



Department of the  
**Environment**  
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# Northern Ireland Climate Change Adaptation Programme



January 2014



# Ministerial Foreword

Maintaining and improving our environment represents one of our toughest tests. This is particularly so when confronted by global issues such as climate change whose environmental impacts know no boundaries or borders. There is no doubt that climate change represents the biggest environmental, economic and social challenge of the 21st century. The threat of global warming, the impact on the polar ice caps, sea level rises, increases in the frequency of extreme weather events cyclones, floods, wildfires can all have extremely serious consequences for the environment, the economy and society.



These are global issues but they can and will continue to have significant local impacts. We have already experienced first hand extreme weather in the form of heavier snowfalls, more intense rainfall and the associated flooding events of recent years. Many of us as individuals and as part of the wider community have felt the severe and harsh consequences of these events.

To minimise the impacts of climate change and ultimately our vulnerability, we not only need to develop robust mitigation strategies to limit future greenhouse gas emissions but crucially develop complementary strategies to adapt to our warming world.

We have known this for some time, so we don't need more words, we need more action. Action to help mitigate against future climate change and action to adapt to and better prepare us for the changing climate.

That is why I am pleased to publish this first Climate Change Adaptation Programme for Northern Ireland.

The Adaptation Programme has adopted a cross-sectoral approach and will set out a range of actions which constitute our initial steps in preparing for the impacts of climate change. It provides an integrated Government response to the priority climate change risks and opportunities identified in the Climate Change Risk Assessment for Northern Ireland. It puts in place the framework to meet the climate change adaptation challenges and it helps build resilience against current and impending changes to our climate over the next five years.

This Adaptation Programme is the start of an ongoing climate change adaptation process. It seeks to bring about a more joined up response to climate change adaptation, highlighting what departments are doing to ensure the North of Ireland is better prepared for the challenges that future changes in our climate will bring. It also builds climate change considerations into Government policy decisions and puts in place a range of activities which will not only counteract climate change risks but will also seek to take advantage of the

potential opportunities that might arise. Therefore many of the activities set out in the Adaptation Programme will bring tangible benefits while helping us to cope with our changing weather patterns.

Government alone cannot meet the climate change challenge. We all need to work together. I believe that this Adaptation Programme provides the leadership needed to empower the wider public sector, the private sector, communities and individuals to take action. Climate change will potentially have far reaching effects for all of us. It could affect our health and wellbeing; our homes; the accessibility of our road network; and the provision of services, such as, water and electricity supplies. Everyone must be made aware of the impacts that climate change will bring and understand how each of us can play our part by taking responsibility for those actions which we can take to help deal with them.

I am confident that we will rise to this challenge, and in doing so boost our resilience to a changing climate, improve the adaptive capacity and stability of our environment, society, and economy now and for future generations. I welcome your involvement in supporting this Adaptation Programme which I believe will bring about a stronger, more climate resilient Northern Ireland.

A handwritten signature in black ink that reads "Mark Durkan". The signature is written in a cursive style and is underlined with a horizontal line.

**Mark H Durkan MLA**  
**Minister of the Environment**

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# Executive Summary

Changes to the Northern Ireland climate system as highlighted, most noticeably, by the recent extreme weather events, pose serious challenges for decision makers throughout Northern Ireland. The global scientific community's understanding of climate change has improved and there is overwhelming scientific consensus that climate change is one of the most complex and challenging global issues with local impacts facing Northern Ireland.

This is the first Northern Ireland Climate Change Adaptation Programme (hereafter referred to as the Adaptation Programme) as required by Section 60 of the UK Climate Change Act 2008<sup>1</sup>. The Adaptation Programme contains the Government's response to the risks and opportunities identified in the Climate Change Risk Assessment (CCRA) for Northern Ireland<sup>2</sup>, which was produced in January 2012, as part of the overall UK CCRA.

The Adaptation Programme covers the period 2014-2019. It provides the strategic objectives in relation to adaptation to climate change, the proposals and policies by which each department will meet these objectives, and the timescales associated with the proposals and policies identified.

It is an iterative process that is required every five years and it contains the first steps in ensuring Northern Ireland's preparedness for the impacts of climate change.

The Adaptation Programme is divided into two parts.

**Part 1 Setting the Scene** provides the background to climate change, climate change adaptation in a global context and describes climate change adaptation activities already undertaken by departments.

**Part 2 The Adaptation Programme** sets out the strategic direction and objectives in preparing for the impacts of climate change. It also establishes a range of adaptation activities and actions (policies and proposals) for the next five years.

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<sup>1</sup> <http://www.legislation.gov.uk/ukpga/2008/27/part/4>

<sup>2</sup> [http://www.doeni.gov.uk/climate\\_change\\_risk\\_assessment\\_ni\\_2012.pdf](http://www.doeni.gov.uk/climate_change_risk_assessment_ni_2012.pdf)

## **PART 1 — Setting the Scene**

### **Chapter 1: Climate change and the need for an Adaptation Programme.**

There is clear evidence that our climate is changing. It is also widely accepted that to address climate change, action is needed to reduce greenhouse gas emissions (mitigation) and to respond to the impacts that it brings (adaptation). Adaptation can help us manage for an uncertain future and prepare us for dealing with the impacts of our changing climate. The Stern Report highlights that adaptive action is needed to reduce the long term costs and disruption that climate change will cause.

### **Chapter 2: Global climate change adaptation**

Addressing the impacts of climate change is an issue across the globe. The most serious and direct impacts are already evident, especially in developing countries. The 'Foresight Report' highlights that the impacts of climate change overseas could affect the UK more than the direct impacts of climate change at home. Likewise the study into the 'International threats and opportunities of climate change to the UK' evaluates the international dimensions of climate change and the implications for the UK.

Climate change adaptation measures are already being taken at International, European and at UK level. The UK Climate Change Risk Assessment (CCRA)<sup>3</sup> identified the key risks and opportunities facing the UK as a result of climate change throughout the 21st century. It provides the evidence base to plan for adaptation in England, Scotland, Wales and Northern Ireland.

### **Chapter 3: Likely impacts of climate change in Northern Ireland**

The UK has one of the most advanced climate change projection models in the world. The latest UK Climate Change Projections, known as UKCP09<sup>4</sup>, provide climate scenarios for a range of emission scenarios and time periods. Using a medium emission scenario UKCP09 Northern Ireland will potentially experience warmer, wetter winters and hotter, drier summers by the 2050's.

UKCP09 also projects that extreme events such as periods of very heavy rainfall, dry spells and flooding will become commonplace in Northern Ireland. Recent weather events have highlighted how our climate is already changing and how extreme weather events have become widespread and more prevalent during the last decade.

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<sup>3</sup> [http://www.doeni.gov.uk/uk\\_climate\\_change\\_risk\\_assessment\\_government\\_report-2.pdf](http://www.doeni.gov.uk/uk_climate_change_risk_assessment_government_report-2.pdf)

<sup>4</sup> <http://ukclimateprojections.defra.gov.uk/>



## **Chapter 4: CCRA for NI - key findings, Government responsibilities and activities to date**

The Climate Change Risk Assessment for Northern Ireland provides an overview of the impacts from climate change. The most important risks and opportunities identified are presented under five themes: natural environment; agriculture and forestry; business; buildings and infrastructure; and health and wellbeing.

All departments have a responsibility to take action on the various risks and opportunities identified under the five themes of the CCRA for Northern Ireland. Climate change has been identified as a key challenge in a number of strategies, such as the Northern Ireland Regional Development Strategy 2035, Everyone's Involved - Sustainable Development Strategy, and the Northern Ireland Economic Strategy. Measures have been included in these to help our society, economy, and the environment prepare for a changing climate.

## **PART 2 — The Adaptation Programme**

### **Chapter 5: Roadmap to the Adaptation Programme**

Our vision for the Adaptation Programme is “A resilient Northern Ireland which will take timely and well-informed decisions that are responsive to the key risks and opportunities presented by climate change.” This will help everyone in Northern Ireland to better understand and manage the impacts from our changing climate.

To achieve this vision the following five objectives have been identified:

- Fulfil the statutory duties;
- Work in partnership across Government and with relevant stakeholders to strengthen and develop policy;
- Raise awareness of the likely effects of climate change;
- Promote and support the enhancement of scientific evidence; and
- Engage with other administrations.

The Adaptation Programme focuses on three adaptation principles:

- Integrating adaptation into relevant key policy areas;
- Developing the evidence base; and
- Communication and cooperation.

The most important risks and opportunities to be addressed over the next five years were identified using a selection process. Each risk and opportunity was categorised against the following framework:

- Action required in next 5 years;
- Investigate / monitor to develop the evidence base;
- No specific current action required in next 5 years; and
- Impacts that fall under the UK National Adaptation Programme

To take account of cross cutting issues to the climate change risks and opportunities being brought forward in the Adaptation Programme, four primary areas for action have been identified. These are:

- Flooding;
- Water;
- Natural Environment; and
- Agriculture and Forestry.

## **Chapter 6: Primary areas for action**

The high level actions and key activities for each primary area within the Adaptation Programme reflect a proportionate and flexible response that will contribute to Northern Ireland's adaptation journey.

### **Flooding**

Flooding has been identified as potentially one of the most significant and urgent risks to affect Northern Ireland. Five high level actions have been identified to address the challenge of flooding now and in the future. These actions will ensure that the impact of flooding on people, property, infrastructure and the environment will be reduced through awareness, avoidance, alleviation and assistance:

- I. Develop and implement sustainable strategies to explore, address and manage significant flood risk;
- II. Build resilience of infrastructure to flooding and implement appropriate inspection and monitoring programmes;
- III. Identify and implement measures to reduce the impact of significant flood risk to people, property and the environment;
- IV. Develop stakeholder understanding and awareness of significant flood risk and potential adaptation measures; and
- V. Identify consequences of significant flood risk on the built heritage.

The range of activities identified within the lifespan of the Adaptation Programme will improve the ability to manage and recover from flooding events. Some of the key activities to be progressed include: preparing flood risk hazard maps and flood risks maps for potential areas of significant flood risk; developing and implementing a Stormwater Management Implementation Strategy; developing a long term water strategy covering flood prevention, protection and preparedness; and promoting preparedness across a range of sectors.

## Water

Water is essential for everyday living and for maintaining healthy ecosystems. Climate change will increase the complexity of managing our water resources. Six high level actions have been identified to address the priority impacts on water. These actions will improve water resource management; build resilience to current climate variability; build capacity to adapt to future climate change and improve our understanding of the dynamics of climate changes as it affects water supply and demand:

- I. Implement ongoing water resource management measures;
- II. Identify opportunities to improve resilience of the water resource and infrastructure;
- III. Improve water efficiency and manage the water resource sustainably to meet need;
- IV. Encourage and implement appropriate water monitoring programmes and modelling;
- V. Maintain and enhance the quality of water; and
- VI. Raise awareness of water issues and develop understanding to motivate adaptation action.

Successful management of Northern Ireland's water resource underpins a number of activities identified in response to the climate change risks identified in the CCRA for Northern Ireland. The activities include: developing and implementing water resource management measures in River Basin Management Plans; encouraging and promoting water efficiency; and developing social and environmental guidance for water and sewerage services, which will set out priorities for the water industry in relation to adaptation and investment.

## Natural Environment

Climate change will exacerbate the threat from land use change and management practices to our natural environment. Seven high level actions have been identified to address the impacts. These actions focus on conserving and protecting ecological networks; improving management to protect ecosystem services; supporting adaptive management; raising awareness and motivating action within the terrestrial, freshwater and marine environments:

- I. Identify and implement opportunities to build resilience into the natural environment;
- II. Explore environmental research opportunities and the development of assessment tools;
- III. Identify, develop and review terrestrial and freshwater environmental surveillance and monitoring programmes;

- IV. Support land managers in building a resilient natural environment and implement best practice;
- V. Protection and enhancement of the management of habitats and species;
- VI. Increase adaptation awareness and motivate stakeholder action in the natural environment; and
- VII. Ensure marine planning considers the impacts of climate change.

Key activities brought forward in the Adaptation Programme will help protect and manage the benefits that the natural environment provides. These include carrying out and contributing to research projects; developing new and revised policy and guidance such as the Natural Capital Policy; enhance funding and grant-aid schemes; implementing and encouraging best practice management of habitats and species; and developing a marine plan.

## Agriculture and Forestry

Agriculture and forestry are important land uses in Northern Ireland due to their contribution to the natural environment and the economy. Five high level actions have been identified to increase the resilience of these sectors from our changing climate. These focus on increasing awareness; developing best practice; supporting land managers in reducing risks and taking advantage of opportunities; identifying measures to support adaptation and exploring research opportunities to build resilience:

- I. Increase awareness of climate change adaptation and develop best practice for land managers;
- II. Research and identify climate resilient grasses and crops;
- III. Identify measures to support adaptation in agriculture;
- IV. Improve the resilience of woodland; and
- V. Support and encourage land managers in reducing the risk of and impacts from wildfires.

To increase the resilience of the agriculture and forestry sectors from climate change key activities include carrying out research into weather related trends; developing best practices and using outcomes to inform policy; and educating farmers and undertaking research on wildfires and vegetation recovery.

## Chapter 7: Governance, delivery and reporting on progress

The Adaptation Programme has been taken forward by the Cross-Departmental Working Group on Climate Change (CDWG CC), which is chaired by the Minister of the Environment. The CDWG CC will report annually to the Northern Ireland Executive on progress in implementing the Adaptation Programme. This Group will also consider indicators which could monitor and evaluate progress in preparing Northern Ireland for the effects of climate change.

Adapting to climate change is not an issue for Government to resolve alone. Whilst Government action is critical, it is up to everyone – private sector; district councils and wider public sector; communities; third sector and individuals - to take responsibility and deliver practical actions to deal with the impacts of climate change.

## **Chapter 8: Building adaptive capacity and addressing climate change**

Government needs to provide leadership if Northern Ireland's adaptation journey is to be successful. Enhanced collaboration and cooperation is fundamental to an effective response as adaptation is a long term process. Government will continue to communicate the need to adapt and work with others to provide support to help key sectors build resilience and enhance adaptive capacity. Work will also continue towards addressing evidence gaps through research.



## **Part 1**

# Setting the Scene





# Chapter 1

## Climate change and the need for an Adaptation Programme



### What is climate change?

- 1.1 Climate refers to the average weather experienced in a region over a long period, typically 30 years. The Earth's climate has experienced many changes in response to natural causes and the term climate change usually refers to changes that have occurred since the early 1900's. The globally averaged combined land and ocean temperature data show a warming of 0.85°C, over the period 1880-2012<sup>5</sup>.
- 1.2 Climate science research has identified how, directly or indirectly, human activity has changed the composition of the atmosphere resulting in the presence of significantly increased amounts of greenhouse gases such as carbon dioxide and methane. This enhances the earth's natural greenhouse effect and increases temperatures globally.

<sup>5</sup> <http://ipcc.ch/report/ar5/wg1/>

So what's the difference between weather and climate?

Climate is the pattern of meteorological variables in a given region over a long period of time. Weather generally refers to the localised temperature and precipitation activity on a day to day basis. In other words...

Climate is what you expect, weather is what you get.

- 1.3 The two major strategies for addressing climate change are mitigation and adaptation. Although both are related and overlap to a degree, there are basic distinctions.

## What is mitigation?

- 1.4 It is generally accepted that greenhouse gas emissions are the main cause of climate change and historic emissions currently in the atmosphere will impact on our climate for many years to come. By reducing these emissions the extent of future climate change will be lessened. The slowing down or mitigating of future impacts is known as climate change mitigation. There are many ways in which we can all cut our greenhouse gas emissions. For example: by being more energy efficient; or using renewable energy sources within our homes and places of work; or by using sustainable forms of transport, such as, walking, cycling and public transport.

## What is adaptation?

- 1.5 Altering our behaviour to respond to the impacts of climate change is called adaptation. Climate change adaptation is the process of adjusting to the changes in our climate and planning how to prepare for the future. It is about risk management. By adapting our economic, social and natural systems in response to climatic change we can help protect against the potential negative impacts by reducing exposure and developing the capacity to cope with unavoidable damage. Adaptation also means seeking out the ways in which we can exploit the opportunities which the changes in climate may also bring.

## Why is adaptation important?

- 1.6 Even if we were able to halt our emissions today it is likely that we would experience the consequences of climate change, as a result of historic emissions in the atmosphere, for at least the next 30-40 years. Projected global changes in annual maximum temperature demonstrate, that with no change to current emission levels, temperatures are projected to increase by up to 6°C relative to the 1961-1990 average, whereas with mitigation warming could be kept to 2°C across most areas<sup>6</sup>.

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<sup>6</sup> <http://www.metoffice.gov.uk/research/news/climate-guide>

- 1.7 Adaptation can help us manage this situation by reducing the future negative effects of climate change, take advantage of the positive opportunities and being better prepared to deal with impacts. Adaptation is an important part of society's response to the climate change challenge, which will have far-reaching consequences for society, natural systems and the economy.
- 1.8 Northern Ireland's climate is already vulnerable to extreme events, such as increased intensity and volume of rainfall. As a consequence of these events there has been added pressure on our water courses, drainage and sewerage systems. Where these systems have been unable to manage the substantial increase in volume of water over such a short period of time, many households and businesses have been affected by flooding.
- 1.9 In recent years, in addition to extreme rainfall and flooding events, Northern Ireland has also experienced heavy snow falls and periods of record high and low temperatures (see Chapter 3). All of these extreme weather events have resulted in major impacts and disruption across all sectors of society.

## The value of adaptation

- 1.10 The Stern Review: The Economics of Climate Change<sup>7</sup> highlights that adaptation costs are hard to estimate, due to uncertainty about the precise impacts of climate change and its multiple effects. The report however indicates that early adaptation action will reduce costs and disruption caused by climate change. It concludes that the costs of adaptation will rise exponentially if efforts to mitigate emissions are not successful.
- 1.11 It is clear that in the short term climate change adaptation will come at a cost but dealing with the impacts of climate change will cost much more if we do not adapt. Early adaptation is essential to reduce long term costs and disruption caused by climate change and its impacts, both direct and indirect. However, our response also needs to be proportionate to the risks, given the level of uncertainty.

## Why do we need an Adaptation Programme?

- 1.12 It is important that Northern Ireland builds resilience to, and maximises the benefits from, our changing climate. Part 4, Section 60 of the UK Climate Change Act 2008 requires relevant Northern Ireland Departments to lay programmes before the Northern Ireland Assembly setting out objectives, proposals, policies and associated timescales to address the risks and opportunities identified in the Climate Change Risk Assessment (CCRA) for Northern Ireland.

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<sup>7</sup> [http://www.hm-treasury.gov.uk/d/Executive\\_Summary.pdf](http://www.hm-treasury.gov.uk/d/Executive_Summary.pdf)

- 1.13 The Department of the Environment (DOE) is co-ordinating a cross-departmental response to these risks and opportunities in the Northern Ireland Climate Change Adaptation Programme (hereafter referred to as the Adaptation Programme).

## **What will the Adaptation Programme do?**

- 1.14 The Adaptation Programme seeks to explore how we can best adapt to climate change. The Adaptation Programme will provide the Northern Ireland response to the priority climate change risks and opportunities identified in the CCRA for Northern Ireland. It will set out the strategic direction and objectives in preparing Northern Ireland for the effects of climate change. It also establishes a range of actions and key adaptation activities for the next five years (2014–2019).

