Northern Ireland Climate Change Adaptation Programme 2019-2024

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Foreword

The Intergovernmental Panel on Climate Change special report on the impacts of global warming of 1.5°C (IPCC Report) published in 2018, has re-emphasised that our climate is changing. Currently, global average temperatures are 1°C higher than the pre-industrial era. There is world-wide scientific consensus that current global warming, which is the cause of climate change, is attributable to greenhouse gases from human activities. The impact of global warming can be seen in the environment today with the loss of sea ice and retreat of glaciers, accelerating sea level rise, more frequent and intense extreme weather events such as storm surges and heavy downpours, increased risk of flooding events, and loss and movement of biodiversity and habitats ranges. In Northern Ireland we have experienced weather events which have damaged property and infrastructure, impacted businesses and altered our natural environment.

The IPCC report has provided a stark warning that, even if we take the most robust mitigation action, the world is locked into further change under all future scenarios due to the greenhouse gases already in the atmosphere. Climate change adaptation action in Northern Ireland is therefore a necessity if we are to pursue the draft Programme for Government outcome: "we live and work sustainably protecting the environment." I also want to deliver on DAERA's vision to have *"A living, working, active landscape valued by everyone"*. Climate change adaptation planning and implementation in an effective and timely manner is a key part of delivering these goals.

This programme is the second climate change adaptation programme to be published in Northern Ireland. It covers the period 2019- 2024 and takes into account the findings of the latest climate change risk assessment covering Northern Ireland. It sets out our preparation for climate change impacts which are already happening and puts in place plans for future impacts. The aim of the Programme is to build a 'resilient Northern Ireland in which timely and well-informed decisions are taken to address the socio-economic and environmental impacts of climate change'.

It is not possible to address every climate change risk. The focus of this adaptation programme is on the priority areas which have been identified as requiring urgent adaptation action over the next five years. It's also the case that government departments alone cannot address all of the

challenges. Local government, businesses, communities and individuals all have parts to play so I am very pleased to see that this programme includes a chapter on the adaptation work that is going on outside central government. I am grateful to Climate NI for their efforts to bring this information together and for their work on the development of the chapter. I am also grateful to those stakeholders from Civil Society and Local Government sectors, who provided input to Climate NI and participated in the chapter's development. We all share a responsibility to work together to adapt to our changing climate. This Programme is part of the delivery of that shared commitment.

Dr. Denis McMahon
DAERA Permanent Secretary

Executive Summary

Introduction

Climate change is a real and unprecedented challenge for Northern Ireland (NI). Adaptation action and planning is essential to managing the resilience of our society and natural environment to an uncertain future, as well as for the known current and projected impacts of a changing climate.

This is NI's second Climate Change Adaptation Programme (NICCAP) as required by UK Climate Change Act 2008 (Climate Change Act). The Climate Change Act places a duty on the relevant NI department to lay before the Assembly a NICCAP setting out the objectives, the proposals and policies for meeting those objectives including time scales for their introduction, so to address the relevant risks specific to NI identified in the most recent UK-wide Climate Change Risk Assessment (CCRA). Being the second NICCAP it contains an assessment of the progress made towards implementing the objectives, proposals and policies set out in the first NICCAP.

The Department of Agriculture, Environment and Rural Affairs (DAERA) is responsible for coordinating a cross-departmental response to the risks and opportunities relevant to NI in the CCRA.

UK-wide Climate Change Risk Assessment and Northern Ireland's National Summary

Statutory Requirement

The UK government is required under the Climate Change Act to publish a CCRA every five years. The Act stipulates that the government must assess 'the risks for the United Kingdom from the current and predicted impacts of climate change'. CCRAs are prepared and laid before Parliament by the UK government on behalf of the Devolved Administrations of NI, Scotland and Wales (DAs).

