

**PROGRESS REPORT ON NATIONAL INDICATOR 188 ~  
ADAPTING TO WEATHER IMPACTS AND CLIMATE  
CHANGE**

**REPORT OF THE DEPUTY CHIEF EXECUTIVE**

**Strategic Priorities: CIO3: Efficient and Effective Council, CIO4:  
Improving partnership working to deliver 'One City'.**

**1. Why has this report come to the Committee?**

- 1.1 There are many issues relating to climate change which the Council and its partners are pursuing. This report completes the suite of reports to inform and update committee on the work in relation to tackling climate change.
- 1.2 Previously, this committee has received reports on :
  - How the Council is managing its own carbon emissions (report received 20<sup>th</sup> October 2009)
  - How the Council is managing the City's carbon emissions (report received 19<sup>th</sup> January 2010)
- 1.3 This report informs committee on how the Council is managing weather impacts on Climate Change.

**2. Background to Tackling Climate change**

- 2.1 Sunderland is aiming to become the most liveable city in the UK, using a smart, life-enhancing and balanced approach to delivering a sustainable future. To achieve a sustainable future for the city, it is essential for Sunderland to tackle the issue of climate change.
- 2.2 Sunderland has also made several public commitments to tackling climate change that include :
  - The Nottingham Declaration (signed November 2001)
  - The EUROCITIES Declaration on Climate Change (signed November 2008)
  - The EU Covenant of Mayors (signed January 2009)
- 2.3 To address the causes of climate change, under these various declarations, the Council has already embarked on a comprehensive programme to reduce its own carbon emissions and emissions from the city as a whole, for which it has received national and international recognition:

- As winners of the national Sustainable Communities Award for “tackling Climate Change” in 2009
- As being the first City in the country to submit its “Sustainable Energy Action Plan” in January 2010 thereby meeting its obligation under the EU Covenant of Mayors. This Action Plan is now being held up as best practise across Europe.
- The City’s simple but effective campaign work into raising community awareness of climate change and carbon emissions has been applauded by a host of European Cities at a recent convention, and looks set to be applied elsewhere.

### **3. Adapting to Climate Change ~ the Council’s Performance.**

- 3.1 To address the weather impacts of climate change, councils are now required by the Audit Commission to demonstrate how they are managing impacts from weather and climate, which is measured through a national indicator (**NI 188**). Performance is measured on a process-based indicator, where Councils are required to work through the following levels:
- Level 0 - Baseline understanding of climate impacts
  - Level 1 - Assessed risks from weather and climate change
  - Level 2 - Taken action in priority areas
  - Level 3 - Developed a comprehensive adaptation strategy, with partners
  - Level 4 - Are implementing, assessing and monitoring actions.
- 3.2 In April 2009, the council adopted a Weather and Climate Risk Management Strategy for Sunderland, to show how it understands and addresses risks from climate change. Using this strategy as supporting evidence, the council’s self-assessment for NI188 in 2008/9 was reported as Level 1.
- 3.3 In terms of benchmarks against other councils in 2008/9, 51% of council’s assessed themselves as Level 0, Sunderland was among the 43% of councils that assessed themselves as Level 1, and another 6% assessed themselves as either Level 2 or 3.
- 3.4 This report presents the updated Weather and Climate Risk Management Strategy 2009/10 which is attached at Annex 1. Using this as evidence, the council has recently self-assessed itself as Level 2, and has submitted this self assessment to DEFRA.
- 3.5 The 2009/10 revisions to this strategy have been made to demonstrate how the council has now moved from Level 1 (in 2008/09) to Level 2 within the NI188 performance monitoring framework.
- 3.6 To meet Level 2, a council must have a “comprehensive risk-based assessment and prioritised action in some areas” for climate risks. Sections 4 to 6 set out in more detail what revisions have been made and what new conclusions have been drawn.

#### **4. Climate Risks to the natural environment**

4.1 A comprehensive risk assessment of weather and climate risks to important habitats and species in Sunderland was commissioned by Sunderland City Council, and delivered by Durham Wildlife Trust. This compliments the previous risk assessments, which solely focused on the impacts of climate change on the built and human environment. The main findings and conclusions of this study are as follows:

4.2 The habitats in Sunderland most at risk from climate change are as follows.

- **Coastal saltmarshes and mudflats**, including Timber Beach, at risk from sea level rise and catastrophic flooding events
- **Maritime cliffs along South Sunderland Coast**, at risk from sea level rise and increasing wave action, leading to greater erosion
- **Magnesian Limestone grasslands**, including Tunstall Hills, at risk from reduced summer rainfall, increased temperatures and heatwaves and greater human disturbance and fire risk from outdoor leisure activities during hot weather.

4.3 These risks should be factored into habitat management plans, alongside the many other risks facing natural habitats in Sunderland (e.g. development pressure, pollution, human disturbance, etc).

#### **5. Weather and Climate Risks to Council Services**

5.1 A more detailed analysis of climate and weather risks to council services was conducted, to document where service responsibilities are already addressing these impacts. This showed that council services are already responding to the priority risks likely to arise from climate change and weather.

5.2 However, this was a preliminary assessment which should be the precursor to a more thorough service-based risk assessment that is developed and owned by each service through service level risk management processes.

#### **6. Flood Risk**

6.1 Several initiatives have improved the understanding and management of flood risk in Sunderland in the past year.

- A comprehensive update to the Strategic Flood Risk Assessment has been commissioned by the council, which is completed and currently awaiting formal adoption. The emerging study has improved and updated information on the location and frequency river and coastal flooding to inform planning policy and development control decisions. Significantly it has also concluded that the level of risk from surface water flooding is low enough so as

to negate the need to develop a multi-agency Surface Water Management Plan in the short term. This is contrary to expectations in the 2008/09 Weather and Climate Risk Management Strategy.

- The work of partners has actively reduced flood risk. The Environment Agency has revised Local Area Flood Plans, and have added 191 properties to their flood warning service in the Lumley Park Burn area. Northumbria Water Ltd continue to deliver more storm water drainage improvements to areas prone to sewer flooding.

