlife & Countryside Act 1981 (as amended) The Conservation (Natural Habitats & c.) Regulations 1994 The Water Environment & Water Services (Scotland) Act 2003 The Environmental Protection Act 1990 The Air Quality Limit Values (Scotland) Regulations 2003 Energy Act 2004 The Orkney Environmental Partnership is one of the sub-strategies of the Community Plan and was established: • in response to the Government's Local Agenda 21 and Community Planning Initiatives; • to assist in the development of the Local Biodiversity Action Planning process; and • in recognition that whilst many of the partner organisations are undertaking individual initiatives and projects for the benefit of Orkney's environment, there was a lack of a strategic overview which would allow resources to be targeted in a more co-coordinated and integrated manner.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, population, human health, material assets A Sustainable Energy Strategy for Orkney will consider the objectives of the Orkney Environmental Strategy and Action Plan which include: • to set out a framework for corporate action on the environment within Orkney; • to work together to develop an Environmental Strategy and Action Plan which reflects the views and wishes of the Orkney community with respect to the environment; • to establish a process for monitoring and reviewing the state of the environment in Orkney Islands Council; and • to raise awareness and involve the community in their local environment.
Orkney Outdoor Access Strategy	Land Reform (Scotland) Act 2003 This strategy will help ensure that the Council is able to fulfil its duties under the legislation. As part of the Orkney Outdoor Access Strategy a range of walks and pathways has been identified throughout the Orkney Islands.	Biodiversity, fauna & flora, water, soil, landscape, cultural heritage, population, human health, material assets A Sustainable Energy Strategy for Orkney must take into account the effect of renewable energy development on the amenity value of Orkney's network of walks and pathways.
Orkney Core Path Plan 2007	Land Reform (Scotland) Act 2003 The purpose of the Core Paths Plan is to identify a framework of paths which will provide local residents and visitors with reasonable access throughout their local authority area.	Climatic factors, Local Air Quality, Biodiversity, flora & fauna, water, soil, landscape, cultural heritage, population, human health and material assets A Sustainable Energy Strategy for Orkney needs to consider the location of paths when considering the siting of new development.

TABLE 3.3 REVIEW OF LOCAL POLICY

Name of PPS / environmental protection objective	Title of legislation and main requirements of PPS / Environmental protection objective	How it affects, or is affected by a Sustainable Energy Strategy for Orkney in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005
Orkney and Shetland Area Waste Plan 2002	The Environmental Protection Act 1990 The aim of the AWP is to contribute to the sustainable development of the Orkney and Shetland area by developing waste management systems that will control waste generation, reduce the environmental impacts of waste production, improve resource efficiency, stimulate investment and maximize the economic opportunities arising from waste.	Climatic factors, Biodiversity, fauna & flora, water, soil, material assets A Sustainable Energy Strategy for Orkney should assist in meeting the objectives of the AWP when considering development proposals including resource efficiency and control of waste.

STRATEGIC ENVIRONMENTAL ASSESSMENT OF

A SUSTAINABLE ENERGY STRATEGY FOR ORKNEY

Appendix B – Environmental Baseline Report

To enable the current state of the environment to be assessed, a search has been carried out of a range of baseline data which are relevant to the SEA issues considered in this Environmental Report. A summary is produced in this section which provides a brief description of the key environmental characteristics of Orkney. This allows any existing problems to be identified and provides the benchmark against which the forecast and monitored levels of environmental effects will be evaluated. The following features of the environment are examined:

1. **Climatic effects**
2. **Local air quality**
3. **Biodiversity, fauna and flora**
4. **Water**
5. **Soil**
6. **Geology**
7. **Landscape and visual amenity**
8. **Cultural heritage**
9. **Human health and residential amenity**
10. **Population**
11. **Material assets**

This report provides a baseline under each of these features, together with the relevant Strategic Environmental Assessment objectives which have been identified as criteria against which to assess the possible environmental effects of Supplementary Planning Guidance for Onshore Wind Energy Projects.

Baseline Overview

Number of islands:	**70+**
Number of inhabited islands:	**17**
Total (land) area of the Orkney Islands:	**989.9 km^2** [2]
Total length of coastline:	**over 980 km**
Dimensions:	**Approximately 85 km north to south and 37 km east to west**
Outlying Island with highest population:	**Westray**
Smallest inhabited island:	**Papa Stronsay**
Longitude: (Kirkwall)	**3° W**
Latitude: (Kirkwall)	**59°N**
Population (2006):	**19,779**
Least distance from Scottish Mainland:	**10.5**

[2] General Register Office for Scotland Population Estimates

Figure 1: The Orkney Islands

Including designated areas, transport routes and settlements

1. Climatic effects

SEA Objective:

- **To contribute towards the reduction of Scottish greenhouse gases in line with Government targets**

It is widely accepted that the increasing levels of certain gases in the atmosphere are causing significant changes to global climates by reducing the rate of radiative heat loss from the atmosphere, which subsequently allows temperatures around the world to rise. This is generally referred to as the greenhouse effect. Recorded weather data confirms that temperatures have indeed increased in the UK over recent decades, but not at the same rate in all regions. Information on climate trends published by the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER)[3] shows that, between 1961 and 2004, the average annual temperature in the north of Scotland increased by 0.92 °C.

The United Nations Convention on Climate Change was established in 1992 as an international framework to agree strategies to reduce emissions of greenhouse gases. The Kyoto Protocol agreement subsequently established a timetable for reduction in emissions as well as a framework for the sequestration of carbon by vegetation. In 1997, under the Kyoto Agreement, the UK Government agreed to reduce emissions in the UK of the 'basket of six greenhouse gases' (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) by 12.5% in the period to 2008-2012 in comparison with a 1990 baseline. By 2004 emissions of these gases had decreased by 14.9 per cent relative to 1990 and the UK looks set to exceed the target.

However, over the next 100 years carbon dioxide is forecast to make the largest contribution to global warming[4] and the UK Government has a further, more ambitious, domestic goal to cut CO_2 emissions by 20 per cent below 1990 levels by 2010. Statistics to 2004 show that achievement of this target is less likely. Table 1.1 below shows changes in emissions of each of the greenhouse gases in Scotland during the period 1990 – 2004. For comparison, net UK emissions are also included.

Table 1.1 Emissions of greenhouse gases in the UK: 1990 - 2004[5]

	Million tonnes (carbon equivalent)						
	1990	1995	2000	2002	2003	2004	% change (1990 – 2004)
Basket of six greenhouse gases							
Carbon dioxide	13.6	13.2	13.6	12.4	12.4	11.7	-14.1
Methane	2.2	2.1	1.8	1.5	1.4	1.4	-36.4
Nitrous oxide	1.7	1.5	1.4	1.4	1.4	1.4	-17.6
Hydrofluorocarbons	0.00	0.04	0.14	0.18	0.19	0.20	Not recorded during 1990 but displaying an increasing trend
Perfluorocarbons	0.03	0.02	0.03	0.02	0.02	0.02	-33.3
Sulphur hexafluoride	0.01	0.01	0.01	0.01	0.01	0.02	+100
Net Scottish emissions	17.6	16.9	17.0	15.5	15.5	14.7	-16.7
Net UK emissions[6]	212.2	194.7	182.8	179.1	180.5	180.5	-14.9

It should be noted that improved data sources and estimation techniques have routinely led to revision of historic greenhouse gas emission estimates.

Detailed information on the level of CO_2 emissions at local authority level is not available for the Orkney Islands. However the Scottish Executive publication *Key Scottish Environmental*

[3] SNIFFER, 'A handbook of climate trends across Scotland', 2006 www.sniffer.org.uk
[4] Climate Change The UK Programme 2006
[5] Key Scottish Environment Statistics 2007
[6] Includes emissions which have not been allocated to Scotland, England, Wales or Northern Ireland

Statistics 2007 **shows that in 2004, Scotland's net emissions of CO_2 were 11.72 million tonnes of carbon equivalent (around 8% of the UK total), a decline of 1.9 million tonnes from 1990 levels.**

Table 1.2 below sets out the total net carbon emissions by source in Scotland

Table 1.2 Net emissions by source in Scotland taking account of emissions and removals
(million tonnes of carbon equivalent)[7]

Sector	1990	1995	2000	2002	2003	2004
	Million tonnes of carbon equivalent					
Energy supply	5.61	6.62	6.74	6.02	6.09	5.47
Agriculture, business, industrial processes and waste management	3.50	2.38	2.66	2.26	2.21	2.22
Public and residential	2.24	2.26	2.25	2.22	2.22	2.20
Transport	2.98	2.93	3.00	3.00	3.08	3.10
Net land use change & forestry	-0.69	-1.01	-1.07	-1.14	-1.16	-1.26
Total net emissions	13.64	13.18	13.57	12.37	12.44	11.72

It should be noted that improved data sources and estimation techniques have routinely led to revision of historic greenhouse gas emission estimates.

The UK government's programme for reducing carbon dioxide emissions includes a target for 10% of the country's electricity to be generated from renewable sources by 2010. The Scottish Government's comparable target of 18%, whilst somewhat higher, includes the contribution made by existing large scale hydro schemes. Established technologies such as onshore wind and hydro are expected to play a major part in achieving Scotland's 18% target by 2010. In the longer term the Scottish Government has an aspirational target of 50% of Scotland's electricity to be generated by 2020.

Renewable energy development in Orkney

Orkney is widely acknowledged as having some of the best renewable energy resources in the world, the majority of which relate to wind, wave and tidal processes. In the early years of on-shore wind energy development a number of wind turbines were tested at Burgar Hill in Evie. Interest in this form of renewable energy development is growing and the current capacity is 24.65 MW with many more proposals at earlier stages in development which are detailed in table 1.3 below.