## **Who is the Adaptation Programme for?**

- 1.15 The impacts of climate change have consequences for everyone in Northern Ireland. In setting out the actions and key activities the Adaptation Programme will raise awareness of the need to adapt to our changing climate within the whole of the wider public sector, across the private sector industries and businesses and also in communities and non government organisations. It will help all of these sectors to consider and review their activities and build upon the Government response to the climate change risks and opportunities. It will also encourage everyone to rise to the challenge of adapting to a changing climate.

## Chapter 2

### Global climate change adaptation



#### Adaptation at International level

- 2.1 There is an urgent need for all countries to take action to address the impacts of global climate change. The most serious and earliest direct impacts of climate change are already evident across other parts of the world, and especially in developing countries, who have contributed least to the problem. Adaptation to climate change presents formidable challenges and dilemmas of justice, many of which are most acute on communities in the developing world. Internationally, developed countries have a moral responsibility to ensure that developing countries and those communities least able to cope with the changing climate are not further disadvantaged. It is therefore important that developed countries lead by example and that as a region we also play our part in adapting to climate change.
- 2.2 International actions to address climate change fall under the 1992 UN Framework Convention on Climate Change (UNFCCC)<sup>8</sup>. The threat of climate change is being addressed globally by the UNFCCC treaty whose long term objective is:

<sup>8</sup> <http://unfccc.int/2860.php>

*“...stabilization of atmospheric greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system...”*

- 2.3 The UNFCCC also commits all Parties to formulate, implement, publish and update adaptation measures, as well as cooperate on adaptation. It provides for a variety of support mechanisms for adaptation implementation in developing countries, including measures on the provision of funding; insurance and technology transfer; and scientific and technical assistance for all parties to enhance their knowledge base.
- 2.4 The Parties to the convention meet annually in a Conference of the Parties (COP)<sup>9</sup>. The COP is responsible for keeping international efforts to address climate change on track. It reviews the implementation of the Convention and examines the commitments of Parties in light of the Convention’s objective, new scientific findings and experience gained in implementing climate change policies.

## Adaptation at EU level

- 2.5 To complement and take forward International agreements across its Member States, the EU intends to support action by promoting greater coordination and information sharing between Member States, and by ensuring that adaptation considerations are addressed in all relevant EU policies.
- 2.6 An EU Adaptation Strategy which seeks to enhance the preparedness and capacity to respond to the impacts of climate change was launched in April 2013<sup>10</sup>. The strategy sets out where the EU can add value highlighting the potential net benefits of effective EU wide action and presents a range of possible policy options to fill identified gaps, including:
- Approaches based on co-ordination, knowledge transfer and better communications;
  - Climate proofing of appropriate EU funding or legislative mechanisms; and
  - Legislative proposals including mandatory National Adaptation Plans.

## International impacts of climate change

- 2.7 Impacts of climate change overseas could be as important as the direct impacts within UK shores over the next few decades<sup>11</sup>.

<sup>9</sup> [http://unfccc.int/meetings/warsaw\\_nov\\_2013/meeting/7649.php](http://unfccc.int/meetings/warsaw_nov_2013/meeting/7649.php)

<sup>10</sup> [http://ec.europa.eu/clima/policies/adaptation/what/index\\_en.htm](http://ec.europa.eu/clima/policies/adaptation/what/index_en.htm)

<sup>11</sup> <http://www.eea.europa.eu/publications/climate-impacts-and-vulnerability-2012>



- 2.8 The Foresight Report<sup>12</sup>, 'International Dimensions of Climate Change' warns that the social, economic and environmental impacts of climate change abroad could affect the UK more than direct impacts of climate change at home.
- 2.9 The report identified the important areas of potential impact and areas of uncertainty, examining risks to the UK across five areas: (1) foreign policy and security; (2) finance and business; (3) infrastructure; (4) resources and commodities and (5) health.
- 2.10 As a follow-up to the Foresight Report the Department of Environment, Food and Rural Affairs (Defra) has published a study into the 'International threats and opportunities of climate change to the UK'<sup>13</sup>. One of the key findings in the report highlights that the threats associated with climate change internationally can be 'an order of magnitude' larger than domestic threats for some thematic areas, in particular business (trade and investment) and food (imports).
- 2.11 The findings demonstrate how the UK is closely interconnected with the global economy and has an important role in addressing risks internationally.

## UK Climate Change Risk Assessment

- 2.12 The UK Climate Change Act (2008) requires the UK Government to publish 5-yearly assessments of risk to the UK, of the current and predicted future impacts of climate change. The UK Climate Change Risk Assessment<sup>14</sup> (CCRA) published on 25 January 2012 was the first assessment of its kind undertaken. It provided a national overview of potential risks and opportunities based primarily on the 2009 UK Climate Projections.
- 2.13 The UK CCRA reviewed the evidence for over 700 potential impacts of climate change in a UK context. Detailed analysis was undertaken for over 100 of these impacts on the basis of their likelihood, the scale of their potential consequences and the urgency with which action may be needed to address them.
- 2.14 The outputs from the UK CCRA included analysis of risks from climate change in:
- Eleven sector reports<sup>15</sup> which describe a wide range of potential risks in each sector, followed by a more detailed analysis of selected risks that were judged to be the most important;

<sup>12</sup> <http://www.bis.gov.uk/assets/foresight/docs/international-dimensions/11-1042-international-dimensions-of-climate-change.pdf>

<sup>13</sup> <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=18348>

<sup>14</sup> [http://www.doeni.gov.uk/uk\\_climate\\_change\\_risk\\_assessment\\_government\\_report-2.pdf](http://www.doeni.gov.uk/uk_climate_change_risk_assessment_government_report-2.pdf)

<sup>15</sup> Agriculture, Biodiversity & Ecosystem Services, Built Environment, Business, Industry & Services, Energy, Forestry, Floods and Coastal Erosion, Health, Marine & Fisheries, Transport and Water.

- An overarching technical evidence report (CCRA Evidence Report) summarising the key findings of all sector reports and covering five key themes: (1) Natural Environment, (2) Agriculture and Forestry, (3) Business, (4) Buildings and Infrastructure, and (5) Health and Wellbeing; and
- Separate reports for each of the Devolved Administrations, including a CCRA for Northern Ireland, which were based on the UK-wide Sector Reports taking account of the risks that are of particular concern in each administration.

2.15 The CCRA for Northern Ireland identifies key risks and opportunities which may be faced as a result of our changing climate in terms of their relative magnitude throughout the 21st century and the confidence that can be attributed to the result. It presents us with a good basis to prioritise and plan how to adapt.

## Economics of Climate Resilience

2.16 Defra published the Economics of Climate Resilience report (ECR)<sup>16</sup> in March 2013. The ECR sets out an economic framework for adaptation in the UK. It was an evidence gathering project to gain an understanding of the barriers to, and enablers for, adapting to climate change. Phase 1 of the project produced nine reports<sup>17</sup> covering the five themes of the CCRA. A synthesis report draws together the key findings and recommendations of the work with particular focus on cross-cutting themes.

2.17 Phase 2 of the project produced a cost benefit analysis on the effects of flooding and mental health aspects.

2.18 These reports provide a trouble-shooting guide to help the UK identify the key obstacles faced in adapting to the impacts of climate change.

## The UK National Adaptation Programme

2.19 The UK Government led by Defra was responsible for the development of the United Kingdom's first National Adaptation Programme<sup>18</sup>, published in July 2013. The programme primarily addresses the most urgent risks and opportunities set out in the first UK CCRA for England as well as covering reserved, excepted and non-devolved matters.

2.20 The UK National Adaptation Programme sets out what the UK Government considers to be the most urgent areas for action. It encourages awareness and action beyond central Government, through collaboration and will be reviewed every five years following publication of ensuing UK CCRA's.

<sup>16</sup> Agriculture, Biodiversity & Ecosystem Services, Built Environment, Business, Industry & Services, Energy, Forestry, Floods and Coastal Erosion, Health, Marine & Fisheries, Transport and Water.

<sup>17</sup> <http://randd.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=18016>

<sup>18</sup> <https://www.gov.uk/government/policies/adapting-to-climate-change/supporting-pages/national-adaptation-programme>



## Adaptation in Wales

- 2.21 Section 80 of the UK Climate Change Act (2008) requires a report on how Welsh Ministers are addressing the causes and consequences of climate change. The Climate Change Strategy for Wales, published in 2010<sup>19</sup> was the first report submitted under this part of the UK Climate Change Act 2008. In the Strategy a framework has been developed to address the impacts resulting from a changing climate and to support effective adaptation in Wales.
- 2.22 Alongside the Strategy there is an Adaptation Delivery Plan that sets out a package of measures to help ensure that Wales is well-equipped to manage the impacts of climate change. The Welsh Government are also developing Sectoral Adaptation Plans which seek to identify the risks and opportunities for sectors and puts in place programmes for embedding climate change adaptation into delivery across these sectors. The Sectoral Adaptation Plans will be developed in the following five categories:
- Natural Environment;
  - Infrastructure;
  - Health;
  - Communities; and
  - Business and Tourism.

For further information please see the Welsh Government website.<sup>20</sup>

## Adaptation in Scotland

- 2.23 Publication of the UK CCRA activated a provision (Section 53) in the Climate Change (Scotland) Act 2009 to develop a Scottish Adaptation Programme. The Scottish Adaptation Programme<sup>21</sup> will address the impacts identified for Scotland in the UK CCRA and will replace the existing Adaptation Framework which already contributes to building resilience and capacity to adapt to climate changes. The Programme addresses the relevant risks identified in the CCRA for Scotland under three themes:
- Climate Ready Buildings and Infrastructure Networks;
  - Climate Ready Natural Environment; and
  - Climate Ready Society.

<sup>19</sup> <http://wales.gov.uk/topics/environmentcountryside/climatechange/publications/strategy/?lang=en>

<sup>20</sup> <http://wales.gov.uk/topics/environmentcountryside/climatechange>

<sup>21</sup> <http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/adaptation/AdaptationProgramme>

## Adaptation in Republic of Ireland

- 2.24 The Republic of Ireland published a 'National Climate Change Adaptation Framework - Building Resilience to Climate Change'<sup>22</sup> in December 2012. The framework provides a strategic policy focus to ensure adaptation measures are taken across different sectors and levels of Government to reduce Ireland's vulnerability to the negative impacts of climate change. The primary aim of the Framework is to ensure that an effective role is played by all stakeholders in putting in place an active and enduring adaptation policy regime.
- 2.25 The Republic of Ireland intends to follow a two-phased approach to adaptation. The first phase, which is underway, will focus on identifying national vulnerability to climate change. The second phase will involve the development and implementation of sectoral and local adaptation action plans which will form part of their comprehensive national response.

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<sup>22</sup> <http://www.environ.ie/en/Environment/Atmosphere/ClimateChange/NationalAdaptationFramework/>

## Chapter 3

# Likely impacts of climate change in Northern Ireland



## Northern Ireland's climate

- 3.1 The climate of Northern Ireland is characterised by equability, a consequence of the moderating effects of the Atlantic Ocean - bringing relatively mild winters and cool summers. However, the indented shape of the coastline and the presence of high ground introduce localised differences in temperature, cloud and precipitation.

## Climate variability recorded by the Met Office

- 3.2 The Met Office<sup>23</sup> holds an extensive archive of weather observations from a variety of different locations around Northern Ireland. It has measured climatic conditions for many years, so it is possible to define what is considered normal and what is considered an extreme event for Northern Ireland. Data is collected and made available for a wide range of climate elements, including average maximum temperature, rainfall amount and hours of sunshine<sup>24</sup>.

<sup>23</sup> <http://www.metoffice.gov.uk/>

<sup>24</sup> <http://www.metoffice.gov.uk/climate-change/policy-relevant/obs-projections-impacts>

## Climate change projections

- 3.3 The most up-to-date UK Climate Change Projections, known as UKCP09 were published in 2009. They provide information on anticipated changes to climate variables such as precipitation, temperature, and sea level rise. UKCP09 combines results from 12 of the world's leading climate models. This reduces the risk that the results are skewed by relying on just one climate model. The projections are determined by the strength of evidence that supports a particular projected outcome. It is anticipated that an estimate of the probabilities associated with each projection offers the opportunity for users to assess relative climate risks, consider a range of options and make informed choices.

UKCP09 gives projections (possible) not predictions (probable) of changes to the UK climate.

## Projected climate for Northern Ireland

- 3.4 There are a wide variety of results for Northern Ireland that can be drawn from UKCP09. Assuming a medium emission scenario and central probabilistic estimates, the future climate of Northern Ireland in the 2050's would be likely to exhibit:
- Increase in winter mean temperature of approx 1.7 °C;
  - Increase in summer mean temperature of approx 2.2°C;
  - Change in winter mean precipitation of approx + 9%;
  - Change in summer mean precipitation of approx -13%; and
  - Sea level rise for Belfast of approx 14.5cm above the 1990 sea level.
- 3.5 Overall climate projections for Northern Ireland show that we can expect warmer, wetter winters and hotter, drier summers. Extreme weather events, such as short periods of intense rainfall, are also likely to become more variable and more frequent, leading to greater risk of flooding and associated impacts.

## Recent extreme weather events in Northern Ireland

- 3.6 Northern Ireland has experienced a number of extreme weather events in recent years, including:
- March 2013 was the joint second coldest (mean temperature of 2.8°C) in Northern Ireland since records began, alongside 1919, 1937 and 1962. The region experienced snow drifts of up to 18 ft, 40,000 homes were left without power and transport services were severely disrupted with many main roads being impassable. Specialist rescue teams were deployed to help vulnerable people at

risk. However, many of those in rural locations were still struggling after 10 days. Farmers across the region lost over 20,000 livestock due to starvation and the freezing conditions;

- In June 2012 torrential rain (48mm of rain fell in 3 hour period) caused floods in Northern Ireland that lasted for several days. Motorists were forced to abandon cars as roads suffered heavy flooding. An estimated 1,000 homes were left without electricity and 100 homes were damaged;
- In April 2011, record temperatures were experienced for the month and wildfires raged across parts of the region. Half the long-term average monthly rainfall was also recorded;
- December 2010 was the coldest December in Northern Ireland since records began. The lowest temperature recorded was -18.7°C at Castlederg. The average temperature was -0.6°C, 5.4°C below the norm. Hundreds of schools were closed as were the three main airports for a time. As temperatures rose, burst pipes and water mains drained a number of service reservoirs. Thousands of homes and businesses were water damaged, or without water for several days;
- Severe weather including gales and heavy rain, led to widespread transport disruption and power cuts in January 2007, November 2010 (70 mph winds), September 2011 (70 mph winds), January 2011 (95 mph winds) and December 2012. In January 2009 record 170 mph gusts were observed;
- During late October and November 2009, County Fermanagh experienced unprecedented and widespread flooding that led to significant disruption to life at both individual and community level. The wettest November was recorded after double the average rainfall was experienced, and 30 days of continuous rainfall in Fermanagh was observed;
- August 2008 was the wettest on record. The Greater Belfast Area and parts of Antrim were affected by flooding. In total a third of the region was affected. The M2 motorway was partially closed because of landslides and the A12 Westlink underpass filled with 15 feet of water. In Greater Belfast 347 homes were flooded; and
- The worst flooding for over 60 years occurred in parts of the UK in June 2007 after 50mm of rain fell in 90 minutes, leading to the wettest June on record (equivalent to a 1 in 200 year event). In Belfast, 609 homes were affected. Other areas affected included Magherafelt, Lisburn, Omagh, Cookstown and Dungannon. Thirty people had to be rescued, and 80 residents at Towell House old people's home on the King's Road in east Belfast had to vacate the building after it was badly damaged by flood water.



## Chapter 4

# Climate Change Risk Assessment for Northern Ireland: key findings, Government responsibilities and activities to date



## Climate Change Risk Assessment for Northern Ireland

- 4.1 A Climate Change Risk Assessment (CCRA) for Northern Ireland (NI) was produced as part of the UK CCRA.
- 4.2 The CCRA for Northern Ireland drew together information from eleven risk assessment sectors and provided an overview of the impacts from climate change to Northern Ireland. The most important risks and opportunities for the UK were reviewed with Northern Ireland stakeholders through correspondence, sectoral meetings and workshops. A determination was made by stakeholders of the most significant climate change risks and opportunities for Northern Ireland. This resulted in some risks and opportunities being dropped from the UK list and other risks and opportunities being added. The Northern Ireland risks and opportunities that were added to the UK risks and opportunities were not analysed in detail, mainly due to time constraints. Likewise some risks were too difficult to assess at the time, either because the inherent uncertainty was too great or the science was not sufficiently well advanced to understand the magnitude and timing of the risk.



- 4.3 The results in the CCRA for Northern Ireland focussed on the five themes of the UK CCRA Evidence report, namely: (1) Natural Environment; (2) Agriculture and Forestry; (3) Business; (4) Buildings and Infrastructure; and (5) Health and Wellbeing.

## Natural Environment

### Overview

- 4.4 The natural world, its biodiversity and its constituent ecosystems are critically important to our wellbeing and economic prosperity. Climate change (both extreme events and incremental change) is anticipated to exacerbate the effects of these pressures and play a larger part in driving change in the future, negatively impacting on biodiversity and ecosystem services.
- 4.5 Northern Ireland has a diverse range of species and a wide variety of habitats that support them, including heathlands, grasslands, wetlands, freshwater loughs, marine and coastal habitats, limestone pavements and woodlands. Collectively these play a major role in defining Northern Ireland and deliver a variety of ecosystem services, such as water supply and purification that support our wellbeing and livelihoods.

### Summary of key findings from CCRA for Northern Ireland on the natural environment

- 4.6 Most findings for the natural environment in the CCRA for Northern Ireland were based on the UK-wide analysis and were not reassessed, as data at the Northern Ireland scale was not readily available and the impacts were judged to be comparable.
- 4.7 The CCRA for Northern Ireland considered climate change consequences under the headings of terrestrial, aquatic (freshwater), coastal and marine.
- 4.8 Potential threats and opportunities from climate change in the natural environment include:
- Changes in soil moisture deficits and drying, with consequences for species habitats and soil organic carbon;
  - Increased risks from pests, diseases and invasive non-native species;
  - Changes in species migration patterns with consequences for the conservation network and cultural ecosystem services;
  - Reduced water quality, due to pollution from point and diffuse sources;
  - Risks to coastal habitats due to flooding;
  - Tidal flooding and coastal erosion;
  - Shifting of marine species, with consequences for ecosystem services; and
  - Changes in fish catch latitude (plaice, sole).



## Government responsibilities for the natural environment

- 4.9 In Northern Ireland, the DOE is primarily responsible for protecting, conserving and enhancing the natural environment, which it does through a variety of statutory and non-statutory means. These include the protection and management of designated sites, promoting biodiversity conservation and gathering evidence to increase our knowledge and understanding of the natural environment. DARD also plays a key role in land management, whilst DCAL is responsible for inland waterways and fisheries.