## **7. Conclusions and Next Steps**

- 7.1 As a result of the major improvements, along with minor revisions in the Weather and Climate Risk Management Strategy, Sunderland's status with NI 188 is now self assessed at Level 2 (as previously programmed).
- 7.2 Production and monitoring of NI 188 through the Weather and Climate Risk Management Strategy forms part of the current responsibility of the Sustainability Team, requiring no additional finance.
- 7.3 When the Weather and Climate Risk Management Strategy was first adopted in April 2009, it was programmed to progress to Level 3 (that is adopting a full adaptation strategy) by March 2011. From the experience gained in reaching Level 2, it is apparent that the step from Level 2 to Level 3 will require considerably more development work in order to develop then adopt a comprehensive citywide action plan. Work will need to include:
- Developing procedures to ensure that all new Council policies and activities are assessed for climate impacts and risks
  - Adopting a comprehensive adaptation action plan covering all significant vulnerabilities and opportunities (to include priority risk areas; actions; roles & responsibilities; timescales; financing; processes for monitoring and review).
  - Council or departmental performance management reports record implementation of adaptive responses for all priority risks identified in the adaptation action plan
  - Wider engagement with the LSP and LSP partners to address climate vulnerabilities and opportunities across the local authority area.
- 7.4 The resource for this will need to be found within existing services and partners, and risks from climate change embedded more strongly within the council's existing risk management processes.
- 7.5 For this reason, it is realistic to aim to achieve Level 3 by March 2012, not March 2011 as first expected.

- 7.6 Beyond this, the scale of capital improvement schemes or changes to revenue based services which might arise from the above plans is not yet known, and would need to be brought forward and considered on a case by case basis.

## **8 Recommendation**

- 8.1 That the committee note the progress on the revised Weather and Climate Risk Management Strategy for Sunderland.

### **Background Papers**

Draft Strategic Flood Risk Assessment (June 2010)

Risk Assessments and Impacts Profile of Climate Change on the Natural Environment in the City of Sunderland (Durham Wildlife Trust, April 2010)

---

**Contact Officer:** Neil Cole, Planning Policy Manager.  
Contact details : 0191 561 1574  
[neil.cole@sunderland.gov.uk](mailto:neil.cole@sunderland.gov.uk)



**WEATHER AND CLIMATE RISK MANAGEMENT  
STRATEGY FOR SUNDERLAND: REVISION 1.**

**JANET JOHNSON  
DEPUTY CHIEF EXECUTIVE  
Sunderland CITY COUNCIL  
PO Box 102  
Civic Centre  
Sunderland  
SR2 7DN**

**REVISED APRIL 2010**

# **CONTENTS**

- 1. Introduction to the first revision**
- 2. General Introduction**
- 3. Weather and Climate in Sunderland**
  - 3.1 Current climate and weather**
  - 3.2 Future climate and weather**
- 4. Future Climate Impacts**
  - 4.1 Built Environment Impacts**
  - 4.2 Natural Environment Impacts**
  - 4.3 Impacts on Council Services**
- 5. Adaptive Responses**
- 6. Next Steps**
- 7. Appendices**
  - 7.1 Document database**
  - 7.2 Communications and events log**
  - 7.3 Severe weather incident log**



## **1. INTRODUCTION TO THE FIRST REVISION**

This is the first annual revision to Sunderland's Weather and Climate Risk Management Strategy.

The original Weather and Climate Risk Management Strategy was adopted in April 2009. This revision has developed the strategy further, to update information on existing risks, broaden our understanding of other climate risks further.

The key changes and amendments to the original strategy are as follows:

- Addition of a comprehensive risk assessment of weather and climate risks to the natural environment in Sunderland (previous, risk assessment concentrated solely on the built environment and human population).
- Categorising climate risks and responsibilities to particular Council Services, which demonstrates that almost all the priority climate and weather risks to Council Services are built into service plans and responsibilities.
- Risks from surface water flooding are now lower than first expected, due to conclusions from the new Strategic Flood Risk Assessment, ongoing improvement works to storm water drainage and recorded improvements in bathing water quality.
- Addition section 5, a log of adaptive responses planned or implemented, to provide evidence of action in priority areas.
- Addition of Appendix 3, to report recorded weather incidents and responses, from Sunderland's Severe Weather incident log

As a result of these improvements, Sunderland's Status within National Indicator 188 is now self-assessed as Level 2, compared to Level 1 last year.

This strategy has also revised the future NI188 action plan and targets, aiming to achieve Level 3 now by March 2012, not March 2011 as previously proposed.

## 2 GENERAL INTRODUCTION

Climate change is the greatest long-term threat facing our planet in recent times. All ecosystems, all populations, all habitats are expected to experience changing weather patterns, at a rate greater than any experienced in the last million years. This is why tackling climate change is the headline priority within the UK Government's strategy for sustainable development.

Scientific consensus is greater than ever before, on the evidence that warming is happening, and that the predominant cause of this warming is the production of greenhouse gases from human activities, such as burning fossil fuels, deforestation and cement production.

Sunderland already has a commitment to reduce the city's greenhouse gas emissions by 80% by 2050, along with an action plan to manage and reduce the City's greenhouse gas emissions over the coming decades.

In the meantime, emissions released so far have already committed the planet to a temperature rise of at least 2°C. Communities, such as Sunderland, have no choice but to adapt to this temperature rise, and the other weather changes it will bring, since this cannot be reversed.

This document is Sunderland's strategy for coping with weather and future changes in the climate.

### ***Why do we have this risk management strategy?***

Sunderland is a city committed to tackling the causes and impacts of climate change. This commitment comes from the Sunderland Partnership and Sunderland City Council signing the **Nottingham Declaration on Climate Change** in November 2001.

This public commitment has been broadened and refreshed recently, by signing the **EUROCITIES Declaration on Climate Change** in November 2008, along with the **EU Covenant of Mayors** on Climate Change in January 2009, which is being signed in collaboration with all North East local authorities.

Within the **Sunderland Strategy 2008 to 2025**, the city has key aims around becoming a safe city, a healthy city and a green city, that protects its built and natural environment. This Action Plan is the framework that shows how the risks associated with weather and climate change will be addressed, to ensure the city's key aims are not compromised by climate change.

The **Civil Contingencies Act** gives Local Authorities the responsibility of managing and responding to any threat that could risk life, property or the natural environment. A **Community Risk Register** for the Northumbria Local Resilience Forum area lists the key risks likely to affect Sunderland, and includes many weather and climate impacts.