Table 1.3: Wind energy developments over 500kw in Orkney (April 2010)[8]

Location	Applicant/Developer	No. of Turbines	Total height	MW
1. Operational				
Rothiesholm, Stronsay	TXU Europe Power Ltd	3	74m	2.7
Burgar Hill, Evie	NEG Micon *(replaced the 2MW turbine in application below)	1	116m	2.75*
Burgar Hill, Evie	NEG Micon	2	96m	1.5 & 2*
Burgar Hill, Evie	Nordex	1	76m	1.3
Spurness Point, Sanday	Your Energy Ltd	4 (Only 3 installed)	100m	8
Northfield, Burray	Mr A Spence	1	70m	0.9
Burgar Hill, Evie	Mr M Spence (applicant) NPower Renewables (developer)	2	100m	5
Burgar Hill	Burgar Hill Renewables	1	100m	2.5

[7] Scottish Executive, Key Scottish Environmental Statistics, 2007
[8] Orkney Islands Council, 2009

Location	Applicant/Developer	No. of Turbines	Total height	MW
Holodyke, Dounby	DC & MC Wallace	1	80m	0.85
Vary turbine type approved above under application 05/451/PPF and install switchgear housing. Gallo Hill, Westray	Westray Development Trust	1	67m	0.9
2. Approved, but not yet constructed				
West Hill, Flotta	Scotrenewables	1	100m	2
West Hill, Flotta (alteration to above)	Scotrenewables	1	100m	2
Rothiesholm Head, Stronsay	Stronsay Development Trust	1	67m	0.9
Kingarly, Rousay	Rousay, Egilsay & Wyre Dev. Trust	1	67m	0.9
Hammars Hill	Richard Jenkins	5 x 0.9MW	5 x 67m	4.5
Ore Brae, Hoy	Island of Hoy Development Trust	1	67m	0.9
Howe, Shapinsay	Shapinsay Development Trust	1	67m	0.9
Sandybanks, Eday	Eday Partnership	1	67m	0.9
Spurness, Sanday	Sanday Development Trust and SSE	1	105m	~2.0
Erect 2 wind turbine generators at Gallowhill, Westray	Mr Colin Risbridger	2	67m	1.8
Crowness Business Park	Orkney Energy Gateway Ltd	1	67m	0.9
Burgar Hill (Land near), Evie	Mr Michael Cursiter	1	93.5m	2.3
Upper Stove, Deerness	Orkney Renewable Energy Ltd	1	67m	0.9
3. Submitted but not yet determined				
Barns of Ayre, Deerness	Mr Norman Skea	1	67m	0.9
5. Anemometer Masts				
Cuffie Hill, Binscarth, nr. Finstown	Scotrenewables			
Wideford Hill	BT			
Melsetter Hoy	Mr Robert Seatter			
6. Pre-application Discussions/Scoping opinions				
Burgar Hill Expansion	Burgar Hill Renewables	2		6
Swanbister Farm/Gruf Hill	Cliff Bichan	Probably 3x0.9MW	Probably 60-70m	Probably 2.7
SE corner of Rousay	Rousay, Egilsay & Wyre Development Trust	1	72m	0.9
Burwick or Berriedale	South Ronaldsay & Burray Development Trust	1	72m	0.9
Eday	Eday Partnership	1	72m	0.9
Stronsay	Stronsay Development Trust	1	72m	0.9

Location	Applicant/Developer	No. of Turbines	Total height	MW
Sanday	Sanday Development Trust	1	72m	0.9
N. of Howe, Shapinsay	Shapinsay Development Trust	1	72m	0.9
Hoy	Island of Hoy Development Trust	1	72m	0.9
Vestra Fiold	Fairwind Statkraft (Orkney) Ltd (FSOL)	8		16-24
Costa Head	FSOL	11		22-33
Kame of Corrigal	FSOL	8		16-24
Clestrain	FSOL	5		10-15
Ward Hill	FSOL	9		18-27
Halcro Head	FSOL	9		18-27
Quanterness	FSOL	13		26-39
Berrridale	FSOL	6		12-18
Lesliedale	FSOL	TBC		
Stromness Reservoir	Stromness Community Development Trust	3	75m	2.6
Flotta Expansion	Scotrenewables	?		22
Flotta	OIC	1	TBC	TBC
Barnes of Ayre, Deerness	Norman Skea	1	67m	0.9
7. Applications refused				
Gruff Hill, Orphir	C Bichan & H Halcro-Johnston	3	72-75m est.	7.5 est.
Enyas Hill	Mr JR Stevenson	3	90m	6
Redland, Firth	Redland Renewables Ltd.	1	90m	2
Merranblo, Stromness	Scotrenewables	3	72m	2.7
8. Applications withdrawn				
Rothiesholm, Stronsay	Farm Energy Ltd	6	75m	5.4
Berriedale Farm, South Ronaldsay	South Ronaldsay & Burray Development Trust	1	67m	0.9

*** 2.75MW NEG Micon turbine replaced the previous 2MW NEG Micon turbine**

Orkney is also at the forefront of marine renewable energy in the UK with the establishment in 2003 of the European Marine Energy Centre. EMEC provides multi-berth, purpose-built, open sea test facilities for wave and tidal marine energy converters with operations spread over three sites:

- **A wave test site at Billia Croo, Mainland Orkney;**
- **A tidal test site in the Fall of Warness off the island of Eday; and**
- **Office and data facilities in Stromness.**

Orkney was chosen because of both its natural and man-made resources. The wave test site receives uninterrupted Atlantic waves of up to 15m. At the Eday site, tidal steams run at up to 4m/sec (8kn) and are among the fastest in Europe. Orkney is also the most northerly community connected to the UK national grid, has excellent harbour facilities and a significant professional community experienced in working with renewable energy.

In August 2004, Pelamis Wave Power installed their "Pelamis 750" device on site at Billia Croo for full scale testing. During 2005 AW Energy from Finland undertook stand alone mechanical testing in the shallower waters at the test site. Aquamarine Power Ltd officially launched their near shore "Oyster" device on 20 November 2009. The device, which was installed over summer 2009, is currently the world's largest working hydro-electric wave energy device. Further infrastructure works continue at Billia Croo. These will provide a lay-down area for

future developers to use, similar to that already created at the Tidal Site. Other site works, which have completed, include an upgrade to the Black Craig lookout point, which will include the facilities for stationed wildlife observers. These trained observers and a high specification camera will provide essential baseline data for the wave test site. The research project began in March 2009.

The first developer to use the Fall of Warness tidal site was Dublin based OpenHydro, who began the installation of their tidal turbine in 2006. Full testing is now underway, with their device becoming the first to be grid connected in Scotland and subsequently the first to successfully generate electricity to the National Grid in the UK. OpenHydro are moving into the next phase of their testing which has involved placing a blank turbine on the seabed adjoining their installed device, using the specially commissioned "OpenHydro Installer" during summer 2008. Tidal Generation Ltd continues preparatory work on the tidal site for deploying their tidal turbine in 2010. Hammerfest Strom UK Ltd has carried out on-site preparatory work prior to their device deployment in 2010. Atlantis Resources Corporation has secured a berth at the tidal test site, and is scheduled to deploy their AK-1000 turbine in 2010.

2. Local air quality

SEA Objective:

- **To protect and, where possible, enhance air quality in line with national air quality standards**

Part IV of the Environment Act 1995 introduced the requirement for development of a national strategy to improve air quality and reduce risks to human health from air-borne pollutants. The resulting *Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, published in January 2000 identified clear and measurable targets to improve air quality in line with European Council directives, World Health Organisation guidance and the UK's Expert Panel on Air Quality Standards. In February 2003 the *Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum* was published. All local authorities are required to review and assess air quality within their area to see if any of the National Air Quality Strategy (NAQS) objectives are unlikely to be met. In Scotland discharges to air from major industrial processes, are regulated by the Scottish Environment Protection Agency (SEPA) and data can be accessed via the SEPA website.[9]

Within Orkney air quality is generally very good as there are few significant industrial processes on the islands and road traffic volumes are low. With the exception of small areas of urban development, and the oil industry activity on Flotta and in Scapa Flow, the County is mainly rural in character. Furthermore, aircraft volumes and passenger numbers at Kirkwall airport are currently less than 2% of the suggested action threshold of 5 million passengers per year. Levels of three air pollutants are monitored by Orkney Islands Council's Environmental Health Department[10]: benzene, sulphur dioxide and nitrogen dioxide. In the Orkney Islands the major source of benzene is recognised to be the Flotta oil terminal and the predominant source of SO_2 is from the combustion of sulphur-containing fossil fuels, principally coal and heavy oils for heating. All combustion sources in air produce oxides of nitrogen.

Benzene

The air quality objective for benzene in Scotland is:

- **3.25µg/m^3 (5ppb) measured as a running annual mean, to be achieved by 31 December 2010.**

After a gap in the monitoring of benzene within Orkney, monitoring has resumed with a network of diffusion tubes. Over the past 6 months there have been no significant changes in the levels of benzene recorded at the three monitoring locations Herston, Waulkmill and St Mary's. All recorded values for this period were below the Limit of Detection (LOD) of 0.2ppb. Therefore benzene levels within Orkney are less than 20% of the NAQS objectives.

It can therefore be concluded that benzene levels within Orkney are not likely to exceed the air quality objectives set out by NAQS.

[9] Scottish Pollutant Release Inventory (SEAP), www.sepa.org.uk
[10] Local Air Quality Management Progress Reports, 2005 and 2006

Sulphur dioxide

The air quality objectives for SO_2 are:

- **266µg/m^3 (100ppb), not to be exceeded more than 35 times per year, measured as a 15-minute mean, to be achieved by December 2005.**
- **350µg/m^3 (132 ppb), not to be exceeded more than 24 times per year, measured as a 1-hour mean, to be achieved by 31 December 2004.**
- **125µg/m^3 (47 ppb), not to be exceeded more than 3 times per year, measured as a 24-hour mean, to be achieved by 31 December 2004.**

There is no new monitoring data for SO_2 in Orkney. In the past SO_2 monitoring has taken place in Orkney through the use of diffusion tubes. Archived results show SO_2 concentrations to be very low with 88% of results below the limit of detection (LOD) of 0.2µg/m^3. However, this is not a preferred method of monitoring SO_2 as the short term objectives in the NAQS cannot be compared directly.

An assessment of SO_2 was conducted in 2005 to measure ambient levels of SO_2 in Kirkwall with the assistance of SEPA. Data was obtained from two locations, the first within Kirkwall and the second to monitor the contribution of SO_2 from the Animal incinerator at Chinglebraes.

The resulting report from SEPA concluded that the ambient air levels of SO_2 in Kirkwall and the vicinity of Chinglebraes never exceeded the limits set out by the air quality objectives'. *'.....effects are unlikely to be noticed even by individuals who are sensitive to air pollutants.'*

Since these findings were published by SEPA and reported on in Orkney Islands Council in 2005 Progress Report, the incinerator at Chinglebraes is no longer operational and there are no significant changes within Kirkwall that would influence ambient SO_2 concentrations in the town.[11]

It can therefore be concluded that SO2 levels within Orkney are not likely to exceed the air quality objectives set out by NAQS.

Further monitoring may be conducted within the county in the future to confirm compliance with the NAQS objectives. The need for any such monitoring will be properly assessed in the 2009 Update and Screening Assessment.

Nitrogen dioxide

The air quality objective for NO_2 is:

- **200µg/m^3 (105ppb), as a 1-hour mean, not to be exceeded more than 18 times per year, to be achieved by 31 December 2005.**
- **40µg/m^3 (21 ppb), as an annual mean, to be achieved by 31 December 2005.**

Monitoring results collected so far indicate that the sites at Kirkwall and Stromness experience the highest levels of NO_2.

In 2004-2005 maximum recorded values were 21µg/m^3 in Kirkwall and 15µg/m^3 in Stromness, both recorded during October 2004.

In 2005-2006 maximum recorded values were 38µg/m^3 at Kirkwall and 13µg/m^3 at Stromness, both recorded during July 2005.

In 2007-2008 maximum recorded values were 18 µg/m^3 at Kirkwall in January 2008 and 11µg/m^3 at Stromness in October and December 2007 and February 2008.

Air quality monitoring resumed in Orkney in August 2007 after a lapse in monitoring in the County. Kirkwall experiences the highest levels of NO_2 which is understandable considering it is Orkney's largest town and has the highest traffic flows. Averaged trends show that concentrations of NO_2 in Kirkwall are less than 30% of the annual mean objective. Levels of NO_2 in Orkney as a whole are less than 15% of the annual mean objective. In their Local Air

[11] Local Air Quality Management Progress Report, 2008

Quality Management Progress Report 2008 Orkney Islands Council states that *"it is unlikely that there would be an exceedance of the NO_2 annual mean objective."*

Particulate Matter (PM_{10})

The air quality objective for Particulate Matter (PM_{10}) is:

- **50µg/m^3 when expressed as a 24hr hourly mean: not to be exceeded more than 7 times a year by 31 December 2010.**

Due to the low levels of other pollutants from exhaust emissions it is not considered necessary to monitor Particulate Matter in the Orkney Islands.