UK-wide Climate Change Risk Assessment

The most recent CCRA was laid before Parliament in January 2017, and hereafter is referred to as 'CCRA 2017'. The purpose of the CCRA 2017 is to outline the UK government and DAs' views on the key climate change risks and opportunities that the UK faces.

These views have been informed primarily by an independent assessment of the available evidence on climate risks and opportunities. The independent assessment is titled 'UK Climate Change Risk Assessment 2017 Evidence Report' (UK Evidence Report). The assessment was commissioned by the UK government and the DAs from the Adaptation Sub-Committee of the Committee on Climate Change[1]. This Evidence report includes technical chapters, a Synthesis report and National summaries.

Northern Ireland's National Summary

The risks and opportunities from climate change vary across the UK. This is due for example to differing geography, policy frameworks and predicated climate change within each UK country. The UK Evidence Report contained four National summaries, one each for NI, England, Scotland and Wales. Each summary presents the climate change impacts evidence specific to that country.

The 'UK Climate Change Risk Assessment 2017 Evidence Report - Summary for Northern Ireland' (NI Evidence Report) presents an analysis of the current and expected climate change risks and opportunities for NI.

The NI Evidence Report follows the same structure as the UK Evidence Report and it assigns an urgency category to each identified climate change risk and opportunity. The findings and urgency categorisation within the NI Evidence Report have been used in the development of the second NICCAP.

Northern Ireland Climate Change Adaptation Programme

The first NICCAP (NICCAP1) was published in January 2014. NICCAP1 provided the NI strategic objectives in relation to adaptation to climate change for the period 2014-2019. The programme contained governments' response to the risks and opportunities identified in the CCRA for NI which was part of the National/UK CCRA published in January 2012.

This document is the second NICCAP (hereafter referred to as 'NICCAP2'). NICCAP2 is a continuation of our process of adapting to a changing climate in NI. The programme covers the period 2019-2024. NICCAP2 primarily contains governments' response to the relevant NI risks and opportunities identified the NI Evidence Report.

NICCAP2 also contains a chapter titled 'Civil Society and local Government Adapts'. This chapter sits outside government and is written by Climate Northern Ireland (Climate NI)

1 The Adaptation Sub-Committee of the Committee on Climate Change provides independent, expert advice on preparing for and adapting to climate change to the UK and devolved governments and parliaments.

with businesses, voluntary and community organisations, academics and the local government sector. The chapter outlines the adaptation actions which will be taken by these outside government sectors. The actions committed to by these sectors contribute to addressing the findings of the NI Evidence Report and help deliver the outcome objectives of NICCAP2 over the lifetime of the programme.

NICCAP2 - Development and Stakeholder Input

The NI Evidence Report categorises, by urgency, the climate change risks and opportunities facing NI in the next five years. The report identifies risks and opportunities into the following urgency categories: more action needed; research priority; sustain current action, and watching brief.

NICCAP2 has been developed in collaboration with, and with input from all NI government departments. This has been achieved through a cross-departmental climate change adaptation working group.

NICCAP2 has also been informed by external stakeholder engagement and input which has been coordinated through Climate NI. Findings of the NI Evidence Report were used to engage with all stakeholders to ensure a comprehensive and collaborative response to inform the development of NICCAP2.

NICCAP2 incorporates lessons learnt and findings of an end-of-programme evaluation of NICCAP1. It also takes on board the findings of independent assessments from the UK Climate Change Committee[2] (CCC) on the UK National and the Scottish Climate Change Adaptation Programmes.

It is not possible to address every single risk which climate change may present. NICCAP2 focus is on priority areas which have been identified in the NI Evidence Report as requiring urgent adaptation action over the next five years. Focus is also on those adaptation actions which will make the most impact.

NICCAP2 sets the strategies, policies and actions by which government departments will deliver on the agreed outcome objectives.

In addition NICCAP2 contains outside government adaptation actions and delivery plans committed to by civil society and local government stakeholders, which also contribute to the delivery of NICCAP2 outcome objectives.