Nationally, the **UK Climate Impacts Programme** defines likely changes in weather patterns and provides best practice and guidance on coping with changing weather patterns. Local adaptation plans are recommended as good practice in increasing communities resilience to weather and climate change. National planning policies (e.g. Planning Policy Statement: Planning and Climate Change, and **PPS25: Flood**

Risk) require that new development should be planned to minimise future vulnerability in a changing climate; and in particular to reduce the risk of flooding.

Regionally, Sustaine, the North East sustainable development champion body, have conducted a **North East Climate Impacts Scoping Study**. This is now being followed up by a more detailed climate risk assessment, using up to date, high resolution climate predictions.

Locally, the **Climate Change Adaptation on the Wear** study was carried out by the Environment Agency and Northumbria Regional Flood Defence Committee. The study reported detailed climate predictions for Sunderland, and analysed key risks to the built environment up to 2050. The study was launched in Sunderland in December 2006. This study provides much of the basis on which this action plan is built.

### ***National Indicator NI 188***

Locally, Councils are now required by the Audit Commission to demonstrate how they are managing impacts from weather and climate, which is measured through a new national indicator (**NI 188**). Performance is measured on a process-based indicator, where Council's are required to work through the following levels:

- Level 0. Baseline understanding of climate impacts
- Level 1. Assessed risks from weather and climate change
- Level 2. Taken action in priority areas
- Level 3. Developed a comprehensive adaptation strategy, with partners
- Level 4. Are implementing, assessing and monitoring actions.

**The timeline below shows how Sunderland is proposing to progress through these levels.**

<b>Level 0</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>
Baseline understanding	Assess climate risks	Acting in priority areas	Full adaptation strategy adopted	Monitoring and reviewing actions
March 2009	March 2009	March 2010	March 2012	TBC
Achieved	Achieved	Achieved	Target moved back, from March 2011	TBC

### 3 WEATHER AND CLIMATE IMPACTS IN SUNDERLAND

#### 3.1 Current Weather and Climate

Sunderland's location and geography give the city and its surrounding a unique set of weather patterns.

Sunderland's coastal setting provides cool summers and mild winters compared to other more inland conurbations in the North East, such as Durham City or Newcastle. The moderating influence of the North Sea is noticeable in summer, when its not uncommon that Sunderland can be 2°C cooler than Durham or Newcastle.

The coastal setting also means the Sunderland receives less cloud cover, and hence greater sunshine hours than many other cities in Central and Northern England and Scotland. And like much of the east coast of the UK, average annual rainfall received is low, by UK standards.

Sunderland's river and coastline is on the whole steep-sided, which limits the geographical extent of any flooding. The topography of Sunderland does not provide a great range of altitude, with the highest point being just over 170m above sea level at Warden Law.

#### ***Current weather and climate risks***

The Community Risk Register, prepared by the Northumbria Local Resilience Forum, has already assessed the risk from current weather events, and outlines the measures in place to address those at risk.

In summary, the key weather risk identified, along with the nominated lead agency, are as follows:

<b>Risk</b>	<b>Impacts</b>	<b>Risk Priority</b>	<b>Lead Agency</b>
<b>Major local coastal / tidal flooding</b>	Very high	5	Environment Agency
Major local fluvial flooding	Very high	5	Environment Agency
Localised fluvial flooding (flash flooding in steep valley catchments)	High	4	Environment Agency
Urban localised flooding	High	4	Local Authority
Low temperatures and heavy snow	High	4	Met Office, Local Authority
Storms and gales	Medium	3	Met Office, Local Authority
Heatwave	Medium	2	Health Protection Agency, Met Office

For more information, please see the full Northumbrian Community Risk Register, on the Government Office North East website.

### 3.2 Future weather and climate

For the River Wear Catchment, a study of future weather and climate has been completed by the Environment Agency, with support from the Met Office, Newcastle University, JMP Consulting and Royal Haskoning21. This study offers a much greater level of detail on expected changes due to climate change for the River Wear Catchment than is available from national climate predictions, produced by the UK Climate Impact Programmes, and was the first study of its type in the UK. The study is based on 5km gridsquares resolution, compared to the 50km resolution of the previous UKCIP prediction.

The study focuses only on the impact on the built environment, not the natural environment, where research is still needed to confirm climate impacts. Neither does the study consider opportunities and benefits of climate change in Sunderland, which requires further investigation.

Taking into account Sunderland's geography and microclimate, the study predicts that the key weather changes in Sunderland by 2050 are expected to include:

- Increases in average or extreme temperature, by up to 3°C, as well as greater numbers of heatwaves
- Decrease in average rainfall over the whole year, but with a significant increase (up to 20%) in winter, and consequent decrease in summer rainfall
- A notable reduction in winter snowfall (50%)
- An increase in sea level and tidal surges of 0.35m, and increased wave energy on the coastline and estuary.

It should be noted that these projections are for average annual changes in local climatic conditions, and do not represent worst case scenarios. Conditions during specific weather events show greater change. Also, these projections are based on the best current understanding of climate change, but the field is constantly developing, and subject to change, as more is learnt about the impact of global warming on the climate system.

## **4. FUTURE CLIMATE IMPACTS**

### **4.1 Built Environment**

The River Wear Catchment study suggests there are two key impacts on the built environment expected to occur in Sunderland from weather and climate change, with several specific locations, infrastructure or sections of the community that are likely to be affected: as being most likely to be affected by weather changes in Sunderland are as follows:

#### **1. The effects of extreme hot temperatures and increasing number of heatwaves on vulnerable populations :**

- Ageing population, babies and alcohol users (due to its dehydrating effects) are at greatest risk from increased frequency and level of heatwaves
- Road and rail surfaces vulnerable to high temperatures.

#### **2. The impacts of increased sea levels and winter rainfall on flood risk from river, streams, the sea and drainage systems ie :**

- Areas presently at risk of flooding seeing increased frequency of flooding
- Flood and coastal defences experiencing greater loading forces
- More frequent flooding due to surcharging drainage systems in winter
- Increased collapse of shallow, near-surface mine workings
- Road and rail networks are most vulnerable at river crossings and embankments, due to increase scouring of bridge foundations and earthwork instability from heavy rainfall
- Business parks vulnerable to winter flooding from inadequate drainage
- The Port of Sunderland is vulnerable to rising sea levels and increased exposure to wave energy and tidal surges
- Business or retail parks vulnerable to winter flooding from inadequate drainage.