The Progress Report shows that Orkney is currently meeting the air quality objectives and is not at risk of exceeding the objectives.

3. Biodiversity

SEA Objectives

- **To protect biodiversity and specified species and habitats**

<u>Designated Areas</u>

The Orkney Islands are particularly valued for their wildlife and certain areas are designated for conservation under European, national and local legislation. The main protected area designations are as follows:

- **Natura 2000 is a European network of protected sites which represent areas of the highest value for natural habitats and species of plants and animals which are rare, endangered or vulnerable in the European Community. The term Natura 2000 comes from the 1992 EC Habitats Directive; it symbolises the conservation of precious natural resources for the year 2000 and beyond into the 21st century. Scotland's Natura 2000 sites will help to protect these important areas now and for generations to come. The Natura 2000 network includes two types of area:**
    - **Special Areas for Conservation (SAC) are classified under the Habitats Directive for the protection of rare, endangered or vulnerable natural habitats and species of plants or animals (other than birds). These are the 189 habitats listed in Annex I and the 788 species listed in Annex II of the Habitats Directive. Species occurring in Orkney for which the UK has special responsibility include otter, grey seal and common seal.**
    - **Special Protection Areas (SPA) are classified under the Birds Directive and are areas which support rare, vulnerable and regularly occurring migratory bird species which are listed in Annex I of the Birds Directive. SPAs are intended to safeguard the habitats of the species for which they are selected and to protect the birds from significant disturbance.**
- **Ramsar Sites are internationally important wetland sites protecting wildfowl habitat.**
- **Sites of Special Scientific Interest (SSSI) represent the best of Scotland's natural heritage and are special for their plants, animals or habitats, their rocks or landforms, or a combination of such natural features. They form a network of the best examples of natural features throughout Scotland, and support a wider network across Great Britain and the European Union. Designation of an SSSI is a legal process and sites are protected under the Nature Conservation (Scotland) Act 2004.**
- **Local Nature Reserves (LNR): places with special local natural interest, set up to protect nature and for people to enjoy and appreciate;**
- **Sites of Local nature Conservation Interest: These are sites which have been designated by Orkney Islands Council and are listed in the Local Plan. They are regarded by the local community as being worthy of protection for their ornithological, botanical or geological interest. It is the Council's policy to protect these areas from**

development unless the development provides facilities which benefit the community as a whole.

Designated sites in the Orkney Islands are summarised in Table 3.1

Table 3.1: Numbers of designated sites and area they cover in Orkney

Designation	Total number	Area within Orkney (ha)	% of Total Area of Orkney*
Site of Special Scientific Interest	36	23,644	23.9
Special Area of Conservation	6	12,908	13.0
Special Protection Area	13	17,530	17.7
Ramsar Site	1	1,607	1.6
Area of the Orkney Islands is 989.9 km^2 or 98,990 hectares			

- **Source – SNH and JNCC, some designations may overlap**

A full list of Orkney's designated sites including a brief summary of the reasons for their notification is included in Appendix B.1.

European Protected Species (EPS)

Certain species are listed on Annex IV of the Habitats Directive as species of European Community interest and in need of strict protection. The protective measures required are outlined in Article 12 of the Directive. The species listed on Annex IV whose natural range includes any area in Great Britain are also listed on Schedules 2 (animals) and 4 (plants) of the Habitats Regulations and are specifically protected under Regulations 38-46 and Regulations 10-13 of the Amendment Regulations. [12]

All European Protected Species are also fully protected under the Wildlife and Countryside Act 1981, but the Habitats Regulations provide a greater level of protection, primarily through licensing procedures. For any European Protected Species of animal, the legislation makes it an offence to deliberately or recklessly capture, kill, injure or disturb any such animal. It is also an offence to damage or destroy their 'breeding sites' or 'resting places' (this does not have to be deliberate, reckless or intentional for an offence to have been committed).

For any European Protected Species of plant, the legislation makes it an offence to deliberately or recklessly pick, collect, cut, uproot or destroy any such plant. This applies to all stages of their biological cycle.

All cetacean species are European Protected Species, as well as the European otter *Lutra lutra*. A number of cetacean species are frequently seen in the seas around Orkney and otter is known to be widespread in the Orkney Islands particularly in the vicinity of aquatic environments, either freshwater or marine.

Wider Countryside Measures

There are a few bird species, either listed on Annex I of the Birds Directive or regularly occurring migratory species, for which Special Protection Areas are not appropriate in Scotland. For some other species, a large proportion of the population is not protected within SPAs. In both these cases, special measures outwith designated areas are of particular significance. [13]

Article 10 of the Habitats Directive encourages national governments, through their land-use planning and development policies, to manage landscape features which are of major importance for wild fauna and flora, particularly with a view to improving the ecological coherence of the Natura 2000 site network. Features which are essential for the passage and dispersal of wild species in the countryside, such as river corridors, and features which act as

[12] SNH website: www.snh.gov.uk
[13] SNH website: www.snh.gov.uk

'stepping stones' between sites such as small woods and ponds, are highlighted as particularly valuable.

The Scottish Executive also makes reference to wider countryside issues in its National Planning Policy Guideline on the Natural Heritage (NPPG 14). This guidance advises planning authorities that they should seek to safeguard and enhance the wider natural heritage beyond the confines of designated areas. NPPG14 states that the effect of a development proposal on the natural heritage can be a material consideration whether or not a designated area is likely to be affected.

Priority Habitats and Species

Each local authority in the Highlands and Islands has developed its own Biodiversity Action Plan (BAP) that lists the priority habitats and species for its area. Although many of these habitats and species occur in the areas protected by designations such as SPA, SAC and SSSI, it is recognized that important flora and fauna are also located in areas outwith these protected areas and should be considered when developing the objectives of renewable energy projects. This includes species and habitats in freshwater and marine environments.

The Orkney Local Biodiversity Action Plan (LBAP) was published in 2003 and lists a total of 83 species and 21 distinct habitats which are of importance in Orkney either in a national (UK) or a local context. The Orkney LBAP 2008-2011 which was published in 2008 focuses on ten of the Habitat Action Plans (HAPs) from the original Plan and introduces a new set of actions for each. The LBAP 2008-2011 also includes updated lists of species and habitats (terrestrial and marine) which occur in Orkney and also appear on the UK BAP list and/or the Scottish Biodiversity List. Both Plans may be viewed on the Orkney Islands Council website at www.orkney.gov.uk/biodiversity/biodiversity/. Further information on the distribution and abundance of species and habitats in the county is available from The Orkney Biodiversity Records Centre which is located in Kirkwall Library.

Perhaps unsurprisingly, the distribution and extent of Orkney's sub tidal marine habitats and species are rather less well understood than those above Mean Low Water Springs. However, it is anticipated that further development of the marine renewable energy industry will be preceded by increased levels of survey work allowing a significantly enhanced understanding of the marine environment around Orkney.

RSPB Reserves

The Royal Society for the Protection of Birds (RSPB) manages over 8000 hectares in Orkney[14], with most of this land designated as nature reserves. The 13 reserves are at the following locations:

Noup Cliffs, Westray	**North Hill, Papa Westray**
Trumland, Rousay	**Onziebust, Egilsay**
Mill Dam, Shapinsay	**Birsay Moors**
Marwick, Birsay	**The Loons, Birsay**
Cottasgarth and Rendall Flows	**Brodgar, Stenness**
Hobbister, Orphir	**Hoy**
Copinsay	

Scottish Wildlife Trust

Linga Holm, a small island off the west coast of Stronsay is owned by the Scottish Wildlife Trust (SWT) and is operated as a sanctuary for grey seal. The SWT also owns areas of land in the parish of Harray and at the Hill of White Hamars in South Walls, which are of interest for ornithological and botanical reasons respectively. All three sites are included in the Council's list of Sites of Local Nature Conservation Interest.

[14] RSPB website: www.rspb.org.uk

4. Water

SEA Objective:

- **To ensure that water resources which include groundwater, fluvial and coastal waters, are protected from adverse effects**

Water

Orkney has a relatively high rainfall occurring throughout the year, and extensive coastal waters, lochs, streams and water catchments, which should ensure adequate supplies for people, community services and industry in the area. Scottish Water is responsible for the supply of potable water within the county, and operates water treatment plants at Boardhouse and Kirbister Lochs on the Orkney mainland, Saintear Loch on Westray, Bea Loch on Sanday and Heldale Water on Hoy. In the other outlying islands water is supplied from boreholes. In addition, some households continue to rely on private, untreated water supplies and on sources that may be vulnerable to diffuse or single-source pollution.

Scottish Water also has responsibility for waste water and, in recent years has upgraded sewerage treatment facilities at a number of locations including: Head of Work, which serves the town of Kirkwall; The Bu, which serves the town of Stromness; St Margaret's Hope; Burray; Holm; Stenness; Dounby; Evie; Sanday and Westray. Work is currently under way to upgrade the sewerage system which serves the village of Finstown.

However, due to the dispersed nature of settlement in Orkney, waste water from many rural homes continues to be treated by septic tank and soak-away systems.

The Scottish Environment Protection Agency (SEPA) has primary responsibility for the water environment and, under the Water Environment (Controlled Activities Regulations) (Scotland) 2005, operates as a regulator for abstraction and discharges from and to surface and ground waters. The subsequent system of classification is based on both chemistry and biology results. An explanation of SEPA's rivers classification scheme can be found at http://www.sepa.org.uk/data/classification/river classification.htm.

The total network length which is classified in Orkney has increased from 23.8 km in 2000 to 71.9 km in 2005 but accurate classification has only been possible during the last two years with improvement of the biological classification tool, RIVPACS. The islands' rivers were not classified until 2004. A Highlands and Islands RIVPACS module was used in 2005 and this gave more accurate results for Orkney. It resulted in a decrease in class A1, B and C watercourses and an increase in A2 watercourses.

It is important to note that the overall network length increased from 57.6 km in 2004 to 71.9 km in 2005 and new rivers would have been classified for the first time. This factor could partly account for the increased number of A2 watercourses in 2005. There was a negligible change in the percentage of class D watercourses which currently account for 1-3% of all Orkney's rivers.

A summary of the freshwater classification results for Orkney is provided in Table 4.1 below.

Table 4.1: Classification of freshwater watercourses in the Orkney Islands 2000-2005

		Classification (% of water sampled (km))				
	Water sampled (km)	A1	A2	B	C	D
2000	23.8	21	46	19	2	12
2001	23.7	21	46	19	2	12
2002	25.7	19	50	18	2	11
2003	24.4	48	50	0	2	0
2004	57.6	28	45	16	8	3
2005	71.9	19	66	12	1	2
2006	83.07	16	58	15	7	2

In 2006 3% of water sampled remained unclassified.

Freshwater watercourses in Orkney generally include freshwater lochs and lochans, streams and drainage ditches but considerable areas of the islands, e.g. moorland and blanket bog are waterlogged with areas of standing water for much of the year.