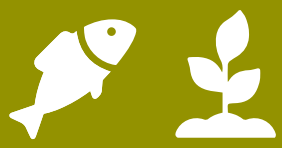
2 The UK Climate Change Committee provides independent advice to government on building a low-carbon economy and preparing for climate change.

NICCAP2 - Content

Aim, key priority areas and outcome objectives

Through an extensive central government engagement process and non-government stakeholder engagement exercises (workshops) the following aim *'A resilient Northern Ireland which will take timely and well-informed decisions to address the socio-economic and environmental impacts of climate change' was agreed*. To achieve the aim, five key priority areas and seven outcome objectives for NICCAP2 was also agreed and are laid out in Figure 1.

Figure 1: NICCAP2 Key Priority Areas and Outcome Objectives

NICCAP2 Key Priority Areas	NICCAP2 Outcome Objectives and Visions
NC Natural Capital, including Terrestrial Coastal/Marine/Freshwater ecosystems,soils and biodiversity. 	- **NC1:** We will have species, habitats and water bodies that are resilient to the impacts of climate change.
	- **NC2:** We have coastal communities, habitats, landforms and infrastructure that are resilient to impacts of climate change.
	- **NC3:** We have soils and woodland that are resilient to the impacts of climate change.
IF Infrastructure Services. 	- **IF1:** We have Transport & Network Services that are resilient to the impacts of Flooding & extreme weather.
P People & Built Environment. 	- **P1:** We have people, homes, buildings and communities that are resilient to the impacts of Flooding & extreme of weather.
B Disruption to Businesses & Supply Chains. 	- **B1:** We have businesses that can adapt to impacts of Climate Change & extreme weather.
I Food Security/Global Food Production. 	- **I1:** We have a food system that is resilient to impacts of climate change.

Adaptation Policies, Strategies, Actions and Delivery Plans

An extensive examination of the findings of the NI Evidence Report was carried out by all government departments. This process allowed departments to identify their policies, strategies and actions which will contribute to addressing the findings of the NI Evidence Report.

Collectively, these policies, strategies and actions make up NICCAP2 and its associated outcome objective delivery plans including:

- 'Valuing Nature, A biodiversity Strategy for Northern Ireland to 2020', which sets a range of targets to assist protection of our natural biodiversity;
- 'Strategic planning policy statement 2015', which places emphasis for NI's planning system to further sustainable development by mitigating and adapting to climate change;
- 'Northern Ireland Rural Development Programme', which contributes to the protection of soil from erosion and the maintenance of soil organic matter and soil structure;
- The first 'Flood Risk Management Plans' for NI, which was published in December 2015 under the 'European Floods Directive'. These included objectives and measures to alleviate flood risk in areas where it is considered to be most significant. The likely impact of climate change on the occurrence of floods must be taken into account in the planning process.
- 'Sustainable Water - A Long-Term Water Strategy for Northern Ireland (2015-2040)', which aims to deliver the long-term vision to have a sustainable water sector in NI;
- 'Invasive Alien Species Strategy for Northern Ireland', which addresses invasive alien species that will reduce the resilience of natural habitats, to climate change;
- 'UK Marine Policy Statement' (UK MPS), which provides the high level policy context within which marine plans in NI are developed. A Marine Plan for NI is currently under development and a draft Plan was published in April 2018. The UK MPS (as the current marine policy document) provides the policy framework for taking decisions affecting the marine area in NI. Decisions that affect or might affect the marine area are required to be in accordance with the UK MPS when taking into account the impacts of climate change; and
- 'Multi-Agency Severe Weather Emergency Response plan' which details the pre-planned arrangements and graduated incident and coordinated inter agency response to potential or actual severe weather events in the region. This strengthens resilience in NI against severe weather events.