## Government natural environment adaptation activities to date

- 4.10 Departments are adhering to a number of EU Directives and international commitments that seek to protect and enhance the natural environment and which indirectly contribute to the process of adapting to climate change. These include the Convention on Biological Diversity, the Ramsar Convention, the Water Framework Directive, Habitats Directive, Floods Directive, Birds Directive and the Marine Strategy Framework Directive.
- 4.11 Actions included within the Natural Heritage Vision and Strategic Plan 2020 are helping ecosystems become more resilient and assisting biodiversity to adapt to climate change. The Invasive Alien Species Strategy aims to minimise risk posed and reduce negative impacts caused by invasive species.
- 4.12 Likewise within the Rural Development Programme 2007-2013 Countryside Management Schemes have taken climate change into account and aimed to maintain and enhance biodiversity on farmland. More recently in July 2013, the publication of Planning Policy Statement (PPS) 2: Natural Heritage aims to facilitate adaptation to climate change and seeks to identify and promote green and blue infrastructure<sup>25</sup>.
- 4.13 River Basin Management Plans, published in 2009 are currently being implemented. They have considered the potential impacts of climate change and set out measures to address the implications for the water environment.
- 4.14 In the marine environment, marine planning and enhanced nature conservation are being introduced, in part, by the Marine Act (Northern Ireland) 2013, which received Royal Assent in September 2013. Development of the Marine Plan for Northern Ireland and the designation of Marine Conservation Zones under the Act will take into account climate change amongst other issues.

<sup>25</sup> Green infrastructure refers to infrastructure such as parks, green spaces and street trees; blue infrastructure refers to infrastructure such as ponds, streams and lakes.

## Gorse Fires in Mourne Mountains

The Mourne Mountain range is a designated Special Area of Conservation and an important catchment area for Northern Ireland's drinking water supply. Wildfires can have major implications on the environment, pose a threat to human life, are a danger to livestock and result in a loss of business for tourism enterprises. Northern Ireland Water, Northern Ireland Environment Agency and the Northern Ireland Fire and Rescue Service came together for a joined up approach to wildfire management. The successes of the project include:

- Bringing stakeholders together to plan a single way forward;
- Developing a network of experts;
- Setting up the Mournes Wildfire Working Group; and
- Raising awareness that fire risk is cyclical and can be managed.

## Agriculture and Forestry

### Overview

- 4.15 Both the Agriculture and Forestry sectors deliver a wide range of goods and services. In 2012 there were just under 24,500 active farms in Northern Ireland, utilising 990,983 hectares of land with nearly 47,500 people involved in farming. Agriculture makes an important contribution to the economy and in 2012 accounted for some £1.7 billion in output. An estimated 20% of all private sector employment in Northern Ireland is derived from the agri-food sector, representing around 92,000 individuals employed.
- 4.16 Woodland cover is relatively low in Northern Ireland at 8% of total land covered or 106,000 hectares of forest compared to the UK average of 12%.

### Summary of key findings from CCRA for Northern Ireland on agriculture and forestry

- 4.17 The CCRA for Northern Ireland determined that the agriculture and forestry sectors potentially face both threats and opportunities due to climate change.
- 4.18 The main threats facing agriculture are flooding of agricultural land and livestock pests and diseases. River flooding is anticipated to be a particular problem for some agricultural areas, whilst the report stated that warmer summers and milder winters could cause an increase in plant pests and diseases. Climate change could alter livestock disease spread patterns. Exotic vector borne diseases in particular, not currently found within the EU could potentially spread to Northern Ireland given favourable climatic conditions. On the positive side potential opportunities for the agriculture sector are identified as an increase in grass and wheat yields based upon projections for warmer conditions which can extend the growing season.

- 4.19 In the forestry sector the projected increase in yield of Sitka spruce has been identified as an opportunity for Northern Ireland. The most significant threat to forests was thought to come from pests and disease. The main trends show that by the 2050's over half of all pine forests could be affected by red needle band blight. It is considered that climate change is likely to exacerbate the frequency and severity of attack. Loss of forest productivity due to drought and wildfires are also potential threats by the 2080's.

## Government responsibilities for agriculture and forestry

- 4.20 DARD leads on agriculture and forestry policies. It also implements a range of environmental policies that impact on these sectors and has primary responsibility for flood defence. DARD works closely with the DOE on issues of common interest where a joined up approach can deliver environmental improvement and sustainability.

## Government agriculture and forestry adaptation activities to date

- 4.21 Agricultural policy in Northern Ireland is largely shaped by EU policy, with the Common Agricultural Policy (CAP) providing support to farmers who follow good agri-environmental practice. This is supported by the Northern Ireland Rural Development Plan 2007-2013 which includes delivery of Agri-Environment Schemes designed to maintain a high proportion of agricultural land under environmental enhancement agreements. Climate change objectives are integral to these schemes. The introduction or spread of serious plant pests and diseases which pose a threat to agriculture and the wider environment are controlled through the implementation of the Plant Health Act 1967.
- 4.22 The DARD Strategic Plan 2012-2020 recognises the challenges presented by climate change and acknowledges that adapting to climate change will ensure a more sustainable future. It includes outcomes on environmental goals and future Rural Development Programmes as well as preparation and planning for:
- Expected changing weather patterns;
  - More frequent extreme weather events; and
  - Adapting to climate change and mitigating its effects by reducing carbon intensity of food products.

As a result there are a number of actions included within the Strategic Plan that will make the agriculture sector more resilient to climate change.

- 4.23 The Strategic Flood Map was developed, and launched in November 2008, by Rivers Agency in co-operation with the DOE. It provides a practical illustration of the areas that are considered to be at possible risk of flooding now and in future.

- 4.24 The Forestry Act (Northern Ireland) 2010 promotes afforestation and sustainable forestry. It's accompanying Delivery Plan set out a range of activities that raise awareness of the potential impact of climate change on forests and the role of forestry in adaptation.
- 4.25 Measures to address the impacts on the water environment through agriculture and forestry are also set out in the 2009 River Basin Management Plans. Further water management related activities within these sectors can be found in the Buildings and Infrastructure theme.

### Rural Development Programme – countryside enhancement

Through the Rural Development Programme DARD's Countryside Management Scheme provides financial support to farmers and landowners for adopting farming practices that enhance our countryside. In addition, the Woodland Grant Scheme aims to expand the amount of tree cover in Northern Ireland by encouraging the creation of new woodland and is open to anyone with at least 0.2 hectares of land on which they can plant trees. Annual payments can also be made to recipients of the scheme for agricultural income foregone as a result of the planting. The scheme can deliver multiple benefits from our changing climate including; the provision of shade and shelter for livestock, habitats for birds and other wildlife, and reduce storm runoff and the possibility of flooding. Tree planting also absorbs and locks up carbon and helps reduce new carbon emissions.

## Business

### Overview

- 4.26 The Northern Ireland economy is dominated by Small and Medium Sized Enterprises (SMEs), which account for 99.9% of the total number of businesses. Tourism is also an important sector to the local economy and was worth some £683m in 2012 and supports around 40,000 jobs.
- 4.27 Businesses have experienced first hand the direct impacts of severe weather events on their premises and operations, due to the disruption caused to the infrastructure on which they rely (roads, ICT, electricity) and associated services (supply chains). They are also exposed to the indirect impacts of climate change throughout the world due to their dependency upon the European and global economy.
- 4.28 For businesses climate change represents a change to existing risk profiles and a potential change in the severity, duration and/or frequency of consequences.

## Summary of key findings from CCRA for Northern Ireland on business

- 4.29 Many of the potential risks for businesses in Northern Ireland could not be assessed with any degree of confidence because the data was not available or the risks were considered too uncertain. However the CCRA for Northern Ireland projected that flooding may become the greatest single climate change concern for businesses. The risks include disruption to business, threat to mortgage provision and monetary losses to tourist assets. In the longer term it also determined that water abstraction for industry could potentially be a significant risk by the 2080's.
- 4.30 The CCRA for Northern Ireland also identified opportunities for businesses with the main potential opportunity identified as an expansion of tourist destinations. Although not identified in the CCRA for Northern Ireland climate change could also present opportunities for both the business and agricultural sectors, with the advent of new techniques and innovations that could produce products and crops that will help us adapt to our changing climate and which will be more resilient to climate change.
- 4.31 Other potential risks, such as risk to investment funds, loss of productivity due to ICT disruption, supply chain disruption and the specific risks to SME's, were deemed to be too uncertain to provide projections.

## Government responsibilities for business

- 4.32 In Northern Ireland responsibility for activities that fall within the business sector is shared across a number of departments; including DETI (tourism, energy and supporting business); DOE (planning, biodiversity, heritage and water resource management) and DARD (farming and flood risk management). HM Treasury leads on financial regulation and impacts of climate change for the mortgage and insurance industries.

## Government business adaptation activities to date

- 4.33 The Northern Ireland Executive's Economic Strategy published in March 2012 encourages business growth by exploiting market opportunities in emerging sectors, including the low carbon / green economy in order to meet key global challenges such as climate change. The Investment Strategy for Northern Ireland also identified climate change as part of the environment priority area for investment.
- 4.34 A preliminary flood risk assessment has been completed which included an assessment of the extent of potential flood risk for commercial and business properties. Strategic Flood Maps have also been produced and these illustrate areas that have flooded in the past and that are estimated to be prone to flooding now and in the future from rivers, sea and rainfall. Planning also plays a role in protecting businesses from the impacts of a changing climate. PPS 15: Planning and

Flood Risk<sup>26</sup>, published in 2006, sets out planning policies to minimise flood risk to property and adopts a precautionary approach to development and the use of land that takes account of climate change.

- 4.35 Climate Northern Ireland, a cross-sectoral partnership sponsored by the DOE, provides advice and support on the impacts of climate change and the adaptation actions necessary to deal with them. In February 2012 Climate Northern Ireland published guidance on how the business sector can prepare for climate change, including information sheets tailored for SME's. In addition and to provide further support to businesses in seeking to increase their resilience to climate change impacts Climate Northern Ireland published a resource guide<sup>27</sup>. The guide provides practical adaptation information tailored for businesses and includes adaptation tools and local case studies.

### Fact sheet for businesses

In partnership with DOE, Climate Northern Ireland produced a fact sheet providing information on key impacts to businesses. This fact sheet was accompanied by a series of information notes covering a range of issues for small and medium sized enterprises, such as, insurance, premises, supplies and ICT. These notes provide information on what small and medium sized enterprises including the agriculture and horticulture business can do to prepare for a changing climate and what adaptation tools are available to help them.

## Buildings and Infrastructure

### Overview

- 4.36 Buildings and the infrastructure that connects them underpin our economy. The buildings and places where we live, work and enjoy life depend on an efficient, effective and functioning transport system, energy supply, water and ICT infrastructure network.
- 4.37 There are also significant interdependencies between different sectors of Northern Ireland's infrastructure. For example, the workforce depends primarily on the road network, and energy is required to run water treatment plants, pumping stations, fuel pumps for transport and to power ICT devices. Transport, water and energy sectors are also reliant on ICT to operate, monitor and control their systems and businesses increasingly rely on an effective ICT network due to our peripheral economic location.
- 4.38 This connectivity and interdependency can exacerbate an initial problem and have severe consequences for emergency response and recovery.

<sup>26</sup> [http://www.planningni.gov.uk/index/policy/policy\\_publications/planning\\_statements/pps15.htm](http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/pps15.htm)

<sup>27</sup> <http://www.climatenorthernireland.org.uk/events/Climate-Change-Business-Risk-and-Reward-Conference.php>



## Summary of key findings from CCRA for Northern Ireland on buildings and infrastructure

- 4.39 The CCRA for Northern Ireland reinforces the importance of increasing the climate resilience of our buildings and infrastructure. It highlighted flooding as the greatest single climate change concern for buildings, urban space, built heritage and the transport, energy supply, water and ICT infrastructure in Northern Ireland.
- 4.40 In relation to infrastructure there is potentially a significant opportunity to reduce energy demand for heating, although this may be offset by the projected increased demand for cooling. Other significant threats that have been identified in the CCRA for Northern Ireland relate to water availability for public water supply and the performance of sewerage infrastructure. Increased water flows could also cause scouring around the piers and foundations of road and rail bridges or weaken embankments resulting in landslides on the road or rail network.
- 4.41 The loss of productivity due to ICT disruption was considered too uncertain to provide projections despite its vital role to the functioning of Northern Ireland's economy.

## Government responsibilities for buildings and infrastructure

- 4.42 DRD is responsible for regional strategic planning and transport policy; this includes a sustainable transport policy; provision and maintenance of all public roads; policy on water and sewerage services; and management of the Department's shareholder interest in Northern Ireland Water. DFP is responsible for building regulations and standards while DOE is responsible for planning policy and planning decisions. DARD takes the lead in flood risk management.

## Government buildings and infrastructure adaptation activities to date

- 4.43 In January 2012 DRD published the Northern Ireland Regional Development Strategy 2035. This is the overarching spatial strategy of the Executive and its purpose is to deliver the spatial aspects of the Programme for Government. The Strategy recognises the need to take account of climate change and sets out measures on transport, energy and the location of jobs and houses to help address and adapt to the changing climate. It complements OFMdfM's Sustainable Development Strategy 'Everyone's Involved' which provides a framework for achieving sustainable development, including the delivery of effective / resilient climate change adaptation mechanisms.
- 4.44 The Social and Environmental Guidance for Water and Sewerage Services produced by DRD in 2010, included investment priorities for Northern Ireland Water relating to sustainable water management. A Northern Ireland Water Climate Change Adaptation Strategy has been developed and Northern Ireland Water has included an assessment of the impact of climate change in its Water Resource Management Plans. These actions are also complemented by cross-departmental measures set out in the DOE's River Basin Management Plans, published in 2009.

- 4.45 A preliminary flood risk assessment has been completed and Strategic Flood Maps have been developed by the DARD's Rivers Agency. PPS 15: Planning and Flood Risk (2006) sets out the DOE planning policies to minimise flood risk and promotes the use of sustainable urban drainage systems. DFP have produced guidance on Sustainable Design in the Built Environment for construction design practitioners. An action plan towards achieving sustainability, including climate change adaptation, in construction procurement for 2012–2015 has also been brought forward. Amendments have also been made to building regulations imposing certain functional or performance requirements. They are designed to further the conservation of fuel and energy and also include reference to flood resilience and resistance measures in technical guidance.
- 4.46 DHSSPS has taken forward a review of critical infrastructure for the health sector. Guidance on Drinking Water and Health has also been produced.
- 4.47 The Strategic Energy Framework (SEF 2010) outlined plans for Northern Ireland's energy future, including ensuring security of supply, enhancing sustainability and developing our energy infrastructure. This includes the promotion of more energy from renewable energy sources and ensuring that energy efficiency is maximised.

### Reducing the risk of flooding at Killyhevlin Water Treatment Works

Killyhevlin Water Treatment Works located on the shore of Lough Erne produces drinking water for the majority of the Enniskillen area. The unprecedented levels of rainfall during October and November of 2009 placed the works in danger of flood water contaminating the potable water supplies and disabling the electrical substation. Northern Ireland Water reviewed the impacts of this event on the Killyhevlin site and the potential for additional damage had the water levels increased further. As a result resilience works to reduce the risk of flooding in the future were designed and implemented at a cost of £600k and completed in January 2012.

## Health and Wellbeing

### Overview

- 4.48 Climate change may affect Northern Ireland's population in the home, the workplace and at a community level. There is potential for implications on public health, the continuity of health and social care services, resilience of local emergency services and the impact on the most vulnerable members of our society.



## Summary of key findings from CCRA for Northern Ireland on health and wellbeing

- 4.49 Human health effects of climate change are likely to have the greatest impact on vulnerable people, particularly those in poor socio-economic conditions. They may therefore require more support or alternative approaches.
- 4.50 The CCRA for Northern Ireland projects that there is potentially a benefit in relation to a decline in the number of premature deaths and hospital admissions as a result of milder winters in the future. This projected decline in deaths in winter is greater than the projected increase in premature deaths caused by future higher temperature in summer.
- 4.51 The emergency services are likely to be affected by climate change, as they are required to respond to emergencies including floods and fires, both of which are projected to come more prevalent by the 2050's increase. Flooding may become a significant climate change threat to people's health, including mental health, and wellbeing. Extreme weather events which result in electricity failures can have severe impacts on people who depend upon electricity for heating or life supporting electrical equipment.
- 4.52 A number of potential risks for health and wellbeing were not assessed or too uncertain (such as, vector-borne diseases, effects of flooding on mental health and risk of marine pathogens). Increased exposure to ultraviolet (UV) radiation and the associated risk of developing skin cancer is a real concern despite the potential for increased sunlight to boost vitamin D levels.

## Government responsibilities for health and wellbeing

- 4.53 DHSSPS has a statutory responsibility to promote an integrated system of health and social care designed to secure improvement in the:

- Physical and mental health of people;
- Prevention, diagnosis and treatment of illness; and
- Social wellbeing of the people in Northern Ireland.

DHSSPS is also responsible for establishing arrangements for the efficient and effective management of the Fire and Rescue Services in Northern Ireland. It discharges these duties both by direct departmental action and through 17 arm's length bodies.

- 4.54 In addition DHSSPS leads the development and implementation of a cross-departmental public health strategic framework which aims to improve health and wellbeing and reduce health inequalities. Other departments, such as DOE, DRD, DARD, and OFMDFM play a supporting role.

## Government health and wellbeing adaptation activities to date

- 4.55 Climate change is being taken into account in the way health and social care infrastructure, buildings, facilities and estates are planned and managed.
- 4.56 Climate Change and Health: Impacts, Inequalities and Action was published in 2010 by Belfast Healthy Cities in partnership with the Climate Change and Health Group. This guide for health professionals highlights how climate change impacts on health, health equity and wellbeing. The document provides information and support for health sector action to address impacts on people and places.
- 4.57 DHSSPS has developed heatwave advice for the public and Health and Social Care professionals. The Skin Cancer Prevention Strategy and Action Plan 2011-2020 published in July 2011 focuses on prevention and early detection of skin cancers and acknowledges the role that climate change could play in increasing future outdoor exposure to UV light.
- 4.58 Civil contingency plans are in place in relation to emergency planning and response arrangements within the public sector to assist the public during and after an emergency affecting all or a large part/s of Northern Ireland.
- 4.59 DOE and DHSSPS receive daily air pollution bulletins and twice-weekly air quality forecasts. Monitoring site data is available on the air quality web site<sup>28</sup> and a DOE / DHSSPS air quality protocol allows for public air quality alerts to be issued via the media when high air pollution levels are monitored or forecast.

### Freeze / thaw event 2010-2011

DHSSPS undertook a review into the resilience of the Health and Social Care estate in Northern Ireland subsequent to the extreme cold weather event of December 2010 and thaw of January 2011.

The review highlighted that:

- Buildings were unable to cope with prolonged temperatures of -10C;
- Natural ventilation in newer buildings caused problems in raising air temperatures;
- Failure of frost coils in air handling units, where these are the only source of heating this can lead to a 'single point of failure' situation;
- Burst pipes;
- Some Reverse Osmosis plant unable to operate due to being in an unheated space;
- Contingency plans do not cover a complete loss of electricity and water supply;
- A formal structure for emergency contact with NI Water is required;
- Each trust needs a dedicated point of contact within NI Water; and
- Loss of water pressure caused problems in multi-storey facilities.

<sup>28</sup> <http://www.airqualityni.co.uk/>

## **Part 2**

# The Adaptation Programme



## Chapter 5

# Roadmap to the Adaptation Programme



### The Vision

*A resilient Northern Ireland which will take timely and well-informed decisions that are responsive to the key risks and opportunities presented by climate change*

### Aim - What do we want to achieve?

- 5.1 The aim of this first Adaptation Programme is to help Northern Ireland better understand and manage the risks and opportunities of climate change. The Adaptation Programme identifies the initial set of actions and activities that will contribute to

making Northern Ireland more resilient to a changing climate over the next five years and beyond. This means enhancing Northern Ireland's preparedness and capacity to respond to the impacts of climate change and focusing on primary areas for action at the earliest possible opportunity and at the lowest possible cost.