Groundwater quality data has been collected by SEPA from three monitoring points in Orkney and these are listed below in Table 4.2.

Table 4.2: Groundwater monitoring points in the Orkney Islands

Location	OS National Grid Reference
Shapinsay	HY 50813 17370
Little Mill House	HY 48843 02539
Lintybrae	HY 40216 07024

SEPA ceased monitoring at Lintybrae after 2003 but continues to monitor groundwater at the Shapinsay and Little Mill House locations.

In 2005 coastal water from eighteen locations around the Orkney Islands was classified and a summary of the results from samples taken are presented in Table 4.3.

Table 4.3: Orkney coastal water classification 2005

Classification of coastal water 2005					
Total class A		Total class B		Total class C	
Sites	Length (km)	Sites	Length (km)	Sites	Length (km)
1	0.1	16	7.2	1	2

By 2006 the network length of coastal waters around Orkney had been quantified and although as yet most is unclassified it is incorporated into the coastal water classification for 2006 which is presented in Table 4.4.

Table 4.4: Orkney coastal water classification 2006

Classification of coastal water 2006									
Total class A		Total class B		Total class C		Total class D		Total unclassified	
Length (km)	% of network	Length (km)	% of network	Length (km)	% of network	Length (km)	% of network	Length (km)	% of network
0.0	0.0	12.7	1.6	1.8	0.2	0.0	0.0	776.0	98.2

Water quality in Orkney is generally high but locally there are waters polluted by effluents and other discharges from agriculture, mineral working, other industries and waste water. The EC Water Framework Directive seeks to achieve the continuous improvement of all water bodies through the implementation of River Basin Management Frameworks. Town and country planning has a significant role to play in ensuring an appropriate distribution of land uses and protecting the environment from pollution.

Development associated with on-shore wind turbines can have effects on hydrology and water quality. Excavation work for foundations and access tracks results in removal of vegetation cover and disturbance of soils. Changes may also occur to land drainage patterns which may result in loss of water in one area and potential for flooding in another. Habitats which are particularly vulnerable to changes in water supply and quality include blanket bog where deep layers of peat hold large volumes of water, and freshwater streams which rely on clear and unpolluted water sources. Development of marine renewable projects will also require to be assessed for their likely environmental impact.

Flooding

Orkney's average annual rainfall ranges from 861 mm to 1250 mm with the west of the county generally experiencing rather higher rainfall than the east.[15] Records dating from 1961 indicate that the winter months in Orkney have become wetter and the summer months a little drier.

In the past, flooding in the Orkney Islands has involved inundation by the sea, generally due to storm surges combined with high spring tides. However, changes to our climate, for example increases in temperature and rainfall, mean that the incidence of flooding may in future become more frequent. Heavy and persistent rain during October 2006 caused widespread disruption on the road network when many areas of Orkney were affected by flooding.

SEPA's Indicative River and Coastal Flood Map (Scotland)[16] indicates areas which are at risk of flooding and will enable effective planning for development of onshore wind energy projects.

5. Soils

SEA Objective:

- **To safeguard soil quality and quantity**

General information on the soil types of Orkney is available from Scottish Natural Heritage Review No 100, Orkney Character Assessment.[17] More detailed information is available from the Soil and Land Capability for Agriculture Maps (Orkney and Shetland) and accompanying handbook, both of which are produced by the Macaulay Institute[18].

Data is currently not available on the quality of soils in Scotland as no monitoring is carried out on their composition. However, Scotland's Climate Change Programme[19] includes plans to establish a soil monitoring system, especially with regard to carbon content, and to develop a soil strategy. We would anticipate using the resulting data to monitor impacts on soils from the development of on shore wind energy projects.

Peat

Layers of peat represent important sinks and storage areas for carbon and can be found underlying much of the moorland areas of Orkney. These layers of peat have formed from over periods of hundreds to thousands of years in wet conditions where water saturation causes anoxic conditions and prevents bacteria and fungi from rapidly decomposing the remains of dead plants. Moorland vegetation such as Sphagnum moss and heather dies back and accumulates, year on year, becoming compressed and altered and ultimately preserved as layers of peat at a very slow rate of approximately 1 cm in 10 years. Although a very slow process, peat continues to form in these areas where conditions are suitable, and represents an important means of removing carbon dioxide from the atmosphere.

Agricultural Land

Much of the land of the Orkney Islands is fertile agricultural land and in recent years farming methods have been predominantly intensive. However, the progression from the production-led agricultural subsidy system to the present Single Farm Payment with Modulation may bring changes to animal stocking densities and farming methods. Modulation is intended to fund improvements to the environment, and increasing uptake of agri-environment schemes such as the Rural Development Contract scheme may further change the farming landscape of Orkney. Figures for agricultural land use in Orkney, released annually by The Scottish Government Rural Payments and Inspections Directorate (SGRPID) show little change between 2001 and 2006. Grassland and rough grazing continue to dominate agricultural land usage in Orkney reaching a figure of over 92% of total land use in 2006.These figures are illustrated in Table 5.1 below.[20]

Table 5.1 Agricultural Land Use in Orkney during the period 2001 until 2006

[15] SNIFFER, 'A handbook of climate trends across Scotland', 2006 www.sniffer.org.uk
[16] Indicative River and Coastal Flood Map (Scotland), SEPA, 2005. www.sepa.org.uk/flooding/mapping/
[17] Scottish Natural Heritage Review No 100, Orkney Landscape Character Assessment. Land Use Consultants, Glasgow (1998)
[18] Soil and Land Capability for Agriculture Maps (Orkney and Shetland) mapsales@macaulay.ac.uk
[19] Changing Our Ways, Scotland's Climate Change Programme Scottish Executive (2006)
[20] Scottish Agricultural Census 2001 - 2006

Agricultural Land Use Practice	Total area (hectares)					
	2001	2002	2003	2004	2005	2006
Cereals	4,036	4,036	4,030	4,121	4,061	4,069
Potatoes	58	58	55	52	55	42
Stock-feeding crops	488	391	420	418	443	523
Other crops	28	44	37	56	82	130
Set aside	306	337	321	392	229	263
Vegetables for human consumption	8	10	8	17	11	12
Bare fallow	88	138	152	121	221	231
Total crops, set aside and fallow	5,012	5,014	5,024	5,177	5,102	5,270
Grassland	49,513	49,966	50,021	49,889	49,266	49,287
Rough grazing	36,265	36,254	36,074	35,985	36,525	36,745
Farm woodland	78	93	101	110	126	320
Other land	1,308	1,344	1,321	1,276	1,344	1,310
Total Land	92,176	92,671	92,540	92,437	92,363	92,932

Contaminated land

Under Part IIA of the Environmental Protection Act 1990 (as inserted by the Environment Act 1995) each local authority is required to *"cause its area to be inspected from time to time for the purposes of identifying contaminated land".* The local authority therefore has the responsibility to determine whether any land is contaminated.

Contaminated land is defined as,

> ***"any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under the land, that***
>
> ***a) significant harm is being caused or there is a significant possibility of such harm being caused; or***
>
> ***b) pollution of controlled waters is being, or is likely to be, caused"***

To ensure compliance, and to deal with contaminated land in the Orkney Islands, Orkney Islands Council Department of Environmental Health has produced a Contaminated Land Strategy. Information gathered on potential contaminated land sites includes some 37 waste management sites, over 70 Second World War military sites and a number of other sites totalling 149 sites. These sites are listed in a Contaminated Land Register which is maintained by the Environmental Health Department and is available for inspection at the Council Offices.

6. Landscape

SEA Objective:

- **To protect landscape character and local distinctiveness**
- **To safeguard visual amenity and scenic value**

The relatively unvaried geology of Orkney, along with the modifying effects of glaciation during the last ice age, has resulted in a landscape in which the differences are often subtle rather than dramatic. Physical processes together with human influences which began when settlers first arrived on the islands over 5,000 years ago have helped create the diversity of landscapes visible in the Orkney Islands today. The high quality visual amenity of the islands is valued by its resident population and is a major factor in attracting the thousands of tourists who visit each year.

Scottish Natural Heritage has carried out assessment of the Orkney landscape[21] enabling the landscape character to be described in a hierarchical framework which establishes the patterns of landscape variations. This is done by identifying and describing Regional Character Areas, Landscape Character Types and Island Character Areas. Explanations of these classifications are reproduced below:

REGIONAL CHARACTER AREAS

The Orkney archipelago is recognisable as a distinct landscape 'region', based on the general characteristics of geology, landform, land use and historical associations. It is also the fact that it is a group of islands that contributes to its unity of character, particularly in the importance of the sea. Its isolation from mainland Scotland, yet mutual inter-dependence, has created a strong identity for the county. It is concluded therefore, that the County of Orkney constitutes the 'Orkney Regional Character Area'.

LANDSCAPE CHARACTER TYPES

Landscape character types are tracts of countryside, defined at a more detailed level, which have a distinct character due to particular combinations of landform and land cover and a consistent pattern of constituent elements. Landscape character types are generic: they can be found anywhere distinct combinations of features occur.

ISLAND CHARACTER AREAS

Although there are many similarities between the islands of Orkney, there are also many characteristics which reflect the individual history of each. Each island contains several landscape character types.

This assessment resulted in the identification of a total of 23 landscape character types in the Orkney Islands. These are:

Holms
Ridgeline Island Landscapes
Undulating Island Pastures
Coastal Basins
Coastal Granite Pastures
Enclosed Bay Landscapes
Cliff Landscapes
Peatland Basins
Low Moorland
Rolling Hill Fringe
Glaciated Valley
Urban and Rural Development
Whaleback Island landscapes
Low Island Pastures
Coastal Plain
Inclined Coastal Pastures
Isolated Coastal Knolls
Coastal Hills and Heath
Coastal Sand Landscapes
Loch Basins
Plateau Heaths and Pasture
Moorland Hills
Rugged Glaciated Hills

The Environment Report for the SEA of the Renewable Energy Planning Framework for Orkney identified the following landscape changes in Orkney over the last 50 years[22]:

- **changes in vegetation cover of semi-natural areas such as moorlands;**
- **changes to field patterns and vegetation at the margins of enclosed and unenclosed land;**
- **loss or deterioration of some distinctive features such as stone dykes, crofts and other buildings in the farmland landscapes;**

[21] Scottish Natural Heritage Review No 100, Orkney Landscape Character Assessment. Land Use Consultants, Glasgow (1998)
[22] Environmental Report for SEA of the Renewable Energy Planning Framework for Orkney, David Tyldesley and Associates. 2005

- **gradual erosion of character in some areas through the loss of distinctive features and the addition of new ones, such as the clutter of telecommunication apparatus, aquaculture developments, service infrastructure and other urbanising features;**
- **the expansion of settlements in ways that have not always respected the settlement pattern; and**
- **new buildings that have not always reflected the settlement pattern, scale, design and materials that are appropriate to the landscape character.**

National Scenic Area (NSA)

National Scenic Areas are areas of exceptional scenic value and comprise some of the best examples of Scotland's landscapes. The Hoy and West Mainland NSA is the only area of Orkney to have this designation and includes examples of several of the landscape character types listed above.

In addition to the National Scenic Area, Orkney Islands Council has identified three areas of Great Landscape Value (Hoy Sea Cliffs, Yesnaby Sea Cliffs and West Westray) and 16 Areas of Attractive Settled Landscape.