Civil society and local government stakeholders have also committed to the delivery of

NICCAP2 outcome objectives by:

- implementing research actions which will contribute to addressing the evidence gaps identified by the NI Evidence Report;
- developing local council strategies and activities which will increase the resilience in the built and natural environment, and local communities; and
- establishing an online climate change and health information exchange platform for health practitioners.

NICCAP2's: Indicators

It is recognised that climate change adaptation is a complex concept, which will take time to embed into policy and practice. Adaptation is a long term and progressive process.

It will not be possible to fully assess the impact of an adaptation programme on climate change vulnerability until considerable time has passed. Nevertheless an initial set of indicators, which are statistical datasets, have been developed after discussions with all government departments and DAERA's Analytical and Services Branch.

Indicators have been assigned where possible against a relevant NICCAP2 outcome objective. The purpose of an indicator will be to serve as an evaluation mechanism to gauge the progress made towards delivering their assigned NICCAP2 outcome objective.

NICCAP2's: Mid-Programme Review and End-of-Programme Evaluation

NICCAP2 will be subject to a mid-programme review and an end-of-programme evaluation. The mid-programme review will provide an assessment on the progress of the implementation of the delivery plans' actions, the appropriateness of the assigned indicators, and the progress towards delivering the programme's outcome objectives. This review will provide a degree of flexibility to the climate change adaptation approach for government, civil society and local government sectors. It will allow us to update and add adaptation actions and indicators, and also update delivery plans as appropriate.

The end-of-programme evaluation will be carried out to ascertain how effective the adaptation programme has been. Lessons learned and knowledge gained, from this evaluation process, will provide the basis for the development of subsequent NI climate change adaptation programmes.

Chapter 1: Introduction

Introduction

1.1 Climate change is real and our local climate is changing. This is supported by global consensus and unequivocal significant evidence from world-leading scientists that climate change and its impacts are occurring on both a national and world-wide scale.

1.2 The most recent United Nations (UN) Intergovernmental Panel on Climate Change[3] (IPPC) report produced by world leading scientists was published in 2018 (IPCC Report 2018). The report reaffirms and updates our understanding of climate change and its current and projected impacts. The IPPC has determined that a significant percentage of observed and predicted climate change is attributed to greenhouse gases (GHG) emitted by human activity. These man-made GHG emissions are estimated by the IPCC Report to have resulted in approximately 1.0°C increase in global warming above pre-industrial period levels.

1.3 IPPC have found we now have warmer temperatures, on a global scale, than any preceding decade since 1850. In addition 2015, 2016 and 2017 were the three hottest years globally since records began according to the United Nations Framework Convention on Climate Change[4].

1.4 Effects from GHG emissions resulting from human activity have been implicated in the warming of our planet's atmosphere and oceans, and the melting of glaciers and icecaps. This has led to an acceleration in the rate of sea level rise and more extreme weather events across the world. The consequences of these changes can include flooding, famine, extreme storm surges, heat waves, wildfires and drought and ultimately, the extinction of some species and the loss of habitats.

1.5 Climate change will have far-reaching impacts on our society and communities, our way of life, our businesses and services, our economy and our natural environment.

Northern Ireland Climate Change

Temperatures

1.6 NI is already experiencing rising average temperatures. The 'UK Climate Change Risk Assessment 2017 Evidence Report - Summary for Northern Ireland' (NI Evidence Report) found that NI has similar annual average temperatures to the UK where annual average temperatures over land have warmed in recent decades.

3 The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.
4 The United Nations Framework Convention on Climate Change secretariat is part of the United Nations (UN). Created in 1945 and guided by its founding Charter. The UN takes action on the most critical issues confronting humanity in the 21st century, such as climate change, among others.

1.7 IPPC Report 2018 found that the UK average temperature rise is around 1°C higher than pre-industrial levels. This trend is in line with global average temperature trends. In addition the report found that nine of the ten warmest UK years since records began, have occurred since the year 2002.