Areas found to be at less risk include :

- Water resources, due to the capacity within Kielder Reservoir
- Electricity lines and pylons, while at risk from increasing high winds in upland areas, are not thought to be at risk at Sunderland's altitude, as long as proper inspection and maintenance continues
- Accepting above risks from flooding and heatwaves, newer stadiums, shopping centres and public buildings are expected to be fairly resilient from other weather impacts (storms, high winds), as long as inspection and maintenance regimes continue
- Also, the area at risk from fluvial and coastal flooding is not anticipated to increase significantly with climate change, as a result of the relatively steep topography of river and coastal areas in Sunderland.

In advance on preparing a comprehensive action plan to tackle all the risks associated with weather and climate change, an analysis has been carried out on these two main risk areas of flooding and heatwaves.

Risk	Impacts	Controls (and lead agency)	Status
<b>Flooding</b>			
Increased frequency of flooding in known flood risk areas (from coastal or river flooding)	<ul style="list-style-type: none"> <li>• Greater occurrence of flood damage to properties at risk</li> <li>• Greater likelihood of injury and harm to health from flooding incidents</li> <li>• Greater disruption likely to businesses in flood risk zones</li> </ul>	<ul style="list-style-type: none"> <li>• A multi-agency Catchment Flood Management Plan (CFMP) (lead by Environment Agency).</li> <li>• Maintaining up to date knowledge of flooding incidents and future floodrisk modelling (Environment Agency)</li> <li>• Planning Policies in place to prevent inappropriate development in flood risk areas (Sunderland City Council and other LAs in River Wear Catchment)</li> <li>• Flood warning service offered (Environment Agency)</li> <li>• Emergency Response Plans in place to respond to flooding incidents (Sunderland City Council)</li> <li>• Business Continuity Plans are encouraged in local businesses (Sunderland City Council)</li> <li>• Effectiveness of flood response plans monitored through NI189 action plan, agreed with Environment Agency (Sunderland City Council)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>OVERALL – GREEN</b></li> <li>• Local Area Flood Plan is awaiting completion and adoption in 2010/11</li> <li>• Strategic Flood Risk Assessment (SFRA) completed and enforced through national, regional and local planning policies.</li> <li>• Level 1 SFRA completed Dec 2009, with improved flood risk mapping.</li> <li>• 1.2% (1,442) of properties are at risk of flooding in Sunderland</li> <li>• 199 of those properties are in Flood Warning Areas, where 48% of properties are registered to the service.</li> <li>• In 2009/10, new flood warning service introduced to Lumley Park Burn area</li> <li>• No inappropriate development has occurred in flood risk zones since recording started in April 2004.</li> </ul>
Surface water drainage	<ul style="list-style-type: none"> <li>• Damage to properties and</li> </ul>	<ul style="list-style-type: none"> <li>• 400 sites prone to surface water</li> </ul>	<ul style="list-style-type: none"> <li>• <b>OVERALL - AMBER</b></li> </ul>

<p>flooding incidence increases, and increased frequency of foul sewage discharges to rivers and sea</p>	<p>risk to life and health of residents flooded by surface water</p> <ul style="list-style-type: none"> <li>• Deterioration of river and bathing water quality, and loss of Blue Flag beach status</li> <li>• The reputation of Sunderland, as a clean, green city by the sea, is damaged by poor bathing water quality</li> </ul>	<p>flooding identified (Sunderland City Council)</p> <ul style="list-style-type: none"> <li>• Northumbria Water Ltd schemes to increase storm water alleviation</li> <li>• Increase water storage and Sustainable Urban Drainage Systems within affected drainage catchments (Sunderland City Council, Northumbrian Water)</li> <li>• Enforcing permitted development rights on permeable paving (Sunderland City Council)</li> <li>• Prevent unnecessary removal of porous surfaces within affected drainage catchments (Sunderland City Council)</li> <li>• Continued investment in drainage maintenance</li> </ul>	<ul style="list-style-type: none"> <li>• SFRA revised and concluded Surface Water Flooding risk lower than previously thought.</li> <li>• No Surface Water Management Plan recommended in short term.</li> <li>• Sustainable Urban Drainage Systems (SUDS) will not currently be adopted by drainage authority.</li> <li>• But NWL have completed £2,5M drainage improvements in past 2 years.</li> <li>• Roker Beach has regained Blue Flag status in 2009</li> <li>• Water quality has been adopted as a local indicator within the Local Area Agreement,</li> </ul>
<p>Coastal defences and coastline to experience greater loading from sea level rise and storm surges</p>	<ul style="list-style-type: none"> <li>• Rates of coastal erosion will increase</li> </ul>	<ul style="list-style-type: none"> <li>• Coastal Management Plan in place, to manage impacts of coastal erosion and sea level rise</li> <li>• Effectiveness of shoreline management plans monitored through NI189</li> </ul>	<ul style="list-style-type: none"> <li>• OVERALL - AMBER</li> <li>• Full repairs / replacements of sea defences not completed though measures have been carried out to extend the life of the sea defences.</li> <li>• Cliff erosion to the south of Sunderland is proceeding as expected.</li> </ul>
<p><b>Heatwaves</b></p>			
<p>Increased frequency of</p>	<ul style="list-style-type: none"> <li>• Increased health</li> </ul>	<ul style="list-style-type: none"> <li>• National Heatwave Plan for England</li> </ul>	<ul style="list-style-type: none"> <li>• OVERALL - AMBER</li> </ul>



heatwaves	problems for the elderly (over 75s) and very young (babies), and alcohol users.	<p>updated each summer, and distributed to key services</p> <ul style="list-style-type: none"> <li>• A co-ordinated heatwave response plan is in place in South of Tyne and Wear NHS Trust, for health care providers and social services.</li> </ul>	<ul style="list-style-type: none"> <li>• National and Local Heatwave Plan communicated to HHAS and Children's Services</li> </ul>
-----------	---	---	---

These risks will be communicated to Sunderland City Council's Executive Management Team, Scrutiny Committee for Sustainable Communities, and the Sunderland Partnership, during the first quarter of 2010/11.

