

# Dundee Coastal Study
# Stage 2

## Environmental Report

May 2011
Dundee City Council

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Mott MacDonald

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# Stage 2

## Environmental Report

May 2011

Dundee City Council

Dundee City Council
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**SEA ENVIRONMENTAL REPORT – COVER NOTE**
**PART 1**

**To:** SEA.gateway@scotland.gsi.gov.uk

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Scottish Government
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**PART 2**

**An Environmental Report is attached for Dundee Coastal Study Stage 2:**

Dundee Coastal Study Stage 2

**The Responsible Authority is:**

Dundee City Council

**PART 3**

| | |
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**PART 4**

| | |
|---|---|
| **Signature:** | |
| **Date:** | |

# 1. Non Technical Summary

## 1.1 Background

As part of the preparation of Dundee Coastal Study Stage 2, Dundee City Council (DCC) is carrying out a Strategic Environmental Assessment (SEA). This plan, programme or strategy (PPS) falls under Section 5(3) of the Act and requires an SEA under the Environmental Assessment (Scotland) Act 2005.

SEA is a systematic method for considering the likely environmental effects of certain PPS. SEA aims to:

- integrate environmental factors into the PPS preparation and decision-making;
- improve PPS 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 PPS 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 PPS and its environmental effects, and consulting on that report;

- **Adoption** providing information on: the adopted PPS, how consultation comments have been taken into account, and methods for monitoring the significant environmental effects of the implementation of the PPS; and

- **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 Dundee Coastal Study Stage 2;
- identify, describe and evaluate the likely significant effects of the PPS and its reasonable alternatives;
- provide an early and effective opportunity for the Consultation Authorities and the public to offer views on any aspect of this Environmental Report.

The following paragraphs provide the non-technical summary to each of the full chapters of the SEA Environmental Report.

## 1.2 Introduction

The Dundee Coastal Study Stage 2 plan seeks to identify local flood alleviation and coastal erosion defence schemes along Dundee's 16.9 km of coastal frontage. The Strategic Environmental Assessment (SEA) activities to date in relation to Dundee Coastal Study stage 2 includes identification of objectives and potential environmental impacts of the PPS, the scoping, consultation period establishment and the relationship with other PPS and environmental objectives. Environmental problems have been identified and the environmental baseline and assessment methods have been established in this report.

The following nine options for coastal management and their potential impact for the coastline as a whole have been identified:

1. Do nothing
2. Do minimum / maintain / fill in gaps in flood wall
3. Erosion protection
4. Wave wall / flood wall
5. Earth bund / land raising
6. Temporary demountable flood barriers / mechanical street barriers
7. Recharge
8. Sediment retention structures
9. Manage Dunes

## 1.3 Dundee Coastal Study and context

The study should seek to enhance public safety, health and security. It should also prevent residential areas, infrastructure, transport links and industry from flooding and erosion. Where possible, it should also seek to maintain biodiversity, protect habitats and species, and maintain recreational facilities, landscape character and local distinctiveness.

The study area of Dundee Coastal Study Stage 2 has been divided into nine management sections:

1. Landfill Site;
2. Dundee's Airport;
3. The Riverside Drive;
4. The City Centre and The Port Of Dundee;
5. Industrial Area;
6. The Coastal Walkway;
7. The Yacht Club;
8. Broughty Ferry; and
9. Beach and Dunes.

A review of environmental designations for Natura 2000 sites, natural heritage and landscape features has been undertaken for each of these sections to establish the environmental baseline. International, national, regional and local legislation, plans, programmes, policies and strategies that may affect or be affected by the study were also considered.

Key issues and implications of existing environmental problems that affect or may be affected by the Dundee Coastal Study Stage 2 have been studied. Environmental problems have been identified for each of the SEA topics. It should be noted that the Air was scoped out in the previous SEA stage. The key implications on existing environmental problems were identified as:

- **Biodiversity, Flora and Fauna:** It would be preferential for the works to be programmed outside the birds breeding season or the winter months when species are present, in order to prevent impacts in fauna and biodiversity. If essential work is carried out during the winter months, advice would be sought from SNH.

- **Soils / Geomorphology and Hydrodynamics:** It is highly unlikely that the current proposed options for Broughty Ferry esplanade will have any impact on the movement of coastal sediments. If the potential option to reclaim land in order to accommodate and earth bund is deemed to be the only viable option, further consultation will be required to ensure that the detailed design does not have a negative impact.

- **Water status:** It is not envisaged that any of the identified options would have a significant negative impact on the water status for the Upper and Lower Tay Estuary. During the construction phase it must be ensured that the water status is maintained as Good.

- **Population and Human Health / Recreation:** Medium and long-term implications of climate change must be considered.

- **Material Assets / Socio-economic Impact:** Medium and long-term implications of climate change must be considered.

- **Cultural Heritage:** The options being considered for the Scheduled Monument include a flood wall, temporary demountable flood barriers or mechanical street barriers. These would be installed on existing hard sea walls and therefore the impact would be minimal.

- **Climatic Factors:** Medium and long-term implication of climate change must be considered in order to maximise climate change adaptation aims.

- **Landscape:** The do nothing/ minimum options will have a minimal impact on the landscape in the short term, but these are likely to increase over time. All of the other main options that are likely to have a significant impact on the landscape

If the Dundee Coastal Study Stage 2 were not developed, there would be a threat to assets within the coastal region and which would potentially result in negative effects on other key policies and plans affecting Dundee's coastline. This could also result in the disuse of the coastal frontage region due to risk of flooding and the possible exposure of contaminated land through coastal erosion.

The likely evolution of the environment without Dundee Coastal Study Stage 2 for each of the management sections was identified as:

- **Landfill Site:** Without erosion protection there is a risk of overall reduction in site area and high potential for contaminants to be exposed and have a negative affect on environment and human health.

- **Airport:** Without any intervention**,** the current defences would gradually be eroded away and increase the vulnerability of flooding. This would consequently increase the likelihood of contaminants being washed further inland and into water bodies.

- **Riverside Drive:** Without any intervention, the existing flood defence wall would deteriorate. Climate change and storm events are likely to increase the risk of flooding in the Riverside Drive area.
- **City Centre and Port of Dundee:** This management section is currently subject to undergo major redevelopment which is unrelated to this project, which will significantly change this area.
- **Industrial Area:** There are relatively high flood defences existing around this area so the evolution of this management section is likely to remain very similar to its current state with no significant changes.
- **Coastal Walk:** The coastal walk area has recently been upgraded and offers good protection against flooding and it is likely to remain in its current state with no significant changes.
- **Yacht Club:** Without protection, there is a risk of increased flooding, which would decrease the area of land and slightly increase the water body area of the River Tay.
- **Broughty Ferry:** Is likely to experience flooding as sea levels rise and the frequency of storm events increases. Over time this would have an impact on health and the local population.
- **Beach and Dunes:** Without the Dundee Coastal Study, there would be a deterioration of the Dune system and reduction in overall area of dune coverage and a decrease the extent of this habitat.

## 1.4 Assessment of environmental effects and measures envisaged for the prevention, reduction and offsetting of significant adverse effects

An assessment of each possible defence type for implementation in Dundee Coastal Study Stage was measured against its ability to meet the SEA Criteria. This includes identification of potential impacts on European designated sites such as SACs and SPAs in SEA. Where a significant environmental effect is found, the potential for mitigation will be considered and whenever possible implemented. The PPS and its alternatives were assessed for each management section. The options 'Do nothing', 'Do minimum/ maintain/ fill gaps in flood wall', 'Erosion Protection' and 'Wave wall/ flood wall' have the potential to have a negative environmental impact, mainly due to increased instances of flooding affecting the local community and economy and the increase in erosion given rise to exposure of contaminants. The options 'Earth bund/ land raising', 'Temporary demountable flood barriers/ mechanical street barriers', Recharge', Erosion Protection', 'Sediment retention structures' and 'Manage Dunes' would potentially have a slight positive environmental impact by preventing flooding and reducing the potential for erosion. Managing dunes would have a more significant positive environmental impact as this will increase and stabilise this ecosystem.

## 1.5 Monitoring

No monitoring has been proposed at this stage as options are still being assessed. Monitoring requirements will be identified when a preferred option is identified for each management section.

## 1.6 Next Steps

Future milestones in the development of the PPS and its SEA have been identified.

# 2. Introduction

## 2.1 Environmental Report key facts

The key facts relating to Dundee Coastal Study Stage 2 are set out in Table 1.

Table 1. Key facts relating to Dundee Coastal Study Stage 2

| | |
|---|---|
| **Responsible Authority** | Dundee City Council (DCC) |
| **Title of Plan** | Dundee Coastal Study Stage 2 |
| **What prompted the Plan** | DCC is responsible for 16.9km of coastal frontage and seeks to exercise its discretionary powers to implement a flood alleviation scheme for non-agricultural land under the Flood Risk Management (Scotland) Act 2009. The Study will also address erosion of Dundee's coastal frontage. |
| **Plan Subject** | Coastal flood alleviation and defence against coastal erosion. |
| **Period covered by the Plan** | 100 years |
| **Frequency of update** | Approximately every 5 years following adoption |
| **Area covered by the Plan** | The study area of Dundee Coastal Study Stage 2 covers the 16.9km of coastal frontage within the jurisdiction of DCC, extending from Invergowrie Bay in the west to Dighty Burn in the east. The study area extends inland to areas at risk from flooding during a 0.5% Annual Exceedance Probability (AEP) flood event (occurring on average once every 200 years) and areas at risk of coastal erosion over the next 100 years. |
| **Plan purpose** | The purpose of Dundee Coastal Study Stage 2 is to identify a framework within which local flood alleviation and coastal erosion defence schemes are developed at different locations along Dundee's coastal frontage. |
| **Contact Point** | Gopal Narayanan<br>Senior Engineer<br>Dundee City Council - City Engineer's Division<br>Tayside House<br>Floor 14<br>28 Crichton Street<br>DD1 3RB<br>01382 433 642<br>Gopal.Narayanan@dundeecity.gov.uk |

## 2.2 SEA Activities to date

Table 2 summarises the SEA activities to date in relation to Dundee Coastal Study Stage 2 Table 2:

Table 2. SEA activities to date

| SEA Action/Activity | When carried out | Notes |
|---|---|---|
| Screening to determine whether the PPS is likely to have significant environmental effects | **October 2009** | *Completed* |
| Scoping the consultation periods and the level of detail to be included in the Environmental Report | **October 2010 – November 2010** | *Completed* |
| Outline and objectives of the PPS | **February 2011** | *Completed* |
| Relationship with other PPS and environmental objectives | **February 2011** | *Completed* |
| Environmental baseline established | **February 2011** | *Completed* |
| Environmental problems identified | **February 2011** | *Completed* |
| Assessment of future of area without the PPS | **February 2011** | *Completed* |
| Alternatives considered | **February 2011** | *Completed* |
| Environmental assessment methods established | **February 2011** | *Completed* |
| Selection of PPS alternatives to be included in the environmental assessment | **February 2011** | *Completed* |
| Identification of environmental problems that may persist after implementation and measures envisaged to prevent, reduce and offset any significant adverse effects | **February 2011** | *Completed* |
| Monitoring methods proposed | **February 2011** | *Completed* |
| Consultation timescales<br>Timescale for Consultation Authorities<br>Timescale for public | **April 2011 – June 2011** | |
| Notification/publicity action | **To be confirmed** | |

# 3. Dundee Coastal Study and context

## 3.1 Outline and objectives of Dundee Coastal Study

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 PPS.

Dundee City Council (DCC) is responsible for 16.5 kilometres of coastal frontage and has discretionary powers to build flood defences for non-agricultural land under the **Flood Prevention (Scotland) Act 1961**.

Dundee City Council has commissioned the Dundee Coastal Study to produce preferred outline management solutions for different frontage sections, to submit to the Dundee City Council City Development Committee and also obtain approval from the Scottish Government for progression of the schemes. As part of the process to preferred outline management solutions have been identified, a short list of potential options was developed from a mutually agreed long-list through a Multi Criteria Analysis (MCA) Workshop.

Figure 3.1 – Dundee City Coastal Frontage

See Appendix A for maps showing the component areas of the Dundee Coastal Study Ares and Appendix B for maps showing the Dundee Coastal Study Stage 2 area and environmental constraints.

