

STRATEGIC ENVIRONMENTAL ASSESSMENT OF THE DRAFT ORKNEY CORE PATHS PLAN

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. Landscape and visual amenity
7. Cultural heritage
8. Human health and residential amenity
9. Population
10. 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 the Draft Orkney Core Paths Plan.

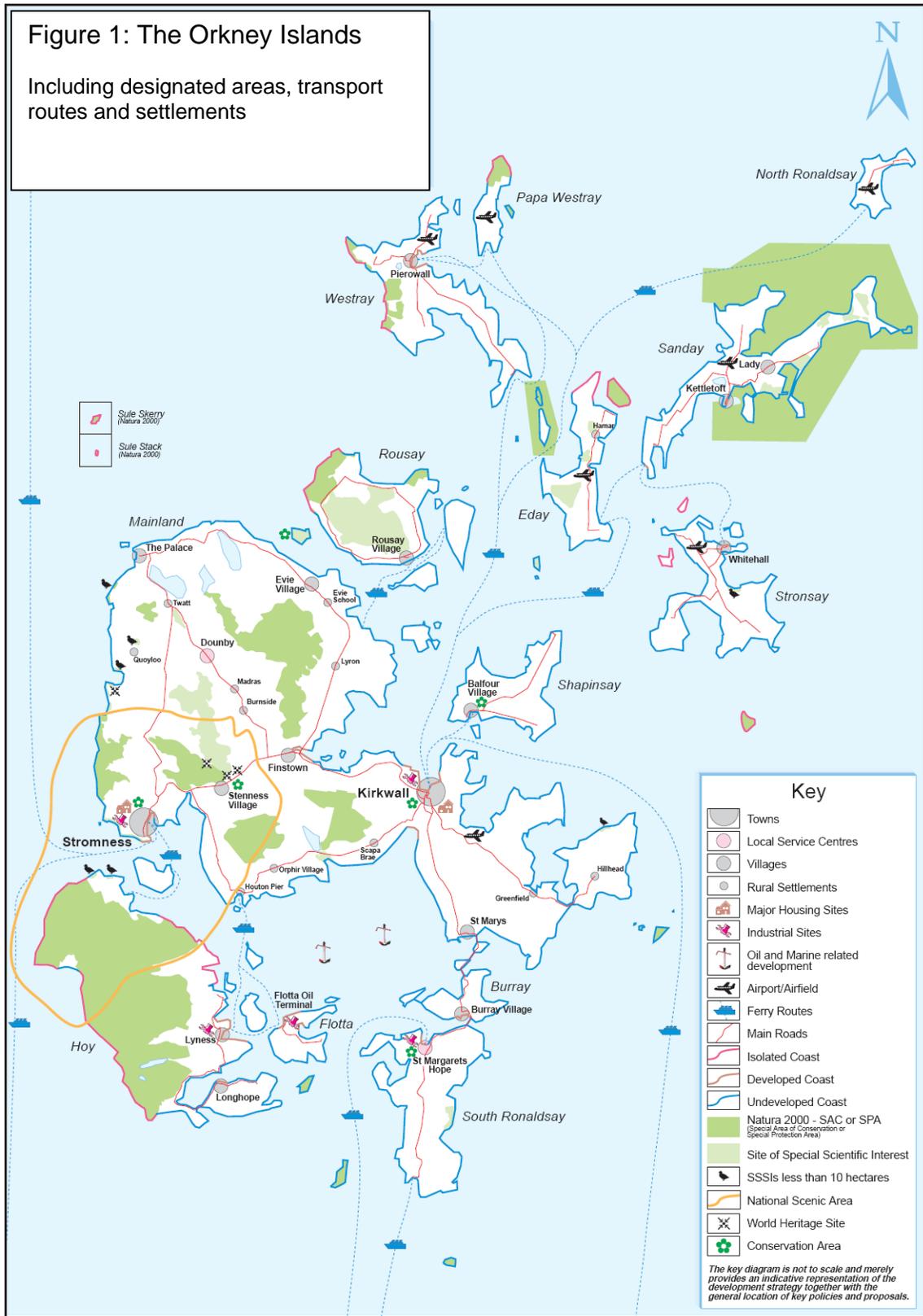
Baseline Overview

Number of islands:	70+
Number of inhabited islands:	17
Total (land) area of the Orkney Islands:	989.9 km ² ¹
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