## 4.2 Natural Environment

To assess the risks that habitats and species in Sunderland might face from climate change, the Council commissioned Durham Wildlife Trust to conduct a detailed risk assessment. It assessed each separate risk arising from climate change on each habitat type in Sunderland.

All habitat types, and significant species within them, were taken from the Durham Biodiversity Action Plan (DBAP).

The study also recognises that these climate change risks are additional to other risks that habitat and species currently face, and therefore these climate risk findings should be incorporated with other habitat risks, to inform overall conservation policies and practices.

### Habitats at most risk from climate change

With this risk assessment, it has been possible to consider which habitats (and hence which species) are most at risk from the climate risks considered above. For example, there are situations where certain habitats face several high risk areas, so making them more vulnerable to climate change overall.

The study concludes that the following habitats in Sunderland are at greatest, cumulative risk from climate change impacts:

- **Coastal saltmarshes and mudflats**, including Timber Beach, at risk from sea level rise and catastrophic flooding events
- **Maritime cliffs along South Sunderland Coast**, at risk from sea level rise and increasing wave action, leading to greater erosion
- **Magnesian Limestone grasslands**, including Tunstall Hills, at risk from reduced summer rainfall, increased temperatures and heatwaves and greater human disturbance and fire risk from outdoor leisure activities during hot weather.

In future programmes to revise conservation policies and practices, these findings on should be incorporated into any prioritisation of schemes.

Other habitats at medium risk from climate impacts include the following:

- **Woodlands and Scrub** are at medium risk from high rainfall events, and storms and gales, which can increase soil erosion and tree fall
- **Wetlands** are at some risk from reduced summer rainfall which could reduce the extent of wetlands during summer months, but this could be offset by but greater frequency of flooding in general, which may be beneficial for some wetland species.

- **Arable grasslands** are at greatest risk from changes to agricultural practices as an indirect response to food production changes, which may arise from climate impacts elsewhere in the world.
- **Urban habitats** are likely to be at the least risk from climate change, although as for arable grasslands, the greater need to cultivate gardens and allotments to generate local food production could reduce the availability of wildlife-friendly urban habitats.

## Climate impacts to the Natural Environment

The study also categorised the risks according to each specific climate impacts, which presents a broader, more detailed analysis of what risks may arise. Again, the study ranks these into high, medium and low risk areas, as follows: risk-based approach, there are many more high risk areas that will

### High risk impacts

1. Major local coastal/tidal flooding and storm surges that may lead to:
  - Significant impacts upon coastal and inter-tidal habitats and along beaches, as well as wave-action undermining the unique coastal cliffs and their biodiversity in the south Sunderland area, at an ever increasing rate
  - Damages to coastal fringing habitats for the impact of additional wave energy and tidal surges and increased salt spray drift as the sea 'gets closer' e.g. coastal grasslands
2. Raised sea levels, which may lead to:
  - Permanent inundations of sensitive coastal habitats such as mudflat and salt marsh, including loss of some important habitats such as the salt marsh habitats at Timber Beach
  - The loss of strandline as result of the beach being squeezed between the sea and hard engineering features e.g. roads., and damage or loss to inter-tidal habitats as a result of increased exposure to raised seas levels.
3. Increased winter rainfall leading to major fluvial flooding, which produce:
  - 'Catastrophic' losses of some species, or damage to some habitats, as a consequence of major floods down the Wear, and changes to the composition of some plant and animal communities within the river water column and sediments
  - Increased number of subsidence ponds and wetland areas a result of the collapse of shallow, near-surface mine workings and the falling into disrepair of local drainage systems that have been damaged by frequent flooding due to surcharging drainage systems in winter
  - Areas presently at risk of flooding are likely to experience even greater frequency of flooding, meaning a greater extent, and longer duration of seasonal flood waters, with and benefits for some wetland species such as winter wildfowl, particularly if this occurs at appropriate times of the year e.g. autumn and winter.
4. The effects of extreme high temperatures and an increasing number of summer heat waves, with:
  - Increased risk of fire damage to grasslands, but also woodlands and scrub habitats because, of fire damage resulting from increased incidence of

drought conditions and greater recreational use in hotter summers e.g. rough grassland at Tunstall Hills, or Magnesian limestone grasslands.

- Changes to the composition of some plant communities in grasslands due to high summer temperature and possibly drier conditions
- Catastrophic' losses of some species e.g. common blue butterflies
- Alterations to the habitats themselves, particularly in the case of damp lowlands meadows and pastures, leading to the loss of characteristic species e.g. northern marsh orchid and common spotted orchids *Dactylorhiza purpurella* and *fuschii*.

### **Medium and Low Risk impacts**

Other expected risks and impacts from climate change have a medium or low risk. These include:

- Localised fluvial flooding (e.g. flash flooding in steep valley catchments), leading to:
- Storms and gales, which during the breeding season can be disastrous for some breeding birds
- Impacts upon biodiversity that arise because of works undertaken to reduce other aspects of climate change impacts. For example, increased hard engineering to offset coastal or river flooding.
- Low temperatures and heavy snow
- Localised urban flooding the 'over-topping' of local drainage systems.

For a more detailed analysis of climate risks to Sunderland habitats and species, with supporting information around all habitat and species important to Sunderland, please refer to the study itself, which is available from the Sustainability Team, Sunderland City Council ("Risk Assessment and Impacts Profile of Climate Change on the Natural Environment in the City of Sunderland", Durham Wildlife Trust, April 2010).

### 4.3 Risks to Council Services

Effective climate risk management requires that climate risks are understood at the service delivery level within Local Authorities. To start this process, an analysis of existing climate risks and service delivery responsibilities has been conducted. This is based on the known risks outlined above, and existing service responsibilities, as recorded in the Council's Corporate Improvement Plan.

The following table presents this information, which should act as the precursor to more rigorous service-based risk assessments to capture other risks, not already highlighted by this process.