- 5.2 The Adaptation Programme is an iterative process. It focuses on policies and proposals within Government aimed at reducing vulnerability and risk today and will help Northern Ireland become more aware and resilient to climate change impacts in the future.

## Objectives

- 5.3 To achieve the vision and aim of the first Adaptation Programme, five objectives have been identified:

- **Fulfil the statutory duties** as set out under the UK Climate Change Act 2008.
- **Work in partnership** across Government and with relevant stakeholders to strengthen and develop policies, strategies and actions which will cope with the threats and exploit the opportunities identified by the CCRA for Northern Ireland.
- **Raise awareness** of the likely effects of climate change and the need for adaptation action.
- **Promote and support the enhancement of scientific evidence** and sector specific data collection that will address climate change adaptation need.
- **Engage with other administrations** at national and international level, in order to ensure the sharing of climate change adaptation best practice.

### **Objective 1:**

*Fulfilling the statutory duties as set out under the UK Climate Change Act 2008.*

- 5.4 We will achieve this by:

- Introducing a cross-departmental Adaptation Programme which will provide a proportionate and flexible response to the risks and opportunities identified in the CCRA for Northern Ireland;
- Normalising climate change adaptation into departmental functions; and
- Encouraging departments to proof policies and proposals against climate change risks and opportunities.

**Objective 2:**

*Work in partnership across Government and with relevant stakeholders to strengthen and develop policies, strategies and actions which will cope with the threats and exploit the opportunities identified by the CCRA for Northern Ireland.*

5.5 We will achieve this by:

- Identifying climate change risks and opportunities that cut across departmental remits and work together to put in place policies and proposals for managing the risks and taking advantage of the opportunities;
- Engaging with relevant stakeholders to ensure a clear, pragmatic and optimal course of action; and
- Working together on climate change adaptation issues through the Adaptation Sub Group of the Cross-Departmental Working Group on Climate Change.

**Objective 3:**

*Raise awareness of the likely effects of climate change and the need for adaptation action.*

5.6 We will achieve this by:

- Providing information to help develop the business case for adaptation and to increase the understanding that it makes good economic sense to adapt and maximise opportunities;
- Identifying and engaging with sector stakeholders to improve resilience to extreme weather events;
- Targeting stakeholders with specific sectoral information, and identifying and promoting best practice adaptation;
- Understanding and overcoming barriers to change and clarifying what success will look like; and
- Support Climate Northern Ireland in implementing an effective communications strategy for stakeholders.

**Objective 4:**

*Promote and support the enhancement of scientific evidence and sector specific data collection that will address climate change adaptation needs.*

5.7 We will achieve this by:

- Seeking to address evidence gaps in the CCRA for Northern Ireland;
- Monitoring and reviewing the Adaptation Programme on an annual basis; and
- Considering the development and adoption of appropriate adaptation indicators which could monitor and evaluate progress in preparing Northern Ireland for the effects of climate change.

**Objective 5:**

*Engage with other administrations at national and international level, in order to ensure the sharing of climate change adaptation best practice.*

5.8 We will achieve this by:

- Developing links with departments with similar responsibilities in the UK Government and Devolved Administrations; and
- Liaising with counterparts in other jurisdictions to share and learn from our programmes of work and experience.

## Adaptation Principles

5.9 The Adaptation Programme focuses on three adaptation principles:

- Integration of adaptation into relevant key policy areas;
- Development of the evidence base; and
- Communication and cooperation.

**Adaptation Principle 1:**

*Integration of adaptation into relevant key policy areas*

5.10 While attention will be given to the adaptation priorities identified, all new policy development processes will need to consider whether climate change is relevant. A major challenge for departments and agencies is to embed climate change into any new or revised policies and operations in light of the risks and opportunities identified; and to consider the options for adaptive action within their policy development. This will promote long-term resilience to climate change and furtherance of sustainable development.



**Adaptation Principle 2:***Development of the evidence base*

- 5.11 A great deal of work has already been done to provide the evidence base on which adaptation decisions need to be taken. To be able to take effective decisions on how, and when to adapt, a reliable understanding about the likely consequences of climate change is needed.
- 5.12 The evidence base will assist in improving our understanding of the potential consequences of climate change, its impacts and the challenges and opportunities that it presents.
- 5.13 Departments are committed to evidence based environmental policy making and seeks to develop and maintain a robust evidence base to support policy development in response to climate change. Departments needs to build upon the work of the UKCP09, the ECR project, the UK CCRA and the CCRA for Northern Ireland. Wider climate research is needed to improve the understanding of the climate system, the impacts of climate change and the potential consequences for our economy, environment and society.
- 5.14 Key actions:
- Contribute to the development of future CCRAs;
  - Develop a better understanding of the costs associated with climate change by contributing to economic and environmental assessments;
  - Continue to support environmental monitoring programmes;
  - Develop climate change adaptation indicators;
  - Build capacity by ensuring climate change adaptation is embedded within research programmes; and
  - Support and co-ordinate the gathering and dissemination of existing data to address gaps in knowledge in the CCRA for Northern Ireland.

**Adaptation Principle 3:***Communication and cooperation*

- 5.15 A comprehensive evidence base is essential, but it is only effective if it is available and well used. Everyone needs to know that there is an issue to be addressed, how to find the information they need and how to use that information.

#### 5.16 Key actions:

- Promote and enhance climate change adaptation messages and actions through the network of communication channels throughout departments; and
- Ensure external stakeholders are kept informed, including the identification and dissemination of tools which consider and integrate climate change impacts.

## Taking action

5.17 The Northern Ireland Executive agreed that as a cross-cutting issue climate change is best addressed by a Cross-Departmental Working Group on Climate Change<sup>29</sup> (CDWG CC), to ensure appropriate governance and accountability.

5.18 The CDWG CC provides the platform that facilitates effective control and monitoring of climate change actions across the departments, and ensures our legal obligations under the UK Climate Change Act 2008 are met.

5.19 The Adaptation Programme requires relevant departments to respond to the risks and opportunities identified in the CCRA for Northern Ireland. However, awareness and action beyond central Government is necessary and DOE has been taking this forward by engaging with, and working alongside Climate Northern Ireland<sup>30</sup>.

5.20 It is anticipated that the Adaptation Programme will:

- Stimulate innovative policymaking and implementation measures; and
- Empower a wide range of non-governmental organisations to take responsibility for providing appropriate adaptation actions for their sector.

## A collaborative approach

5.21 The CCRA for Northern Ireland identified approximately 130 risks and opportunities. Initially, each of these risks and opportunities were mapped against departments and a review of the linkages between existing policies and the projected impacts was undertaken.

5.22 To identify the most important risks and opportunities to be addressed over the next five years, the Adaptation Sub Group<sup>31</sup> oversaw a selection process based upon the following criteria:

<sup>29</sup> The CDWG CC is chaired by the Minister of the Environment and consists of representatives from all Government Departments.

<sup>30</sup> Climate Northern Ireland is an intersectoral network devoted to increasing understanding of climate change impacts and risks within Northern Ireland and the adaptation actions to deal with it. The partnership brings together members from a range of key sectors to share best practice and promote positive action to address the impacts from a changing climate.

<sup>31</sup> The Adaptation Sub Group is one of three sub-groups of the CDWG CC. It is chaired by a DOE official and consists of representatives from all departments. A Mitigation Sub Group and Analyst Sub Group also take forward work on climate change.

- Were decisions considered 'urgent';
- Focus on priority areas of risk, where current policies leave the greatest deficit;
- Was there a role for Government or significant potential for Government action; and
- Was there sufficient suitable data to take action or was the risk deemed too uncertain.

5.23 Using the above criteria each risk and opportunity was categorised against the following framework:

- Action required in next 5 years;
- Investigate / monitor to develop the evidence base;
- No specific current action required in next 5 years; and
- Impacts that fall under the UK National Adaptation Programme.

5.24 It was agreed by the Adaptation Sub Group that approximately one third of the total number of risks and opportunities, would be the focus of the first Adaptation Programme. It was also agreed by the Adaptation Sub Group that in order to take account of the cross-cutting issues of the risks and opportunities brought forward in the Adaptation Programme, that these would be addressed under four primary areas. This list, however, should not be seen to preclude further adaptation actions within and across sectors beyond these primary areas.

The Adaptation Programme identifies four **Primary Areas** for action, within which progress on the application of the objectives and adaptation principles will be pursued.

These are:

- Flooding;
- Water;
- Natural Environment; and
- Agriculture and Forestry.

5.25 A workshop held in September 2012 with representatives from departments identified a range of adaptation options that would build adaptive capacity and deliver adaptive action for the risks and opportunities brought forward under the primary areas.

5.26 External stakeholder consultation for the Adaptation Programme was held by Climate Northern Ireland over a period of four months, from June to October 2012. A wide

range of consultation approaches were used to ensure the scope of stakeholders was extensive. The consultation approach was based upon the adaptation themes identified within the CCRA for Northern Ireland. The stakeholder events used various methods to engage the participants in discussion and obtained a high level of input including expert talks, scenario-based workshops, open meetings, and web-based surveys. A detailed report on the key points obtained under each of the themes and from local government was produced by Climate Northern Ireland. It was provided to the DOE for consideration in developing the Adaptation Programme.

- 5.27 The views and key outputs from all the events were used as a basis for a series of bilateral meetings between the Climate Change Unit in the DOE and representatives from all departments. The process allowed each department to consider a wide spectrum of potential adaptation options, and to have a better understanding of stakeholder views whilst finalising their response in terms of actions and activities to the risks and opportunities taken forward under the four primary areas. Many of the activities aim to prevent vulnerability from climate change increasing by providing benefits regardless of the uncertainty in future climate and begin the process of incorporating climate change into long term policies.

## Chapter 6

### Primary areas for action



#### Flooding

- 6.1 The CCRA for Northern Ireland identifies flooding as potentially one of the most significant and urgent risks. Whilst flood risk is expected to increase in response to climate change, there is uncertainty surrounding the flood risks that particular areas of Northern Ireland face both today and in the future.
- 6.2 Uncertainty applies not only to the degree of climate change that will occur, but also the implications this will have for rainfall patterns, and the ability of the soil to absorb rainfall. Of course flood risk can also be the result of non-climate change factors such as obstructions in watercourses, blockages in sewers and the presence of buildings or infrastructure in or near natural floodplains. Commonly, a mix of both extreme weather and environmental factors come together in the development of a significant flooding incident.

- 6.3 Flooding is, and will remain, a natural phenomenon that cannot entirely be prevented, no matter how effective legislation or collective actions are. It can directly, and indirectly, affect homes; schools; hospitals; businesses; offices and agricultural and recreational land. Transport networks (road and rail); water; sewerage and energy infrastructure are also at significant risk. The consequences for individuals can be severe, even fatal, and can be long term, due to distress and health impacts during the event, in the recovery period and clean up afterwards.
- 6.4 Northern Ireland has experienced flood events more commonly in recent years. Serious local flood incidents have been experienced every year since 2007 and the frequency of these events is likely to further increase in the future. Government must therefore seek to limit the most devastating impacts of flooding particularly where those impacts can be exacerbated by the real potential of cascade failures<sup>32</sup> across networks and sectors. This can be achieved by increasing preparedness, by raising awareness of flood risk and by enhancing the ability to manage it. In this way Government will continue to reduce the impact of future flood events, and improve our ability to manage and recover from those events which do occur.
- 6.5 We know that legislation, policy, technology or engineering measures alone cannot prevent flood events and that communities can play their part by being proactive in initiating self-help. The wider public sector will help communities to recognise what they can do to avoid or minimise impacts and to build adaptive capacity.
- 6.6 Aligning our public responsibilities, the sharing of goals and the pooling of our efforts and resources will address the challenges that arise from flooding. By working together the likelihood of flooding, the risk to life and the damage caused to buildings, infrastructure, communities and the economy can be reduced. Collaborative working will also ensure a risk based, sustainable and plan-led approach to managing floods.

#### **‘Flood’ priority risks and opportunities from the CCRA for Northern Ireland taken forward in the Adaptation Programme**

<b>Risk / Opportunity</b>	<b>Description</b>
<b>Infrastructure</b>	
EN1	Energy infrastructure at significant risk from flooding
FL11b	Substations at significant risk from flooding
TR1/FL8	Disruption to road traffic due to flooding
TR2	Landslide risks on road network
TR6	Scouring of road and rail bridges

<sup>32</sup> A cascade failure is a failure in a system of interconnected parts in which the failure of a part can trigger the failure of successive parts. Such a failure may happen in many types of systems, including power transmission, computer networking, road network and water and sewerage systems.



<b>Risk / Opportunity</b>	<b>Description</b>
WA10	Combined Sewer Overflow spill frequency
NEW	Flooding of critical infrastructure (water)
NEW	Failure of water impoundment structures
<b>Business</b>	
BU2	Monetary losses due to tourist assets at risk from flooding
BU4	Risk of business disruption due to flooding
<b>Agriculture &amp; Forestry</b>	
AG2a/FL4b	Flooding of agricultural land
<b>Buildings</b>	
FL6a	Residential properties at significant risk from flooding
FL7a	Non-residential properties at significant risk from flooding
BE4	Flood damage to cultural heritage
FL15	Flood risk for Scheduled Ancient Monument Sites
NEW	Coastal erosion to cultural heritage
<b>Health &amp; Wellbeing</b>	
GEN	Emergency response to climate events (including flooding)
FL1	Number of people at significant risk of flooding
FL2	Vulnerable people at significant risk of flooding

- 6.7 Five actions have been identified to address the challenge of flooding now and in the future. These actions will ensure that the impact of flooding on people, property, infrastructure and the environment will be reduced through awareness, avoidance, alleviation and assistance. The high level actions identified are as follows:
- I. Develop and implement sustainable strategies to explore, address and manage significant flood risk;
  - II. Build resilience of infrastructure to flooding and implement appropriate inspection and monitoring programmes;
  - III. Identify and implement measures to reduce the impact of significant flood risk to people, property and the environment;
  - IV. Develop stakeholder understanding and awareness of significant flood risk and potential adaptation measures; and
  - V. Identify consequences of significant flood risk on the built heritage.

## I. Develop and implement sustainable strategies to explore, address and manage significant flood risk

6.8 Flood risk management through the EU Floods Directive will take place alongside the ongoing programme of drainage and flood alleviation measures<sup>33</sup>. Under the Directive, DARD's Rivers Agency will produce:

- Flood risk and flood hazard maps for significant risk areas; and
- Develop flood risk management plans.

6.9 The flood maps will be an important communication tool providing a visual representation of flood risk. Whilst the flood risk management plans will assist DARD in producing catchment based solutions for the three River Basin Districts. The plans will address all aspects of flood risk management and together with DRD's Long Term Water Strategy will consider a sustainable long term approach to water management by focusing on prevention, protection and preparedness.

6.10 In addition, the Stormwater Management Group (SMG)<sup>34</sup> aims to examine a range of approaches to develop more integrated stormwater management in Northern Ireland to reduce the danger of flooding. Key deliverables of the SMG will include:

- The development of a Stormwater Management Implementation Strategy;
- Identification of legislative mechanisms and key policies to deliver and implement stormwater management; and
- The development of revised technical guidance for the design of stormwater management systems.

6.11 The planning system plays an important role in guiding the location of development, both public and private, away from areas at risk of flooding through the implementation of planning policy in the development management and development plan processes. A revised PPS 15 will bring forward a new policy for development proposed in proximity to reservoirs so as to minimise and manage flood risk from this source. It will also take account of the latest information on flood risk and climate change. The preparation of a new single Strategic PPS will also facilitate adaptation by taking account of the impacts arising from climate change.

6.12 A forthcoming Reservoirs Bill will ensure that reservoirs are managed and operated to minimise the risk of flooding due to dam failure. Furthermore, the development of the second cycle of River Basin Management Plans for delivery in 2015 will integrate the assessment of climate change risks and bring forward sustainable adaptation actions to address the risks within them.

<sup>33</sup> <http://www.dardni.gov.uk/riversagency/index/flood-defence.htm>

<sup>34</sup> SMG is an inter-departmental policy coordination and implementation group, jointly chaired by Northern Ireland Environment Agency (NIEA) Water Management Unit (WMU) and Department for Regional Development (DRD) Water Policy Division.



## Key Activities

Prepare flood risk hazard maps and flood risk maps for potential areas of significant flood risk	DARD	By the Spring of 2014
Develop Flood Risk Management Plans	DARD	By December 2015
Develop Long Term Water Strategy	DRD	By December 2015
Develop and implement a Stormwater Management Implementation Strategy and develop revised technical guidelines	DOE, DARD, DRD, NI Water	By December 2017
Progress review of Planning Policy Statement 15: Planning and Flood Risk and implement policy	DOE	Over lifetime of Adaptation Programme
Develop and publish a single Strategic Planning Policy Statement	DOE	On time for transfer of planning powers to Councils April 2015
Progress the Reservoirs Bill through the NI Assembly	DARD	Acquire Royal Assent in 2014/2015

## II. Build resilience of infrastructure to flooding and implement appropriate inspection and monitoring programmes

- 6.13 Disruption resulting from flooding can have widespread effects on the economy and society due to the reliance on infrastructure networks (water, energy, transport and communications). It is therefore necessary to protect the existing infrastructure network against significant flooding and ensure new infrastructure is resilient to the full range of predicted climate change impacts given the long lifetime and significant investment in these networks.
- 6.14 When making decisions about infrastructure investment it is important in the initial stages to account for climate change uncertainty and avoid closing off options that may be useful in the future. Infrastructure that is difficult to modify is potentially more costly to adapt in the future as more knowledge and improved technology become available. Developing an understanding and where possible quantifying current and future flood risk to infrastructure, the acceptable levels of risk and the capacity and options available to continue to manage the risks will be crucial.
- 6.15 Roads Service is responsible for over 25,000km of public roads. They will continue to manage and improve the road network through regular monitoring and inspection.

This will allow decisions on whether interventions, such as maintaining sea defences on coastal routes, are required. The review and updating of protection measures within the Design Manual for Roads and Bridges, produced by the UK Highway Authorities, including DRD, will take account of climate change impacts and will further improve the resilience of the road network. These measures will help to ensure the road network can continue to operate effectively during flood events and avoid the disruption they cause.

- 6.16 In addition to developing a Long Term Water Strategy, DRD is developing a new Social and Environmental Guidance for Water and Sewerage Services<sup>35</sup>. The guidance provides the Northern Ireland Authority for Utility Regulation with advice on the key environmental and social policies that it should contribute to in carrying out its role as regulator of the water and sewerage industry provided by NI Water. The guidance will include appropriate priorities for the water industry in relation to climate change adaptation and investment. To address flood risk NI Water is taking action through an internal Climate Change Adaptation Strategy which it annually reviews and updates.
- 6.17 Underground water conveyance infrastructure cannot economically or sustainably be built large enough for the most extreme rainfall or snow melt events. As a result there will continue to be occasions when surface water runoff will exceed the design capacity of the sewer and/or drainage system.
- 6.18 Measures to improve the condition of the water environment identified in River Basin Management Plans (2009) will contribute to building resilience of the water infrastructure to flooding by way of drainage or network upgrades and reviewing of waste water consents to ensure adequate controls are set. In addition, Rivers Agency regularly survey drainage infrastructure and flood and sea defences. Work will continue to be undertaken by DRD, DARD and DOE to ensure that water infrastructure is maintained in good condition and to provide adequate standards of protection or flow capacity to manage against significant flood risk.