Dundee is Scotland's 4th largest city, with an estimated population of 142,4701. Dundee's City Centre is located on the north coast of the mouth of the Tay estuary and has major residential, commercial and historical assets along the city coastline. The adjacent Tayside coastal region includes extensive intertidal areas of major ecological importance.

Environmental issues relevant to Dundee Coastal Study Stage 2 include the threat of global warming with predicted associated sea-level rise and increased risk of flooding and coastal erosion affecting developed areas. The current standard of flood risk management within the study area is not sufficient to protect assets along the coastline from flooding resulting from sea level rises predicted for the next 200 years.

Dundee Coastal Study Stage 2 will provide a framework for future adoption of localised coastal flood and erosion prevention schemes. Such schemes may be required to provide a consistent level of flood and erosion protection to assets along the Dundee City coastal frontage.

[1] General Register Office for Scotland (GROS) 2008 Mid-Year Population Estimate

**Option Development**

The development of the Dundee Coastal Study included an Options Workshop which was held in December 2009 at Dundee Council offices, where options for the type of coastal defences were considered.

The Dundee Coastal Study Stage 2 Programme is being developed through a series of consultation and optioneering exercises. Work to date on development of the Programme includes a Multi Criteria Analysis Workshop (MCA workshop) (held on 8 December 2009).

The MCA workshop refined the list of 25 options to a short list of 12 options which has been further refined to 9 options, listed below (Table 3.1). This Strategic Environmental Assessment covers each of the short listed 9 types of coastal defence will be measured against its ability to meet the SEA Criteria, any issues relating to specific sections of coastline or significant environmental problems will be identified.

Table 3.1 Management Sections for Dundee's Coastal Frontage

| Original Screening/ Scoping List of Options | Environmental Report options for assessment |
|---|---|
| **1. Do nothing** | 1. Do Nothing |
| **2. Do minimum / maintain / tidy** | 2. Do Minimum/ maintain/ fill gaps |
| 3. Improve (fill in gaps etc) | |
| 4. Replace / reconstruct wall | |
| **5. Rock armour revetment** | 3. Erosion Protection |
| **6. Reno mattresses** | |
| **7. Concrete mattresses** | |
| **8. Open stone asphalt** | |
| 9. Structural wall (concrete, gabion basket, etc) | |
| **10. Wave wall** | 4. Wave wall/flood wall |
| **11. Earth bund with erosion protection** | 5. Earth bund/ land raising |
| 12. Secondary earth bund set back from the frontage | |
| 13. Secondary flood defence around buildings | |
| 14. Flood protection for individual buildings | |
| **15. Land raising** | |
| 16. Coastal protection structure | |
| **17. Temporary demountable flood barriers** | 6. Temporary demountable flood barriers/ mechanical street barriers |
| **18. Mechanical street barriers** | |
| **19. Edge structures** | |
| **20. Beach recharge** | 7. Recharge |
| **21. Shingle recharge** | |
| 22. Beach management | |
| **23. Sediment retention structures and recharge** | 8. Sediment retention structures |
| **24. Manage Dunes** | 9. Manage Dunes |
| 25. Offshore breakwaters | |

These 9 options for coastal management will be assessed against the potential impact for the coastline as a whole; however key areas with potential for impact will be identified in the comments section. Some of these schemes could have limited negative impact on environmental features of European importance, if suitable mitigation measures are not implemented.

The SEA process seeks to ensure that a robust framework for sustainable flood and erosion risk management is adopted at an early stage of the development process. The Dundee Coastal Study Stage 2 Programme will be designed to incorporate the findings of the Strategic Environmental Assessment in development of the Programme.

Once the formal consultation phase of the SEA is completed and provided there are no outstanding objections, Dundee Coastal Study Stage 2 will be adopted by the Council. The plan will be published and available on the Dundee City Council website as well as in libraries across the City. The plan will then be updated alongside the Dundee Local Plan, approximately every 5 years.

Based on criteria including existing defences, assets, environments and compartmentalised flood cells, the study area of Dundee Coastal Study Stage 2 has been divided into nine management sections.

The management sections are described below in Table 3.2.

Table 3.2 Management Sections for Dundee's Coastal Frontage

| Section | Length | Area | Existing Defence | Issue |
|---|---|---|---|---|
| 1 | 1,050m | Landfill site | Shallow gradient vegetated embankment with light rock armour and rubble protection | Erosion |
| 2 | 1,565m | Airport | Steep armoured embankment with rock armour, rubble, concrete block, and brickwork protection | Flooding & Erosion |
| 3 | 3,185m | Riverside Drive | Sloped open faced masonry revetment with wave wall | Flooding |
| 4 | 3,585m | City Centre and Port of Dundee | Vertical pointed masonry wall | Flooding |
| 5 | 720m | Industrial Area | Sloping rock filled gabion baskets, concrete and rock rubble embankment | Flooding & Erosion |
| 6 | 1,470m | Coastal Walkway | Concrete walkway backed by a masonry retaining wall | Flooding & Erosion |
| 7 | 460m | Yacht Club | Shallow sloping shingle and grassed bank | Flooding & Erosion |
| 8 | 2,290m | Broughty Ferry | Sloping masonry block/concrete revetment above shingle beach | Flooding |
| 9 | 2,570m | Beach and Dunes | Dunes, sandy beaches with groynes and rubble/boulder upper banks | Flooding & Erosion |

## 3.2 Relationship with other PPS and environmental objectives

The key applicable legislation, plans, programmes, policies and strategies at an international, national, regional and local level are listed in the table below. Their details and the way they affect or are affected by Dundee Coastal Study Stage 2 are listed in Table 3.3.

From analysis of the relevant plans, programmes and environmental protection objectives, the key points arising from this analysis are that the Dundee Coastal Study Stage 2 should, as a minimum;

- Protect, and where possible enhance, public safety, health and security;
- Prevent industry from flooding and erosion;
- Prevent residential areas from flooding and erosion;
- Prevent or reduce flooding and erosion of infrastructure and transport links to an acceptable level;
- Maintain safe navigation, access to sea and moorings for commercial, recreational and safety purposes.

In addition, in the context of constraints associated with the execution of local authority schemes where possible DCC will seek to maintain biodiversity, protect habitats and species, maintain recreational facilities, protect land designated for future development and maintain landscape character and local distinctiveness.

Table 3.3 Relationship with other PPS

| Name of PPS/ Environmental Objective | Title of legislation and main requirements of PPS / Environmental Protection Objective | How affects or is affected by Dundee Coastal Study Stage 2 in terms of SEA issues* at Schedule 3 of the Environmental Assessment (Scotland) Act 2005 |
|---|---|---|
| **International** | | |
| **Strategic Environmental Assessment Directive** | Requires screening to determine whether the plans/programmes are likely to have significant environmental effects. | Potential significant environmental effects of the Dundee Coastal Study Stage 2 should be identified and any significant effects should be addressed through the identification of reasonable alternatives. |
| **The Rio Convention on Biological Diversity, June 1992** | There are 3 main objectives:<br>The conservation of biological diversity;<br>The sustainable use of the components of biological diversity; and the fair and equitable sharing of the benefits arsing out of the utilisation of genetic resources. | Dundee Coastal Study Stage 2 should seek to conserve biological diversity and ensure the sustainable use of the components of biological diversity. |
| **The Ramsar Convention on Wetlands of International Importance** | Requires member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use" or sustainable use of wetlands. | Dundee Coastal Study Stage 2 should seek to maintain the ecological character of the wetlands the plan should also seek to ensure wise use or sustainable use of the wetlands in identifying flood mitigation options. |
| **The Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention)** | Ensure plan aims are sensitive to the requirement to conserve terrestrial, marine and avian migratory species throughout their range. | Dundee Coastal Study Stage 2 should not hinder terrestrial, marine or avian migration. |
| **European Union** | | |
| **The Council of Europe Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention)** | Ensure conservation and protection of wild plant and animal species and their natural habitats<br>Regulate the exploitation of protected species | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should not result in any adverse impact on naturally occurring wild plant and animal species or their habitats |
| **Directive on the Conservation of Wild Birds (Directive EEC/79/409)** | Provide for the protection, management and control of all species of naturally occurring wild | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should not hinder protection, |

| | | |
|---|---|---|
| | birds<br>Seeks to preserve habitats for naturally occurring, rare and migratory species | management and control of species of naturally occurring wild birds |
| **Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Directive EEC 92/43/EEC)** | Ensure biodiversity through the conservation of natural habitats and of wild fauna and flora<br>Maintain or restore natural habitats<br>Take into account economic, social and cultural requirements and regional and local characteristics | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should maintain and restore natural habitats to reflect European biodiversity targets |
| **European Biodiversity Framework** | Promotes the conservation and sustainable use of biological diversity<br><br>Emphasises education, training and awareness, research, identification, monitoring and exchange of information | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should support conservation and sustainable use of biological diversity |
| **European Community (EC) Water Framework Directive (Directive 2000/60/EC)** | Safeguard the sustainable use of surface water, transitional waters, coastal waters and groundwater<br>Supports the status of aquatic ecosystems and environments.<br><br>Addresses groundwater pollution, flooding and droughts including river basin management planning. | **Water**<br>The primary purpose of Dundee Coastal Study Stage 2 is to mitigate the effects of flooding. Water quality and water body classifications should be maintained, or where possible enhanced, as part of the Study. |
| **Directive 2007/60/EC on the assessment and management of flood risks** | Requires Member States to assess if all water courses and coast lines are at risk from flooding and to take adequate and coordinated measures to reduce any flood risk identified.<br><br>The Directive should be carried out in coordination with the Water Framework Directive, through coordination of flood risk management plans and river basin management plans. | **Water**<br>The primary purpose of Dundee Coastal Study Stage 2 is to mitigate the effects of flooding. The programme for prevention of coastal flooding should be formulated in coordination with objectives of the Water Framework Directive (river basin management plans) and any existing flood risk plans or strategies for the Dundee area. |
| **National Government** | | |
| **The Environmental Assessment** | Makes provision for the assessment of the | **All Issues** |

| | | |
|---|---|---|
| **(Scotland) Act 2005** | environmental effects of certain plans and programmes | Dundee Coastal Study Stage 2 must be subject to the level of environmental assessment required by European law. This is addressed through completion of the SEA. |
| **The Flood Prevention (Scotland) Act 1961** | Enables local authorities in Scotland to take measures for the prevention or mitigation of flooding of non-agricultural land in their areas | **Water**<br>Dundee City Council intends to exercise its powers under the Act for the purpose of preventing or mitigating the flooding of land in their area, not being agricultural land. |
| **Flood Risk Management (Scotland) Act 2009** | Makes provision for the assessment and sustainable management of flood risks<br>Makes provision for local authorities and SEPA's functions in relation to flood risk management | **Water**<br>Dundee Coastal Study Stage 2 is informed by flood risk assessments, which should be completed to comply with any requirements of the Act. |
| **The Flood Prevention and Land Drainage (Scotland) Act 1997** | Amends the Flood Prevention (Scotland) Act 1961 in relation to flood prevention measures to be taken by local authorities | **Water**<br>Objectives of the Act should be reflected in Dundee Coastal Study Stage 2. |
| **SEPA Interim Position Statement on Planning and Flooding (2009)** | Presents an interim statement of SEPA's role and policy position on flooding relative to land use planning | **Water**<br>SEPA guidance and requirements for management of flood risk should be incorporated in Dundee Coastal Study Stage 2. |
| **Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR)** | Provides a framework within which SEPA may regulate all activities which may affect Scotland's water environment<br>Includes regulation of discharges, disposal to land, abstractions, impoundments and engineering works. | **Water**<br>CAR Regulation requirements should be incorporated in Dundee Coastal Study Stage 2. |
| **Environmental Protection Act 1990: Part IIA Contaminated Land (amended 2006)** | Provides for a contaminated land regime, which places a duty on local authorities to identify and secure the remediation of contaminated land in their respective areas. | **Human Health, Soil**<br>Due to the presence of contaminated land within the Study area, Dundee Coastal Study Stage 2 will need to be developed in accordance with the procedures and requirements adopted in the EPA. |
| **Food & Environment Protection Act 1985 – Part II Deposits in the sea** | Makes provision for the control of the deposit of substances and articles under the sea-bed | **Water**<br>Works below Mean High Water Springs (MHWS) will require FEPA licensing. |
| **Coast Protection Act 1949** | Provides for coast protection against erosion and encroachment by the sea | **Water**<br>Works below MHWS will require CPA licensing. |

| | | |
|---|---|---|
| | Delegates power to local authorities to carry out coastal protection work as necessary in their area | |
| **Scottish Executive: Marine Strategy for Scotland's Coast and Marine Environment (2005)** | Provides a strategy for the long-term sustainability of Scotland's coasts and seas<br>Founded on five guiding principles of sustainability, seeks to secure clean, healthy, safe, productive and biologically diverse marine and coastal environments, managed to meet the long term needs of nature and people. | **Water**<br>The objectives of the Marine Strategy should be incorporated in Dundee Coastal Study Stage 2. |
| **UK Biodiversity Action Plan (1994)** | Seeks to conserve and enhance biological diversity within the UK and to contribute to the conservation of global biodiversity | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should promote biodiversity. |
| **Wildlife and Countryside Act 1981 (as amended)** | Gives protection to listed species from disturbance, injury, intentional destruction or sale. | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should protect wildlife from disturbance, injury and intentional destruction. |
| **Nature Conservation (Scotland) Act 2004** | Sets out a series of measures designed to conserve biodiversity and to protect and enhance the biological and geological natural heritage of Scotland.<br>Places a general duty on all public bodies to further the conservation of biodiversity | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should promote biodiversity. |
| **The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)** | Provide for the designation and protection of European sites, of European Protected Species and the adaptation of planning and other controls for the protection of European sites. | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should ensure the protection of sites and species designated under EU legislation. |
| **The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007**<br><br>The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007. contd……. | Expands the scope of the existing regulations to include<br>Part 1 of the Water Environment and Water Services (Scotland) Act 2003, the Water Environment (Controlled Activities) (Scotland) Regulations 2005 and National Park authorities<br>It tightens the regulations regarding<br>Surveillance of conservation status of habitats and species<br>Protection of certain wild animals<br>Protection of certain wild plants | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should tighten the protection of habitats and species.. |