<b>Council Service</b>	<b>Weather or Climate Risk</b>	<b>Details of current responsibilities and duties</b>	<b>Lead Officer</b>
<b>Office of Chief Executive</b>			
Property Services	Major incidents caused by severe weather  Impact of storm surges and sea level on Port operations	Emergency response to major incidents, including weather events <ul style="list-style-type: none"> <li>Managing major incident plan</li> <li>Co-ordination of Local Area Flood Plan</li> <li>Co-ordination of Pitt Review Action Plan</li> </ul>	Security Services Manager
Planning and Environment Services	New development increases risk of flooding  Council services and projects at risk from climate	Producing the Local Development Framework <ul style="list-style-type: none"> <li>Producing the Strategic Flood Risk Assessment</li> <li>Allocating development sites to avoid flood risk</li> <li>Setting planning policies to reduce all risks from climate change to future development</li> </ul> Approval of new developments <ul style="list-style-type: none"> <li>Ensuring new development does not increase flood risk</li> </ul> Conduct Sustainability Impact Appraisal <ul style="list-style-type: none"> <li>monitor climate risk in corporate projects and programmes.</li> </ul>	Planning Policy Manager  Development Control Technical Manager  Sustainability Co-ordinator
Transport and Engineering Services	Increased coastal erosion and flooding	Coastal Maintenance <ul style="list-style-type: none"> <li>Delivery the Shoreline Management Plan.</li> <li>Monitoring and maintenance of coastal defences</li> </ul>	Structures and New Works Manager  Highway

	Flooding of highways	<p>Management of Council infrastructure assets (including highways drainage)</p> <ul style="list-style-type: none"> <li>• Maintenance and upgrading of existing drainage systems</li> <li>• Monitoring of surface water flooding areas</li> <li>• Development of drainage improvement schemes</li> </ul>	Maintenance Manager
<b>City Services</b>			
Streetscene Services	<p>Flooding of highways</p> <p>Damage to highways and buildings from flooding and weather events</p> <p>Extension of growing season requires more grounds maintenance</p> <p>Public health risks caused by severe weather</p>	<p>Street Cleansing</p> <ul style="list-style-type: none"> <li>• Ensures highways are cleaned and maintained to an acceptable level</li> <li>• Provides programme of road gully cleansing</li> </ul> <p>Maintenance of Highways and Council Buildings</p> <ul style="list-style-type: none"> <li>• Repairs to highways and buildings</li> <li>• Emergency response (including drainage and flooding)</li> </ul> <p>Open space and parks grounds maintenance</p> <ul style="list-style-type: none"> <li>• To deliver effective grounds maintenance services</li> </ul> <p>Environmental Health service</p> <ul style="list-style-type: none"> <li>• Assessment of public health risks following severe weather events</li> </ul>	<p>Asst. Head of Streetscene</p> <p>Building Services Manager</p> <p>Asst. Head of Streetscene</p> <p>Environmental Health Manager</p>
<b>Health Housing and Adult Services</b>			
Provider Services Older Persons Business Support	Harm to vulnerable residents from severe weather events	<p>Protecting all the affected populace</p> <ul style="list-style-type: none"> <li>• Provide emergency care facilities during major incidents</li> <li>• Provide welfare services and advice</li> <li>• Provide welfare transport</li> </ul>	Head of Adult Services
<b>Children's Services</b>			
Capital Team	School closures due to severe weather	<p>Management of school closures</p> <ul style="list-style-type: none"> <li>• Advice to schools and governing bodies in developing a severe weather</li> </ul>	Capital Manager

		<p>school action plan with the intention of keeping the school open as far as possible</p> <ul style="list-style-type: none"> <li>• Individual heads and governing bodies have delegated responsibility when decisions to close are taken</li> <li>• Schools to make information available to parents on plans and procedures in place in dealing with severe weather events</li> <li>• Develop Children's Services Emergency School Closure Protocol</li> </ul>	
--	--	--	--

It should be emphasised that there will be other risks not included in this list, as well as other responsibilities and actions that Council Services are taking to minimise those risk. These will need to be captured by more in depth, service based risk assessments.

## 5 ADAPTIVE RESPONSES

This section provides information on what strategic or physical measures have been put in place to actively reduce the risk or severity of weather and climate impacts. This evidence is a critical part of demonstrating that Sunderland is actively reducing the main risks arising from climate change, which is a requirement of meeting Level 2 status within NI188.

The table below is a record of all adaptive responses planned or completed, by both Sunderland City Council and other agencies that operate in the City.

Risk area	Adaptive Response	Details	Lead agency
Flooding - general	Consider flood risk within Development Control decision	<b>Ongoing.</b> All development control decisions made to avoid development in flood risk areas, based on Strategic Flood Risk Assessment maps, and Environment Agency advice.	Sunderland City Council
	Strategic Flood Risk Assessment	<b>2009/10.</b> Commissioned and adopted new Strategic Flood Risk Assessment, to improve flood risk mapping and include surface water flood risks and critical drainage areas.	Sunderland City Council
River and coastal flooding	Extension of flood warning areas	<b>2009/10.</b> Expansion and improvements to the flood warning service to 109 homes and premises in the Lumley Park Burn area	Environment Agency
	Adoption of Local Area Flood Plan	<b>2009/10.</b> New response plan adopted by March 2010, to guide local response to area or regional flood incidents, aligned to the Northumbria Region Flood Plan.	Sunderland City Council and Environment Agency
Surface water flooding	Storm water alleviation schemes	<b>2008/9.</b> Completion of £1M scheme to improve sewerage in Fulwell,.  <b>2009/10.</b> Completion of £1.45M scheme to improve storm water alleviation, and reduce the of sewer flooding, to properties in Penshaw and Shiney Row	Northumbria Water Ltd
	Highways drainage improvements	<b>2008/9.</b> Completed £350,000 of Highways drainage improvements, to tackle surface water flooding hotspots	Sunderland City Council
	Gully cleansing	<b>Ongoing.</b> Council continues to operate a gully cleansing service, to keep gullies clear of debris, improve highways drainage and reduce risk of surface water	Sunderland City Council



		flooding	
Heatwaves	Local Heatwave Plan	<b>2007/8.</b> Adopted the South Tyne and Wear Heatwave Plan to coordinate health and social services response to heatwave episodes.	South Tyne and Wear NHS Trusts
Species migration	Living Landscapes project	<b>2009/10.</b> Programme launched to improve connectivity of key habitats in North East England, to increase resilience to changing climate and species migration.	Durham Wildlife Trust
	Green Infrastructure Plan	<b>2009/10.</b> Draft Green Infrastructure Plan developed, to provide strategy for more linked green corridors throughout the City, which will among other aims, support species migration and support urban cooling.	Sunderland City Council

### 3 NEXT STEPS / PROJECT PLAN

This strategy will continue to evolve as it is developed further. The table below outlines the completed and planned actions required to take forward this action plan, as outlined by guidance on NI188 and in a way that meets national requirements on climate change adaptation.