### Investment – Connswater Greenway Community Project

In October 2012, Agriculture Minister Michelle O’Neill secured £6million for flood alleviation work to help protect 1,700 properties in East Belfast. The Connswater Community Greenway project aims to reduce flooding and create a 9km ‘linear park’ following the Knock, Loop and Connswater Rivers. The Rivers Agency is overseeing the delivery of a substantial programme of works.

In addition to the £6m scheme, Rivers Agency is also carrying out £5million worth of stand-alone work in the area to reduce the risk and potential disruption from flooding.

<sup>35</sup> Under Article 7 of the Water and Sewerage Services Order (NI) 2006.

## Key Activities

Monitor, inspect and maintain road / bridge network and implement action plans	DRD	In line with Design Manual for Roads and Bridges and Roads Service manual.
Maintain sea defences and manage geotechnical and structural issues along coastal routes	DRD	In line with Design Manual for Roads and Bridges and Roads Service manual.
Develop Social and Environmental Guidance for Water and Sewerage Services	DRD	By December 2015
Complete programme of measures set out in River Basin Management Plans (2009)	DRD, DARD, DOE	By December 2015
Maintain flood defence and drainage infrastructure	DARD	Ongoing

### III. Identify and implement measures to reduce the impact of significant flood risk to people, property and the environment

- 6.19 Flooding can directly affect people, particularly the vulnerable, and also affect people indirectly through impacts on buildings and the delivery of services. Impacts may continue within the recovery and clean up period after the event. It is important that critical services and systems are capable of coping with current and future flood events and other weather extremes, or have contingency arrangements in place in the event of failure.
- 6.20 Social support, information provision, and practical support for residents are particularly effective according to the ECR report. OFMDFM will continue to promote further development, across the public sector, of civil contingencies preparedness and response in line with the Civil Contingencies Framework 2011. DOE will continue to facilitate practical support in making homes habitable by establishing appropriate measures to provide emergency financial assistance to district councils for residents who suffer severe inconvenience and hardship as a result of significant flooding.
- 6.21 Integrating voluntary groups within the formal flood response enhances community resilience. In working with the Northern Ireland Fire and Rescue Service and the

British Red Cross, Fire and Emergency Support Service (FESS) will seek to provide immediate shelter, emotional support, clothing, food and shower facilities for people in the aftermath of a flood. Multi-agency operational protocols are also in place for the establishment of Emergency Support Centres (ESCs). These protocols set out the roles and responsibilities of each of the agencies involved in setting up and managing an ESC, including the Councils, Police, Health and Social Care (HSC) Trusts, the Housing Executive and the Ambulance Service.

### Performance and Efficiency Delivery Unit (PEDU) – Review of Response to Flooding on 27th and 28th June 2012

Government has made significant progress towards the implementation of the recommendations outlined in the PEDU Report following the June 2012 flood event. The recommendations include:

- Investment in Flooding Counter Measures;
- Developing a Northern Ireland Flood Alert System; and
- Improving Operational Flood Defence with real time GIS mapping to record flood calls.

The experience of 27th and 28th June 2012 illustrated the valuable role that district councils can play in handling local emergencies.

- 6.22 Public Safety and HSC organisations will be encouraged to establish the exposure of the health estate to significant flood risk to enable them to plan and take action. Departments, such as DOJ and DCAL will increase their knowledge of significant flood risk to their respective department's assets, and their functional responsibility. In working with the Northern Ireland Tourist Board, DETI will build the evidence base in relation to significant tourist assets that are at risk from flooding.
- 6.23 DHSSPS will review annually the Business Continuity criteria in the Risk Management and Emergency Planning Control Assurance Standards. These Standards require HSC organisations to regularly review their respective Business Continuity Management plans, which have been developed in line with the British Standard BS 25999. Updating the Health Estates Sustainable Development Design Guide on climate change adaptation within the estate will further promote the provision of sustainable healthcare facilities for future generations.
- 6.24 DFP will promote sustainable design in the built environment through guidance for project sponsors and managers. These will improve the resilience of Government led construction and regeneration projects from flood events. Building regulations will continue to evolve in response to, and to take account of, the impacts of climate change.

- 6.25 DE and DEL will ensure that schools and colleges are prepared for flood events by:
- Reviewing school opening and closure advice and emergency response plans to take account of Flood Maps and Flood Management Plans respectively;
  - Taking account of impacts in college risk registers and business continuity plans; and
  - Giving consideration to adaptation when developing estates strategy.

### Key Activities

Provide emergency financial assistance to district councils	DOE	When scheme is established as a result of significant flooding.
Promote flood preparedness with Health and Social Care and Public Safety organisations	DHSSPS, HEIG	Over lifetime of Adaptation Programme
Deliver the PEDU recommendations	All relevant Departments	Ongoing
Develop the evidence base of significant tourist assets at risk from flooding	DETI	By December 2014
Update Health Estates Sustainable Development Design Guide, and review Controls Assurance Standards	DHSSPS	At least every 3 years
Promote sustainable design	DFP	Ongoing
Align emergency response plans with flood hazard maps and flood management plans and review School Opening and Closure advice	DE	By December 2014
Consider adaptation measures within the review of estate strategy and policy for Higher Education Institutions and consider climate change risks in further education college risk registers and business continuity plans	DEL	From 2015/16

## IV. Develop stakeholder understanding and awareness of significant flood risk and potential adaptation measures

- 6.26 Flood information failures will be addressed by improving communication, raising awareness and engaging with stakeholders, agencies and sponsor bodies on flood risk and relevant climate change impacts. DETI will build upon their existing

engagement with the Northern Ireland Tourist Board and Invest Northern Ireland to help raise awareness around adaptation. Support will continue to be given to district councils, by DOE, in developing their flood response capability.

- 6.27 Utilising existing networks and media by signposting climate change information and links on departmental websites will act as catalyst for action by public bodies, communities, businesses, district councils and other organisations. For example, strategic flood maps will enable a proactive and co-operative approach to be adopted to flood risk management. By being aware of the land estimated to be at risk of flooding and commissioning more detailed flood risk assessments as appropriate, organisations can develop strategies to better manage the changing flood risk. In addition, DARD will liaise with the MET Office to enhance the assessment of risk when the MET Office considers issuing Severe Weather Warnings for heavy rainfall.
- 6.28 Building further capacity to understand the interdependencies between sectors can be met through the sharing of knowledge and best practice. Departments are committed to working together and sharing information. For example, DCAL will continue to work with the Rivers Agency to assist in raising awareness and to assess the risks to their functional responsibility. DRD will continue to support the work of NI Water's Climate Change Forum.
- 6.29 Business Continuity Plans will be updated to take account of pertinent climate change impacts, such as severe weather events like flooding, on an annual basis. These plans ensure that departments are able to continue with critical business activities and will put arrangements in place to restore normal service as quickly as possible.
- 6.30 The energy and water sectors will continue to be encouraged to take action to enhance resilience against agreed significant flood risks. DETI will continue to work alongside the energy sector and the Northern Ireland Authority for Utility Regulation (NIAUR) to encourage the long term resilience of the energy infrastructure.

### Key Activities

Raise awareness and engage with key tourism stakeholders	DETI	To commence January 2014
Support district councils in developing their flood response capability	DOE	Over lifetime of Adaptation Programme
Work with energy companies and NIAUR to encourage resilience of energy infrastructure	DETI	Over lifetime of Adaptation Programme

## Key Activities

Make available / signpost climate change or severe weather event information to encourage people to take appropriate action	All relevant Departments	Ongoing
Engage with Met Office in a partnering approach to increase public awareness of impending flood risk	DARD	Over lifetime of Adaptation Programme
Raise awareness and understanding of flood risk on functional responsibility and engage with agencies, sponsor branches and arms length bodies on potential need for appropriate adaptive measures	DCAL, DOJ	By December 2015
Promote preparedness for flood risk in business continuity plans	All Departments	Annually

## V. Identify consequences of significant flood risk on the built heritage

- 6.31 Our built heritage is principally under threat from flooding and coastal erosion. Scheduled monuments, archaeological sites, historic and listed buildings add to the quality of our environment and are important to our economy and to our health and wellbeing. Government is committed to setting a good example in regard to the built heritage in its care and this is set out in the joint NI Executive, DOE publication 'Protocol for the Care of the Government Historic Estate'. In regard to climate change, the Protocol requires all departments and agencies to '*ensure that the historic environment is included in climate change action plans*'. This means that when preparing such plans they should carry out risk assessments for heritage assets, consider climate change impacts and propose measures to ensure that vulnerable sites can respond to expected changes.
- 6.32 To address the affects of climate change DOE's Built Heritage will continue to work with stakeholders by providing advice and guidance. This applies across departments and to owners and managers of heritage assets. The choice of adaptive strategy will be crucial in ensuring that that the importance of these assets is appropriately protected. Risk assessments, including the identification of sites liable to flooding and coastal erosion through vulnerability mapping, the establishment of baseline data and additional research will help inform these decisions. This will enable resources to be allocated towards threatened assets of greatest archaeological, historic or architectural importance.
- 6.33 DCAL has primary responsibility for a range of cultural assets, such as museums and libraries through its Arms Lengths Bodies. DCAL will raise awareness, communicate risks and share information with these relevant bodies to ensure that climate change is an integral part of their business activities.



## Key Activities

Implement the Protocol for the Care of the Government Historic Estate	All Departments	Biennial Reporting from September 2013
Implement the recommendations of 'The Impacts of Climate Change on the Built Heritage' Report	DOE	By December 2018
Raise awareness and engage with arms length bodies with cultural assets	DCAL	By December 2015

## Water

- 6.34 Water is essential for everyday living and for maintaining healthy ecosystems. The water environment is highly valued and is a significant feature of the landscape in Northern Ireland. Climate change will increase the complexity of managing our water resources as changing rainfall and river flow patterns will affect all water users.
- 6.35 The CCRA for Northern Ireland provides a better understanding of the dynamics of climate change as it affects water supply and demand, and the wider water environment. The significance of the impact that climate change will have on water is highlighted by the identification of a number of water related priority risks and opportunities.
- 6.36 The CCRA for Northern Ireland projects that higher average temperatures and changing rainfall patterns may significantly increase pressure on water supplies. Climate change will directly affect water availability particularly in the summer at a time when water demand can increase in the hotter weather. Other impacts identified include reductions in water quality and increases in sewer flooding and spill from combined sewer overflows.

### 'Water' priority risks and opportunities from the CCRA for Northern Ireland taken forward in Adaptation Programme

Risk/opportunity	Description
<b>Business and services</b>	
BU3	Risk of restrictions in water abstraction for industry
<b>Natural environment</b>	
MA2a	Decline in marine water quality due to sewer overflows
WA2	Lower summer river flows



<b>Risk/opportunity</b>	<b>Description</b>
WA9a	Potential decline in summer water quality – point source pollution
WA9b	Potential decline in water quality due to diffuse pollution
New	Algal growth
<b>Buildings and infrastructure</b>	
New	Algal growth in raw water supply sources
WA3	Reduction in water available for public supply
WA5	Public water supply / demand deficits
WA6	Population affected by water supply – demand pressures
New	Change in reservoir yields for public water supply

6.37 To address the impacts that climate change will have on the ‘water’ priority risks and opportunities, a number of actions have been identified. These actions will be taken forward to improve water resource management; build resilience to current climate variability; build capacity to adapt to future climate change and improve understanding of the dynamics of climate change as it affects water supply and demand. The high level actions are:

- I. Implement ongoing water resource management measures;
- II. Identify opportunities to improve resilience of the water resource and infrastructure;
- III. Improve water efficiency and manage the water resource sustainably to meet need;
- IV. Encourage and implement appropriate water monitoring programmes and modelling;
- V. Maintain and enhance the quality of water; and
- VI. Raise awareness of water issues and develop understanding to motivate adaptation action.

## I. Implement ongoing water resource management measures

6.38 Successful management of our water resource requires accurate knowledge of the resource that is available and the uses to which it may be put. Account needs to be taken of the competing demands for the resource and mechanisms, to translate policy decisions into actions on the ground.

- 6.39 Relevant measures within the 2009 River Basin Management Plans that apply to water resource management will continue to be implemented. These include:
- Targeted assessment of water resource availability to set management priorities;
  - Develop a better understanding of the relationship between groundwater and surface waters;
  - Monitor abstraction compensation flows and impoundment authorisation conditions;
  - Identify best practice in relation to on site Waste Water Treatment Systems;
  - Use the SIMCAT Model to look at climate scenarios to address risk;
  - Review the Nitrates Action Programme;
  - Review the Pollution Prevention guidelines; and
  - Review water order consents, groundwater authorisations and pollution prevention and control permits.

#### Key Activity

Complete water resource management measures in River Basin Management Plans (2009)	DOE, DRD, DARD, NI Water	By end of 2015
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## II. Identify opportunities to improve resilience of the water resource and infrastructure

- 6.40 Water Resource Management Plans (WRMP) and the infrastructure that supports them seek to optimise the available natural water flows, including surface water and groundwater. NI Water has produced a WRMP which explains how NI Water intends to meet the drinking water needs of the population of Northern Ireland over the period 2010 to 2035. The WRMP takes into account forecast changes in population, housing and water usage and incorporates predicted changes to our climate.
- 6.41 DRD will develop a Long Term Water Strategy which will raise public awareness of issues affecting the water sector including water efficiency, water reuse and recycling, promoting sustainable waste water treatment solutions, working towards separation of storm water from combined drainage systems and reductions in infiltration of water into sewers.
- 6.42 River basin planning is an ongoing process that promotes sustainable water use while protecting and improving the water environment. The second series of River Basin Management Plans will take into account climate change impacts. These will aim to ensure that our waters will be available for a wide range of uses which contribute to our economic and social wellbeing.

- 6.43 Sustainable urban drainage systems (SUDS) are the preferred approach to managing rainfall from hard surfaces and this method of stormwater management will continue to be promoted and encouraged in Northern Ireland. The SMG will draft and agree a new Stormwater Management Implementation Strategy, identify the legislative mechanisms and key policies required to implement stormwater management and develop revised technical guidelines for the design of stormwater management systems. A revised PPS 15: Planning and Flood Risk will promote and encourage the use of SUDS in association with new developments.

### Ballyclare Sustainable Drainage System

The Stormwater Management Group (SMG) is carrying out a pilot study in Ballyclare exploring the benefits of the implementation of sustainable drainage systems within the catchment of the town.

This pilot will identify the range of benefits and issues required to inform legislation, policy and appraisals necessary to drive forward the implementation of sustainable stormwater management in Northern Ireland. Already it has identified that by taking storm water out of the foul sewer the treatment costs incurred by Northern Ireland Water will be significantly less; flood and combined sewer overflow events along with combined sewer overflow frequency will be reduced and the existing dry streams in Ballyclare will support aquatic life again.

Overall, the study has developed new ways of working between the members of the SMG, which are essential to delivering the principles of better regulation and to efficiently achieve shared goals. It will help future proof the sewerage infrastructure and help NI Water to meet the challenges of adapting for the increased rainfall projected as a result of climate change.

#### Key Activities

Implement Water Resource Management Plan and take further account of climate change in revised plan	NI Water	By December 2017
Develop Long Term Water Strategy	DRD	By December 2015
Develop 2nd round of River Basin Management Plans	DOE	By December 2015
Develop and implement a Stormwater Management Implementation Strategy	DARD, DRD, DOE, NI Water	By December 2017
Progress review of Planning Policy Statement 15: Planning and Flood Risk	DOE	By December 2014

### III. Improve water efficiency and manage the water resource sustainably to meet need

- 6.44 An increase in extreme weather events is likely to lead to a decrease in the amounts of water available, a reduction in its quality and an increase in demand. NI Water will seek to address demand by continuing to encourage consumers to use water wisely, work towards a sustainable economic level of leakage from the water supply network and maintain its reservoir infrastructure, as appropriate, for the supply of drinking water, including de-silting reservoirs as necessary.
- 6.45 Water efficiency will be encouraged in new build housing by DSD in line with DFP building control regulations. DETI will promote water efficiency in businesses and encourage sustainable alternatives to the public water supply through Invest Northern Ireland's Sustainable Productivity programme which aims to promote and incentivise resource (including water, materials and waste) and energy efficiency.
- 6.46 Social and Environmental Guidance for Water and Sewerage Services will be developed by DRD. The guidance will include appropriate priorities for the water industry in relation to leakage. It will provide investment priorities for drinking water and waste water collection and treatment, which should support a NI Water Sustainable Catchment Management Programme. DRD will also develop guidance for NI Water drought planning and make use of drought orders where appropriate.
- 6.47 The Rivers Agency manages and operates the Northern Ireland surface water hydrometric network through its Hydrometric Section. They will continue to invest in and retain the integrity of the Northern Ireland Surface Water Hydrometric network to describe hydrological characteristics and understanding of long-term trends gained through the analysis of long-term data sets.

#### Key Activities

Encourage and promote water efficiency	DSD, NI Water, DETI	Over lifetime of Adaptation Programme
Develop 'Social and Environmental Guidance for Water and Sewerage Services'	DRD	By December 2015
Retain integrity of the surface water hydrometric network	DARD	Over lifetime of Adaptation Programme

## IV. Encourage and implement appropriate water monitoring programmes and modelling

- 6.48 Comprehensive water quality monitoring and assessment information on environmental conditions and changes over time are needed to help set levels of protection within water quality standards and identify emerging problem areas. Collaboration between the Water Management Unit in the Northern Ireland Environment Agency (NIEA) of the DOE and NI Water on the use of Simulated Catchment (SIMCAT) modelling will develop cost effective measures to protect water quality in each catchment. They will also promote and encourage use of SIMCAT modelling across Northern Ireland.
- 6.49 As the supply of water is limited, we need to make sure that it is managed and used effectively to meet the needs of people and the natural environment. The Water Management Unit will highlight areas at risk from reduced resource availability using catchment based flow models as part of the River Basin Management Planning process. Outputs from the models will be used by DOE to inform abstraction licensing activities and the risk assessment will be reviewed at 3 yearly intervals.
- 6.50 Northern Ireland has a large marine area, rich in marine life and natural resources, with a wide diversity of underwater habitats and species. The marine environment is coming under increasing pressure from climate change, which can damage and further threaten marine ecosystems. The Marine Division will continue to protect our marine environment by implementing marine monitoring programmes, providing input into the planning process and by contributing to the NI Water Price Control process.

### Key Activities

Promote and encourage use of SIMCAT Modelling	DOE	From 2013
Use of catchment based flow models as part of the River Basin Management Planning process.	DOE	Review by December 2016
Implement Marine monitoring programmes	DOE	Annually (Reviewed Quarterly)

## V. Maintain and enhance the quality of water

- 6.51 The water cycle is one of the most important processes sustaining life. Maintaining water quality provides a resource for human consumption and sanitation, viable and sustainable industries and diverse aquatic biodiversity. NI Water is providing ongoing investment in waste water treatment and sewerage improvements which will enhance the quality of the water resource. NI Water continues to work to waste water

quality standards which contribute to the achievement of high levels of Bathing Water and Shellfish Water compliance.