1.8 The NI Evidence Report highlights that the impacts of a warmer climate are being observed in our natural habitats. The report found there has been a shift of typically warmer 'southern' species towards more northerly regions. The colder, typically 'northern' species numbers are in decline around the UK.

Extreme/Notable Weather Events

1.9 In recent years NI has experienced incidents of extreme and notable weather events. It is not possible to say conclusively if these events, such as severe and sustained rainfall, are the direct result of human induced climate change. The increased incidence and intensity of such events however, is consistent with what we would expect to see with a changing climate. These events can have serious consequences for all sectors across NI affecting our infrastructure, buildings, service provision and natural world.

1.10 The following is a snapshot list of some extreme or notable weather events from 2018 and their impacts:

- In January 2018 - Storm 'Eleanor' resulted in approximately 25,000 premises across NI losing power and caused extensive tree damage and some transport disruption.
- February/March 2018 saw the arrival of 'the Beast from the East' where NI experienced a spell of severe winter weather with very low temperatures and significant snowfalls including deep drifts in parts of Counties Armagh and Down. This caused widespread transport disruption; healthcare provision was significantly impacted.
- In June 2018 - Storm 'Hector', an unusually strong wind event for summer, resulted in 23,000 premises losing power, extensive tree damage and road blockages.
- June/July 2018 saw the warmest June since 1910 with the mean temperature being 2.1°C above the 1981-2010 average. The mean temperature for July was provisionally 1.2 °C above the 1981-2010 average, which made it provisionally the sixth warmest July in a series from 1910. This warm weather event resulted in NI Water Ltd issuing a 3 week hosepipe ban, which was the first hosepipe ban in NI in over two decades.

1.11 Other examples of extreme or notable weather events which have been experienced in previous years include:

- December 2015 - Storm 'Frank' brought heavy rain and high winds. This caused travel disruption with more than 270 roads blocked by floods or fallen trees. The east coast experienced sea inundation. This was the wettest of any two-month period in a series from 1910 for NI with some areas receiving half a year's rainfall over this period. According to Alan Strong's Report - 'Review of Winter Flooding (Northern Ireland) 2015-2016' in the Lough Neagh and Lough Erne catchments more than 3,300 hectares of land, 174 domestic properties, 36 commercial properties, at least 55 roads and the rail line between Belfast and Dublin were adversely impacted by extreme flooding. Upper Lough Erne water levels were about 1m above the prescribed upper limit and Lough Neagh water levels reached their highest level since 1928.

- In January 2016 - Storm 'Gertrude' resulted in around 20,000 homes and businesses losing power.

- In August 2017 weather events comprising heavy rain and severe thunderstorms affected the west and particularly north-west of NI. Approximately 60-70mm of rain, equivalent to 63% of the average August rainfall fell in this area in the space of 8-9 hours, causing many watercourses to rise to unprecedented levels in a very short period of time. Extensive flash flooding occurred in Counties Derry-Londonderry and north Tyrone. Hundreds of homes and businesses were flooded and extensive damage to roads and bridges occurred with 5 bridges being washed away. Landslips on the slopes of the Glenelly Valley deposited large volumes of silt and rock across a swathe of farms near Plumbridge. It is estimated that 300 sheep were lost when sections of a hillside collapsed and 55,000 chickens were killed in flash floods at a processing farm. City of Derry Airport was also closed for nearly two days due to the terminal being flooded.

Sea levels

1.12 United Kingdom Climate Projections (UKCP) has found a 16cm rise in mean UK sea levels since the beginning of the 20th century (when corrected for land movement). This sea level rise is also in line with climate change expectations and events happening at varying levels across the globe, due mainly to temperature expansion of the oceans and melting glaciers.

1.13 Sea level rise affects NI's coasts by increasing flood risks and vulnerability to storm surges. It can negatively impact our coastal economy, communities, buildings and essential infrastructure, all of which are intimately linked to the health, safety and wellbeing of people. It can also be detrimental to our natural coastal environment including the habitats and species it supports.