¹ 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 reduce greenhouse gas emissions

It is widely accepted that the increasing levels of certain gases in the atmosphere are causing significant changes to global climates through their “greenhouse effect,” whereby they reduce the rate of radiative heat loss from the atmosphere, causing temperatures around the world to rise. 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)² 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 warming³ and the UK Government has a further, more ambitious, domestic goal to cut CO₂ 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 - 2004⁴

	Million tonnes (carbon equivalent)						% change (1990 – 2004)
	1990	1995	2000	2002	2003	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 emissions⁵	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 CO₂ emissions at local authority level is not available for the Orkney Islands. However the Scottish Executive publication *Key Scottish Environmental Statistics 2007* shows that in 2004, Scotland's net emissions of CO₂ 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

² SNIFFER, ‘A handbook of climate trends across Scotland’, 2006 www.sniffer.org.uk

³ Climate Change The UK Programme 2006

⁴ Key Scottish Environment Statistics 2007

⁵ Includes emissions which have not been allocated to Scotland, England, Wales or Northern Ireland

Table 1.2 Net emissions by source in Scotland taking account of emissions and removals (million tonnes of carbon equivalent)⁶

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.

2. Local air quality

SEA Objective:

- To maintain and improve air quality

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.⁷

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 Department⁸: 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 SO₂ 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 is monitored at three locations (Waulkmill, St Mary's and Herston) with sulphur dioxide and nitrogen dioxide monitored at six locations (the previous three plus Stromness, Kirkwall and Stronsay). Monitoring is carried out in all areas using passive diffusion tubes.

Benzene

The air quality objective for benzene in Scotland is:

- 3.25µg/m³ (5ppb) measured as a running annual mean, to be achieved by 31 December 2010.

⁶ Scottish Executive, Key Scottish Environmental Statistics, 2007

⁷ Scottish Pollutant Release Inventory (SEAP), www.sepa.org.uk

⁸ Local Air Quality Management Progress Reports, 2005 and 2006

During 2004-2005 the highest level of benzene recorded was 1.6 ppb and over the following year no significant changes to these levels were recorded. All levels recorded over a six month period were below the level of detection of the measuring instrument ($0.1\mu\text{g}/\text{m}^3$).

It is therefore concluded that benzene levels within Orkney are not likely to exceed the air quality objective.

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

- $50\mu\text{g}/\text{m}^3$ when expressed as a 24hr hourly mean: not to be exceeded more than 7 times a year by 31 December 2010.

Sulphur dioxide

The air quality objectives for SO_2 are:

- $266\mu\text{g}/\text{m}^3$ (100ppb), not to be exceeded more than 35 times per year, measured as a 15-minute mean, to be achieved by December 2005.
- $350\mu\text{g}/\text{m}^3$ (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.
- $125\mu\text{g}/\text{m}^3$ (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.

Results of SO_2 monitoring carried out during the period between 2004 and 2006 indicated that levels in the county were very low, with the majority of readings being below the detection limits of the instrument (0.2 ppb or $0.5\mu\text{g}/\text{m}^3$). Diffusion tubes are not recommended for monitoring SO_2 on the grounds that they measure concentrations over a long averaging period, and the results cannot easily be compared with the shorter-term objectives. Therefore, to ensure compliance with the short-term limits (15 minutes, 1 hour, 24 hour), a study was carried out by SEPA Field Chemistry to measure SO_2 in ambient air at a further two sites: close to the SEPA authorised animal incinerator at Chinglebraes and within the Clay Loan area in Kirkwall (an area where approximately 150 houses have solid-fuel fires). Over two separate periods between October 2004 and April 2005, SO_2 levels were measured, averaged and stored as 15-minute averages. The results of this monitoring programme confirmed the very low readings taken from the diffusion tubes and it was concluded that SO_2 levels within Orkney are not likely to exceed the air quality objectives presented within the Air Quality Strategy, 2003.