7. Cultural heritage

SEA Objectives:

- **To safeguard cultural heritage resources and their settings through responsible design and siting of development**

Scheduled Ancient Monuments and Sites of Archaeological Importance

The historic environment includes scheduled ancient monuments, other archaeological sites, historic buildings, historic gardens and designed landscapes, townscapes, historic landscapes, wrecks and other submerged archaeological interests and submerged historic landscapes. The wider setting of many archaeological sites and historic buildings and views to and from designed landscapes are also important and sensitive to change.

The Orkney Islands have a rich cultural heritage, with a total of 365 Scheduled Ancient Monuments (SAMs) widely distributed throughout the county, representing periods dating from prehistoric times to the 20th century. Details of all 365 SAMs can be obtained from PASTMAP[23], Historic Scotland's free online service to display and search data on Scotland's historic environment. A further 2,000 unscheduled sites are listed on the Sites and Monuments Record.

Orkney has an outstanding cultural heritage of archaeological sites and features. The heart of Neolithic Orkney is one of only four World Heritage Sites (WHS) in Scotland to have been inscribed by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) on the World Heritage List in 1999. Located in the West Mainland, it includes Skara Brae, Maeshowe, the Stones of Stenness and the Ring of Brodgar together with adjacent standing stones and burial mounds.

The history of Orkney during the twentieth century is also well represented, largely due to the strategic importance of the islands during World Wars I and II. Scapa Flow was used as an anchorage for the British Naval Fleet during both wars and a naval base was established at Lyness in Hoy. After the end of World War I the German High Seas Fleet was interned in Scapa Flow under the terms of the Armistice whilst negotiations took place over the fate of the ships. Fearing that the fleet would be seized and divided amongst the allied powers, the German commander, Admiral Ludwig von Reuter, decided to scuttle the fleet.

[23] PASTMAP, www.historic-scotland.gov.uk/index/ancientmonuments/searchmonuments.htm

The scuttling was carried out on 21 June 1919. Intervening British guard ships were able to beach a number of the ships, but 52 of the 74 interned vessels sank. Many of the wrecks were salvaged over the next few years and were towed away to be scrapped. The few that remain are popular dive sites.[24]

***HMS Royal Oak* a *Revenge*-class battleship of the British Royal Navy was torpedoed at anchor in Scapa Flow by the German submarine *U-47* on 14 October 1939. The loss of life was heavy: of *Royal Oak*'s complement of 1,234 men, 833 were killed that night or died later of their wounds. Now lying upside-down in 30 m of water with her hull 5 m beneath the surface, *Royal Oak* is a designated war grave.[25]**

The remains of other historic buildings dating from this period, for example gun emplacements and camps, can still be seen at many coastal locations around Orkney.

Many more wrecks are located in the seas around Orkney. These include *HMS Hampshire* which struck a mine on 5 June 1916 off the west mainland between Brough of Birsay and Marwick Head whilst carrying Lord Kitchener on a diplomatic mission to Russia. The ship sank very rapidly and only twelve men survived. Kitchener, his staff and most of the crew perished. The wreck lies in around 65 metres of water and is designated as a controlled site under the Protection of Military Remains Act 1986. [26]

In November 1740 the Swedish East Indiaman, *Svecia* went ashore on the Reef Dyke, east of Strom Ness, North Ronaldsay, and only thirteen survivors made it to the shore. Much of the valuable cargo of silk and other goods was salvaged.[27]

There is a presumption in favour of the physical preservation of all scheduled ancient monuments and archaeological sites. Developments that would adversely affect such remains or their settings will only be permitted in exceptional circumstances, where there is no practical alternative site and where there are imperative reasons of over-riding need. Development which would affect other sites of archaeological interest not yet included on the Sites and Monuments Record may be permitted after the Islands' Archaeologist confirms that the significance of the remains are not such as to justify their physical preservation when judged against other material considerations and the possible benefits of the development.

Conservation Areas

Buildings may be 'listed' for their special architectural and/or historic interest. The 'listing' of buildings is carried out by Historic Scotland on behalf of the Scottish Minister. They are assigned to one of three categories (A, B or C(S)) according to their relative importance. Conservation areas are *"areas of special architectural or historical interest, the character or appearance of which it is desirable to preserve or enhance", for the enjoyment and benefit of future generations*.[28] Within Orkney there are four Urban Conservation Areas: Balfour Village in Shapinsay, St Margaret's Hope in South Ronaldsay, Kirkwall and Stromness. The island of Eynhallow and the inner buffer zone of the World Heritage Site (Brodgar Rural Conservation Area) have been designated as Rural Conservation Areas.

A total of 642 listed buildings are located throughout the Orkney Islands. Details of these buildings may be obtained from the Historic Scotland website through its listed buildings search facility.

Gardens and Designed Landscapes

The Inventory of Gardens and Designed Landscape[29] identifies gardens and designed landscapes in Scotland that are of national significance. These include private gardens, parks in country estates, public parks, cemeteries and botanical gardens. Three gardens and designed landscapes in the Orkney Islands are listed in the Inventory. These are located at Balfour Castle in Shapinsay, Melsetter House in Hoy and Skaill House in Sandwick.

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[24] en.wikipedia.org/wiki/Scuttling_of_the_German_fleet_in_Scapa_Flow
[25] en.wikipedia.org/wiki/HMS_Royal_Oak_(08)
[26] en.wikipedia.org/wiki/HMS_Hampshire_(1903)
[27] www.orkneyguide.com/ogbpdf/North Ronaldsay.pdf
[28] The Orkney Islands Council Structure Plan 2001
[29] www.historic-scotland.gov.uk/index/gardens.htm

8. Human health and residential amenity

SEA Objective:

- **To protect and enhance human health and residential amenity**

Life expectancy in the Orkney Islands is among the highest of all Scottish local authorities and since 2000 has generally displayed an increasing trend, with a slight decrease however to the year 2005. These figures are shown in Table 8.1.

Table 8.1: Life expectancy at birth of residents of the Orkney Islands over the period 2000 – 2005[30]

	PERIOD				
Gender	2000-2002	2001-2003	2002-2004	2003-2005	2005-2007
Males	75.4	75.9	76.5	76.3	74.9
Females	81.7	81.0	80.5	81.4	81.5

Although Orkney has high life expectancy rates and the area has an outstanding natural environment with clean air and water, fine scenery and diverse wildlife, human health can be adversely affected by rural poverty, caused by a range of factors including long-term unemployment, lack of affordable housing, isolation from main services and difficulties in travelling to a range of health and educational facilities. Rural poverty also exacerbates the effects of inequality and social exclusion which have implications for human health.

The Scottish Index of Multiple Deprivation (SIMD) is used to measure health inequalities associated with low income and deprivation. Orkney has no neighbourhoods which register on the most deprived 15% in Scotland, if the 2004 SIMD composite indicator is used.

However geographical deprivation is one component of the Scottish Index of Multiple Deprivation in which parts of the Orkney Islands do register within the top 15% most deprived in Scotland. Geographical deprivation is measured by ranking areas for geographical access to services. There are a total of 6,505 data zones in Scotland and the data zone ranked 1 is the most deprived. The islands of Orkney are grouped together and their geographical isolation is assessed according to access to, and level of, public transport provision in that area. The results of this exercise appears in Table 8.2 which indicates that most of the Isles fall within the most geographically deprived 10% of data zones in Scotland.

Table 8.2: SIMD ranking of areas in the Orkney Islands for geographical access to services

INTERMEDIATE GEOGRAPHY – ISLES ZONE SO2000947			
Data zone	Islands	Population	SIMD ranking for geographical access to services
S01004968	Rousay, Shapinsay, Egilsay and Wyre	567	387 (top 6% most deprived)
S01004969	Sanday, Stronsay and North Ronaldsay	906	87 (top 2% most deprived)
S01004970	Eday, Westray and Papa Westray	749	43 (top 1% most deprived)
S01004971	South Ronaldsay (south), Hoy and Flotta	935	27 (top 1% most deprived)
S01004972	Burray and South Ronaldsay (north)	749	595 (top 10% most deprived)

[30] Scottish Executive National Census 2001

Travel and Transport represents one of the Strategic Issues of *A Sustainable Energy Strategy for Orkney* and highlights Orkney's dependence on fossil fuels for transport, in particular its transport links between the islands and between Orkney and the Scottish mainland.

Data compiled from questionnaires carried out during the 2001 National Census suggests that the population of the Orkney Islands is relatively healthy, with almost 73% reporting that they feel in good health.

Table 8.3 contains selected health statistics from data collected during the 2001 National Census and compares aspects of the health of the Orkney population with that of Scotland as a whole.

Table 8.3: General health of the population of the Orkney Islands and Scotland[31]

	Orkney Islands	Scotland
Total resident population	19,245	5,062,011
- % Good	72.55	67.91
- % Fairly good	20.79	21.94
- % Not good	6.66	10.15
Average age of a person with good health	34.94	32.86
Average age of a person with a limiting long term illness	60.22	57.94
Percentage of economically inactive people who are permanently sick/disabled	15.60	21.25
- % Having a limiting long term illness	17.43	20.31
- % Not having a limiting long term illness	82.57	79.69

9. Population

SEA Objective:

- **To improve the community environment and quality of life**

Over the period between 1994 and 2006 population levels in the Orkney Islands have fluctuated, decreasing to a minimum of 19,210 in 2002 before increasing again to 19,770 in 2006. Birth rates over this period have decreased and the increasing trend between 2003 and 2006 was due to numbers migrating to the county slightly outweighing a falling birth rate and outward migration. This trend is illustrated in Table 9.1.

Table 9.1: Population change, based on Orkney Islands Council 2008 Economic Review[32]

Ended 30 June	Births	Deaths	Natural change	Migration	Population
1994	257	247	+10	+40	19,810
1995	231	229	+2	+58	19,870
1996	217	242	-25	-45	19,800
1997	233	232	+1	+39	19,840
1998	200	244	-44	-246	19,550
1999	202	217	-15	-35	19,600
2000	163	220	-57	-63	19,480
2000	(revised)		-	-	19,290
2001	153	199	-46	-24	19,220
2002	176	210	-34	+24	19,210

[31] Scottish Executive National Census 2001
[32] General Register Office for Scotland (GROS

Ended 30 June	Births	Deaths	Natural change	Migration	Population
2003	168	212	-44	+144	19,310
2004	167	224	-57	+247	19,500
2005	194	207	-13	+103	19,590
2006	194	208	-14	+194	19,770

The General Register Office has revised its predictions and is now expecting almost a 15% increase in the County's population up to 2031. This is possibly due to the estimated population in recent years exceeding the previously predicted years. The population projections for the period 2007-2031 are shown in Table 9.2 below.