- 6.52 The quality of our rivers, loughs, groundwaters and coastal waters represent an indicator for the quality of our environment and reflect, determine and depend upon how we manage our land resource. To counteract nutrient enrichment which promotes algal growth in natural waters DARD, in association with DOE, are currently considering additional adaptation measures to minimise farm runoff through land management schemes.
- 6.53 The Nitrates Directive (91/676/EEC) aims to improve water quality by protecting water against pollution and nutrient enrichment from agricultural sources. DOE and DARD will consider appropriate adaptation measures in the cyclical review process for the Nitrates Action Programme. In addition, during the 2014/2015 review, the regulations concerning the use of phosphorus fertiliser and storage of animal manures will also be reviewed and adaptation measures considered. DOE will also use Geographic Information Systems (GIS) to identify areas of high risk from nutrient runoff and work with DARD to inform and support UK climate change and water priorities within CAP reform for 2015.
- 6.54 DOE will continue to work towards improving the marine water quality for shellfish and bathing waters by implementing and ensuring that the relevant requirements of the Urban Waste Water Treatment Directive (UWWTD) are in place for Waste Water Treatment Works and sewerage networks. A review of existing shellfish waters has taken place, and revised shellfish waters pollution reduction programmes are to be delivered.
- 6.55 DOE will promote low carbon waste water treatment measures, such as constructing or improving wetlands where appropriate and promote a Sustainable Catchment Management approach to improving water quality. Discharge Licences and Consents will also be reviewed by 2015 in line with the requirements of the Water Framework Directive<sup>36</sup>.
- 6.56 A large proportion of the NI Water sewerage system is made up of combined sewers, which, as well as transporting waste water from homes and industry, also carry surface water runoff from gutters, drains and some roads. NI Water is currently prioritising sites for the installation of flow monitors at combined sewers.

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<sup>36</sup> New consents can only be reviewed after a 4 year period unless there is a significant impact.

## Key Activities

Investment in waste water treatment and sewerage improvements	NI Water	During Price Control (PC) 13 and PC15 investment periods
Include appropriate adaptation measures in the cyclical review process for the Nitrates Action Programme	DOE and DARD	By December 2015
Use of GIS to identify nutrient run off to inform CAP Reform	DOE	By December 2015
Implement and ensure requirements of Urban Waste Water Treatment Directive	DOE	Yearly monitoring supported by quarterly compliance checks
Develop revised Shellfish Water Pollution Reduction Programmes	DOE	By March 2014
Prioritisation of NI Water sites for the installation of flow monitors during 2015-2021 investment cycle	DOE, NI Water	By December 2015

## VI. Raise awareness of water issues and develop understanding to motivate adaptation action

- 6.57 The impacts of a changing climate are directly felt within the water sector. Consequently, much of the work on adaptation awareness and building resilience needs to be carried out across the sector. DCAL and DOE are committed to continuing their work with relevant stakeholders to provide advice and guidance on planning applications that may result in low flows. DOE will also continue to inform and educate departments and external stakeholders on the risk from point source pollution, taking enforcement action where appropriate.
- 6.58 The safety of drinking water is a paramount public health concern. The Drinking Water Inspectorate of the DOE produces an annual report on drinking water quality in Northern Ireland. In addition, the Drinking Water Liaison Group<sup>37</sup>, chaired by DHSSPS, published multi-agency guidance entitled: 'Drinking Water and Health; a guide for public and environmental health professionals and for those in the water industry in Northern Ireland'. Annual reviews of these reports will consider how the safety and quality of our water will be affected by climate change. DRD's Long Term Water Strategy and its implementation will also raise awareness of climate change issues and sustainable solutions in the water sector.

<sup>37</sup> Members include – DHSSPS, Public Health Agency, NI Water, Drinking Water Inspectorate, Chief Environmental Health Officers' Group and NI Public Health Laboratory.



## Key Activities

Provide advice and guidance on planning applications proposals that may result in low flows	DCAL, DOE	Over the lifetime of Adaptation Programme
Review the 'Drinking Water and Health' guidance	DHSSPS	Annually Every December
Reporting any effects of climate change on drinking water quality	DOE	Annually - Autumn
Develop Long Term Water Strategy	DRD	By end of 2015

## Natural Environment – Terrestrial, Freshwater and Marine

- 6.59 The natural environment, its landscapes and the ecosystems it provides are already under threat from land use change and management practices. Climate change will exacerbate these threats. Our wellbeing and the economy depend upon the natural environment due to the range of benefits it provides, such as food and other resources, green spaces for recreation, tourism and the role it plays in the provision of fresh water. These functions are known as ecosystem services. If species key to the functioning of the ecosystem are lost, then the system itself becomes vulnerable to disruption, decreasing the system's ability to deliver the full range of services it can provide.
- 6.60 Changes in our climate such as rainfall patterns and temperature increases will have a profound impact on our species and habitats. Species such as salmon<sup>38</sup> which have lifecycles in both fresh and marine waters have been shown to be particularly vulnerable to climate change in terms of water temperature and river flows. Increased water temperatures may see salmon decline and early fish migration may also be triggered by warmer rivers. Coastal habitats will be increasingly threatened by tidal flooding and coastal evolution.
- 6.61 A key element of the success of achieving adaptation within the natural environment will be the draw-down of substantial European funding by DOE in partnership with DARD, other departments, agencies, environmental NGOs and stakeholders; primarily in farming, fishing and industry. The basis of this has been initiated through the Prioritised Action Framework (PAF)<sup>39</sup>. Achievement of the six targets of the European

<sup>38</sup> Salmon are a European Protected Species

<sup>39</sup> [http://www.doeni.gov.uk/niea/biodiversity/prioritised\\_action\\_framework.htm](http://www.doeni.gov.uk/niea/biodiversity/prioritised_action_framework.htm) - To achieve the European Union's Biodiversity Strategy to 2020, the European Commission has asked each Member State to provide a Prioritised Action Framework (PAF) which describes the actions needed to achieve the six high level targets in the Strategy. This will assist the Commission in directing European Funding for the forthcoming Multi-annual Finance Framework (MFF) 2014-2020 to achieve action for biodiversity and nature. Northern Ireland's specific PAF will underpin projects to achieve the 2020 European vision.



Union's Biodiversity Strategy<sup>40</sup> are vital if Northern Ireland is to play its full part in the global targets on climate change as reflected in the Nagoya Protocol<sup>41</sup>, to which the UK is a signatory.

### **'Natural Environment' priority risks and opportunities from the CCRA for Northern Ireland taken forward in the Adaptation Programme**

<b>Risk / opportunity</b>	<b>Description</b>
BD2	Risk to species and habitats due to coastal evolution
BD3	Risk of pests (including invasive non native species) to biodiversity
BD4	Risk of disease to biodiversity
BD5	Species unable to track changing climate space
BD7	Risk to coastal habitats due to flooding
BD9	Changes in species migration patterns
BD10	Biodiversity risks due to warmer rivers and lakes
BD12	Wildfires due to warmer and drier conditions
NEW	Decline of native freshwater fish species

6.62 Seven actions have been identified to address the impacts that climate change will have on the natural environment. These actions focus on conserving and protecting ecological networks; improving management to protect ecosystem services; supporting adaptive management; raising awareness and motivating action within the terrestrial, freshwater and marine environments. The high level actions are as follows:

- I. Identify and implement opportunities to build resilience into the natural environment;
- II. Explore environmental research opportunities and the development of assessment tools;

<sup>40</sup> From the EU Biodiversity Strategy: The Commission and Member States will pay particular attention to securing a better uptake and distribution of EU funds under the current and future Multi-annual Financial Framework for 2014–2020. This should be achieved by rationalising available resources and maximising the combined benefits of the different sources of funding, including funding for agriculture and rural development, fisheries, regional policy and climate change.

<sup>41</sup> <http://www.cbd.int/abs/about/>

- III. Identify, develop and review terrestrial and freshwater environmental surveillance and monitoring programmes;
- IV. Support land managers in building a resilient natural environment and implement best practice;
- V. Protection and enhancement of the management of habitats and species;
- VI. Increase adaptation awareness and motivate stakeholder action in the natural environment; and
- VII. Ensure marine planning considers the impacts of climate change.

## I. Identify and implement opportunities to build resilience into the natural environment

- 6.63 Water is important to the quality of the natural environment and its ability to deliver a range of public goods and services. River Basin Management Plans (2009) will improve the condition of groundwater, wetlands, rivers, lakes, estuarine and coastal waters to create better habitats for wildlife in and around water. By continuing to implement the measures within the 2009 Plans, the resilience of the natural environment will be enhanced.
- 6.64 To improve the flows in rivers and levels in lakes DOE will develop biological tools to assess the impacts of changes in hydrology. DOE will also protect freshwater pearl mussel sites by developing and implementing specific management plans particularly for designated Special Areas of Conservation.
- 6.65 DCAL will facilitate fish migration; and protect fisheries and habitats by constructing fish passes where weirs are built or reinstated, regulate commercial fisheries and establish the scientific basis for conservation and management. DCAL will also protect and restore salmon populations by carrying out acoustic tagging studies. These studies which monitor the passage of salmon to spawning beds provide improved data to inform decisions on habitat enhancement projects that help restore salmon populations.
- 6.66 The Northern Ireland SIMCAT model has modelled climate change scenarios to assess the impact on river quality when river flows are adjusted for the projected climate conditions in 2020. The results received in April 2013 will assist in assessing changes to discharge conditions as a consequence of the predicted changes in river flows associated with climate change.
- 6.67 Climatic impacts will also be considered in the development of the second cycle of River Basin Management Plans and a new Biodiversity Strategy. The Wildlife and Natural Environment Act 2011 places a duty on all public bodies to promote biodiversity in undertaking their functions. DOE will develop guidance offering practical examples of how this duty can be adhered to.

- 6.68 The development of a single Strategic PPS, allows the planning system the opportunity at a strategic level to take account of the natural environment risks and opportunities arising from our changing climate. The statement will provide the strategic direction on how these impacts can be addressed through the planning system in its contribution to sustainable development.
- 6.69 Climate change will have a substantial impact on biodiversity by enabling some invasive alien species to become more abundant and widespread. Opportunities to build adaptation into work on invasive species include the 'Invasive Species Ireland' project and the implementation of the measures set out in the An Invasive Alien Species Strategy for Northern Ireland.
- 6.70 DOE will develop an action plan to improve compliance with the European Landscape Convention (Florence 20 October 2000) ratified by the UK in 2006. The focus on integrating landscape into policy will be supported by renewing the Northern Ireland Landscape Character Assessment 2000 to provide the evidence base; setting landscape objectives and facilitating the integrated protection, management, planning and monitoring of our landscape in response to climate change and other drivers.

### Key Activities

Complete programme of measures set out in River Basin Management Plans (2009)	DOE, DCAL	By December 2015
Use results from SIMCAT model on climate change scenarios to assess changes to discharge conditions	DOE, NI Water	Over lifetime of Adaptation Programme
Develop 2nd round of River Basin Management Plans	DOE	By December 2015
Review Biodiversity Strategy	DOE	By December 2014
Develop guidance on the biodiversity duty	DOE	By December 2014
Develop and publish a single Strategic Planning Policy Statement	DOE	On time for transfer of planning powers to Councils April 2015
Continue to support the Invasive Species Ireland Project and monitor the implementation of An Invasive Alien Species Strategy for Northern Ireland.	DOE	Over lifetime of Adaptation Programme
Develop an action plan to implement the European Landscape Convention	DOE	By December 2015

## II. Explore environmental research opportunities and the development of assessment tools

- 6.71 Improving our understanding of climatic factors on the natural environment and the ecosystem services that it provides and how these will respond is critical. This information is important in planning the best adaptive management approaches to protect the integrity of natural systems and their ability to deliver a range of services cost effectively.
- 6.72 Research opportunities will continue to be explored through the DOE's Natural Heritage Research Partnership<sup>42</sup>. The aim of the partnership is to provide high quality research to underpin decisions relating to the statutory duties of natural heritage and to help deliver strategic targets relating to sustainable development, biodiversity and climate change.
- 6.73 Some habitats of high biodiversity value are particularly vulnerable to fire, such as, woodlands, grassland, peatlands and heathlands. Research on the impact of fires and vegetation recovery will be undertaken by DARD and DOE. In addition, DOE will investigate the implications of climate change on the ability of potential invasive alien species to establish and impact upon our native biodiversity.
- 6.74 Marine mortality for salmon stocks has been directly linked to climate change. DCAL will continue to contribute to the North Atlantic Salmon Conservation Organisation Research in exploring the opportunities to counteract this mortality. DCAL and DOE will assess the extent to which barriers impede the migration of all fish species by piloting the use of a fish passability tool to establish a methodology for barrier assessment.

### Key Activities

Explore research opportunities through the Natural Heritage Research Partnership	DOE	Annually Assessed (Autumn)
Investigate implications of climate change on invasive alien species	DOE	By December 2018
Research on impact of wildfires and vegetation recovery	DARD, DOE	By December 2016
Contribute to North Atlantic Salmon Conservation Organisation Research	DCAL	Reporting Annually (Summer)
Pilot fish possibility tool to establish a methodology for barrier assessment	DCAL, DOE	By December 2014

<sup>42</sup> The Natural Heritage Research Partnership (NHRP) is the largest collaborative venture within Quercus between the Northern Ireland Environment Agency (NIEA) and the School of Biological Sciences, Queen's University Belfast.

### III. Identify, develop and review terrestrial and freshwater environmental surveillance and monitoring programmes

- 6.75 It is important to develop a better understanding of how the natural environment is changing. Through regular surveillance and monitoring of the natural environment we will be able to inform future decisions and actions.
- 6.76 DOE will continue to implement its surveillance and monitoring obligations under the Habitats Directive. Existing programmes will also be reviewed to ensure that they address climate change issues. These programmes are vital in allocating management resources to where they are most required and ensure that effective action is taken. Gaps identified have included the frequency of surveillance for plants, lichen, bryophytes, fungi and invertebrate species.
- 6.77 Biodiversity indicators will be utilised to help assess the impacts of climate change. DOE will continue to enhance the science and evidence base to ensure the provision of evidence based information to support effective decision making.
- 6.78 DOE manages some 260 sites and properties including a dozen coastal Nature Reserves and a coastal Country Park where sea level rise and increased storminess are of particular concern. All DOE sites will be monitored to assess the impacts of climate change, such as the risk at coastal sites to species, habitats and infrastructure due to coastal erosion. The results will inform adaptive management decisions and measures. The implications of climate change on existing site selection features and boundaries will also be kept under ongoing review by site managers with independent review by other DOE scientists on a six year cycle. The need for monitoring the impacts of climate change on these sites and for any adaptive measures will be addressed in policy position statements on the management of Country Parks and statutory Nature Reserves and in site management plans.

#### Key Activities

Review surveillance and monitoring programmes and build into decision making on EU Habitats, habitat management, priority habitats and species	DOE	Over lifetime of Adaptation Programme
Enhance the evidence base for policy development	DOE	Over lifetime of Adaptation Programme
Utilise biodiversity indicators	DOE	Over lifetime of Adaptation Programme
Monitor and assess impacts of sea level rise and storminess on coastal Nature Reserves and Country Parks	DOE	Over lifetime of Adaptation Programme

### Key Activities

Address climate change issues in Policy Position Statements for Nature Reserves and Country Parks	DOE	To be completed March 2014
Address climate change issues in management plans for Nature Reserves and Country Parks	DOE	On a six year cycle as plans come up for renewal

## IV. Support land managers and owners in building a resilient natural environment and implement best practice

- 6.79 Land owners, land managers and a variety of non government organisations make a valuable contribution to the stewardship of the natural environment. DOE currently works with stakeholders through the Management Of Sensitive Sites (MOSS) scheme which considers the need for adaptive measures in Areas of Special Scientific Interest. Funding and grant aid opportunities will continue to be available from DOE to build resilience and facilitate biodiversity adaptation. Future funding options and opportunities to support this work is being assessed through one of the DOE's Innovation Trials, established to examine and implement improved and innovative approaches to resourcing the delivery of objectives.

The Environment and Marine Group (EMG) of DOE has and will continue to provide a number of funding and grant aid schemes, currently including:

- Natural Heritage Grant Programme;
- Research Partnership and Contracts in the Research and Development Programme;
- European Funding;
- Management of Sensitive Sites;
- Challenge Fund;
- Water Quality Improvement Grant; and
- Coastal Communities Fund.

- 6.80 Land based management schemes including agri-environment schemes will play an increasingly important role in providing refuges and habitat connections for wildlife in the wider countryside. Through these EU funded schemes DARD will support the removal of invasive species and take account of climate change in the management of habitats and species, such as peatland. DARD advice to landowners regarding the burning of heath and moorland will also be reviewed.

- 6.81 There are over 60 fisheries within the public angling estate. In managing the estate DCAL will provide guidance and raise awareness of relevant climate change risks, such as invasive species and diseases.
- 6.82 The DOE will use the management of its owned properties and designated sites as demonstration sites in order to raise awareness about our changing climate and encourage implementation of best practice. As set out in the PAF, DOE will also explore the opportunity to work with DARD on Nature Reserves as exemplars of best practice management on specific habitats.

### Key Activities

Enhance grant schemes to explore new and innovative funding mechanism to build resilience and facilitate adaptation in the natural environment	DOE	By December 2014
Use land based management schemes in the management of habitats and species including peatland and the removal of invasive species	DARD	By December 2015
Review advice to landowners on the burning of heath and moorland	DARD, DOE	By December 2014
Manage public angling estate	DCAL	Ongoing
Implement and encourage best practice management, including greater integration	DOE	Over lifetime of Adaptation Programme

## V. Protection and enhancement of the management of habitats and species

- 6.83 Identifying and establishing a well connected network of ecological areas; protecting, managing and restoring habitats to favourable condition and increasing the number, quality and size of designated sites can support habitats and species in adapting to climate change and minimise its threat.
- 6.84 DOE will continue to designate and protect a range of nature conservation sites of featured interest including marine sites and will work with stakeholders to:
- Screen new sites and selection features for likely effects of climate change;
  - Periodically review any implications of climate change on existing site selection features and boundaries; and
  - Promote local wildlife interests.



- 6.85 Policies and legislation will also be developed to protect habitats and species from pests and disease. DARD will be developing policies in relation to new and emerging vector borne plant and animal diseases as well as control strategies to deal with the impacts. Dedicated EU legislation on invasive species has the potential to include additional requirements to invasive species import and control.
- 6.86 The planning system will minimise the vulnerability of biodiversity to the impacts of climate change and facilitate adaptation by promoting the provision of green infrastructure and contributing to the enhancement and conservation of the natural environment as an integral part of social, economic and environmental development. This will be complemented by the identification, establishment, protection and management of a coherent and resilient ecological network.
- 6.87 Managing the land and water environment for the species and habitats that they support and integrating climate change into management plans is essential if ecosystems are to function for the benefit of society. It is anticipated that EU funding will provide the resource to develop management plans which will integrate climate change into the management regime to ensure essential ecosystem function for the benefit of society.
- 6.88 DOE will progress policy development to inform and advise stakeholders including those across departments and district councils on the appropriate management of habitats, ecosystems, species and marine environment that are broadly defined as our natural capital. Site specific habitat management plans will incorporate a range of habitat and species action plans, including priority habitats and species. These will be supported by the development of a Natural Capital Policy<sup>43</sup>, including a designated site management strategy for Areas of Special Scientific Interest, which will bring habitats up to favourable condition, incorporate adaptive measures and encourage best practice implementation. Best practice invasive species management will be developed by DOE.
- 6.89 Restoration of habitats is a vital management tool to enable the natural environment to cope with the additional stress caused by climate change. DOE in partnership with others<sup>44</sup> will continue to support the restoration of priority habitats, particularly peatlands and wetlands, by updating the peatland inventory and working with non government organisations in support of landscape scale projects.
- 6.90 DCAL will be developing a strategic approach to fisheries management and the protection of habitats and species through enforcement in the forthcoming Inland Fisheries Strategy.