Levels of SO_2 recorded at all of the six monitoring locations during 2005/2006 were well below the air quality objective levels with all, apart from three, monthly measurements being below the limits of detection. Of the three readings above the LOD the highest was $3.99\mu\text{g}/\text{m}^3$ and was recorded in Stromsay. The annual mean was not calculated for this pollutant as readings were so low that most would have to be omitted from the calculation.

Nitrogen dioxide

The air quality objective for NO_2 is:

- $200\mu\text{g}/\text{m}^3$ (105ppb), as a 1-hour mean, not to be exceeded more than 18 times per year, to be achieved by 31 December 2005.
- $40\mu\text{g}/\text{m}^3$ (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 .

Maximum values during 2004-2005 were $21\mu\text{g}/\text{m}^3$ in Kirkwall and $15\mu\text{g}/\text{m}^3$ in Stromness, both recorded during October 2004.

In 2005-2006 maximum values were $38\mu\text{g}/\text{m}^3$ at Kirkwall and $13\mu\text{g}/\text{m}^3$ at Stromness, both recorded during July 2005.

It has not been possible to calculate annual means for either year due to incomplete data sets, but the highest measured six-month mean for Kirkwall is $16.2\mu\text{g}/\text{m}^3$ and at the four rural sites NO_2 levels were below the detection limits of the instrument and were therefore recorded as being less than $0.2\mu\text{g}/\text{m}^3$. Orkney Islands Council subsequently produced a Local Air Quality Assessment and Screening Report stating that *'the likelihood of the Air Quality Objective for nitrogen dioxide being exceeded in Orkney is negligible*. Due to the low levels of other pollutants from exhaust emissions it is not 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. Data for 2006-2007 are not available as monitoring recommenced in August 2007 following an 18-month gap. However, values recorded are very similar to those of 2005 - 2006 and any change is negligible.

3. Biodiversity

SEA Objectives

- To conserve and enhance natural habitats and species and avoid adverse effects on Natura sites
- To conserve and enhance the integrity of ecosystems

Designated Areas

The Orkney Islands are particularly valued for their wildlife and a range of sites 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;

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

Sites of Local Nature Conservation Importance

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. A full list of these sites is included in Appendix B1.

A full list of all 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.⁹

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.

The European Protected Species, 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.¹⁰

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 '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 are covered by the range of 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. This includes species and habitats in freshwater and marine environments.

A total of 83 different species (or species types) and 21 distinct habitats have been identified as being of importance in the Orkney Islands. Lists of these are included in **Appendix B.2 Lists of Priority Species and Habitats**.

⁹ SNH website: www.snh.gov.uk

¹⁰ SNH website: www.snh.gov.uk

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.

RSPB Reserves

The Royal Society for the Protection of Birds (RSPB) manages over 8000 hectares in Orkney¹¹, 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.

4. Water

SEA Objective:

- To protect water bodies and water quality

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.

¹¹ RSPB website: www.rspb.org.uk

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

	Water sampled (km)	Classification (% of 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 shown in Table 4.4. The individual lengths in km of coastal waters sampled are:

Westray	Unclassified	74.4
Sanday	Unclassified	107.3
Eday	Unclassified	39.8
Rousay	Unclassified	35.6
Stronsay	Unclassified	61.5
Shapinsay	Unclassified	38.8
Mainland	Unclassified	231.1
Hoy/Walls	Unclassified	87.3
Flotta	Unclassified	18.9

Burray/S. Ronaldsay	Unclassified	81.3
Total network length in km		790.5

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.

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.

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.¹² Records dating from 1961 indicate that, similar to other regions of Scotland, 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)¹³ 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 maintain soil quality and integrity

General information on the soil types of Orkney is available from Scottish Natural Heritage Review No 100, Orkney Character Assessment.¹⁴ 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 Institute¹⁵.