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| | Monitoring incidental capture and killing<br>Offence of breaching licence condition<br>Abstraction and works authorised under water legislation | |
| **Ancient Monuments and Archaeological Areas Act 1979** | Makes provision for the investigation, preservation and recording of operations or activities affecting archaeological or historical interest<br>Makes provision for the regulation of operations or activities affecting archaeological or historical interests | **Cultural Heritage**<br>Dundee Coastal Study Stage 2 should ensure the conservation historic areas and areas of cultural significance. |
| **Scottish Historic Environment Policy (2009)** | Sets out policy for the identification and designation of nationally important ancient monuments<br><br>Provides a framework for conservation of the evidence of Scotland's past based on cultural significance | **Cultural Heritage**<br>Dundee Coastal Study Stage 2 should ensure the conservation historic areas and areas of cultural significance. |
| **Town and Country Planning Act (Scotland) 1997, amended by the Planning etc. (Scotland) Act 2006** | Makes provision for town and country planning, including business improvement districts | Any proposed development as part of the Dundee Coastal Study Stage 2 is subject to regulation under the Act, requiring planning permission. Local Authority plans and strategies affecting the coastal region of Dundee should be incorporated in Dundee Coastal Study Stage 2. |
| **Scottish Planning Policy (SPP)** | Presents the Scottish Government's policy on nationally important land use planning matters<br>Includes subject policies of coastal planning, historic environment, landscape and natural heritage, waste management and flooding and drainage | **All Issues**<br>Dundee Coastal Study Stage 2 should seek to incorporate the principles and objectives set by the SPP. |
| **National Planning Framework 2 (NPF2)**<br><br>**Contd….** | Provides a long term spatial strategy for Scotland's development<br>Provides targets for Scotland to 2030, including sustainable growth and communities, build environment, regeneration, vacant and derelict | **All Issues**<br>Dundee Coastal Study Stage 2 should seek to incorporate the principles and objectives set by the NPF2. |

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| | land, landscape and cultural heritage and marine and coastal environment. | |
| **NPPG 14: Natural Heritage** | Provides guidance on how the Scottish Government's policies for the conservation and enhancement of Scotland's natural heritage should be reflected in land use planning. | **Biodiversity, Fauna and Flora, Cultural Heritage, Landscape**<br>Guidance in NPPG 14 should be adopted in development of Dundee Coastal Study Stage 2. |
| **PAN 1/2010: Strategic Environmental Assessment of Development Plans** | Provides advice on how the requirements of the Environmental Assessment (Scotland) Act 2005 can be met within the development planning process | **All Issues**<br>Guidance in PAN 1/2010 should be adopted in development of Dundee Coastal Study Stage 2. |
| **PAN 33: Development of Contaminated Land (Revised 2000)** | Provides advice on the development of contaminated land and the approach to contaminated land in development plans | **Soil**<br>Guidance in PAN 33 should be adopted in development of Dundee Coastal Study Stage 2. |
| **PAN 51: Planning, Environmental Protection and Regulation (Revised 2006)** | Supports the existing policy on the role of the planning system in relation to the environmental protection regimes | **All Issues**<br>Dundee Coastal Study Stage 2 should contribute to protection of the environment. |
| **PAN 60: Planning for Natural Heritage** | Provides advice on how development and the planning system can contribute to the conservation, enhancement, enjoyment and understanding of Scotland's natural environment Encourages developers and planning authorities to be positive and creative in addressing natural heritage issues | **Cultural Heritage, Landscape**<br>Dundee Coastal Study Stage 2 should contribute to the conservation, enhancement, enjoyment and understanding of the natural environment. |
| **PAN 69: Planning and Building Standards Advice on Flooding** | Provides good practice advice on planning and building standards in areas where there is a risk of flooding. Includes guidance on water resistant materials and forms of construction, design of flood prevention schemes and sustainable drainage and flooding | **Water**<br>Guidance in PAN 69 should be adopted in development of Dundee Coastal Study Stage 2. |
| **PAN 81: Community Engagement – Planning with People** | Represents good practice for engagement of community groups and members of the public in planning and development proposals | **Population and Human Health, Material Assets**<br>Good practice in community engagement, as outlined in PAN 81, should be adopted in development of Dundee Coastal Study Stage 2. |
| **SNH Guidance: Coastal Erosion and Defence (Policy Guidance Note 00/03)** | Sets out SNH policy with respect to the management of coastal erosion and the consent | **All Issues**<br>SNH guidance relating to coastal erosion and defence should be |

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| | and implementation of coastal defences and lists an umber of strategic priorities relating to these issues. | adopted in development of Dundee Coastal Study Stage 2. |
| **SNH Guidance: A guide to managing coastal erosion in beach / dune systems** | Reviews the options available for managing erosion<br>Offers guidance on how to select or design the most appropriate response to a particular situation<br>Describes and illustrates how each erosion management technique might best be designed so as to minimise damage to natural heritage and reduce the potential for altering shoreline evolution elsewhere | **All Issues**<br>SNH guidance relating to coastal erosion and defence should be adopted in development of Dundee Coastal Study Stage 2. |
| **SNH Advisory Notes No. 36, 72 and 73: Coastal Erosion and Defence I, II and III** | Provides information and advice on different aspects of coastal erosion and defence | **All Issues**<br>SNH guidance relating to coastal erosion and defence should be adopted in development of Dundee Coastal Study Stage 2. |
| **Scotland's Biodiversity: It's in Your Hands - A strategy for the conservation and enhancement of biodiversity in Scotland** | Sets out a vision for the future health of Scotland's biodiversity, and maps out a 25 year framework for action to conserve and enhance biodiversity for the health, enjoyment and well-being of all the people of Scotland. | **Biodiversity, Fauna and Flora**<br>Incorporate the key themes of the Strategy in development of Dundee Coastal Study Stage 2. Where possible raise the issue of biodiversity in public consciousness and reinforce the link between people and biodiversity. |
| **Regional** | | |
| **Tayside Biodiversity Action Plan** | Co-ordinate existing actions and initiate new actions to conserve and enhance the region's biodiversity. Take into account local and national priorities | **Biodiversity, Fauna and Flora**<br>Dundee Coastal Study Stage 2 should protect local species and habitats identified for conservation priority in the Tayside BAP |
| **Dundee and Angus Structure Plan** | Provides a long term vision for the Dundee and Angus area over the period 2001 – 2016<br>Sets the broad land use planning strategy guiding development and change. Sets the context for Local Plans. | **All Issues**<br>Land use planning objectives of the Dundee and Angus Structure Plan should be considered during development of Dundee Coastal Study Stage 2. |
| **Angus Shoreline Management Plan** | Seeks to document a co-ordinated approach taken to managing coastal erosion | **All Issues**<br>As the region adjacent to Dundee City, the Angus Shoreline Management Plan should be reviewed to inform development of Dundee Coastal Study Stage 2. |
| **Local** | | |
| | Sets the context and targets for land use in | Dundee Coastal Study Stage 2 will need to be developed in |

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| **Dundee Local Plan** | Dundee. | accordance with the objectives of and policies contained in the Dundee Local Plan, and will assist in protecting valued infrastructure, public amenity areas and material assets from flood and erosion damage. |
| **Dundee Core Paths Plan** | Promotes public outdoor access through adoption of a network of path routes throughout the city of Dundee. | Some sections of the Core Path network will be along the coastline and within the Study area. Dundee Coastal Study Stage 2 will need to make sure coastal defence works do not impact on the Core Paths network. |
| **Dundee City Council: Flood Prevention Report 2009** | Following the Flood Prevention and Land Drainage (Scotland) Act 1997, reports on the duty of local authorities to<br>Periodically inspect, assess and ensure maintenance, to a due state of efficiency, those watercourses within their area, and<br>Publish biennial reports which contain information about areas affected by flooding and actions taken to reduce the risk of future flooding | Dundee Coastal Study Stage 2 will affect Dundee City Council's 2011 flood risk review and Flood Prevention Report. |
| **Local Flood Risk Management Plans and Assessments** | As a response to the Flood Risk Management (Scotland) Act 2009, local authorities are working to prepare localised flood management plans and flood risk assessments.<br><br>These plans and assessments are currently being developed for the Dundee City Council area. | **Water**<br>Development of Dundee Coastal Study Stage 2 should reflect or contribute to any local flood risk assessments or flood management plans. |
| **Dundee City Council: Contaminated Land Strategy 2001** | Presents an inspection strategy for identifying where land contamination may be causing unacceptable risks to human health and the environment. | Due to the presence of contaminated land within the Study area, Dundee Coastal Study Stage 2 will need to be developed in accordance with the procedures and requirements adopted in the Contaminated Land Strategy. |
| **Dundee Central Waterfront – Development Masterplan 2001 – 2031** | Presents a long-term development framework for the Central Waterfront area of Dundee | This is within the Study area, and the objectives of the Masterplan should be retained in Dundee Coastal Study Stage 2. |
| **Dundee Partnership: Environmental Strategy 2008 - 2011** | Presents a strategy for balancing the long-term protection and enhancement of the local environment of Dundee against the development | The objectives of the Environmental Strategy should be retained in Dundee Coastal Study Stage 2. |

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| | and regeneration of Dundee. | |
| **Tay Estuary Forum Local Council Partnership: Management Plan** | Represents a management plan formed by a voluntary, non-statutory Local Coastal Partnership, dedicated to promoting the wise and sustainable use of the Tay Estuary and adjacent coastline. Includes Social, Environmental and Economic Strategies. | The objectives of the Tay Estuary Forum Local Council Partnership Management Plan should be retained in Dundee Coastal Study Stage 2. |

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

## 3.3 Relevant aspects of the current state of the environment

### 3.3.1 Background

The Environmental Assessment (Scotland) Act 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 PPS operates and the constraints and targets that this context imposes on the PPS.

The review of the environmental baseline represents a high-level assessment of the environmental character and trends of each of the nine management sections. The potential for environmental effects of the Programme on the baseline conditions, with reference to the SEA objectives, is then tested.

A review of the environmental baseline has been established as part of this Environmental Report for the SEA.

### 3.3.2 Historical Use

The Dundee City Council area covers approximately 63 sq. km, and is bounded on the south side by approximately 16.9 km of coastline along the Tay Estuary to the south.

Dundee's coastal frontage extends from Invergowrie Bay in the west to the Dighty Burn in the east and includes a range of land uses, including an airport runway, residential and commercial development in the city quay and central waterfront (including business centre, hotels, leisure centre, and recreational area), industrial activities (including Camperdown Oil Refinery, pumping station, dock yards, oil mills, warehouses and scrap yards), shingle foreshores and sandy recreation beaches with dunes.