NI188 Level, and target date	Actions required / completed	Lead
Level 0 – by March 2009	Compile list of relevant documents and action plans	<b>Completed Jan 2009</b> (see appendix to this document)
	Collate existing risk assessments on weather and climate change	<b>Completed Jan 2009</b> (see Climate Change Adaptation on the Wear study)
	Nominate lead officials (through EMT and cabinet report)	<b>Completed -</b> Sustainability Team – by March 2009
	Raise climate impacts with LSP	<b>Completed -</b> Sustainability Team – 10 March 2009
Level 1 – by March 2009	Make public commitment to tackle climate impacts	<b>Completed</b> , by signing the Nottingham Declaration, <b>November 2001</b> , <b>EUROCITIES Declaration in Nov 2008</b> , and <b>EU Covenant of Mayors in Jan 2009</b>
	Compile climate impacts profile of existing and future impacts	<b>Completed</b> , by Climate Change Adaptation on the Wear study (Dec 2006) and Northumbria Community Risk Register (Oct 2008)
	Draft “Weather and climate adaptation strategy” , which defines priority risks	<b>Completed Feb 2008.</b> by Sustainability Team
	Communicate key vulnerabilities to Heads of Service, by EMT/cabinet report on climate impacts and project plan to meet NI188 targets	<b>Completed March 2009</b> , by Sustainability Team.
	Communicate key vulnerabilities to LSP Board	<b>Completed March 2009</b> by Sustainability Team.
		Sustainability Team – still

	Add climate impacts to Corporate Risk Register	pending agreement with Corp. Risk Management Group. Target for July 2010.
	Consider establishing a weather events register (within emergency planning)	<b>Completed.</b> Severe weather warning register started from July 2008, From Feb 2009 will start to record response to events too.
	Agree lead officer (Planning Policy Manager) for co-ordinating flood and coastal erosion risk management, for NI189	<b>Completed</b> – 31 March 2009
Level 2 – by March 2010	Impacts profile of climate on natural environment in Sunderland	<b>Completed</b> – by Durham Wildlife Services, April 2010
	Conduct corporate risk assessment of all climate impacts within Council	<b>Partially completed:</b> Service-specific risks identified. Requires additional work to embed into service-based risk management plans, as part of work to move to Level 3 .
	Conduct a community risk assessment of all climate impacts (and communicate with LSP partners)	Not progressed, Required as part of work to move to Level 3
	Develop prioritised actions against all risks	Not progressed. Needed as part of action plan to achieve Level 3.
	Show evidence of actions commencing on prioritised risks, as follows:	<b>Completed.</b> Log of adaptive response (Appendix 3) documents this evidence.
	<ul style="list-style-type: none"> <li>Improve Council's response to SOTW NHS Heatwave Plan</li> </ul>	<b>Completed.</b> Revised Heatwave Plan for England reported to HHAS and Children's Service June 2009
	<ul style="list-style-type: none"> <li>Action on surface water drainage, linked to coastal water quality</li> </ul>	<b>Progressed.</b> Risk downgraded, following completion of SFRA.
	Update "Weather and climate risk management strategy"	<b>Completed</b> - April 2010.

Level 3 – by March 2012	The programme of activity required to meet Level 3 must be developed and approved by March 2011, to be delivered in 2011/12	March 2011
	The overall goal to meet Level 3 will be met by adopting Sunderland's Weather and Climate Risk Action Plan by March 2012, with the full involvement and support of all relevant city partners.	March 2012

## 4 APPENDICES

### Appendix 1. Document database

The table below is a record of all local or regional plans, strategies, risk assessments and other information relevant to weather and climate change impacts. Items in bold indicate new sources added in the current revision of this strategy.

<b>Document title</b>	<b>Details</b>	<b>Lead Agency and source</b>
Northumbria Community Risk Register	List of community risks, as compiled by the Northumbria Local Resilience Forum, and relevant to the Sunderland Area.	Northumbria Local Resilience Forum
Climate Change Adaptation on the Wear	Climate impacts and risk assessment for the River Wear catchment, to 2050.	Environment Agency and Northumbria Regional Flood Defence Committee
Severe Weather Warning database	Record of all severe weather warnings issued in Sunderland since July 2008. Details of any responses to be included from Feb 2009.	Sunderland City Council
Strategic Flood Risk Assessment	GIS based assessment of flood risk zones in Sunderland, prepared by JBA Consulting (2008).	Sunderland City Council
<b>Level 1 Strategic Flood Risk Assessment</b>	<b>Revision to SFRA, to inform Local Development Framework, which now incorporate flood risk from surface water flooding and critical drainage areas (March 2010).</b>	<b>Sunderland City Council</b>
Regional Spatial Strategy	Contains regional planning policies to ensure new development is resilient to climate change impacts	North East Assembly
Sunderland's Unitary Development Plan, Alteration No. 2	Current development plan for Sunderland, including planning policies to encourage sustainable construction and to prevent unsuitable development in flood risk zones.	Sunderland City Council
LDF Core Strategy Preferred Options	Core Strategy of the Local Development Framework, containing policies to prevent development within flood risk zones, and to promote weather resilient building design. To be adopted 2011.	Sunderland City Council
LDF Core Strategy Topic Paper – Flood Risk	Evidence paper, reporting and analysing all flood risk information in Sunderland, particularly the SFRA.	Sunderland City Council
LDF Core Strategy Topic Paper – Energy and Climate Change	Evidence paper, summarising the key issues around carbon emissions and climate impacts in Sunderland	Sunderland City Council
<b>LDF Annual</b>	<b>Reports on the number of planning</b>	<b>Sunderland</b>