Table 9.2: Population estimates for Orkney 2007-2031[33]

Year	Population Estimate
2007	19,958
2008	20,139
2009	20,266
2010	20,403
2015	21,067
2020	21,679
2024	22,111
2031	22,686

The values shown above do not include the internal population changes which are taking place within the Orkney Islands as a result of migration from the smaller islands towards the mainland of Orkney. Depopulation of these islands has given cause for concern for a number of years and initiatives are under way to try to reverse this trend. Changes in population levels of the North and South Isles during the period 1961 to 2001 are illustrated in Table 9.3

Table 9.3 Population trends in the Orkney Islands over the period 1961 – 2001[34]

	POPULATION					
ISLAND	1961	1971	1981	1991	2001	% change
Burray	262	209	283	363	357	+36
Eday	198	179	147	166	121	-39
Egilsay	54	39	23	46	37	-31
Flotta	123	73	178	126	81	-34
Graemsay	51	39	21	27	21	-59
Hoy	511	419	461	450	392	-23
Mainland Orkney	13,495	12,747	14,000	15,123	15,315	+13
North Ronaldsay	161	134	109	92	70	-57
Papa Stronsay	4	3	0	0	10	+250
Papa Westray	139	106	92	85	65	-53
Rousay	237	181	209	217	212	-11
Sanday	670	592	525	533	478	-29

[33] General Register Office for Scotland (GROS) estimates
[34] Scotland's Census Results Online

	POPULATION					
ISLAND	1961	1971	1981	1991	2001	% change
Shapinsay	416	346	329	322	300	-28
South Ronaldsay	980	776	891	943	854	-13
Stronsay	497	436	420	382	343	-31
Westray	872	735	701	704	563	-35
Wyre	47	36	21	28	18	-62

Table 9.3 indicates that, over the forty year period between 1961 and 2001, the population of the Orkney mainland increased by 13%, whereas in the Isles the trend was for a decrease in population, in some cases by over 50%. Of the two South Isles which are linked to the Orkney mainland by the Churchill Barriers, the population of Burray showed an increase of 36% whereas that of South Ronaldsay showed a decrease of 13%.

10. Material assets

SEA Objective:

- **To promote sustainable and efficient use of Orkney's natural resources and facilitate the use of energy from renewable sources**

The development of renewable energy projects has potential to affect material assets such as buildings, public amenity land and agricultural land.

In addition, materials such as aggregate and sand will be required for the construction of turbine foundations, access roads and other ancillary works. Currently aggregate is sourced from Cursiter Quarry which is operated by Orkney Islands Council and further privately operated quarries at Hill of Heddle in Firth and Gairsty and Cruaday in Quoyloo. Where necessary, further supplies of stone may be quarried from temporary borrow pits. Sand is currently extracted and supplied by a private operator from The Bu in Burray.

Summary of data collected in compiling an environmental baseline of the Orkney Islands

The Environmental Report features a summary of the data sources accessed in compiling this environmental baseline of the Orkney Islands. A copy of this summary (Table 3 in the Environmental Report) is also included below.

Table 3: Summary of data collected in compiling an environmental baseline of the Orkney Islands

DATA	SOURCE
Information on climate change	SNIFFER, 'A handbook of climate trends across Scotland', 2006 Climate Change The UK Programme 2006
Information on carbon dioxide emissions	Scottish Executive, Key Scottish Environmental Statistics, 2007 Original information from 'Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2004'. AEA Technology, AEAT/ENV/R/2318
Local air quality data for Kirkwall	Orkney Islands Council Department of Environmental Health Scottish Pollutant Release Inventory (SEAP), www.sepa.org.uk
List of statutory and non-statutory designated natural heritage sites	Scottish Natural Heritage (SNH) www.snh.gov.uk Joint Nature Conservation Committee (JNCC) www.jncc.gov.uk Orkney Islands Council Local Plan www.orkney.gov.uk

DATA	SOURCE
RSPB reserves in Orkney	Royal Society for the Protection of Birds www.rspb.org.uk
European Protected Species	Scottish Natural Heritage (SNH) www.snh.gov.uk
Lists of Priority habitats and species in Orkney	Orkney Islands Council Local Biodiversity Action Plan 2002 and 2008-2011 www.orkney.gov.uk
Water quality data (freshwater and coastal) and Groundwater quality data	Scottish Environment Protection Agency (SEPA) www.sepa.org.uk
Information on rainfall in Orkney Information on areas at risk of flooding	SNIFFER, 'A handbook of climate trends across Scotland', 2006 www.sniffer.org.uk Indicative River and Coastal Flood Map (Scotland), SEPA, 2005
Soil types in Orkney	Scottish Natural Heritage Review No 100, Orkney Landscape Character Assessment, Land Use Consultants, Glasgow (1998) Changing Our Ways, Scotland's Climate Change Programme Scottish Executive (2006) Soil and Land Capability for Agriculture Maps (Orkney and Shetland) mapsales@macaulay.ac.uk
Data on Agricultural Land Use in Orkney during 2002 and 2005	Scottish Agricultural Census 2001 - 2006
Information on contaminated land in Orkney	Orkney Islands Council Department of Environmental Health
Information on Landscape Character Assessment	Scottish Natural Heritage Review No 100, Orkney Landscape Character Assessment, Land Use Consultants, Glasgow (1998) Environmental Report for SEA of the Renewable Energy Planning Framework for Orkney, David Tyldesley and Associates. 2005
Listed buildings in Orkney	PASTMAP, www.historic-scotland.gov.uk
Orkney Scheduled Ancient Monuments	PASTMAP, www.historic-scotland.gov.uk/index/ancientmonuments/searchmonuments.htm
Gardens and Designed Landscapes	Inventory of Gardens and Designed Landscape www.historic-scotland.gov.uk/index/gardens.htm
Information on Conservation Areas	The Orkney Islands Council Development Plan (The Structure Plan (2001) and Local Plan (2004))
General health of the populations of Orkney and Scotland Life expectancy of residents of the Orkney Islands over the period 2000-2005	Scottish Executive National Census 2001 British Heart Foundation Website www.heartstats.org Scottish Executive and NHS Health Scotland healthy Living website www.InfoScotland.com
Population of Orkney (2006) Population trends in the Orkney Isles 1961 – 2001	General Register Office for Scotland Population (GROS) Estimates General Register Office for Scotland (GROS)
Source of aggregates used in Orkney	Orkney Islands Council Roads Department
Current status of grid-connected onshore wind energy projects in Orkney	Orkney Islands Council, 2008

Appendix C

Table 11: Assessment of the Strategic Issues

	ASSESSMENT CRITERIA										
4: Level of Renewable Energy Production in Orkney **The Strategy proposes that achieving in excess of 1 GW of production should be an aspirational goal for the long term, capable of being considered as a definite future target when this strategy is reviewed.** **For the medium term, the target of electricity use equivalence (i.e. 50MW of installed renewables capacity) within 5 years, and energy-use equivalence (160MW) in 10 years, are considered to be realistic goals.** **Target 1: Maintain the present level of energy production from renewable sources.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	0	0	0	0	0	0	0	0	0	0	No
Comment: This alternative represents maintenance of the current level of on-shore wind energy development in Orkney with no further development of the renewable energy industry in the County. There would be no additional benefit to climatic factors or local air quality and also no further impact from renewable energy development upon the other SEA environmental issues.											

	ASSESSMENT CRITERIA										
4: Level of Renewable Energy Production in Orkney **Target 2: 50MW of installed renewables capacity within 5 years, representing electricity use equivalence.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	0	? / -	? / -	-	? / -	? / -	? / + / -	?	? / -	Yes

Comment: Over the five-year period 2008-2013, additional on-shore wind energy development in Orkney is likely to contribute towards this level of increase in installed renewable energy capacity. All prospective projects would have to fulfil the requirements of the Spatial Planning Policy and the nine Development Criteria of the Council's *Supplementary Guidance On-shore Wind Energy Development.* Produced in October 2008, this guidance document was prepared for the purpose of protecting those areas which are sensitive to on-shore wind energy development and guiding prospective developers towards those areas which are more likely to accommodate further development. As indicated in *Supplementary Guidance On-shore Wind Energy Development,* a number of factors limit the area of land in Orkney which is suitable for development of on-shore wind energy, in particular those developments which would aim to produce over 20MW of electricity. In order to achieve the desired level of electricity generation this factor may lead to developers submitting planning applications to install fewer but significantly larger turbines than those which are presently located in the County. Significant increases in the height of turbines and also the length of their rotating blades would lead to increased risk of negative landscape and visual and impacts as these structures would be more likely to represent the dominant element in many of Orkney's landscape character types. The SG is considered to provide adequate mitigation against the potential for adverse effects from further on-shore wind energy development. Additionally, the use of planning conditions will ensure that impacts on any remaining SEA environmental issues are minimised and are not significantly adverse.

A further alternative would be the introduction of offshore wind energy development in the relatively shallower areas of Orkney's coastal waters. The technology for offshore wind energy turbines is at an advanced stage in development with a number of wind farms already operational or under construction off the coast of mainland Britain.

It is also possible that development of marine tidal or wave energy may contribute to realization of the 50MW target. Currently (November 2008) development of marine renewables in Orkney waters is at the prototype testing stage at the test facilities operated by the European Marine Energy Centre either at its wave energy site in the seas off Billia Croo to the west of Orkney or at its tidal energy test site in the Falls of Warness, to the west of Eday. It is possible however that, within five years, the marine renewable

	ASSESSMENT CRITERIA										
4: Level of Renewable Energy Production in Orkney **Target 2: 50MW of installed renewables capacity within 5 years, representing electricity use equivalence.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	0	? / -	? / -	-	? / -	? / -	? / + / -	?	? / -	Yes

industry in Scotland may progress to a more advanced stage with the establishment of a demonstration site, which is increasingly likely to be located in the strongly tidal seas of the Pentland Firth which separate Orkney and Caithness.

Positive impact would be expected on climatic factors at a local scale as the electricity generated by additional renewable energy developments offsets the total amount of electricity used in the islands, and also nationally in terms of Orkney's contribution towards the Scottish Government's target of 18% of the country's electricity to be generated from renewable sources by 2010 and 50% by 2020.

Local air quality is good and, although there may be a degree of shift from use of fossil fuels to electricity, this is not anticipated to lead to significant improvements in air quality.

Possible effects from renewable energy development in the marine environment include:

On biodiversity, fauna & flora:

- **collision or entanglement, e.g. large marine mammals such as cetaceans or seals, certain species of diving birds; large fish such as basking shark;**
- **exclusion of fish species from spawning areas;**
- **exclusion of species from feeding areas;**
- **disturbance along routes routinely followed by migratory fish, e.g. Atlantic salmon;**
- **disturbance to stretches of coastline used by species such as grey and common seals or European otter.**

On water:

- **pollution of water by accidental release of fluids, including hydrocarbons, from renewable devices.**

On soil/sediments:

- **localized changes in underwater sediment transport due to alterations to water flow.**

	ASSESSMENT CRITERIA										
4: Level of Renewable Energy Production in Orkney **Target 2: 50MW of installed renewables capacity within 5 years, representing electricity use equivalence.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	0	? / -	? / -	-	? / -	? / -	? / + / -	?	? / -	Yes

On landscape:

- **presence of large moving structures such as wind turbines in an otherwise empty seascape;**
- **presence of on-shore electricity sub stations and additional electricity transmission infrastructure;**

On cultural heritage:

- **disturbance of underwater wrecks or archaeology; and**
- **impact on coastal archaeology on land where electricity cables make landfall.**

On population and human health:

- **conflicting pressures relating to use of the sea as a resource, e.g. for fishing, creeling or diving, tourism;**
- **Increased and more diverse forms of employment in the County.**

On material assets:

- **Use of resources such as sand and aggregate to construct foundations for marine energy devices.**

Development of marine renewable energy could also impact upon the terrestrial environment, e.g. on biodiversity, water, landscape, access and human health issues, where cables from the devices make landfall and link into an electricity substation. Additional electricity transmission infrastructure, in the form of poles and overhead cabling would also be required which would add to the impact on landscape.