Future Climate Change Projections

UN Intergovernmental Panel on Climate Change

1.14 IPCC report 2018 projected that climate change-related 'risks to health, livelihoods, food security, water supply, human security, and economic growth are to increase with global warming scenario of 1.5°C and increase further with 2°C scenario'.

1.15 The report provided a stark warning that even if vigorous efforts to limit the emissions of GHG from human activities are undertaken, the world is locked into further climatic changes due to both historical and current GHG emissions. A number of climate change impacts however maybe be avoided if global warming is limited to 1.5ºC compared to 2ºC.

United Kingdom Climate Projections

1.16 UKCP provides information on anticipated changes to climate variables such as precipitation, temperature and sea-level rise.

1.17 UKCP published in 2009 (UKCP09) were used to inform the most recent UK Climate Change Risk Assessment (CCRA) published in 2017 (CCRA 2017). NICCAP2 has been developed in response to the risks and opportunities identified for NI in the CCRA 2017.

1.18 A new UKCP was launched in November 2018 (UKCP18) based on improved models and the latest observational records. UKCP18 builds on the success of UK UKCP09 and provides the most up-to-date assessment of how climate in the UK is expected to change over the coming century.

1.19 UKCP18 will be used to inform the next two UK CCRAs, which will be the UK's third and fourth Climate Change Risk Assessments. These are due to be published in 2022 and 2027 consecutively. Future NICCAPs will be developed in response to each of these CCRAs.

1.18 UKCP18 projects that we will experience 'a greater chance of warmer, wetter winters and hotter, drier summers' with all areas of the UK projected to experience warming.

1.20 It also projects increases in extreme weather events with higher intensity rainfall events, storm events and increased flood risk. UKCP18 reaffirmed that we are locked into continuing sea-level rise regardless of all future GHG emission scenarios. It is expected that there will be an increase in both the frequency, and magnitude of, extreme water levels around our coastlines.

The International Impacts

1.21 The Foresight Report, 'International Dimensions of Climate Change' which was published in 2011 examined the risks and identified the main threats and challenges to the UK from the impacts of international climate change up to 2030.

1.22 Following on from the Foresight Report, the UK government's Department for Environment, Food & Rural Affairs (Defra) commissioned Price Waterhouse Coopers, multinational professional services network, to carry out a study into international threats and opportunities that may arise from climate change in the UK. It found that the threats associated with climate change internationally considerably outweigh the opportunities that could be exploited by the UK.

1.23 Building on the Foresight and Defra commissioned reports, CCRA 2017 (for the first time in a UK CCRA) contained a chapter which directly addressed the international impacts of climate change. It concluded that the main international risks for the UK from climate change are through impacts on the food system, economic interests abroad, and increased demand for humanitarian aid.

Addressing Climate Change - Adaptation and Mitigation

1.24 There are two major strategies for addressing climate change in NI: mitigation and adaptation. Mitigation addresses the root causes of climate change by preventing and reducing GHG emissions. Adaptation seeks to mitigate the risks while utilising opportunities caused by the consequences of climate change.

1.25 NI will inevitably experience further climate change. The scale and rate at which this change will happen in the future is difficult to predict due to various factors and inherent complexity. Such factors include, the success of the world implementing international mitigation agreements (such as the Paris Agreement) to cut GHG emissions, advancements in technology and the growth in populations or energy needs. Preparation for climate change impacts should therefore take account of these unknowns as well as what is known.

1.26 Adaptation action and planning in NI should evolve in line with our increasing world-wide scientific evidence and understanding of the scale of climate change and the associated impacts. This is critical if we are to effectively manage the resilience of our society and natural environment in an uncertain future.

Adaptation - The Requirements

The Economic Requirements:

1.27 The IPCC, Fourth Assessment Review, Magnitude of Impacts Report, states that taken as a whole, 'the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time'.