¹² SNIFFER, 'A handbook of climate trends across Scotland', 2006 www.sniffer.org.uk

¹³ Indicative River and Coastal Flood Map (Scotland), SEPA, 2005. www.sepa.org.uk/flooding/mapping/

¹⁴ Scottish Natural Heritage Review No 100, Orkney Landscape Character Assessment. Land Use Consultants, Glasgow (1998)

¹⁵ Soil and Land Capability for Agriculture Maps (Orkney and Shetland) mapsales@macaulay.ac.uk

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 Programme¹⁶ 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 Stewardship scheme and SNH's Natural Care scheme may further change the farming landscape of Orkney. Figures for agricultural land use in Orkney, released annually by The Scottish Executive Environment and Rural Affairs Department (SEERAD) 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.¹⁷

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

¹⁶ Changing Our Ways, Scotland's Climate Change Programme Scottish Executive (2006)

¹⁷ Scottish Agricultural Census 2001 - 2006

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 and visual amenity

SEA Objective:

- To conserve & enhance distinctive landscape character, visual amenity and scenic value of the area

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 landscape¹⁸ 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. For that reason, descriptions of ‘Island Character Areas’ have been included for the main inhabited islands. 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	Whaleback Island landscapes
Ridgeline Island Landscapes	Low Island Pastures
Undulating Island Pastures	Coastal Plain
Coastal Basins	Inclined Coastal Pastures

¹⁸ Scottish Natural Heritage Review No 100, Orkney Landscape Character Assessment. Land Use Consultants, Glasgow (1998)

Coastal Granite Pastures	Isolated Coastal Knolls
Enclosed Bay Landscapes	Coastal Hills and Heath
Cliff Landscapes	Coastal Sand Landscapes
Peatland Basins	Loch Basins
Low Moorland	Plateau Heaths and Pasture
Rolling Hill Fringe	Moorland Hills
Glaciated Valley	Rugged Glaciated Hills
Urban and Rural Development	

The Environment Report for the SEA of the draft Core Paths Plan identified the following landscape changes in Orkney over the last 50 years¹⁹:

- 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;
- 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.

Gardens and Designed Landscapes

The Inventory of Gardens and Designed Landscape²⁰ 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 Skail House in Sandwick.

7. Cultural heritage

SEA Objectives:

- To conserve & where appropriate enhance or restore the historic environment
- Provide opportunities for people to enjoy and appreciate the historic environment

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, townscape, historic landscapes, wrecks and other submerged

²⁰ www.historic-scotland.gov.uk/index/gardens.htm

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. Of these, 37 are in the care of the Scottish Ministers. Details of all 365 SAMs can be obtained from PASTMAP²¹, Historic Scotland’s free online service to display and search data on Scotland’s historic environment. A further 2,000 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, adjacent standing stones 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. 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.

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.²² 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.

8. Human health

SEA Objective:

- To protect and enhance human health

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 – 2005²³

Gender	PERIOD			
	2000-2002	2001-2003	2002-2004	2003-2005
Males	75.4	75.9	76.5	76.3

²¹ PASTMAP, www.historic-scotland.gov.uk/index/ancientmonuments/searchmonuments.htm

²² The Orkney Islands Council Structure Plan 2001

²³ Scottish Executive National Census 2001

Females	81.7	81.0	80.5	81.4
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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)

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 Scotland²⁴

	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

Apart from any short-term disruption due to the initial construction phase of onshore wind energy projects and resulting increased traffic levels, there is also potential for the presence and operation of wind turbines to impact upon human health and residential amenity. This may be as a result of shadow flicker, low frequency noise or

9. Material assets

²⁴ Scottish Executive National Census 2001

SEA Objective:

- To reduce waste and pollution
- To promote sustainable use of natural resources and material assets

The development of access projects could affect public amenity land and agricultural land.

In addition, materials such as aggregate and sand could be required for path construction 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 at 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 is also included below.

Table 5: 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 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 Islands Council Department of Environmental Health

DATA	SOURCE
Orkney	
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
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 Structure Plan 2001
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
Source of aggregates used in Orkney	Orkney Islands Council Roads Department