However, due to the level of uncertainty relating to how or exactly where the marine renewables industry may develop, and without further baseline marine environmental information, it is impossible to quantify in this SEA the likely level of impact above environmental issues.

	ASSESSMENT CRITERIA										
4: Level of Renewable Energy Production in Orkney **Target 3: 160MW of installed renewables capacity within 10 years representing energy-use equivalence.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	+	? / -	? / -	-	? / -	? / -	? / + / -	? / +	? / -	Yes

Comment: Due to the level of constraint with regard to locating wind turbines on land, the increase from 50MW to 160MW of electricity generated from renewable sources is likely to be achieved increasingly through development in the marine environment of devices to harness offshore wind, wave or tidal energy.

Positive impact from this level of increase in renewable energy development would be expected on climatic factors on a local scale as the electricity generated by additional renewable energy developments offsets the total amount of energy used in the islands, and also nationally in terms of Orkney's contribution towards the Scottish Government's target of 18% of the country's electricity to be generated from renewable sources by 2010 and 50% by 2020.
There would also be potential for positive impact on local air quality as additional renewable energy development may replaces a proportion of the fossil fuels currently used in Orkney.

Development at this scale has potential to lead to significant impacts (positive and negative) on marine fauna and flora, water, seascapes, archaeology interests in coastal areas and to employment in the islands and to other users of the sea such as shipping, tourism and the fishing industry as listed above in the assessment of the likely impacts of Target 2. This level of renewable energy production may also lead to additional positive impacts on Human health through the development of alternative, perhaps more affordable, energy supply options.

Without further information on the types of renewable energy devices which would be used, and where they would be located it is not possible to quantify the likely scale of effects on the SEA environmental issues.

	ASSESSMENT CRITERIA										
4: Strategic issue 1: Level of Renewable Energy Production in Orkney **Target 4: Total carbon emissions offset – increase production of electricity from renewable sources to 230MW.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	+	? / -	? / -	-	-	? / -	? / + / -	? / +	? / -	Yes

Comment: Due to the level of constraint with regard to locating wind turbines on land, the increase from 160MW to 230MW of electricity generated from renewable sources is likely to be achieved increasingly through development in the marine environment of devices to harness offshore wind, wave or tidal energy.

Positive impact from this level of increase in renewable energy development would be expected on climatic factors on a local scale as the electricity generated by additional renewable energy developments offsets the total carbon emissions in the islands, and also nationally in terms of Orkney's contribution towards the Scottish Government's target of 18% of the country's electricity to be generated from renewable sources by 2010 and 50% by 2020.

There would also be potential for positive impact on local air quality as additional renewable energy development could provide realistic alternative energy options, e.g. for transport, lighting and space heating, largely replacing the use of fossil fuels in Orkney.

Development at this scale would be likely to lead to significant impacts (both positive and negative) on marine fauna and flora, water, seascapes, archaeology interests in coastal areas and to employment in the islands and to other users of the sea such as shipping, tourism and the fishing industry as listed in the assessment of the likely impacts of Target 2. This level of renewable energy production may also lead to additional positive impacts on Human health through the development of alternative, perhaps more affordable, energy supply options.

Without further information on the types of renewable energy devices which would be used, and where they would be located it is not possible to quantify the likely scale of effects on the SEA environmental issues.

	ASSESSMENT CRITERIA										
5: Electricity transmission **The Strategy supports development of the grid, to overcome the current constraint on significant renewables development in Orkney.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	+	? / -	? / -	-	-	? / -	?	?	0	Yes

Comment: Installation of an additional underwater cable would remove a major constraint to further development of the renewable energy industry in Orkney by enabling the export of up to 200MW of electricity from new renewables projects.

Further development of the renewables industry in Orkney would lead to positive impact on climatic factors on a local scale and also nationally in terms of Orkney's contribution towards the Scottish Government's target of 18% of the country's electricity to be generated from renewable sources by 2010 and 50% by 2020. There is also potential for positive effects on local air quality through a shift to further use of electricity and reduced reliance on fossil fuels.

Completion of the additional connection would require construction of associated electrical infrastructure including overhead transmission lines and/or underground cables and sub-stations in both Orkney and the Scottish Mainland. The construction and/or ongoing operation of these would have potential to impact negatively upon biodiversity, water, soil, landscape and cultural heritage. Potential effects on population and human health are uncertain until further information is available on the routes to be followed by the overland transmission infrastructure and the type of poles to be used.

Without further information on the routes to be followed by the overland transmission infrastructure and the type of poles to be used, it is not possible to quantify the likely scale of effects on the SEA environmental issues.

	ASSESSMENT CRITERIA										
6: Planning issues for renewable energy projects Orkney Islands Council has published Supplementary Guidance for On-shore Wind Energy Development which includes a spatial policy based on three different zones: Broad Areas of Search for Onshore Wind Energy Development Areas of Significant Protection Areas of Potential Constraint	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	+	+	+	+	+	+	+	+	0	No

Comment: ***Supplementary Guidance On-shore Wind Energy Development*** **was prepared in response to the growing demand for onshore wind energy developments, in order to assist developers in the planning process, to guide them in the development and design of projects and steer them away from areas which are, in the view of Orkney Islands Council, inappropriate for such development. It contains three Spatial Policies and nine Development Criteria.**

Spatial Policy 1 Broad Areas of Search identifies areas with potential to accommodate onshore wind energy development in Orkney. The Broad Areas of Search represent areas of least constraint to onshore wind energy development where onshore wind energy development is likely to be supported in principle, subject to proposals complying with Development Criteria 1 to 9 and any other material planning considerations.

Spatial Policy 2 Areas of Significant Protection identifies areas which are sensitive to the development of onshore wind energy development and should be afforded significant protection. These are:

- **Natura 2000 Sites (Special Protection Areas and Special Areas of Conservation)**
- **The Ramsar Site**
- **Sites of Special Scientific Interest**
- **The World Heritage Site and its Zones of Visual Influence**
- **The Hoy and West Mainland National Scenic Area**

Planning applications for on-shore wind energy development within these areas will require to be supported by significant levels of information to demonstrate that they do not cause harm to the designated areas and that they are fully compliant with Development Criteria 1-9 and any other material planning considerations.

Spatial Policy 3 Areas of Potential Constraint identifies areas where there are potential constraints to onshore wind energy development. These are:

- **The Heart of Neolithic Orkney World Heritage Site and Buffer Zone;**
- **2km Buffer Zones around towns, villages and rural settlements;**
- **Kirkwall Airport Safeguarding Area;**

	ASSESSMENT CRITERIA										
6: Planning issues for renewable energy projects **Orkney Islands Council has published Supplementary Guidance for On-shore Wind Energy Development which includes a spatial policy based on three different zones:** **Broad Areas of Search for Onshore Wind Energy Development** **Areas of Significant Protection** **Areas of Potential Constraint**	**Climatic factors**	**Local air quality**	**Biodiversity, flora & fauna**	**Water**	**Soil**	**Landscape**	**Cultural Heritage**	**Population**	**Human health**	**Material assets**	**Mitigation required?**
	+	+	+	+	+	+	+	+	+	0	No

- **Sites of Local Nature Conservation Interest; and**
- **Sites of Local Landscape Character.**

Within the Areas of Potential Constraint planning applications will require to be supported by evidence showing that the level of impact on the constraining factors is not significantly adverse before the principle of development will be accepted by the Council and will also have to demonstrate full compliance with the nine Development Criteria

	ASSESSMENT CRITERIA										
7: Community benefit **As a guideline, the Council proposes that the minimum annual community benefit payment by a wind turbine project to the local community, should be £2000 per MW installed capacity, plus £1000 per MW installed x actual efficiency in any given year.** **The Council is prepared to consider investment in wind turbine projects in Orkney, from a £2m investment fund established for this purpose.** **Future community owned renewables projects could be considered for assistance or investment, through the Council's Renewables Investment Fund.** **The Council will consider participating in renewables projects by private investors' clubs, through equity investment from the Council's Renewables Investment Fund.** **The Council will consider developing renewables projects at its own hand, on land which it owns or can acquire for this purpose.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	0	0	0	0	0	0	+	0	0	No
Comment: Annual payments from private developers to communities which live in the vicinity of wind turbines ensure that the benefits of renewable energy developments are experienced more widely by the local population. **It is possible that in certain situations these payments encourage on-shore wind energy development where otherwise it would not take place due to local resistance to such projects.** **Investment by Orkney Islands Council, through the various means outlined in the Strategy, may also allow certain developments to proceed which otherwise would have been unable to do so due to insufficient funding.** **Any on-shore wind energy development proposed by Orkney Islands Council will need to demonstrate that it fulfils the requirements of *Supplementary Guidance On-shore Wind Energy Development* as well as any other material planning considerations.**											

	ASSESSMENT CRITERIA										
8: Fuel poverty **The Council will examine ways of strengthening its actions to reduce Fuel Poverty in Orkney, including through the establishment of an Orkney Energy Agency or Company.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	0	0	0	0	0	0	+	+	0	No

Comment: Winter weather in Orkney tends to be cool and damp and space heating is generally required over the months between the beginning of October and the end of April and often beyond.

The promotion of energy efficiency measures is likely to result in positive impact on climatic factors, population and human health as people will be able to warm their homes using less energy, subsequently decreasing the percentage of their income which they have to spend on fuel. Installation of small scale renewable energy devices such as solar panels also help reduce electricity usage, whereas small-scale wind turbines produce electricity to feed into the grid, offsetting the developer's electricity use and saving or even earning money. Domestic-sized wind turbines are generally not considered to cause significant negative effects to any of the remaining environmental issues. Increased installation of energy saving measures and small-scale renewable would also result in additional employment opportunities in the islands.

The establishment of a Council–run energy supply company could bring positive impact to the population and human health issues by supplying energy at advantageous prices, making electricity affordable to all sectors of the community and helping counter the costs of fossil fuels such as domestic heating oil which are relatively higher in island communities such as Orkney.

	ASSESSMENT CRITERIA										
9: Energy efficiency and micro renewables **The Carbon Management Strategy and Implementation Plan commit the Council to a target of reducing CO2 by 11% by 2014, and underpin potential financial savings to the Council of 1.6M.** **The Council will continue to support the drive for energy efficiency, as an important mechanism for tackling fuel poverty, and reducing fuel consumption and carbon emissions.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	0	0	0	0	0	0	+	+	0	No

Comment: Winter weather in Orkney tends to be cool and damp and space heating is generally required over the months between the beginning of October and the end of April and often beyond.

The promotion of energy efficiency measures is likely to result in positive impact on climatic factors, population and human health as people will be able to warm their homes using less energy, subsequently decreasing the percentage of their income which they have to spend on fuel. Installation of small scale renewable energy devices such as solar panels also help reduce electricity usage, whereas small-scale wind turbines produce electricity to feed into the grid, offsetting the developer's electricity use and saving or even earning money. Domestic - sized wind turbines are generally not considered to cause significant negative effects to any of the remaining environmental issues.