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<sup>43</sup> New policy being developed by DOE – Environment and Marine Group, inclusive of ASSI's.

<sup>44</sup> Other government departments, public bodies including district councils, other agencies and non-government organisations.

## Key Activities

Identify, establish, protect and manage a resilient ecological network and implement site designation programme for species and habitats, including marine	DOE	By December 2018
Review implications of climate change on designated sites	DOE	In line with risk based site monitoring annual returns
Develop policies and strategies for new and emerging vector borne plant and animal diseases	DARD	Ongoing
Implement Planning Policy Statement 2: Natural Heritage	DOE	Over lifetime of Adaptation Programme
Preparation of habitat management on EU designated sites and priority habitats funded through EU measures	DOE	To commence 2015
Develop a Natural Capital Policy including a Designated Site Management Strategy for ASSI's	DOE	By December 2014
Assess vulnerability of habitats and species and revise management action plans	DOE	By December 2018
Support the restoration of priority habitats, peatlands, wetlands through EU integrated projects	DOE	To commence 2015
Develop and implement Inland Fisheries Strategy	DCAL	By end of 2018

## VI. Increase adaptation awareness and motivate stakeholder action in the natural environment

- 6.91 Engaging stakeholders early and repeatedly is vital in preparing the natural environment for the changes that lie ahead as a result of the changing climate.
- 6.92 Stakeholders will continue to be engaged in the development of initiatives concerning the terrestrial, freshwater and marine environment. Engagement will be defined and enhanced in the Natural Capital Policy and will ensure the adaptive needs of

the natural environment are fully considered. This is particularly important when considering development proposals and the potentially detrimental impact on plant and animals, including fish.

- 6.93 In the marine environment DOE will engage with a wide range of stakeholders over the lifetime of the Marine Plan development process. DCAL will also work with stakeholders to improve the management of wild fish and provide information and guidance for anglers and commercial fishermen. A number of departments will promote a better understanding of the risks of wildfires and signpost the way forward in both preventative initiatives and co-ordination of response activities.
- 6.94 DOE will maintain and support partnerships, promoting the embedding of adaptation within their functional responsibility and management activities. DOE will also provide support to the Invasive Species Ireland group to raise awareness of the threat from these species to our biodiversity.

### Key Activities

Outline duties and responsibilities of all stakeholders in Natural Capital Policy	DOE	By December 2014
Work with stakeholders to improve the management of wild fish	DCAL	Ongoing
Engage with stakeholders over lifetime of the Marine Plan development process	DOE	At each stage of the plan making process and also as part of the regular monitoring and review of the adopted Marine Plan for Northern Ireland.
Promote a better understanding of the risks posed by wildfires and the damage they cause and co-ordinate and support initiatives to signpost the way forward in both preventative and response activities.	DHSSPS, DOE, DARD, NI Water	Bi-annually
Provide advice and guidance on development proposals	DOE, DCAL	Over lifetime of Adaptation Programme

## VII. Ensure marine planning considers the impacts of climate change

- 6.95 The Marine Strategy Framework Directive will enable the sustainable use of marine goods and services and will ensure the marine environment is safeguarded for the use of future generations. Protecting and restoring marine habitats will increase their resilience to climate change. Work will continue on developing an ecologically coherent network of Marine Protected Areas, including Marine Conservation Zones under the Marine Act (Northern Ireland) 2013. This will result in a well managed network of habitats that will facilitate the attainment of good conservation status for species and habitats.
- 6.96 A programme of cost effective measures will be developed and implemented to address a range of marine impacts arising from a changing climate. A strategic approach to the management of our shorelines will be developed as part of the Marine Strategy.
- 6.97 The Marine Plan for Northern Ireland will encourage developments and projects to take account of climate risks over their lifetime and take advantage of opportunities, including synergies with mitigation actions.
- 6.98 The ECR report highlights the importance of monitoring in the marine environment. In this regard DOE, DARD and DRD will set up a co-ordinated monitoring programme for the on-going assessment of good environmental status.

### Key Activities

Implement the Marine Strategy Framework Directive	DOE	By December 2016
Consult on the designation of Marine Conservation Zones	DOE	By December 2015
Develop a strategic approach to the management of our shorelines	DOE	By December 2018
Develop a Marine Plan based on the principles of sustainability	DOE	Draft plan for public consultation in early 2015.

## Agriculture and Forestry

- 6.99 Agriculture and forestry are very important land uses in Northern Ireland. Both contribute to our natural environment by providing a range of ecosystem services through the food we eat; the places that we live and the countryside we visit; the water, air and soil we depend upon and the wildlife that we see. Climate change may alter the impact that agriculture and forestry have on the natural environment and the value of the ecosystem services provided.

- 6.100 The CCRA for Northern Ireland highlights the need to increase the resilience of the agriculture and forestry sectors. The type of resilience measures which are most suitable will vary greatly and be dependent on many factors, including the locality, the particular crops grown, the types of livestock production systems, and the structure, composition and management of forests.
- 6.101 Opportunities for the agriculture and forestry sectors that were identified include; increasing yields, opportunities to grow new varieties of crops, and the provision of ecosystem based adaptation services. It is imperative that the sectors exploit the opportunities that arise, whilst ensuring they are resilient to climate change threats, maintain ecosystem services, and protect and enhance biodiversity.

**‘Agriculture and forestry’ priority risks and opportunities from the CCRA for Northern Ireland taken forward in the Adaptation Programme.**

Risk/Opportunity	Description
AG1a	Changes in wheat yield (due to warmer conditions). <ul style="list-style-type: none"> <li>Changes in arable crops, fruit and potatoes yields (due to warmer and drier conditions).</li> </ul>
AG10	Changes in grassland productivity
FO1a	Forest extent affected by red band needle blight (tree diseases)
FO1b	Forest extent affected by green spruce aphid (tree pests)
BD12 Wildfires	Wildfires due to warmer and drier conditions.

- 6.102 In order for Northern Ireland to address and tackle the impacts that climate change will have on agriculture and forestry the following five actions have been identified:
- I. Increase awareness of climate change adaptation and develop best practice for land managers;
  - II. Research and identify climate resilient grasses and crops;
  - III. Identify measures to support adaptation in agriculture;
  - IV. Improve the resilience of woodland; and
  - V. Support and encourage land managers in reducing the risk of and impacts from wildfires.

## I. Increase awareness of climate change adaptation and develop best practice for land managers

- 6.103 The need for practical information for the agriculture sector is highlighted by the ECR report and increasing climate change awareness and knowledge in the agriculture sector is a priority. DARD will provide farmers with advice on the economic opportunities, as well as the environmental threats, from climate change. DARD will engage with agriculture stakeholders to develop, promote and embed adaptation good practice, common messages, tools and guidance within the industry. This will be provided through the College of Agriculture, Food and Rural Enterprise (CAFRE) and Countryside Management Unit. Key areas where further advice to farms will be required will also be highlighted.
- 6.104 DARD has commissioned a scientific review in which strategies to reduce losses following extreme weather events on livestock and the arable sectors will be evaluated. Recommendations on the adoption of strategies will be produced in formats appropriate for producers in the industry. Information on potato varieties, grasses and arable crops suitable for growing in our environment are produced regularly.

### Key Activities

Assessment of weather-related and other risks, including disease, to farm businesses and evidence to inform risk mitigation/management strategies and policy on hardship policies	DARD	By end 2016
Provide advice for farmers to enable them to exploit climate change opportunities.	DARD	Ongoing

## II. Research and identify climate resilient grasses and crops

- 6.105 The projected warmer, drier summers may mean changes such as a longer growing season and the possibility of new grasses and crops. However warmer, wetter winters could see crop damage due to flooding, soil waterlogging or the introduction of new diseases. Grasses and crops grown in Northern Ireland will need to be increasingly resilient to cope with the possible changes in climate and more frequent weather extremes. DARD will carry out research into the identification of grasses, arable crops and potatoes, taking account of the local changing conditions and soils. Those identified will be more resilient to climate change and may deliver a wide range of benefits. An example of this is the current research into different apple varieties. DARD will also look at better ways of monitoring, measuring and utilising crops and grassland to improve efficiency and performance, with the aim of having a positive influence on greenhouse gas (GHG) emissions and the carbon footprint of local farming systems.

- 6.106 Research into genetic improvements of perennial rye grass, which will provide scientific data on how to reduce methane production by grazing livestock will be undertaken. The research programme will also include investigation into precision nutrient management to improve grassland production. As recommended in the ECR report, adaptation must be embedded into relevant research programmes.

### Key Activities

Apple project: looking at the resilience of different varieties	DARD	By June 2015
Identification and publication of recommended lists of grasses which take account of local changing conditions, soils and tolerance of extreme conditions	DARD	Annually (June)
Identification and publication of recommended lists of arable crops which take account of local changing conditions, soils and tolerance of extreme conditions	DARD	Annually (December / January)
Identification and publication of recommended lists of potato varieties which take account of local changing conditions, soils and tolerance of extreme conditions	DARD	September every other year
Investigation of the effect of harvest moisture content of wheat affected by poor weather conditions and how to accurately predict its nutritive value for broilers	DARD	By March 2015
Research and development into genetic improvements of perennial rye grass and precision nutrient management	DARD	By March 2015
Strategic monitoring of grass growth to provide information to farmers on grass growth and to review and develop grass growth monitoring tools to allow farmers to improve grassland utilisation efficiency	DARD	By April 2016
Investigation of the impact of compaction on soil quality and nutrient availability for sustainable and competitive production in grassland and arable farming systems	DARD	By April 2016



### III. Identify measures to support adaptation in agriculture

- 6.107 Stakeholders will be involved in assessing climate risk, and in supporting, strengthening and identifying relevant agriculture adaptation measures. Grass yields are projected to increase by some 19% in the 2020's. This is a potential opportunity for livestock agriculture, although other factors (such as dietary changes and the suitability of ground conditions for grazing or cutting and consumer preferences) need to be taken into consideration.
- 6.108 The Nitrates Directive (91/676/EEC) aims to improve water quality by protecting water against pollution caused by nitrates from agricultural sources. In particular, it is about promoting better management of animal manures, chemical nitrogen fertilisers and other nitrogen-containing materials spread onto land. DOE and DARD will consider appropriate adaptation measures in the cyclical review process for the Nitrates Action Programme. In addition, during the 2014/2015 review, the regulations concerning the use of phosphorus fertiliser will also be reviewed and adaptation measures considered.
- 6.109 DARD's agri-environment schemes provide funding to farmers and land managers to farm in a way that supports biodiversity, enhances the landscape, and improves the quality of water, air and soil. DARD is developing a new agri-environment scheme for the period 2015-2020 and will consider climate change adaptation measures within its design.
- 6.110 DARD has and will continue to integrate climate change adaptation into its strategies policies and actions through the Rural Development Programme and the Countryside Management Scheme. The aim is to focus action where risks are greatest, supporting skills development and knowledge exchange and ensuring investments continue to offer good value for money.

#### Key Activities

Include appropriate adaptation measures in the cyclical review process for the Nitrates Action Programme	DOE, DARD	By December 2014
Develop new agri-environment schemes (2015-2020)	DARD	By December 2015
Integrate climate change adaptation into the next Rural Development Programme and the reform of the Common Agriculture Policy.	DARD	By December 2014

## IV. Improve the resilience of woodland

- 6.111 Northern Ireland woodlands will need to be increasingly resilient to cope with the projected changes in climate and more frequent weather extremes. By actively managing more sites, preserving and enhancing species diversity and embedding skills and knowledge in how to adapt, our woodlands will continue to deliver a wide range of benefits. This will be facilitated by maintaining compliance with the UK Forestry Standard and relevant legislation.
- 6.112 The ECR report promotes active forest management to achieve and maintain healthy forests, consistent with land management objectives, which is expected to increase resilience to climate change. The report also indicates that greater pro-active management of forests is expected to increase resilience in relation to pests and diseases and forest fires.
- 6.113 Taking climate change into consideration will be particularly important, given the long timescales involved in woodland regeneration following felling. DARD's Forest Service will ensure that the impacts of climate change are considered in the new woodland creation target, identified annually in the Forest Service business plan.
- 6.114 Pests and diseases pose a significant risk to the sustainability of the forestry sector and the wider natural world. Recent events, such as the outbreak of ash dieback ('Chalara fraxinea') have only served to underline this. This potential threat must therefore be met with proportionate action to manage the threat of outbreaks and pest infestations, to protect the viability of woodlands and Northern Ireland's ability to export products.

### Key Activities

Encourage forest expansion	DARD	Identified annually in Forest Service business plan
Monitoring and surveying for tree pests and diseases.	DARD, DOE	Annually and multi-annually
Demonstrate DARD forests are managed sustainably	DARD	Maintain certification Annually

## V. Support and encourage land managers in reducing the risk of and impacts from wildfires

- 6.115 Wildfires are unplanned or uncontrolled fires in the countryside or open areas in towns and cities. They often spread quickly through vegetation that is dry and easy to burn such as gorse and heather.
- 6.116 In response to the spate of wildfires that affected many upland areas in the spring of 2011, a Wildfires Stakeholder Group<sup>45</sup>, facilitated by DOE, was set up to share approaches and co-ordinate activity to reduce the impacts of wildfires. The Group is working towards the development of fire plans for high risk areas and looking at how current land management practices may be affecting vulnerability to wildfire damage. It also aims to determine what preventative measures can be put in place to reduce the scale and impact of wildfires in future years.
- 6.117 The Wildfires Stakeholder Group will promote a better understanding of the risks posed by wildfires and signpost the way forward in both preventative initiatives and co-ordination of response activities. They will also raise awareness of the dangers of fire (including wildfire) through a programme of interventions designed to reach all sections of the community.
- 6.118 DARD will take account of climate change risks, such as wildfires, in the management of upland areas through land based management schemes. Research on the impact of burning and vegetation recovery will help inform guidance to landowners on the burning of heath and moorland.
- 6.119 It is important that woodlands are managed in a way that increase their resilience to climate change and contribute fully to their wider adaptation role. The Forest Service will review and consider the severe wildfire risk annually in collaboration with the Fire and Rescue Service. The Forest Commission is publishing guidance for land managers to increase the resilience of woodland to wildfire through forest design planning, including forest structure and species.
- 6.120 Other initiatives that will facilitate wildfire prevention include the promotion of sustainable urban drainage systems in stormwater management.

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<sup>45</sup> Members include - Northern Ireland Environment Agency, DARD: Forest Service and Countryside Management, Ulster Farmers Union, Belfast Hills Partnership, Northern Ireland Fire and Rescue Services, Fermanagh District Council, Ring of Gullion AONB, National Trust, Mourne Heritage Trust, Causeway Coast and Glens Heritage Trust, NI Water and PSNI.

### Key Activities

Promote a better understanding of the risks posed by wildfires and the damage they cause, and co-ordinate and support initiatives to signpost the way forward in both preventative and response activities.	DHSSPS, DOE, DARD, NI Water	Bi-annually
Research on impact of burning and vegetation recovery; review advice to landowners regarding burning of heath and moorland and reduce wildfire risk through land based management schemes	DARD, DOE	By end of 2016

## Chapter 7

### Governance, delivery and reporting on progress



#### Accountability

- 7.1 The Adaptation Programme has been taken forward by the CDWG CC. Amongst its tasks the CDWG CC is responsible for:
- Reviewing cross-departmental action on climate change on an annual basis;
  - Supporting the preparation of an assessment of the risks to the UK of the current and predicted impact of climate change; and
  - Preparing and delivering a cross-departmental Adaptation Programme on climate change.
- 7.2 An Adaptation Sub Group of the CDWG CC has been tasked with the delivery of the Adaptation Programme and will ensure that Northern Ireland fulfils the obligations as set out in Part 4 Section 60 of the UK Climate Change Act 2008.

## Measuring climate change adaptation

- 7.3 The CDWG CC needs to determine whether the aims and objectives set out in the Adaptation Programme are being achieved. Reviewing the Adaptation Programme allows for new climate information and lessons learned to be captured and fed into an ongoing appraisal process.
- 7.4 Monitoring, reviewing and reporting on progress will allow an evaluation on how effectively the adaptation activities taken in the Adaptation Programme are improving our resilience to climate change impacts.
- 7.5 Climate change adaptation is a complex concept, which will take time to embed into policy and practice. Measuring the effectiveness of adaptation activities is inherently complex as there remains a great deal of conceptual uncertainty about what to measure (adaptive capacity, resilience, vulnerability reduction etc.). Adaptation interventions tend to cut across many sectors, are implemented at different scales, over different timescales, and take a broad range of approaches. Therefore, a range of different approaches may be needed.

## Adaptation indicators

- 7.6 The use of Adaptation indicators can be an important tool for assessing progress on climate change adaptation. They can be used:
- As part of a monitoring or evaluation process to assess policy performance;
  - To prioritise areas for action;
  - To highlight areas where policy changes are needed;
  - To prevent action which increases vulnerability; and
  - To integrate adaptation into existing decision making.
- 7.7 The Adaptation Sub Group of the CDWG CC is taking forward a project to consider and develop a range of relevant adaptation indicators for Northern Ireland. It is hoped that these indicators will enable Northern Ireland to monitor progress in preparing for the effects of climate change.

## Reporting on progress

- 7.8 It is important that activities undertaken in the Adaptation Programme undergo a post-evaluation assessment to see how effective they have been. In order to achieve practical results it is important to ascertain if the Adaptation Programme is successful and how wide its influence is being felt and activities delivered.

- 7.9 The CDWG CC provides an annual report to the Northern Ireland Executive on climate change. The annual report will contain an update on Government progress in implementing the aim, objectives and activities identified in the Adaptation Programme.
- 7.10 All assessments on the achievement, progress and limitations of the first Adaptation Programme will be used when developing a subsequent Adaptation Programme.

## **Further UK Climate Change Risk Assessments and Adaptation Programmes**

- 7.11 The UK Climate Change Act 2008 sets the requirement that a subsequent report on an assessment of the risks for the UK of the current and predicted impacts of climate change must be laid before Parliament no later than five years after the previous report was so laid. The first UK CCRA was laid in Parliament in January 2012; therefore the second UK CCRA must be laid in Parliament by January 2017. Work is currently underway on scoping for the second CCRA and the CDWG CC will ensure that this provides relevant Northern Ireland outcomes.
- 7.12 The UK Climate Change Act 2008 states that after the publication of the first CCRA, Northern Ireland must lay a programme before the Northern Ireland Assembly which addresses the impacts identified in the most recent risk assessment report. It also states that the second and each subsequent programme must contain an assessment of the progress made towards implementing the objectives, proposals and policies set out in the earlier programme.

## **Delivery outside Government**

- 7.13 The requirement under the UK Climate Change Act 2008 to produce an Adaptation Programme has helped to raise climate change adaptation up the policy agenda. However, adapting to climate change is not an issue for Government to resolve alone. While Government action is critical to successful adaptation, it is up to everyone to take responsibility and deliver practical actions to deal with the impacts climate change will have on them.
- 7.14 The need to adapt to our changing climate is not yet sufficiently reflected at the local and sectoral levels. Departments will continue to work alongside the wider public sector, private sector and the voluntary sector to help them understand and manage their climate change risks.
- 7.15 The Adaptation Programme provides a real opportunity to take forward this agenda, and to promote and encourage adaptation responsibilities throughout society. Delivering real actions that will help Northern Ireland to adapt to climate change is a shared challenge, requiring complementary input and commitment from:



- The private sector;
- District councils and the wider public sector;
- Communities and third sector; and
- Individuals.