The Study area has a legacy of industrial use, which has led to significant areas of contaminated land. Waste disposal has also taken place in landfill sites at various sections along the coastline, where landfill has been used for land reclamation. The Study seeks to protect local infrastructure from flooding and to protect the frontage from coastal erosion, which could mobilise and release contaminants from previously filled land into waterways.

Historical land uses and potential sources of contamination include a former landfill site (municipal solids, commercial wastes and clinical wastes), railway goods yard, oil refinery, gas works, oil services depot, timber treatment works, tanneries and ship yards.

### 3.3.3 Environmental designations overview

An environmental data review has been undertaken for each of the nine management sections to establish the environmental baseline; this represents a high-level assessment of the environmental character and trends of each of the Dundee Coastal Study area. The relevant findings of the review have been summarised below (the detailed review can be found in Appendix C).

The following paragraphs describe the area of the Dundee Coastal Study Stage 2:

The Inner Tay estuary is of national and international importance to nature conservation, supporting wintering birds on intertidal mudflat and saltmarsh. Sea defence works within the Study area have potential to impact on the;

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- Firth of Tay & Eden Estuary Special Protection Area (SPA),
- Firth of Tay & Eden Estuary Ramsar Site, and
- Firth of Tay & Eden Estuary Special Area of Conservation (SAC).

The Firth of Tay & Eden Estuary comprises estuarine and coastal habitats in eastern Scotland from the mouth of the River Earn and extending to Barry Sands on the Angus Coast and St Andrews on the Fife Coast.

Grey Seals from Isle of May and bottlenose dolphins from Moray Firth use the estuary and its sandbanks of the Firth of Tay & Eden Estuary region, and therefore the following European interests are also considered:

- Isle of May Special Area of Conservation (SAC)
- Moray Firth Special Area of Conservation (SAC)

The environmental designations have been given to this area are due to the numbers of breeding pairs of Marsh Harriers and Little Terns. The designated areas also support migratory and wintering populations of birds that are of European importance.

The designations are also due to the high-quality estuarine areas with animal communities which are ecologically representative of northern North Sea estuaries. This are also noted for the Intertidal mudflats and sandflats (Mudflats and sandflats not covered by seawater at low tide). This habitat is dominated by a high biomass of invertebrates, which provide an important food source for waders and wildfowl. Also a noted feature are the subtidal sandbanks (Sandbanks which are slightly covered by sea water all the time). The habitat comprises distinct banks which may rise from horizontal or sloping plains of sandy sediment. This area is also home to the Common seal (Phoca vitulina), approximately 600 adults haul-out at on the sandbanks (this represents around 2% of the UK population of this species).

The Dundee Coastal Study must fulfil the requirements of the Habitats Regulations (Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2007 SSI 80). The HRA will follow on the completion of the Dundee Coastal Study and will describe the environmental context within which the Dundee Coastal Study Stage 2 operates and make an appropriate assessment of the implications of the plans in the view of conservation objectives.

In addition to the Natura 2000 sites referenced above, the area covered by the Study involves potential for impact on several areas designated for Natural Heritage and landscape features, including;

- Inner Tay Estuary Local Nature Reserve (LNR)
- Dighty Burn Site of Importance for Nature Conservation (SINC) for fisheries
- Broughty Ferry Beach LNR and Blue Flag Beach
- Firth of Tay Important Bird Area
- Inner Tay Estuary Site of Special Scientific Interest (SSSI)
- Monifieth Bay SSSI
- Tayside Landscape Character Area

Local stakeholder groups in the Dundee area promoting environmental issues include the Broughty Ferry Environmental Project and the Dighty Environmental Group.

Objectives set by SNH[2] for Dundee include;

- Allow river systems to function naturally wherever possible
- Create a diverse and attractive urban landscape
- Promote the creation of path networks to the wider countryside
- Ensure that open space close to where people live incorporates access to the countryside

[2] From 'Scottish Natural Heritage in Dundee' http://www.snh.org.uk/pdfs/scottishparlimentleaflets/dundee.pdf

- Achieve better integration of settlements with the natural heritage and ensure that new developments complement and enhance the landscape, accommodate wildlife and use open space to create environments of natural heritage value.

### 3.3.4 Environmental Baseline

The Firth of Tay & Eden Estuary comprises estuarine and coastal habitats in eastern Scotland from the mouth of the River Earn and extends to Barry Sands on the Angus Coast and St Andrews on the Fife Coast. The Eden Estuary is a rich and diverse landscape of mudflats, sandbanks and saltmarshes, and an important site for bird watching. The bulk of the reserve is made up of rich intertidal mud and sand flats, home to millions of tiny plants and animals. These in turn provide the food for the thousands of birds during the winter season.

River Tay represents important water supply catchments for the Dundee city regions. Plans for strategic growth areas and development Dundee and the surrounding areas could increase demands on water resources.

The redevelopment of the Dundee waterfront could affect the hydrological regime of the area, and have potential impacts on the designated mudflat, sandflats and estuarine habitats. It could also alter the feeding habitats and cause disturbance to birds within the Firth of Tay and Eden Estuary.

The following management sections have been identified for the Dundee Coastal Study Stage 2:

| Section | Length (m) | Area |
|---|---|---|
| 1 | 1,050 | Landfill site |
| 2 | 1,565 | Airport |
| 3 | 3,185 | Riverside Drive |
| 4 | 3,585 | City Centre and Port of Dundee |
| 5 | 720 | Industrial Area |
| 6 | 1,470 | Coastal Walkway |
| 7 | 460 | Yacht/Sailing Club |
| 8 | 2,290 | Broughty Ferry |
| 9 | 2,570 | Beach and Dunes |

**Landfill Site**

Dundee presently generates a high volume of waste, despite tighter constraints on landfill and increasing legislation to control waste. Waste disposal has taken place in landfill sites at various sections along the coastline, where landfill has been used in places for land reclamation. The area where the land has been reclaimed using landfill comprises a significant presence of contaminated land along the coastal frontage.

The boundaries of the landfill site are vulnerable to erosion and Dundee City Council supports the policy of self-sufficiency for waste management within the Tayside Waste Plan Area in order to mitigate the environmental impacts in the area.

**Airport**

Dundee Airport is a relatively small airport and is located 3km from the City Centre and lies on the shore of the Firth of Tay. NPF2 plans for the further growth of services from

Dundee airport, however this is limited to some extent by runway length. It is not anticipated that growth at the airport would require major physical expansion of the airports itself.

Increased development and services from Dundee airport could potentially place bird populations in the Firth of Tay and Eden Estuary at greater risk of disturbance and air strikes.

**Riverside Drive**

The Riverside Drive is one of the main arterial routes forming priority corridors between the Council boundary and Dundee City Centre. The route exists primarily for cars but benefit from bus priority measures and advanced traffic management facilities.

Semi-natural green spaces of local nature conservation importance stretch along the north side of Riverside Drive. These are identified as Wildlife Corridors to promote habitat continuity and support biodiversity conservation.

**City Centre and Port of Dundee**

The city centre consists of various shopping centres, the Waterfront area is currently undergoing major redevelopment activity. The Dundee Waterfront project (current area and proposed plan shown below) is a bold and ambitious transformational project to restructure the city infrastructure around the existing landfall of the Tay Road Bridge and effect the extension and reconnection of the city with its Waterfront.

The Port of Dundee is situated to the east of Dundee City Centre on the River Tay. It is easily an easily accessible deep water port with no draught access issues. There are presently around 60 acres of space at the Port of Dundee. The Port has also been identified as the most strategically important and suitable port location for marine renewables. There are 25 hectares of available quayside land for renewable energy manufacturing

**Industrial Area**

The industrial area houses warehouses and manufacturing processes. This area has minimal landward assets.

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**Coastal Walkway**

The coastal area has a wide range of habitats including sand flats, mudflats, salt marsh, brackish lagoons and reed beds. Water resources also include rivers, burns, lochs and small areas of standing water and mires. There are large areas with unimproved grassland, woodland is absent from many areas where it may once have been extensive.

**Yacht/Sailing Club**

The yacht club house and boat storage area are located at the Grassy Beach, Broughty Ferry on the outskirts of Dundee.

**Broughty Ferry**

Broughty Ferry is on north coast of the Firth of Tay. It comprises a diversity of habitats including grassland, marine derived sand areas, woodland, scrub and limestone ballasted areas and it is the home to over 20 species of bird and 50 species of invertebrates.

**Beach and Dunes**

Broughty Ferry achieved Blue Flag status at the start of the 2010 summer season but lost this status by the end of the season due to a number of samples achieving only the mandatory standards. The Broughty Ferry beach is backed by dunes. There is a nature conservation site and a host of wildlife, including birds, seals and the occasional porpoise can be seen.

The dune system borders the Monifieth Bay SSSI and due to its importance, the beach (up to the high tide mark) is designated as a feeding area for migrating birds. It has been developed over recent years to provide an area that not only helps to protect the community of Broughty Ferry from high tides, but also provides local people with a popular sheltered place to walk and play.

### 3.3.5 Archaeological and cultural heritage overview

Features of importance for Cultural Heritage in the area potentially affected by coastal flooding include;

- The ships, Discovery and frigate Unicorn
- Conservation areas
- Listed buildings
- A scheduled monument (Broughty Castle)

## 3.4 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 Dundee Coastal Study Stage 2, and whether the PPS is likely to aggravate, reduce or otherwise affect existing environmental problems.

Environmental problems have been identified through discussions with SEPA, SNH and Historic Scotland and analysis of the baseline data. Relevant environmental problems are summarised in Table 3.4.

Table 3.4. Environmental problems relevant to Dundee Coastal Study Stage 2

| Environmental Problem | Key Issues | Implications |
|---|---|---|
| **Biodiversity, Flora and Fauna** | There are a number of statutory and non-statutory sites designated for their nature conservation value within the study area. These sites include protected habitats and species, including some European Protected Species and BAP priority habitats. Many of these are located within the inter-tidal area and should be protected within the development of the Dundee Coastal Study Stage 2. | In terms of the programming of the Dundee Coastal works it would be preferential for the works to be programmed outwith the breeding season or the winter months when there are several species present of over-winter birds including the:<br>• Marsh Harrier (breeding)<br>• Little Tern (breeding)<br>• Bar-tailed Gowit (winter)<br>• Redshank (migratory/winter)<br>• Pink-footed Goose (migratory/winter)<br>• Greylag Goose (migratory/winter)<br>• Cormorant (migratory/winter)<br>• Shelduck (migratory/winter)<br>• Eider (migratory/winter)<br>• Long-tailed Duck (migratory/winter)<br>• Common Scoter (migratory/winter)<br>• Velvet Scoter (migratory/winter)<br>• Goldeneye (migratory/winter)<br>• Red-breasted (migratory/winter)<br>• Goosander (migratory/winter)<br>• Oystercatcher (migratory/winter)<br>• Grey Plver (migratory/winter)<br>• Sanderling (migratory/winter)<br>• Dunlin (migratory/winter)<br>• Black-tailed Godwit (migratory/winter)<br><br>If essential work is required to be carried out during the winter months (due to accelerated erosion of existing defences) advice will be sought from SNH to establish suitable working practices and establish appropriate buffer zones to avoid disturbing the over wintering birds. (This topic will be examined in more detail within the HRA). |
| **Soils / Geomorphology and Hydrodynamics** | The movement of coastal sediments is dependent on a number of parameters. These have been investigated specifically for the Broughty Esplanade Frontage and addressed at the Environmental Report stage of the SEA, during option appraisal.<br><br>The Airport area options include an option to create an earth bund with erosion protection to defend against flooding. | The short-list of options for the Broughty Ferry Esplanade frontage include:<br>• Flood wall;<br>• Temporary demountable flood barriers; and<br>• Mechanical street barriers.<br>It is envisaged that the flood wall would be built on top of existing sea walls and also replace existing open hand railing with a more suitable defence. As the proposed option will be extending the existing sea wall it is not likely to impact the movement of coastal sediments.<br><br>Where this is not deemed suitable temporary |