<b>Monitoring Report 2008/9</b>	<b>applications granted in flood risk zones, against Environment Agency guidance.</b>	<b>City Council</b>
Sunderland City Council Emergency Plan	Emergency Response Plan for Sunderland, which would be triggered in the event of a severe weather event.	Sunderland City Council
Multi Agency Flood Plan	A regional flood risk response plan including plans of each agency involved in responding to regional flood incidents.	Northumbria Local Resilience Forum
Sunderland Local Area Flood Plan	A new flood response plan will be adopted in 2010/11, to guide local response to area or regional flood incidents, agreed by SCC and Environment Agency.	Environment Agency,
Business Continuity guidance	Information and support for businesses and organisations in Sunderland to develop business continuity plans, to increase resilience against disruptions, which would include weather events.	Sunderland City Council
Shoreline Management Plan	Provides an assessment of the potential risk of flooding from the sea and coastal erosion, and is adopted in partnership with other coastal authorities in the North East.	Sunderland City Council
Wearside Weather	Published record of current and past weather patterns and measurements for Sunderland	Professor Wheeler, University of Sunderland
Durham Biodiversity Action Plan	Contains a specific action plan to limit the impact of climate change on sensitive habitats and species.	Durham Wildlife Trust
<b>Living Landscapes</b>	<b>Programme of projects to improve connectivity between habitats, to provide better resilience to changing climate</b>	<b>Durham Wildlife Trust</b>
<b>Habitats Risk Assessment for Sunderland</b>	<b>Detailed risk assessment of climate risks to key habitats and species in Sunderland, conducted by Durham Wildlife Trust.</b>	<b>Sunderland City Council</b>

## Appendix 2. Communications and events log

The table below is a record of all communications and events occurring in Sunderland that relate to climate and weather risks. Items in bold indicate recent events, not included in the previous version of this strategy.

<b>Date</b>	<b>Event or communication</b>	<b>Details</b>	<b>Lead agency</b>
13 Sept 2006	Norland Exercise	Multi-agency emergency response exercise, based around a severe weather scenario (including presentation on 2005 Carlisle floods).	Sunderland City Council and Tyne and Wear Emergency Planning Unit
March 2007	Launch of Climate Change Adaptation on the Wear Study	Regional launch, hosted by Environment Agency at Stadium of Light, Sunderland, attended by local and regional partners.	Environment Agency
May 2007 – April 2008	Climate Change Communication Campaign	Year long campaign in Sunderland, raising general awareness around the causes and impacts of climate change (funded by DEFRA's Climate Change Communication Fund). The main result was to achieve a 22% increase in the number of residents that now believe climate change to be caused by human activities.	Sunderland City Council
June 2007	Environment Week 2007	Week of activities and events highlighting the causes and impacts of climate change, involving sand and ice sculptures, NE Climate Dome, screenings of "Inconvenient Truth"	Sunderland City Council
Jul – Sept 2007	"Picture a World without CO2" photo competition.	Photo competition, where participants were requested to submit photos of their favourite place in Sunderland which they want to protect from climate change. Winning entries have been displayed in a touring exhibition at art centres across Sunderland.	Sunderland City Council
Summer 2007	North East Climate Dome.	Tour of several venues, events and schools, promoting causes and impacts of climate change in the North East.	Climate Neutral North East
27 Feb 2008	Norland Exercise	Multi-agency emergency response exercise, based around a flood scenario	Sunderland City Council and Tyne and Wear Emergency Planning Unit

April 2008	“Whatever the Weather” exhibition.	Public exhibition at Sunderland Museum and Winter Gardens, featuring exhibits, artefacts and information about weather, past and present, local and global.	Tyne and Wear Museums
May 2006, 2007, 2008 and 2009	Eco-rangers climate change zone.	Educational workshop for 1,000 children each year, raising awareness about the causes and impacts of climate change	Sunderland City Council
<b>May 2009</b>	<b>Sewage Treatment and Water Quality presentation</b>	<b>The Environment Agency presented a seminar to Councillors and Council Officers relating to Sewage Treatment and Water Quality issues in Sunderland.</b>	<b>Environment Agency and Sunderland City Council</b>
June 2009	Report on Heatwave Plan for England 2009	Updated Heatwave Plan reported to Health Housing and Adult Services and Children’s Service for appropriate action.	Sunderland City Council
Jan 2010	Attended Globe UK working group on climate adaptation	Sunderland and NE Regional Climate Change Co-ordinator were invited to input to working group, on climate adaptation, lead by Lord Hunt.	Sunderland City Council, ANEC.
March 2010	Strategic Flood Risk Assessment presentation	JBA Consultants hosted a day workshop, to present findings of the SFRA to Council Officers	Sunderland City Council
March 2010	Northumbria Water Ltd Consultation	Northumbria Water Ltd commenced a consultation exercise of all key local stakeholders, including SCC, to inform future engagement and improvement plans	Northumbria Water Ltd.



### Appendix 3. Severe weather incident log

The table below is a record of all recorded weather incidents and responses recorded, along with the total number of weather warnings received, as recorded in Sunderland's Severe Weather Incident log.

#### 2009 Incident log

<b>Date</b>	<b>Weather Warning</b>	<b>Incident details</b>	<b>Response details</b>
2 Feb 2009	Early and flash warning for heavy snow	School closures	
10 Feb 2009	Flood warning for coastal flooding	No incidents recorded	Rapid deployment camera deployed, sandbags issued
12 Feb 2009	Flash warning for heavy snow and icy roads	Early school closures	Gritters deployed
23 March 2009	Flood watch for low-lying areas	No incidents recorded	Sandbags, Pegasus Security Monitoring
5 July 2009	Guidance issued on extreme rainfall	A195 & A182 road flooding at Washington roundabout,	Various incidents attended by drainage
16 July 2009	Early warning, guidance and flash warning for heavy rainfall	Instances of surface water flooding	No recorded response
17 July 2009	Guidance and flood warning issued for possible flooding (medium risk)	Multiple instances of surface water flooding and also some areas of fluvial flooding. Major Incident Standby declared by NP. Some road closures.	Sandbags deployed, drainage and arbor teams activated. Incident control set up.
<b>Totals</b>	<b>108 separate warnings received, over 28 days</b>	<b>5 recorded incidents (including 1 major incident standby)</b>	<b>5 recorded responses</b>