## Private sector

- 7.16 Effective adaptation to climate change requires sound risk management and strengthened business resilience. Most organisations are exposed to natural resource constraints, manufacturing, financial or economic challenges as a direct or indirect result of climate change. Business will need to assess how the risks and opportunities identified from our changing climate might affect them, from logistics and their operating requirements to the potential impact on their customers.
- 7.17 The insurance industry is one of the largest global economic sectors. Climate change has affected, and will continue to affect, the core activities of insurance companies from the risk profiles of underwritten products and services to decisions on asset management. Businesses need to factor in insured losses from extreme weather events that will result in higher insurance premiums.
- 7.18 The globalisation of markets and supply chains means that organisations of all sizes are increasingly interdependent, providing direct and indirect exposure and business opportunities from climate change. Risks often drive opportunities for the private sector with the need for technological development and new potential markets, products and services. By managing risks and opportunities specific to their everyday functioning businesses can ensure they improve their resilience.
- 7.19 Local businesses need to have regard to global events. Whilst rapid globalisation has brought about greater wealth and prosperity across the world, this has also meant that a risk in one location can rapidly spread to another. For example, the eruption of a volcano in Iceland caused chaos for airlines worldwide and had a significant cost on the European economy.

## District councils and the wider public sector

- 7.20 District councils deliver a wide range of public services and will be taking on more services with the review of public administration, such as, land use planning, urban regeneration, local economic development and local tourism. As a result they will have more opportunity to build adaptation into decision making. Due to the local consequences of our changing climate district councils have accrued direct experience of climate change impacts, such as flooding, and are particularly well placed to raise awareness and provide leadership through their responsibilities. Through the Belfast Resilience Forum, Belfast City Council has already shown the capacity of district councils to coordinate a local response to extreme weather events.

- 7.21 There are a range of practical tools to help district councils assess and plan for adaptation. For example the Local Climate Impact Profile can move the impacts of climate change up the local Government agenda.

Omagh District Council in partnership with the Chartered Institute of Environmental Health undertook the first local climate impact profile in Northern Ireland.

It concluded that climate change is likely to place additional strain on the resources of Omagh District Council and the longer term impacts of climate change needed to be considered. It also made a number of recommendations in relation to the council's response to extreme weather events. These included

- The development of protocols;
- Establishing a monitoring database system to record the impact of weather events including costs;
- Identifying all vulnerable groups and areas potentially at risk; and
- To develop further formal partnerships with external agencies.

## Communities, third sector and individuals

- 7.22 Individuals and groups have a responsibility to recognise and take into account how climate change will affect them. The impacts of climate change will affect individuals and communities in different ways, at different times and in varying degrees. Central Government in particular lacks the flexibility to respond differently to every local need whilst individuals are often better placed to manage their own risks.
- 7.23 The third sector and communities play a vital role in responding to and dealing with the aftermath of extreme events, such as flooding. They can convey information and engage with communities and individuals to support them in adapting their homes and communities.



## Chapter 8

# Building adaptive capacity and addressing climate change



### Leadership

8.1 Leadership on climate change adaptation is essential, particularly at the early stage in understanding and preparing for the impacts. In order to ensure proactive adaptive action Government will continue to take the lead by:

- Considering climate change adaptation when developing, implementing and reviewing relevant policies, strategies and actions;
- Improving the evidence base, providing tools and information, and raising awareness of adaptation options;
- Managing risks from climate change programmes, activities and assets;

- Providing information and building understanding to inform decision making by stakeholders adapting to climate change;
- Challenging stakeholders to take action and play their part in adapting and building resilience to the impacts of climate change;
- Contributing to the development of future CCRA's; and
- Providing input and promoting Northern Ireland and UK wide adaptation studies, programmes and scientific research.

## Communicating the need to adapt

8.2 Adaptation is a long term process. One of the strategic objectives is to ensure an enabling framework that supports and encourages adaptive action across Northern Ireland. Government will continue to communicate the need to adapt by:

- Promoting the need to take action to adapt to climate change;
- Highlighting the need for adaptation and bringing climate change adaptation to the wider community;
- Building on existing partnerships to create a willingness to share information and best practice across sectors; and
- Supporting the wider business, third sector and local communities to prepare and deliver adaptation measures.

## Working with others

8.3 It is imperative that tailored support is provided to help key sectors build resilience to climate change. Departments will continue to work with stakeholders to ensure that everyone has access to the latest climate science and that they have access to the appropriate tools and advice to help plan for the impacts of climate change.

8.4 There is a collective responsibility within both central and local Government, the wider community and the private sector to work together effectively to deliver successful climate change adaptation. Enhanced collaboration and cooperation is fundamental to an effective response to climate change.

## Climate partnerships

8.5 Climate partnerships have been established across the UK to promote action on addressing climate change. They aim to investigate, inform and advise on the risks and opportunities presented by climate change; and coordinate and support integrated, sustainable and effective responses. Nine English regions and the

Devolved Administrations in Scotland and Northern Ireland each have a regional Climate Change Partnership, which bring together local stakeholders across the public, private and third sectors to address climate change adaptation.

- 8.6 Climate UK<sup>46</sup> is the single collective body which represents all the UK wide Partnerships. As a significant amount of autonomous adaptation is planned or already taking place at the regional and local levels. By sharing resources, experience, knowledge and technical expertise across a wide range of sectors and regions, this collaborative approach to climate change adaptation ensures that there is an improved service to all local areas.

## Climate Northern Ireland

- 8.7 Following a key recommendation in the “Preparing for a Changing Climate in Northern Ireland”<sup>47</sup> report a Northern Ireland Climate Change Impacts Partnership was formed in 2007. The Partnership consists of representatives from central and local Government, the business community, the public and voluntary sectors, and professional organisations. It is tasked with increasing the understanding of climate change impacts and risks within Northern Ireland and the adaptation actions needed to deal with them. The partnership formally changed its name to <sup>48</sup>Climate Northern Ireland in December 2011.
- 8.8 Climate Northern Ireland brings together members from a range of key sectors to share best practice and promote positive action to address the impacts of our changing climate. By acting as a primary point of contact for all aspects of climate change, Climate Northern Ireland is promoting a more coordinated, active and coherent approach that adds value to the work of its members.

## Enhancing adaptive capacity

- 8.9 The DOE recognises the need for an increased climate change adaptation delivery role in Northern Ireland and the need to provide additional support in assisting stakeholders prepare for the challenges and opportunities presented. Due to the increased demand for knowledge on climate change adaptation, additional resources were allocated to Climate Northern Ireland from May 2012 for a period of two years. The additional resources provided for a delivery model with an increased emphasis on adaptation advice and support. To date this has resulted in the development of a high quality website, e-bulletin and social media presence, which provide an information hub for all climate change related information. It has also allowed for an enhanced core evidence and scientific information dissemination role. Climate Northern Ireland provides a range of resources and tools to support adaptation by

<sup>46</sup> <http://climateuk.net/>

<sup>47</sup> [http://www.doeni.gov.uk/index/protect\\_the\\_environment/climate\\_change/climate\\_change\\_act\\_and\\_adaptation.htm](http://www.doeni.gov.uk/index/protect_the_environment/climate_change/climate_change_act_and_adaptation.htm)

<sup>48</sup> <http://www.climatenorthernireland.org.uk/>

particular groups and sectors, and undertakes an outreach and capacity building role providing encouragement, practical networking, support and information on various adaptation measures that can be adopted across sectors.

8.10 Over the coming years Climate Northern Ireland will continue to:

- Deliver practical knowledge / guidance on adaptation measures;
- Facilitate the delivery of best practice through facilitating inter-sectoral networking and partnership;
- Support a ‘joined-up’ approach to encourage regional climate change related research and data sharing;
- Support policy development and framework implementation;
- Embed learning in relation to raising awareness, sharing information, best practice, and dissemination of lessons learned;
- Support development of expertise in adaptation measures;
- Provide targeted and tailored education and information to those at risk so they can understand the extent of the risk and heed advice; and
- Collaborate with appropriate / relevant organisations and groups across sectors.

## **Working with DEFRA and the Devolved Administrations**

8.11 There is a continuing commitment across the UK to put in place measures to adapt to climate change.

8.12 Some key changes can only be achieved by working together. In developing the UKCP09, UK CCRA and the ECR, the CDWG CC has forged and maintained close links with DEFRA and the other Devolved Administrations. Joint working will continue to enhance our understanding of the complex and interacting impacts of climate change; share best practices when developing respective adaptation programmes, frameworks and adaptation indicators; and gain better understanding of the risks and opportunities of climate change through ensuing CCRA’s.

## **Research**

8.13 The CCRA for Northern Ireland contains findings that have high levels of uncertainty. Although there are many adaptation actions that are sensible to initiate now, many risks and opportunities do not have sufficient qualitative or quantitative information to allow well-informed adaptation decisions to be made. While not all uncertainty can be eliminated, research and evidence gathering would make a crucial contribution



towards achieving a proper and holistic understanding of climate change, and its impact upon our environment, economy and society. Research could:

- Establish costs and benefits of specific climate change adaptation policy options;
- Improve methodologies to consider climate change in policy options appraisal;
- Identify ‘no-regret’ policy options; and
- Explore further the potential impacts of climate change on particular sectors.

8.14 Adaptive capacity could be built upon by ensuring climate change adaptation is embedded within research programmes, and that relevant Northern Ireland case studies are investigated and developed in partnership with relevant sectors. Further research and evidence gathering could be vital to the preparation and production of future CCRA’s for Northern Ireland. Research could also assist in monitoring the progress and effectiveness of our current adaptation activities.

8.15 Northern Ireland will need to develop and build upon critical relationships with scientists, academics and sector experts. This will be especially important as we build the evidence base for the second CCRA. Organisations are encouraged to use tools and information to help them consider how they can adapt to changing climate.

## **EU adaptation funding opportunities**

8.16 The 2011-2015 Programme for Government committed the Executive to a target of increasing the drawdown of competitive EU funding by 20% over the lifetime of the current Assembly. One of the four thematic groups established to help achieve this target was the ‘Climate Change and Energy’ group, led by the DOE but operating cross-departmentally with representative from DARD, DETI, DRD and DSD.

8.17 One of the key aims of the group is to encourage the development of projects which help address climate change mitigation and adaptation issues. The intention is to try to obtain financial support through the submission of projects - targeted at EU elective funding streams.

8.18 The Multiannual Financial Framework for 2014-2020 sets out the budgetary framework and main orientations for delivering the Europe 2020 strategy and has yet to be finalised. An integral part of all main instruments and interventions will be the mainstreaming of climate related outcomes – provisionally estimated to be up to 20% or €200bn – although much of this will be delivered through structural funds, e.g. the Common Agriculture Policy (CAP). However, many of the elective funding streams such as Horizon 2020 (budget expected to be in the order of €70bn) and LIFE (budget of around €3bn) will be open to climate action projects directly. Within LIFE, it is expected that almost €0.8bn will be for climate action solely.

- 8.19 The CCRA for Northern Ireland identified a range of gaps in evidence associated with the key climate change risks and opportunities. There are clear opportunities to seek EU funding support for research projects to address these gaps. While research can be useful from a European perspective the projects should ultimately inform and support the development of policy that can deliver concrete actions and results for Northern Ireland. However, eligible projects must also have a specific link to the overarching climate change adaptation priority of increased resilience. National research gaps will only be considered where there is a clear community wide knowledge benefit and there will be no replication funded unless it is to enable knowledge transfer. There is a focus on developing and implementing integrated strategies, and developing and demonstrating innovative technologies and systems. A climate governance sub-programme will allow applications that raise awareness, support communication, and contribute to better climate governance through stakeholder involvement.
- 8.20 The DOE Barroso Team, in conjunction with the Climate Change and Energy Desk Officer in Brussels, provides a range of support services including: research into the availability of funds; partner/project searches; the dissemination of information; the development of appropriate networks; the facilitation of meetings between potential partners; and in some cases the provision of direct support, including staff time, letters of support and small amounts of match funding. This support is available to help organisations' develop their project proposals so that they are ready for submission when the appropriate funding call is announced. It is important however to note that organisations need to start making preparations now, to enable them to take advantage of the first round of funding calls at the end of 2013.

# Annexes



## Annex A

### List of acronyms

ASSI	Area of Special Scientific Interest
BS	British Standard
CAFRE	College of Agriculture, Food and Rural Enterprise
CAP	Common Agricultural Policy
CCRA	Climate Change Risk Assessment
CDWG CC	Cross-Departmental Working Group on Climate Change
COP	Conference of the Parties
DARD	Department of Agriculture and Rural Development
DCAL	Department of Culture, Arts and Leisure
DE	Department of Education
DEFRA	Department for Environment, Food and Rural Affairs
DEL	Department for Employment and Learning
DETI	Department of Enterprise, Trade and Investment
DFP	Department of Finance and Personnel
DHSSPS	Department of Health, Social Services and Public Safety
DOE	Department of the Environment
DOJ	Department of Justice
DRD	Department for Regional Development
DSD	Department for Social Development
EC	European Commission
ECR	Economics of Climate Resilience
EEC	European Economic Community
EMG	Environment and Marine Group
ESC	Emergency Support Centres

EU	European Union
FESS	Fire and Emergency Support Service
GIS	Geographical Information Systems
HEIG	Health Estates Investment Group
HM	Her Majesty's
HSC	Health and Social Care
ICT	Information and Communications Technology
MOSS	Management of Sensitive Sites
NGO	Non Government Organisation
NI	Northern Ireland
NIEA	Northern Ireland Environment Agency
NPWS	National Parks and Wildlife Service
OFMdfM	Office of First Minister and Deputy First Minister
PAF	Priority Action Framework
PC	Price Control
PEDU	Performance and Efficiency Delivery Unit
PPS	Planning Policy Statement
SEF	Strategic Energy Framework
SIMCAT	Simulated Catchment
SME	Small and Medium sized Enterprises
SMG	Stormwater Management Group
SUDS	Sustainable Urban Drainage Systems
UK	United Kingdom
UKCP09	United Kingdom Climate Projections 2009
UNFCCC	United Nations Framework Convention on Climate Change
UWWTD	Urban Waste Water Treatment Directive
WRMP	Water Resource Management Plans

## Annex B

### Adaptation Programme – vision, objectives and principles

<b>Vision</b>				
<i><b>A resilient Northern Ireland which will take timely and well-informed decisions that are responsive to the key risks and opportunities presented by climate change</b></i>				
<b>Objectives</b>				
1	2	3	4	5
Fulfil the Statutory Duties	Work in Partnership	Raise Awareness	Promote and support the enhancement of scientific evidence	Engage with other Administrations
<b>Adaptation Principles</b>				
1. Integrate adaptation into relevant key policy areas	2. Develop the evidence base		3. Communication & cooperation	
<b>Northern Ireland Climate Change Risk Assessment Themes</b>				
Natural Environment	Agriculture & Forestry	Business	Buildings & Infrastructure	Health & Wellbeing
<b>Government's ongoing and planned high level actions by work area</b>				
Flooding	Natural Environment	Water	Agriculture & Forestry	



## Annex C

### Ongoing and planned high level actions by work area

Flooding	Natural Environment	Water	Agriculture & Forestry
Develop and implement sustainable strategies to explore, address and manage significant flood risk	Identify and implement opportunities to build resilience into the natural environment	Implement ongoing water resource management measures	Increase awareness of climate change adaptation and develop best practice for land managers
Build resilience of infrastructure to flooding and implement appropriate inspection and monitoring programmes	Explore environmental research opportunities and the development of assessment tools	Identify opportunities to improve resilience of the water resource and infrastructure	Research and identify climate resilient grasses and crops
Identify and implement measures to reduce the impact of significant flood risk to people, property and the environment	Identify, develop and review terrestrial and freshwater environment surveillance and monitoring programmes	Improve water efficiency and manage the water resource sustainably to meet need	Identify measures to support adaptation in agriculture
Develop stakeholder understanding and awareness of significant flood risk and potential adaptation measures	Support land managers in building a resilient natural environment and implement best practice	Encourage and implement appropriate water monitoring programmes and modelling	Improve the resilience of woodland
Identify future significant flood risk to explore the consequences of climate change on built heritage	Protection and enhancement of the management of habitats and species	Maintain and enhance the quality of the water	Support and encourage land managers in reducing the risk of and impacts from wildfires
	Increase adaptation awareness and motivate stakeholder action in the natural environment	Raise awareness of water issues and develop understanding to motivate adaptation action	
	Ensure marine planning considers the impacts of climate change		

## Annex D

### Priority risks and opportunities from CCRA for Northern Ireland taken forward in the Adaptation Programme

NI CCRA Theme				
Natural Environment	Agriculture & Forestry	Business	Buildings & Infrastructure	Health & Wellbeing
<b>Priority Risks and Opportunities</b>				
<p>Risk to species and habitats due to coastal evolution</p> <p>Risk of pests (incl. invasive non-native species) to biodiversity</p> <p>Risk of disease to biodiversity</p> <p>Species unable to track changing climate space</p> <p>Changes in species migration patterns</p> <p>Biodiversity risks due to warmer rivers and lakes</p> <p>Decline of native freshwater fish species</p> <p>Wildfires due to warmer and drier conditions</p> <p>Risk to coastal habitats due to flooding</p> <p>Potential decline in summer water quality (point source pollution)</p> <p>Potential decline in water quality due to diffuse pollution</p> <p>Lower summer river flows</p> <p>Algal growth</p> <p>Decline in marine water quality due to sewer overflows</p>	<p>Changes in wheat yield (due to warmer conditions)</p> <p>Changes in grassland productivity</p> <p>Forest extent affected by red band needle blight</p> <p>Forest extent affected by green spruce aphid</p> <p>Wildfires due to warmer and drier conditions</p> <p>Flooding of agricultural land</p>	<p>Risk of restrictions in water abstraction for industry</p> <p>Monetary losses due to tourist assets at risk from flooding</p> <p>Risk of business disruption due to flooding</p>	<p>Flood damage to cultural heritage</p> <p>Flood risk for Scheduled Ancient Monument sites</p> <p>Residential properties at significant risk from flooding</p> <p>Non-residential properties at significant risk of flooding</p> <p>Coastal erosion to cultural heritage</p> <p>Population affected by water supply – demand pressures</p> <p>Reduction in water available for public supply</p> <p>Public water supply / demand deficits</p> <p>Combined sewer overflow spill frequency</p> <p>Scouring of road and rail bridges</p> <p>Landslide risk on the road network</p> <p>Energy infrastructure at significant risk from flooding</p> <p>Sub stations at significant risk from flooding</p> <p>Disruption to road traffic due to flooding</p> <p>Flooding of critical infrastructure (water)</p> <p>Failure of water impoundment structures</p> <p>Algal growth in raw water supply sources</p> <p>Change in reservoir yields for public water supply</p>	<p>Number of people at significant risk from flooding</p> <p>Vulnerable people at significant risk from flooding</p> <p>Emergency response to climate events (including flooding)</p>







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**Environment**

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This document is available on the following internet site:

[http://www.doeni.gov.uk/index/protect\\_the\\_environment/climate\\_change\\_adaptation\\_programme.htm](http://www.doeni.gov.uk/index/protect_the_environment/climate_change_adaptation_programme.htm)

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