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| | The key issue in this location is the land available currently is insufficient to accommodate an earth bund whilst maintaining compliance with aviation safety regulations. If this option is to be progressed additional land would need to be reclaimed to accommodate the earth bund. As this area of the River Tay holds SAC, SPA and SSSI designations careful consideration needs to be given. SNH have indicated that an 'Appropriate Assessment' would potentially need to be undertaken if this option is progressed. | demountable flood barriers will be used during potential flood events along with mechanical street barriers. These will be installed within and on top existing hard engineering and are unlikely to influence costal sediments.<br><br>It is therefore highly unlikely that the current proposed options for Broughty Ferry esplanade will have any impact either positive or negative on the movement of coastal sediments.<br><br>The potential option to reclaim land in order to accommodate and earth bund will need to be given further and careful consideration if it is deemed that this is the only viable option for this management section then further consultation will be required to ensure that the detailed design does not have a negative impact. |
| **Water status** | Under the Bathing Water Directive, coastal water quality is good. Broughty Ferry beach achieved a Pass for the Directive's Guideline Standards in 2008 and 2009. Under the Water Framework Directive, the Dundee coastline falls within two River Basin Management Plan areas – Upper Tay Estuary [ID Code 200439] and Lower Tay Estuary [ID Code 200438]. Both of these water bodies were classified by SEPA as having an overall ecological status of Good with High confidence in 2008<br>It is important that no deterioration from good status occurs for the Upper and Lower Tay Estuary. | It is not envisaged that any of the identified options would have a significant negative impact on the water status for the Upper and Lower Tay Estuary as the options identified would involve building upon existing structures and reinforcing existing structures.<br><br>During the construction phase appropriate construction guidelines would be implemented to ensure the water status is maintained as Good. |
| **Population and Human Health / Recreation** | Risk of flooding and coastal erosion to both people and properties within the Dundee Coastal Study Stage 2 study area.<br>Safeguarding human health and safety through prevention of flooding and prevention of mobilisation of contaminants is of utmost importance.<br>Safeguarding access to recreational resources, including local nature reserves and green spaces, beaches, yacht and sailing clubs and moorings is important. | The final options identified by the Dundee Coastal Study need to take account the medium and long-term implication of climate change so that synergies of the Study and climate change adaption aims are maximised.<br><br>The final options will need to be both flexible and resilient to cope with a changing climate and protect Dundee City inhabitants and properties. |
| **Material Assets / Socio-economic Impact** | Safeguarding commercial and industrial assets and homes is of high importance.<br><br>The main roads, Core Paths Network, | The final options identified by the Dundee Coastal Study need to take account the medium and long-term implication of climate change so that synergies of the Study and climate change adaptation aims are maximised. |

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| | railway line, and airport runway along the seafront are at least partially at risk from flooding and coastal erosion. There are also multiple yacht and sailing clubs and moorings located along the seafront, used by residents and tourists. It is important that these key material assets are considered for protection. | The final options will need to be both flexible and resilient to cope with a changing climate and protect Dundee City inhabitants and properties. |
| **Cultural Heritage** | Several listed buildings and sites of cultural importance are at risk from coastal flooding.<br><br>One Scheduled Monument is located within the study area, however due to its raised aspect is not at risk from coastal flooding or erosion.<br><br>Sites of value for cultural heritage must be evaluated for impacts from proposed options. | The options being considered for the Scheduled Monument include a flood wall, temporary demountable flood barriers or mechanical street barriers.<br><br>These options would be installed on existing hard sea walls therefore there would be minimal impact |
| **Climatic Factors** | Climate change predictions must be considered in the assessment of the strategic flood risk management options. Utilisation of existing assets, waste minimisation and management should be employed to reduce the carbon footprint should be considered throughout development of the Dundee Coastal Study Stage 2. | The final options identified by the Dundee Coastal Study need to take account the medium and long-term implication of climate change so that synergies of the Study and climate change adaption aims are maximised.<br><br>The final options will need to be both flexible and resilient to cope with a changing climate and protect Dundee City inhabitants and properties. |
| **Landscape** | Any coastal defence works have the potential to be conspicuous and prominent features in the urban landscape.<br><br>The landscape character and visual amenity of the Dundee Coastal Study Stage 2 Study area should be considered for any options proposed. | The do nothing/ minimal options will have very little impact on the landscape in the short term. However in the longer term with increased instances of flooding and as the existing defences erode the landscape character of the coastal frontage will likely start to deteriorate.<br><br>The main options that are likely to have a significant impact on the landscape |

## 3.5 Likely Evolution of the Environment without the Dundee Coastal Study Stage 2

Without Dundee Coastal Study Stage 2 the likely future evolution of each of the management sections in the Study area are summarised in the table 3.5 below.

In summary any future increase in sea level, flood events and coastal erosion is likely to have a negative impact on local population, properties, infrastructure, recreational facilities and industry along the coastal frontage.

If Dundee Coastal Study Stage 2 were not developed, likely future changes to the area include;

- Threat to assets within the coastal region;
- Possible disuse and neglect of the coastal frontage region due to risk of flooding;
- Possible exposure of contaminated land through coastal erosion, where contaminants could leach into the sea; and
- Possible detrimental effects on other key policies and plans affecting Dundee's coastline and city region, for example the Dundee Core Paths Plan and Dundee Central Waterfront Development Masterplan 2001 – 2031.

Table 3.5. Likely Evolution of the Environment without Dundee Coastal Study Stage 2

| Management Section | Likely Evolution of the Environment without Dundee Coastal Study Stage 2 |
|---|---|
| **Landfill Site** | This management section is 1,050m in length and currently has a shallow gradient vegetated embankment with light rock armour and rubble protection. This area contains an old landfill that was used from the early 1900's to 1996 receiving municipal solid waste and some commercial waste.<br><br>The likely evolution of the Landfill Site management section would be an overall reduction in site area as the land would be subject to erosion and washed away by the River Tay during high tides, storms and during flooding events.<br><br>The *do nothing* option examined during the MCA workshop gives the best indication of the likely evolution of the landfill site area without any intervention it was deemed the landfill management section required erosion protection in order to protect the environment and human health.<br><br>Without erosion protection there is a high potential for contaminants to be exposed and have a negative affect on the local surrounding environment and human health from material buried within the capped landfill site escaping as the land is eroded during storm events, high tides and flooding. |
| **Airport** | The Airport management section (1,565m in length) contains Dundee Airport which is an active airfield that operates scheduled, private and chartered flights as well as having a flying school. The airport is located on reclaimed land and is vulnerable to flooding and erosion, it currently has steep armoured embankment with rock armour, rubble, concrete block and brickwork protection. Dundee airport has had a history of water logging in the past[3]. The likely evolution of the Airport management section without any human intervention would be that the current defences would gradually be eroded away and increase the vulnerability of the airport to flooding. An increase in flood events would |

[3] http://www.hial.co.uk/dundee-airport/about-us/

| | |
|---|---|
| | increase the likelihood of contaminants such as aviation fuel and oil being washed further inland and into the River Tay. This would likely have a negative impact on the local habitats and ecosystems<br><br>The increased frequency of flood events would subsequently increase the erosion of this reclaimed land eventually impacting on the airport operations and would likely result in the curtailment of airport operations which would have a detrimental effect on material assets and on the socio-economics as this would reduce the accessibility of Dundee to both business and to tourist visitors to the city.<br><br>Potentially the reduction in the number of flights to and from Dundee would have a slight positive impact on the climate and local air quality but as the airport is near a busy road it is assumed that this positive impact would be negligible. |
| **Riverside Drive** | Riverside Drive has an existing flood defence wall without any intervention it is likely that this wall would deteriorate and reduce the protection that it currently offers. Taking into consideration the implications of climate change with increase in water levels and frequency of storm events it is likely that increases in the number of instances of flooding would affect the Riverside Drive area. As a number of business are located in this area it is likely that this would have a slight negative impact on the local economy and may alos have a negative impact on human health. |
| **City Centre and Port of Dundee** | This management section is currently subject to undergo major redevelopment through the Dundee Waterfront project which is unrelated to this project, which will significantly change this area.<br><br>The Dundee Waterfront project is a bold and ambitious transformational project to restructure the city infrastructure around the existing landfall of the Tay Road Bridge, adjacent to the existing city centre, and effect the extension and reconnection of the city with its Waterfront.<br><br>The Dundee Waterfront Masterplan is based on a grid of streets creating development sites. Most sites will only be available once most of the infrastructure re-arrangement is complete, including the demolition of Olympia Leisure Centre, Tayside House, the Hilton Hotel and Gala Casino. |
| **Industrial Area** | There are relatively high flood defences existing around this area so the evolution of this management section is likely to remain very similar to its current state with no significant changes. |
| **Coastal Walk** | The coastal walk area has recently been upgraded and offers good protection against flooding the likely evolution of this management section is likely to remain in its current state with no significant changes. |
| **Yacht Club** | The likely evolution of this management section with the Dundee Coastal would be increased instances of flooding and increased erosion which would decrease the area of land and slightly increase the water body area of the River Tay. |
| **Broughty Ferry** | It is likely that Broughty Ferry would experience increased instances of flooding as sea levels rise and the frequency of storm events increases. Over time this would have an impact on the local population as they would be displaced during serious floods. Over time this could have a negative impact on the health of the local population as the sewers back up and contaminate the local area. |
| **Beach and Dunes** | The main option for this management section is to manage the dune system therefore the likely evolution without the Dundee Coastal Study would be a deterioration of the Dune system and reduction in overall area of dune coverage and subsequently a decrease in this habitat. |

Future increase in sea level and coastal erosion is likely to have a negative impact on local population, properties, infrastructure, recreational facilities and industry along the coastal frontage.

If Dundee Coastal Study Stage 2 were not developed, likely future changes to the area include;

- Threat to assets within the coastal region;
- Possible disuse and neglect of the coastal frontage region due to risk of flooding;
- Possible exposure of contaminated land through coastal erosion, where contaminants could leach into the sea; and
- Possible detrimental effects on other key policies and plans affecting Dundee's coastline and city region, for example the Dundee Core Paths Plan and Dundee Central Waterfront Development Masterplan 2001 – 2031.

## 3.6 SEA Objectives

The SEA objectives in Table 3.6 below have been included as measures against which the environmental impacts of Dundee Coastal Study Stage 2 will be assessed.

SEA objectives have been devised and recorded as part of the scoping stage to allow the Consultation Authorities an opportunity to review and comment on the proposed approach early in the SEA process.

Potential indicators have been included in Table 3.6 below, set against the relevant SEA objectives, as a method of assisting with assessment of the environmental effects of the Study.

**Table 3.6: SEA Objectives**

| SEA topic | SEA objectives | Potential Indicators |
|---|---|---|
| **Biodiversity, flora and fauna** | ▪ Conserve and enhance the integrity of habitats<br>▪ Prevent damage to designated wildlife and geological sites and protected species<br>▪ Maintain biodiversity, avoiding irreversible losses<br>▪ Ensure the sustainable management of key wildlife sites and the ecological processes on which they depend<br>▪ Provide appropriate opportunities for people to come into contact with and appreciate wildlife and wild places | ▪ Favourable Condition Status of Firth of Tay and Eden Estuary SAC, SPA and Ramsar Site, Inner Tay Estuary and Monifieth Bay SSSIs.<br>▪ Preservation of key features of LNR, SINC and Important Bird Area features.<br>▪ Tayside BAP objectives and targets<br>▪ Fish movement and migration<br>▪ Coastal water quality |
| **Population and human health** | ▪ Protect and enhance human health<br>▪ Conserve and enhance the quality of the built environment<br>▪ Improve and promote appropriate access to the natural and historic environment | ▪ Condition of coastal defences and Standards of Protection<br>▪ Length of footpaths and cycle ways<br>▪ Number of yacht and sailing moorings<br>▪ Access to recreational resources<br>▪ Diversity and quantity of recreational resources, especially beaches |
| **Water** | ▪ Protect and, where necessary, enhance waterbody status<br>▪ Reduce / manage flood risk | ▪ Surface water quality<br>▪ Ground water quality<br>▪ Coastal water quality<br>▪ Ecological status of water resources<br>▪ Reduced number of flood events |
| **Soil** | ▪ Reduce levels of brownfield, derelict and contaminated land in the plan area | ▪ Erosion and deposition of coastal sediments<br>▪ Extent of and standard of protection for contaminated land within the Study area |
| **Climatic factors** | ▪ Reduce vulnerability to the effects of climate change e.g. flooding and coastal erosion<br>▪ Reduce contribution to the causes of climate change | ▪ Carbon Footprint - use of local materials, use of low embodied energy materials, maintenance proposals<br>▪ Return periods used in modelling to inform selection of coastal defence schemes to include allowance for climate change |
| **Material assets** | ▪ Promote sustainable use of natural resources and material assets<br>▪ Minimise waste, then re-use or recover it through recycling, composting or energy recovery<br>▪ Promote effective use of existing infrastructure | ▪ Properties at risk from flooding and / or coastal erosion<br>▪ Economic cost of flood damage<br>▪ Communications links, utilities and transport infrastructure routes |

**Table 3.6: SEA Objectives**

| SEA topic | SEA objectives | Potential Indicators |
|---|---|---|
| **Cultural Heritage** | ▪ Protect and, where appropriate, enhance or restore the historic environment<br>▪ Preserve historic buildings, archaeological sites and other culturally important features<br>▪ Promote access to the historic environment<br>▪ Improve the enjoyment and understanding of the historic environment | ▪ Designated and non-designated heritage assets<br>▪ Buried archaeology as listed in the Historic Environment Record<br>▪ Areas of significant archaeological and palaeoenvironmental potential |
| **Landscape** | ▪ Conserve and enhance landscape character and scenic value of the area<br>▪ Protect and enhance the landscape everywhere and particularly in designated areas<br>▪ Value and protect diversity and local distinctiveness<br>▪ Improve the quantity and quality of publicly accessible open space | ▪ Landscape Character<br>▪ Visual amenity for seafront properties and beaches<br>▪ Existing significant landscape restoration projects |

# 4. Environmental Assessment

## 4.1 Assessment of the PPS and its alternatives

This section compiles the assessment of environmental effects of the Dundee Coastal Study Stage 2.