Increased installation of energy saving measures and small-scale renewable would also result in additional employment opportunities in the islands.

The Council's commitment to reducing its own and Orkney's carbon footprint will result in further positive impact on climatic factors.

	ASSESSMENT CRITERIA										
10: Travel and transport **The Council is investigating the possibility of European Regional Development Fund support for a demonstration project using alternative fuels.** **Through its Local Transport Strategy, the Council is seeking to improve public transport and other alternatives to use of the private car, and to encourage their use for commuting and other journeys.** **In reviewing the Local Plan, the Council will address the issue of reducing the need to travel.**	**Climatic factors**	**Local air quality**	**Biodiversity, flora & fauna**	**Water**	**Soil**	**Landscape**	**Cultural Heritage**	**Population**	**Human health**	**Material assets**	**Mitigation required?**
	+	+	+	+	+	+	+	+	+	+	No

Comment: The Strategy highlights Orkney's dependency on fossil fuels for transport both between islands and between Orkney and the Scottish mainland. It also points out that the dispersed settlement pattern tends to favour private transport rather than public transport.
Positive impact on climatic factors would be anticipated should funding be obtained for a demonstration project using alternative fuels. The costs of petrol and diesel are significantly higher in Orkney than on Mainland UK and it is a factor which adds cost to many other goods and services in the islands. This is a feature of island life which generates considerable public debate. If the demonstration project using alternative fuels proved successful it would be likely to generate further interest in more widespread development of such schemes and therefore greater use of non-fossil fuels.

The introduction of less costly options for travel and transport is likely to benefit the SEA issue, 'Population' as transport costs are recognised as an important contributory factor in depopulation of the North and South Isles.

The Local Transport Strategy encourages increased use of public transport and for short journeys it also encourages active means of travel such as walking or cycling. In SEA of the LTS, travel solutions which aim to reduce motorised road traffic were assessed as promoting positive impact on local air quality, biodiversity, fauna & flora, water, soil, landscape and cultural heritage. Positive impact on Human health is also anticipated from increased levels of exercise as people opt to walk or cycle for short journeys.
The Orkney Local Plan is currently under review and proximity to public transport routes will be a major consideration in the assessment of land allocations for development.

	ASSESSMENT CRITERIA										
11: Marine renewables **Support for marine energy developments will continue in the future to ensure that Orkney maintains and develops its lead in this area.** **The Council will investigate the possibility of tidal generation from fixed links.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	+	? / -	? / -	-	-	? / -	? / + / -	? / +	?	Yes

Comment: Positive impact would be expected on climatic factors at a local scale as the electricity generated by marine renewable energy developments would contribute towards offsetting the amount of electricity used in Orkney. Positive impact would also be anticipated nationally in terms of Orkney's contribution towards the Scottish Government's target of 18% of the country's electricity to be generated from renewable sources by 2010 and 50% by 2020. It is likely that the travelling patterns of the Orkney residents and also of visitors to the islands would change substantially if fixed links were introduced but, without further information on where fixed links would be constructed, it is impossible to assess whether transport emissions would be higher or lower than the emissions which result from current operation of the ferry services.
Further positive impact on climatic factors and local air quality is possible within Orkney and even in other parts of Scotland should the generation of electricity from marine renewable sources including tidal energy generation associated with fixed links reduce or replace the use of fossil fuels.

Development of marine renewables has potential to lead to significant impacts (positive and negative) on marine fauna and flora, water, seascapes, archaeology interests in coastal areas and to employment in the islands and to other users of the sea such as shipping, tourism and the fishing industry as listed above in the assessment of the likely impacts of Strategic Issue 1, Target 2. This level of renewable energy production may also lead to additional positive impacts on Human health through the development of alternative, perhaps more affordable, energy supply options.

The introduction of fixed links as an option for travel and transport is likely to benefit the SEA issue, 'Population' as transport costs and isolation are recognised as important contributory factors in depopulation of the North and South Isles.

	ASSESSMENT CRITERIA										
12: Jurisdiction over marine projects **The Council will continue to make the case for local control of developments in the marine environment around Orkney.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	0	0	+	+	+	+	+	+	+	+	No
Comment: Development of marine renewable energy will require careful spatial planning in order that the needs and views of other users of the seas around Orkney can be considered and also to ensure that Orkney's valuable natural and cultural heritages are protected from inappropriate development. A similar exercise was carried out during 2007-2008 during preparation of the Council's *Supplementary Guidance On-shore Wind Energy Development* and participation by members of the public, developers and other stakeholders through consultation, seminars and meetings of discussion groups formed a valuable contribution to the planning process.											

	ASSESSMENT CRITERIA										
13: The hydrogen economy **Orkney should be promoted as an ideal location for a hydrogen fuel cell demonstration project.**	Climatic factors	Local air quality	Biodiversity, flora & fauna	Water	Soil	Landscape	Cultural Heritage	Population	Human health	Material assets	Mitigation required?
	+	+	?	?	?	?	?	?	?	?	Yes

Comment: The process of splitting water (H_2O) into its atomic components (hydrogen and oxygen) using electricity is known as electrolysis. In terms of energy required to drive this is a costly process and, as a result, hydrogen is often described as an energy carrier rather than a fuel. Production of hydrogen is being considered as a possible option for the future, to enable the electricity generated from renewables to be used within Orkney, for example as a fuel for transport, or to be stored and transported out of the islands.

Establishment of a demonstration project in Orkney would be likely to benefit the SEA issue 'Population' through the introduction of further employment and increased technical knowledge in the islands.

Replacement of fossil fuels by hydrogen would be likely to lead to positive impact on climatic factors and local air quality.

However, the concept of the hydrogen economy remains the subject of considerable debate and certain environmental interactions of hydrogen are not entirely understood. For example, hydrogen gas is very light and any escaped gas rises quickly to the troposphere where it can form free radicals which may then combine with ozone. The ozone layer acts as a protective shield for the earth by preventing the most harmful UVB wavelengths (270–315 nm) of ultraviolet light (UV light) from passing through the Earth's atmosphere, Significant depletion of this layer would weaken its protective effect.

Until more detail is known of the process and the scale of development required in setting up such a project, its likely effects on the remaining SEA issues are unknown.

	ASSESSMENT CRITERIA										
14: Policy formulation and monitoring **The Council will take a lead in the matters raised by this strategy through its Sustainable Energy Sub-committee and the Community Planning Partnership and in liaison with the Orkney Renewable Energy Forum.** **The role of the Orkney Renewable Energy Forum in providing an active energy network will be supported and strengthened**	**Climatic factors**	**Local air quality**	**Biodiversity, flora & fauna**	**Water**	**Soil**	**Landscape**	**Cultural Heritage**	**Population**	**Human health**	**Material assets**	**Mitigation required?**
	+	+	+	+	+	+	+	+	+	+	**No**
Comment: The Strategy rightly highlights the importance of energy to the future of Orkney and its residents. It is important that Orkney Islands Council addresses the issues relevant to Sustainable Energy in all its policies and plans. It will however be important to ensure that the Council's policies are compatible and that no policy contradicts or compromises the objectives of another. **Effective monitoring of energy developments will also be vital in order to identify projects which are operating successfully and to make the necessary adjustment to any which are not.**											

Appendix D: Scoping Consultation Responses

Consultation Body	Ref. in Act	Scoping Report Ref.	Consultation Body Comment	Response	Action
SEA Gateway	Section 15 (a)		Note, in accordance with Section 15 (3) of the Environmental Assessment (Scotland) Act 2005, you are required to formally write to advise the Scottish Ministers of the period of consultation you intend to specify, both for the public and the Consultation Authorities.	Noted	
Historic Scotland			No comment received at this stage.		
SEPA		Relationship with other relevant Strategies, Plans and Programmes Relationship with existing Environmental Objectives	Most of the plans, programmes and strategies SEPA would usually expect to be covered are outlined in Table 1, however there are a few which SEPA considers should also be included as follows: • Scottish Planning Policy 7 and Planning Advice Note 69 – which make recommendations in relation to new development and climate change; • Modern Building Standards Regulations and the associated technical manuals now have significant energy efficiency requirements and are therefore relevant. It is recommended that you speak to your Building Standards colleagues for further details on this matter; and • The newly published Planning Advice Note 84 Reducing Carbon Emissions in New Development.	Noted	Due to its high level nature, *A Sustainable Energy Strategy for Orkney* will not address these topics this amount of detail. Orkney Islands Council is currently preparing guidance on Sustainable Construction which will draw on the content of these advice notes and Building Standards Regulations.
		Environmental Problems	SEPA considers that the problems which could impact on the water and soil environmental	Noted	Supplementary Guidance On-shore Wind Energy

Consultation Body	Ref. in Act	Scoping Report Ref.	Consultation Body Comment	Response	Action
			receptors are outlined well. SEPA agrees that there is potential for long and short term affects on the water environment from renewable energy facilities. Additionally SEPA agrees that the issue of peat disturbance is one which needs specific consideration.		Development
		Alternatives	SEPA notes that four high level targets are being considered as alternatives. SEPA considers this reasonable.	Noted	
		Scoping in/out of SEA issues	SEPA supports the proposal that only geology would be scoped out at this stage.	Noted	
		Method of Assessing Environmental Effects	SEPA is satisfied with the proposal to assess alternatives by way of the matrix provided in Table 5. The Responsible Authority is reminded that SEPA would wish to be provided with enough information in the table to understand how the assessment conclusions were reached.	Noted	A comments section is included in all assessments tables.
			Similar comments apply to the proposal to use the matrix in Table 6 to assess aspects of the preferred Strategy. For the avoidance of doubt SEPA would expect all aspects of the Strategy that could have environmental effects to be assessed, e.g. aims, objectives and policies.	Noted	Assessment has been carried out of the following aspects of the Strategy: • Its three aims • The eleven Strategic Issues. And • Cumulative effects of the eleven Strategic Issues
		Next steps	SEPA would wish the ER to make it clear how carrying out SEA has impacted upon the Strategy. One of the most important mitigation measures to consider in the report is the way in which the Strategy itself has been modified as a result on the environmental assessment process.	Noted	
			It would also be helpful if it was made clear, exactly for which aspects of the Strategy	Noted	Table 10, assessment of the Strategic Issues, includes a

Consultation Body	Ref. in Act	Scoping Report Ref.	Consultation Body Comment	Response	Action
			mitigation is required and who will be required to implement it. Without such an approach, it can be difficult to tease out the measures required and does not make any commitment that such measures are indeed put in place.		column where it is made clear whether mitigation will be required.
		Consultation period for the environmental report	SEPA is satisfied with the proposed 6 week consultation period.	Noted	
SNH		Scope of assessment and level of detail	Subject to the specific comments set out below SNH is content with the scope and level of detail proposed for the environmental report.	Comment welcomed	
			SNH would suggest that reduction in energy demand is included within the alternatives to be considered.	Reduction in energy demand will be included in the Strategy	Strategic Issue 9 addresses energy efficiency and micro renewables
		Consultation period for the environmental report	SNH notes that period proposed for consultation is June/July 2008 to August 2008 on the Environmental Report and is content with this proposed period.	Noted	