A selection of option types have been assessed, this assessment will form the basis for choosing the final preferred option in the Dundee Coastal Study. The final option for each management section will be the one deemed to have the least potential for negative environmental impact and also be economically viable.

The Dundee Coastal Study Stage 2 is still in the optioneering phase so it is not appropriate to consider alternatives for the flood defence option types as essentially the alternatives are part of this assessment process and the most suitable solution environmentally will be chosen.

Each option type will also be subject to Cost Benefit Analysis.

For the SEA, each type of coastal defence option listed below (taken from the short-list of options following the MCA Workshop) has been be measured against its ability to meet the SEA Criteria (Table 4.1), so that any issues relating to specific sections of coastline or significant environmental problems will be highlighted.

1. Do nothing
2. Do minimum / maintain / fill in gaps in flood wall
3. Erosion protection
4. Wave wall / flood wall
5. Earth bund / land raising
6. Temporary demountable flood barriers / mechanical street barriers
7. Recharge
8. Sediment retention structures
9. Manage Dunes

The PPS and its alternatives were assessed using the framework given in the Dundee Coastal Study Stage 2 Scoping Study. A summary of the assessment findings is shown in Table 4.1.

The following assessment of each possible defence type for implementation in Dundee Coastal Study Stage 2, will inform the Dundee Coastal Study Stage 2 to take forward the best option for each management section.

Once the preferred option is identified where a significant environmental effect is found, the potential for mitigation will be considered and whenever possible implemented. Mitigation measures could take the form of recommendation for a specific coastal defence type in any sensitive environmental areas, in order to minimise potential for impact.

Table 4.1. Summary of assessment findings

| PPS COMPONENT | Assessment Criteria for SEA objectives | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (Coastal defence option types) | Biodiversity, flora and fauna | Population and human health (including recreation) | Soil (for geomorphology and hydromechanics) | Water | Climate | Material Assets (including consideration of socio economics) | Cultural Heritage | Landscape | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Comments |
| 1. Do Nothing | -1 MT/I | -1 ST/D | -1 MT/I | -1 ST/I | 0 | -2 ST/D | -2 MT/D | 0 | *Likely to result in flooding and erosion of the coastal frontage of Dundee which could give rise to exposure of contaminants to the population, flora, fauna, soil and water. Also likely to negatively impact on the local economy and damage cultural heritage and local assets.* |
| 2. Do minimum/ maintain/ fill gaps in flood wall | -1 MT/I | -1 ST/D | -1 MT/I | -1 ST/I | 0 | 0 | -1 MT/D | 0 | *Likely to result in flooding of the coastal frontage of Dundee which could give rise to exposure of contaminants to the population, flora, fauna, soil and water. Also likely to negatively impact on the local economy and damage cultural heritage and local assets.* |
| 3. Erosion protection | -1 MT/I | +1 MT/I | -1 MT/I | -1 MT/I | 0 | +1 MT/I | +1 MT/I | -1 LT/D | *As this option would involve the introduction of hard engineering into the coastal frontage areas this could have a slightly negative impact either by introducing hard engineering into more natural areas or increasing the height of some areas of the existing defences.* |
| 4. Wave wall/ flood wall | -1 MT/I | +1 MT/I | -1 MT/I | -1 MT/I | 0 | +1 MT/D | +1 MT/D | -2 LT/D | *As this option would involve the introduction of hard engineering into the coastal frontage areas this could have a slightly negative impact either by introducing hard engineering into more natural areas or increasing the height of some areas of the existing defences. Visually this could have a significant negative impact on the local landscape and result in cutting off the local population from the water.* |
| 5. Earth bund/ land raising | +1 MT/I | +1 MT/I | -2 LT/D | +1 MT/I | 0 | +1 MT/D | +1 MT/D | -2 LT/D | *As earth bunds are a softer approach and can be made more of an attractive feature for example the raised embankments in the Perth flood defences upstream of Dundee on the Tay, earth bunds are less likely to have a negative impact on the environment – however visually depending on where they are located they may have the potential to have a significantly negative impact.*<br><br>*Given the importance of the tidal estuary and the sand flats land raising has the potential to have a significant negative impact on the environment.* |
| 6. Temporary demountable flood barriers/ mechanical street barriers | 0 | +1 MT/I | 0 | +1 MT/I | 0 | +1 MT/D | +1 MT/D | -1 ST/D | *By their very nature these defences are temporary and therefore the benefit of protecting against flooding outweighs any temporary negative visual impact.* |
| 7. Recharge | +1 MT/I | +1 MT/I | +1 MT/I | +1 MT/I | 0 | +1 MT/D | +1 MT/D | +1 MT/D | *Would enhance the existing beaches and therefore would have a positive environmental impact.* |
| 8. Sediment retention structures | -1 MT/I | +1 MT/I | -1 MT/I | -1 MT/I | 0 | +1 MT/D | +1 MT/D | -1 MT/D | *Would potentially introduce hard engineering into the natural environment however in protecting against flooding would have a positive effect.* |
| 9. Manage Dunes | +2 LT/ D | +1 LT/I | +1 LT/I | +1 LT/I | 0 | +1 LT/I | +1 LT/I | +2 LT/ D | *Would enhance the existing dune system and therefore would have a positive environmental impact.* |

**SEA Scoring**

| | |
|---|---|
| +2 | = significant positive environmental effects |
| +1 | = minor positive environmental effects, |
| 0 | = no significant environmental effects |
| –2 | = significant negative environmental effects |
| –1 | = minor negative environmental effects |
| ? | = Don't know |

**Duration of effect** = LT (long term), MT (medium term), ST (short term), perm (permanent), temp (temporary)

**Cumulative effect** = D (direct), I (indirect), SE (secondary), SY (synergistic)

## 4.2 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 4.1 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 4.1. Measures envisaged for the prevention, reduction and offsetting of any significant adverse effects**

| SEA issue | Existing problem? | Impact of PPS | Proposed measures for the reduction/prevention and offset of significant adverse effects |
|---|---|---|---|
| **Biodiversity, flora and fauna** | Require outputs from HRA to complete. | *Cannot establish impact of PPS until option to progress is determined.* | *TBC* |
| **Population and human health** | | *Cannot establish impact of PPS until option to progress is determined* | *TBC* |
| **Water** | Require outputs from HRA to complete | *Cannot establish impact of PPS until option to progress is determined* | *TBC* |
| **Soil** | | *Cannot establish impact of PPS until option to progress is determined* | *TBC* |
| **Climatic factors** | | *Cannot establish impact of PPS until option to progress is determined* | *TBC* |
| **Material assets** | | *Cannot establish impact of PPS until option to progress is determined* | *TBC* |
| **Cultural Heritage** | | *Cannot establish impact of PPS until option to progress is determined* | *TBC* |
| **Landscape** | | *Cannot establish impact of PPS until option to progress is determined* | *TBC* |

# 5. Monitoring

The following activities were undertaken to establish the monitoring approach

The proposed SEA monitoring activities are set out in Table 5.1.

Table 5.1. Proposed SEA monitoring programme

| What is being monitored | Data source, frequency of monitoring | Summary of proposed remedial action (if information is available) | Timescale and responsibility |
|---|---|---|---|
| **Landfill site** | *TBC once specific options are developed for management section.* | | |
| **Airport** | *TBC once specific options are developed for management section.* | | |
| **Riverside Drive** | *TBC once specific options are developed for management section.* | | |
| **City Centre and Port of Dundee** | *TBC once specific options are developed for management section.* | | |
| **Industrial Area** | *TBC once specific options are developed for management section.* | | |
| **Coastal Walkway** | *TBC once specific options are developed for management section.* | | |
| **Yacht Club** | *TBC once specific options are developed for management section.* | | |
| **Broughty Ferry** | *TBC once specific options are developed for management section.* | | |
| **Beach and Dunes** | *TBC once specific options are developed for management section.* | | |

Table 6.1 lists future milestones in the development of the PPS and its SEA, and the dates when these are expected to be completed.

# 6. Next Steps

Table 7.1 lists future milestones in the development of the PPS and its SEA, and the dates when these are expected to be completed.

Table 7.1. Anticipated plan-making and SEA milestones

| Expected date | Milestone |
|---|---|
| April - May 2011 | Environmental Report Consultation |
| TBC | HRA Consultation |
| TBC | *Post-adoption SEA Statement* |
| TBC | *Monitoring* |
| | |
| | |
| | |

# Appendices

Appendix A. Dundee Coastal Study Stage 2 Management Section Plan and Conservation Areas
Appendix B. Dundee Coastal Study Stage 2 Natural and Cultural Heritage Sites
Appendix C. Full Assessment Results

# Appendix A. Dundee Coastal Study Stage 2 Management Section Plan and Conservation Areas

Inner Tay Estuary Local Nature Reserve
Firth of Tay and Eden Estuary Ramsar
Firth of Tay and Eden Estuary SPA
Inner Tay Estuary SSSI

Firth of Tay and Eden Estuary SAC

Broughty Ferry LNR

Firth of Tay and Eden Estuary SAC

Monifeth Bay SSSI
Firth of Tay and Eden Estuary SPA
Firth of Tay and Eden Estuary Ramsar

Notes

Key to symbols

Environmental Designations

- Wildlife corridor
- SPA/SSSI
- Local nature reserve
- Ramsar site
- Woodlands
- SAC
- Nature conservation site
- Community wildlife site

Management Section

- Frontage Section 1 - Landfill Site
- Frontage Section 2 - Airport
- Frontage Section 3 - Riverside Drive
- Frontage Section 4 - City Centre and Port of Dundee
- Frontage Section 5 - Industrial Area
- Frontage Section 6 - Coastal Walkway
- Frontage Section 7 - Yacht Club
- Frontage Section 8 Broughty Ferry
- Frontage Section 9 - Beach and dunes

Reference drawings

| Rev | Date | Drawn | Description | Ch'k'd | App'd |
|---|---|---|---|---|---|
| P1 | 21.04.11 | | First Issue | | |


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Title
Dundee Coastal Study Stage 2
Management Section Plan and
Conservation Areas

| | | | | | |
|---|---|---|---|---|---|
| Designed | | | Eng check | | |
| Drawn | S.Oldham | | Coordination | | |
| Dwg check | M DeLeon | | Approved | L Mair | |

| Scale at A1 | Status | Rev |
|---|---|---|
| NTS | PRE | P1 |

Drawing Number
MMD-260186-EN-DR-000-XX-003




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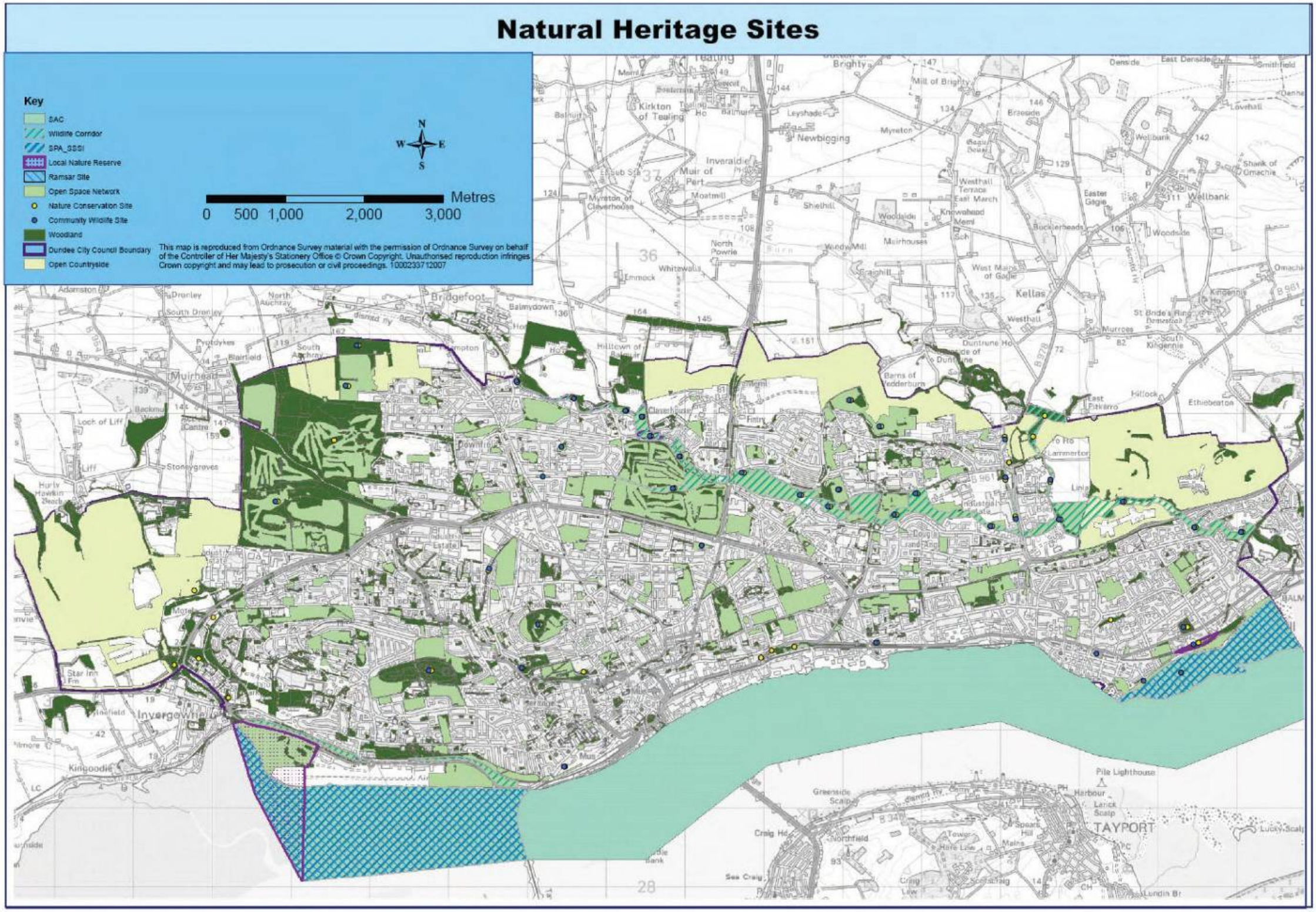
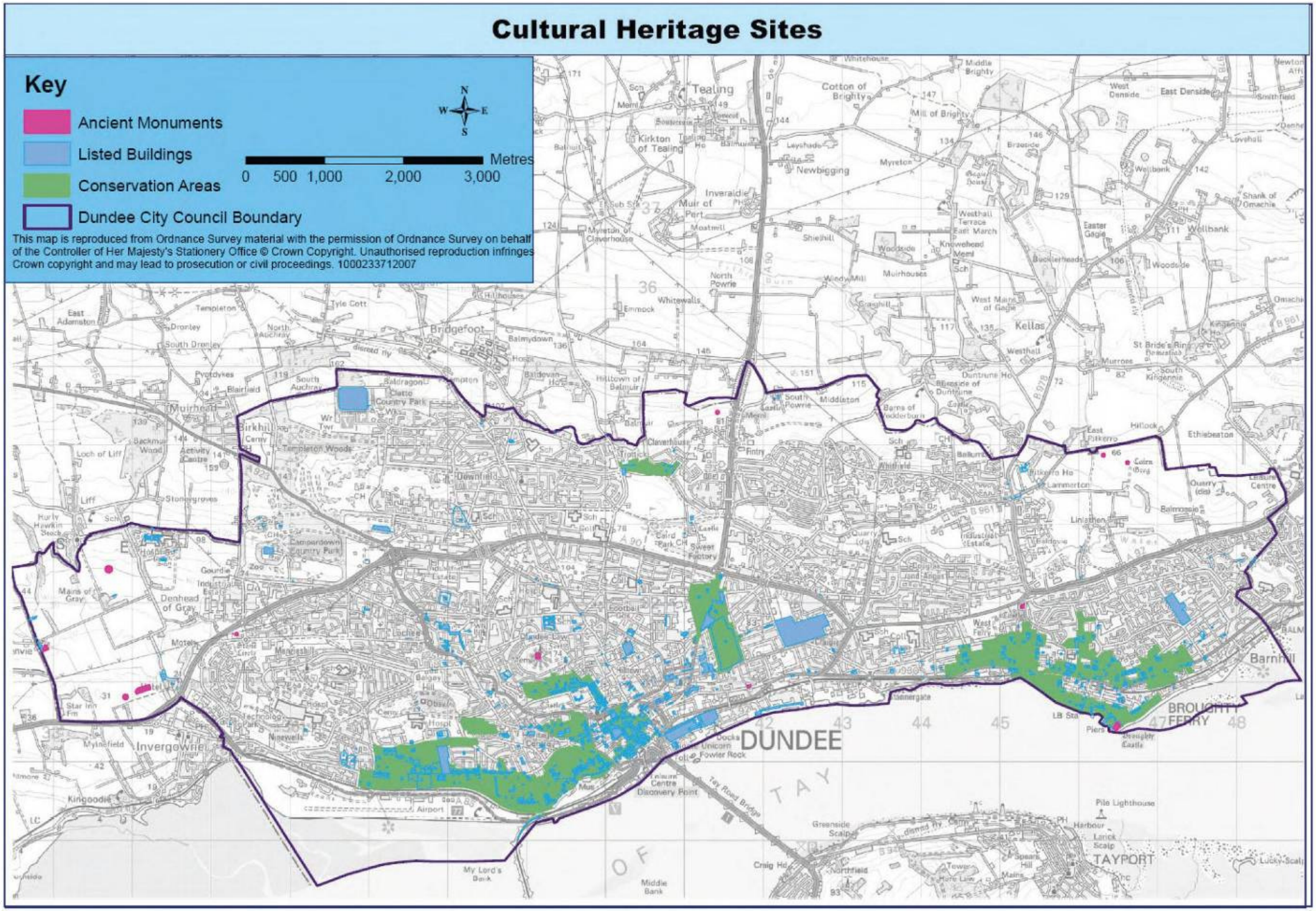
# Appendix B. Dundee Coastal Study Stage 2 Natural and Cultural Heritage Sites

# Natural Heritage Sites




PIMS: http://pims01/pims/llisapi.dll?func=ll&objId=1473225054&objAction=browse&viewType=1

# Cultural Heritage Sites





PiMS: http://pimsu1/pims/flisapi.dll?func=ll&objId=14732250S4&objAction=browse&viewType=1

# Appendix C. Full Assessment Results

# Environmental Data Review

| Section | Length (m) | Area |
|---|---|---|
| 1 | 1,050 | Landfill site |
| 2 | 1,565 | Airport |
| 3 | 3,185 | Riverside Drive |
| 4 | 3,585 | City Centre and Port of Dundee |
| 5 | 720 | Industrial Area |
| 6 | 1,470 | Coastal Walkway |
| 7 | 460 | Yacht Club |
| 8 | 2,290 | Broughty Ferry |
| 9 | 2,570 | Beach and Dunes |

| Environmental Designation | Description | Management Area |
|---|---|---|
| Firth of Tay & Eden Estuary Special<br><br>Protection Area (SPA) | The Firth of Tay & Eden Estuary comprises estuarine and coastal habitats in eastern Scotland from the mouth of the River Earn and extending to Barry Sands on the Angus Coast and St Andrews on the Fife Coast. The Eden Estuary is a rich and diverse landscape of mudflats, sandbanks and saltmarshes, and a primary regional site for bird watching. The bulk of the reserve is made up of rich intertidal mud and sand flats, home to millions of tiny plants and animals. These in turn provide the food for the thousands of birds during the winter season.<br><br>The site supports important national and European populations of several bird species. The waterfowl assemblage regular supports over 20,000 wintering species. The following species make up an important component of the waterfowl assemblage:<br><br>- Pink-footed goose and Greylag goose<br>- Cormorant<br>- Eider<br>- Long-tailed duck<br>- Common scoter<br>- Velvet scoter, Goldeneye<br>- Red-breasted merganser<br>- Goosander<br>- Oystercatcher<br>- Grey plover<br>- Sanderling<br>- Dunlin<br>- Black-tailed godwit<br>- Marsh harrier<br>- Little tern<br>- Bar-tailed godwit<br><br>The site condition has generally been described by SNH as **favourable maintained** except for the following species, for which it has been described as **Unfavourable/No change:** Common scoter**,** Dunlin**,** Eider**,** Little Tern**,** Oystercatcher**,** Pink-footed goose**,** Red-breasted merganser and Sanderling | 1. Landfill<br>2. Airport<br>3. Riverside Drive |
| Firth of Tay & Eden Estuary Ramsar Site | The Firth of Tay & Eden Estuary Ramsar site includes extensive invertebrate-rich intertidal flats and areas of reedbed, saltmarsh and sand dune. The proposed site is contained within the following SSSIs: Inner Tay Estuary, Monifieth Bay, Barry Links, Tayport-Tentsmuir Coast and Eden Estuary. | |

| | | |
|---|---|---|
| | The Firth of Tay & Eden Estuary Ramsar site qualifies under the following criterions:<br><br>In winter the site regularly supports over 20,000 waterfowl with a 1990/91-94/95 winter peak mean of 48,000 waterfowl, comprising 28,000 wildfowl and 20,000 waders, as well as internationally important populations of pink-footed goose, greylag goose, bar-tailed godwit and redshank. | |
| Firth of Tay & Eden Estuary Special Area of Conservation (SAC) | The Eden Estuary Special Area of Conservation site overlaps with the Firth of Tay & Eden Estuary Special Protection Area. Therefore, it also covers the bird species mentioned above.<br><br>This site is designated as SAC for the European qualifying habitats and species listed below:<br><br>- **Estuaries**: The Firth of Tay and the Eden estuary are two high-quality estuarine areas with animal communities are ecologically representative of northern North Sea estuaries.]<br><br>- **Intertidal mudflats and sandflats** (Mudflats and sandflats not covered by seawater at low tide): The habitat is dominated by a high biomass of invertebrates, which provide an important food source for waders and wildfowl.<br><br>- **Subtidal sandbanks** (Sandbanks which are slightly covered by sea water all the time): The habitat comprises distinct banks which may arise from horizontal or sloping plains of sandy sediment.<br><br>- **Common seal**: Around 600 adults haul-out at the site, representing around 2% of the UK population of this species.<br><br>The site condition related to the categories featured above has generally been described by SNH as **favourable maintained**. | 1. Landfill<br>2. Airport<br>3. Riverside Drive<br>4. City Centre and Port of Dundee<br>5. Industrial Area<br>6. Coastal Walkway<br>7. Yacht Club<br>8. Broughty Ferry<br>9. Beach and Dunes |
| Isle of May Special Area of Conservation (SAC) | Grey Seals from Isle of May use the estuary and its sandbanks of the Firth of Tay & Eden Estuary region, therefore they are considered in this assessment.<br><br>The Isle of May supports the largest breeding colony of grey seals (*Halichoerus Ggrypus*) in Scotland and the fourth-largest breeding colony in the UK. This population of seals use the | |

| | | |
|---|---|---|
| | estuary and its sandbanks of the Firth of Tay & Eden Estuary region, and therefore it is considered in this appraisal.<br><br>The site condition related to the categories featured above has generally been described by SNH as **favourable maintained**. | |
| Moray Firth Special Area of Conservation (SAC) | Bottlenose dolphins from Moray Firth use the estuary and its sandbanks of the Firth of Tay & Eden Estuary region and are regularly seen offshore. Therefore they are considered in this assessment.<br><br>Dolphins live a long time and reproduce slowly and Moray Firth population is relatively small (130 individuals). This is the only bottlenose dolphin population in the North Sea and therefore it is extremely vulnerable. | |
| Inner Tay Estuary Local Nature Reserve (LNR) | Inner Tay holds the most extensive continuous reedbeds in Britain. These are fens or swamps where the water table is at or above ground level for most of the year.<br><br>The Reedbeds provide good grazing for Roe deer after the winter harvest Otters are occasionally sighted in or near the reedbeds.<br><br>Wood mouse, Common shrew and bat species also use the reedbeds to forage for food<br><br>The coastal habitats support a diverse range of wildlife. A variety of coastal environments characterise the Tay area from marshes and mudflats to beaches and dunes.<br><br>The LNR covers an area centred on the Invergowrie and Kingoodie Bay areas and encompasses an area of mudflats of vital importance to the resident and migratory wildlife. | 1. Landfill<br>2. Airport<br>8. Broughty Ferry<br>9. Beach and Dunes |
| Dighty Burn Site of Importance for Nature Conservation (SINC) for fisheries | The site is located on the north side of the Firth of Tay, 8 km east of Dundee city centre. | |
| Broughty Ferry Beach Local Nature Reserve (LNR) and Blue Flag Beach | Located along the north coast of the Firth of Tay, a few miles east of Dundee city centre. The site is 3.9 Hectares and filled with a diversity of habitats including grassland, marine derived sand areas, woodland, scrub and limestone ballasted areas.<br><br>Undulating mounds are covered in grasses and small herbaceous plants whereas the sides of | 8. Broughty Ferry<br>9. Beach and Dunes |

| | | |
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| | the railway embankments are covered in woody scrubs and trees.<br><br>Over 20 species of bird and 50 species of invertebrate have been spotted on the site.<br><br>Broughty Ferry currently holds a Blue Flag status but it might not be able to regain it this year after it failed to achieve the required water quality last summer. Broughty Ferry achieved Blue Flag status at the start of the season but lost this status by the end of the season due to a number of samples achieving only the mandatory standards. | |
| Inner Tay Estuary Site of Special Scientific Interest (SSSI) | The Inner Tay Estuary particularly supports the following natural features:<br><br>Non-breeding bird species<br>- Greylag<br>- Pink-footed goose<br>- Cormorant<br>- Goldeneye<br><br>Breeding bird species<br>- Bearded tit<br>- Marsh harrier<br>- Water rail<br><br>Coastlands: Saltmarsh<br>Fens: Transition saltmarsh<br><br>Part of Inner Tay Estuary SSSI overlaps with part of Balmerino - Wormit Shore SSSI which is notified for old red sandstone igneous geology.<br><br>The Inner Tay Estuary SSSI is also part of the Firth of Tay and Eden Estuary Special Area of Conservation (SAC) and Special Protection Area (SPA). Please refer to sections above for details of natural features. | 1. Landfill<br>2. Airport<br>3. Riverside Drive<br>4. City Centre and Port of Dundee<br>5. Industrial Area<br>6. Coastal Walkway<br>7. Yacht Club<br>8. Broughty Ferry<br>9. Beach and Dunes |
| Monifieth Bay Site of Special Scientific Interest (SSSI) | Monifieth Bay is situated on the north shore of the outer Firth of Tay 5 km east of Dundee.<br><br>It consists primarily of intertidal sand and mud. The site is important as the extensive mud flats with its rich invertebrate population provide a feeding ground for wintering waders specifically important numbers of sanderling. | 1. Landfill<br>2. Airport<br>3. Riverside Drive<br>4. City Centre and Port of Dundee<br>5. Industrial Area<br>6. Coastal Walkway<br>7. Yacht Club |

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| | Sanderling utilise Monifieth Bay at low tide to feed on the exposed mud and sand. They roost elsewhere, mainly on Buddon Ness to the east and on Lucky Scalp on the south side of the estuary.<br><br>Monifieth Bay SSSI is also a constituent part of the Firth of Tay and Eden Estuary Special Area of Conservation (SAC) and Special Protection Area (SPA). Please refer to sections above for details of natural features. | 8. Broughty Ferry<br>9. Beach and Dunes |

# GLOSSARY

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| **Consultation Authorities** | Authorities which because of their environmental responsibilities are likely to be concerned by the effects of implementing PPS and must be consulted at specified stages of the SEA. The Consultation Authorities, designated in the Act, are:<br>Scottish Ministers (Historic Scotland),<br>Scottish Natural Heritage ( SNH), and<br>The Scottish Environment Protection Agency ( SEPA). |
| **EIA** | Environmental Impact Assessment - A project level assessment |
| **Environmental Appraisal** | A form of environmental assessment used in the UK (primarily for Development Plans) since the early 1990s, supported by "Environmental Appraisal of Development Plans: A Good Practice Guide" (DoE, 1993); more recently superseded by sustainability appraisal. Some aspects of environmental appraisal foreshadow the requirements of the SEA Directive. |
| **Environmental Assessment** | A method or procedure for predicting the effects on the environment of a proposal, either for an individual project or a higher-level "strategy" (a PPS), with the aim of taking account of these effects in decision-making. The term "Environmental Impact Assessment" ( EIA) is used, as in European Directive 337/85/ EEC, for assessments of projects. In the SEA Directive, an environmental assessment means "the preparation of an environmental report, the carrying out of consultations, the taking into account of the environmental report and the results of the consultations in decision-making and the provision of information on the decision", in accordance with the Directive's requirements. |
| **Environmental Report** | Document required by the SEA Directive [Directive 2001/42/EEC on the assessment of the effects of certain plans and programmes on the environment] as part of an environmental assessment, which identifies, describes and evaluates the likely significant effects on the environment of implementing a PPS and its reasonable alternatives. Section 14 and Schedule 3 of the Act set out the information required in an Environmental Report. |
| **Hierarchies of plans, programmes, strategies ( PPS) and projects** | A high level or "parent" PPS may have plans or programmes at lower tiers or later stages. |
| **Minimal Effect on the environment: Minimal takes its normal meaning** | Whether environmental effects are considered "minimal" should be seen as a difficult test to meet and should always be assessed in the context of each individual PPS. |
| **Mitigation** | Measures to prevent, reduce or offset, as fully as possible, adverse effects on the environment. Mitigation in SEA also includes enhancement and compensating measures. |
| **Objective** | A statement of what is intended, specifying the desired direction and outcome |
| **PPS** | A plan, programme or strategy. |
| **Plan or Programme** | The Term "plan or programme" covers any plans or programmes to which the Act applies and includes strategies. |
| **Responsible Authority** | Any person, body or office holder exercising functions of a public character. If such an authority prepares a PPS which requires an SEA then that authority is responsible for the SEA. Where more than one authority is responsible for a PPS they should reach an agreement as to who is responsible for the SEA. Where an agreement cannot be reached, the Scottish Ministers shall make the determination. |

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| **Scoping** | The process of deciding the scope and level of detail to be included in an Environmental Report along with requirements regarding consultation periods (section 15(1)(b). |
| **Screening** | The process of determining the likely significance of effects on the environment of a PPS. Schedule 2 of the Act sets out criteria for determining the likely significant effects on the environment. |
| **Strategic Environmental Assessment ( SEA)** | Term used to describe environmental assessment as applied to PPS. In this Tool Kit, " SEA" is used to refer to the type of environmental assessment required under the Environmental Assessment (Scotland) Act 2005. |
| **SEA Directive** | European Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. |
| **SEA Regulations** | In Scotland SEA is provided for by the Environmental Assessment (Scotland) Act 2005 and is the transposing legislation for the SEA Directive. The Act repealed the Environmental Assessment of Plans and Programmes (Scotland) Regulations 2004 ( SSI 2004/258). |
| **Significant environmental effects** | A degree of professional judgement is required in assessing significance of environmental effects but to help ensure that determinations are consistent and appropriate Schedule 2 of the Act sets out specific criteria for determining the likely significance of effects on the environment of a PPS. |
| **Sustainability appraisal** | A form of assessment that considers social and economic effects as well as environmental ones, and appraises them in relation to the aims of sustainable development. |

**Environmental Designations Glossary:**

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| **Blue Flag Beach:** | It is a voluntary certification awarded by the Foundation for Environmental Education (FEE). This label confirms that a beach meets environmental quality standards. FEE's Blue Flag criteria include standards for water quality, safety, environmental education and information, the provision of services and general environmental management criteria. The Blue Flag is sought for beaches and marinas as an indication of their high environmental and quality standards. In Scotland, the Blue Flag programme is administered by 'Keep Scotland Beautiful'. |
| **Community Wildlife Site:** | These are sites that aim to engage the connection between people and their surrounding natural environment. They symbolise the people's need to connect with 'place' and 'nature'. |
| **Landscape Character Area:** | It is a unique geographical area of a particular landscape character type. In Scotland, landscape character areas take on the names of specific places, such as 'Galloway uplands' and 'Dumfries coastlands'. |
| **Nature Conservation Site:** | Also know as Local Nature Conservation Site (LNCS), it is a non-statutory designation given by local authorities to areas of locally important nature and landscapes. And their main purpose of LNCS is to flag-up to planners and developers where there are natural feature of some merit. Scottish Natural Heritage, on behalf of the Local Nature Conservation Sites Working Group, published guidance for local authorities on the establishment and management of LNCS systems in Scotland. |
| **Local Nature Reserve (LNR):** | It is a protected area of land designated by a local authority because of its local special natural interest and/or educational value. LNRs are areas of at least locally important natural heritage, designated and managed by local authorities to maintain and enhance their special wildlife and geology and provide access to nature for local communities and give people better opportunities to learn about and enjoy nature close to where they live. |

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| **Natura 2000:** | It defines a network of nature conservation sites for the 21st century. In May 1992 the UK and other European Union (EU) governments brought in a new law to protect the most seriously threatened habitats and species across Europe. The EU law is known as the 'Habitats Directive' and it works with the earlier 'Birds Directive' which was introduced in 1979. At the heart of these Directives is the creation of a network of EU -wide protected sites. |
| **Ramsar Site:** | The Ramsar designation comes from the Convention on Wetlands was called the "Ramsar Convention"(which took place in Ramsar, Iran, 1971) and is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance. Unlike the other global environmental conventions, Ramsar is not affiliated with the United Nations system of Multilateral Environmental Agreements, but it works very closely with the other MEAs and is a full partner among the "biodiversity-related cluster" of treaties and agreements. |
| **Site of Special Scientific Interest (SSSI):** | It is a conservation designation denoting a protected area in the United Kingdom. In Scotland, SSSIs are those areas of land and water (to the seaward limits of local authority areas) that Scottish Natural Heritage (SNH) considers to best represent Scotland's natural heritage and its diversity of plants, animals and habitats, rocks and landforms. SNH designates SSSIs under the Nature Conservation (Scotland) Act 2004. |
| **Special Area of Conservation (SAC):** | It is a designation defined in the European Union's Habitats Directive (92/43/EEC), also known as the Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora. In Scotland, SAC sites have been selected have to meet the criteria set out in the Habitats Directive and the resulting list of sites then needs to be approved by the European Commission before designation can take place. |
| **Special Protection Area (SPA):** | It is a designation for the protection of bird species under the European Commission Directive. They are classified for rarea and vulnerable birds and for regularly occurring migratory species. In Scotland many classified SPAs are wetland areas, such as estuaries or lochs. |
| **The Birds Directive:** | Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds, commonly known as the Birds Directive, protects all wild birds, their nests, eggs and habitats within the European Community. It gives member states of the European Union the power and responsibility to classify Special Protection Areas (SPAs) to protect birds which are rare or vulnerable in Europe, as well as all migratory birds which are regular visitors. |
| **The Habitats Directive:** | Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora adopted in 1992. It complements and amends the Birds Directive. The Habitats Directive is a major contribution by the European Community to implementing the Biodiversity Convention agreed at the 1992 Rio Earth Summit. As well as establishing Natura sites and setting out how they should be protected, the Directive has a number of wider implications, such as those relating to European Protected Species. In Scotland, the requirements of the Habitats Directive are translated into specific legal obligations by the Habitats Regulations. |
| **Wildlife Corridor:** | It is an area connecting wildlife populations separated by human activities which allows an exchange of individuals between populations and may help prevent the negative effects of inbreeding and reduced genetic diversity that often occur within isolated populations. |