1.28 Early adaptation action will most likely reduce risks and will be more cost effective than reactive, unplanned actions. The economic rationale for adaptation is that the cost of inaction will most likely exceed the cost of action.

International Agreements/Strategies, legislations and Strategic Frameworks:
NICCAP2 contributes to NI meeting its obligations under the following:

The Paris Agreement

1.29 The UK was among 195 signatories to the international Paris Agreement in December 2015. The Agreement, calls for action on both the causes (mitigation action) and consequences (adaptation action) of climate change.

1.30 The agreement requires ambitious mitigation action to reduce GHG emissions to hold the global temperature rise 'well below 2°C above pre-industrial levels', and to pursue efforts to limit the rise to 1.5°C.

1.31 The Agreement also includes a long-term adaptation goal of 'enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change'. It requires countries to prepare for the impacts of climate change including implementation and financing of adaptive actions. The long-term adaptation goal of the agreement is aimed at strengthening the ability of countries to adapt to the adverse effects of climate change while fostering climate change resilience at a national, subnational and regional level.

1.32 The Paris Agreement requires each country to publish national adaptation plans that take into consideration both negative impacts and utilisation of positive opportunities from the impacts of climate change.

The European Union Climate Change Adaptation Strategy

1.33 The aim of the European Union (EU) Climate Change Adaptation Strategy published in 2013 is the creation of a more climate change resilient Europe by enhancing the preparedness and capacity of all member states to respond to the impacts of climate change.

The Strategy focuses on three key objectives:

1. Promoting action by EU Member States: the EU Commission encourages all Member States to adopt comprehensive adaptation strategies and provides funding to help build up adaptation capacities and take action.

2. Climate-proofing by further promoting climate change adaptation in key vulnerable sectors.

3. Better informed decision-making by addressing gaps in knowledge about adaptation and further developing the European climate adaptation platform (Climate-ADAPT) as the 'one-stop shop' for adaptation information in Europe.

United Nations 2030 Sustainable Development Goals

1.34 The United Nations (UN) 2030 sustainable development goals (SDGs) are a universal set of 17 sustainable development goals and they include guidelines and targets that UN member states are expected to adopt to frame their agendas and political policies until 2030.

1.35 Goal 13 of the sustainable development goals (SDG 13) specifically sets the following targets relating to climate adaptation:

- strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries;
- integrate climate change measures into national policies, strategies and planning;
- improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning;
- mobilise and distribute 50% of the UN Framework Convention on Climate Change Green Climate Fund to adaptation projects in developing countries; and
- promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small-island developing States, including focusing on women, youth and local and marginalised communities.

The UK Climate Change Act 2008

13.6 The UK Climate Change Act 2008 (Climate Change Act) places a duty on the relevant NI government department to lay before the Assembly programmes, setting out the objectives of the department in relation to adaptation to climate change, the proposals and policies for meeting those objectives including time scales for their introduction, addressing the relevant risks specific to NI identified in the most recent CCRA. It also requires that an assessment of progress made towards implementing the objectives, proposals and policies is included in subsequent programmes.

1.37 The Department of Agriculture, Environment and Rural Affairs (DAERA) is responsible for coordinating the government cross-departmental response to the risks and opportunities relevant to NI in the CCRA through development of a NICCAP.

Northern Ireland Outcomes Delivery Plan 2018-19

1.38 The NI Outcomes Delivery Plan 2018-19 is the highest level strategic document of the NI Civil Service - providing a direction for the work of government as set out by the Executive in the form of the draft Programme for Government. The Outcomes Delivery Plan contains 12 strategic outcomes which have been identified as making the greatest difference to people's lives and wellbeing.

1.39 'Outcome 2' of the Outcomes Delivery Plan: is that 'We live and work sustainably - protecting the environment'. This outcome includes the aim of ensuring that ambition for economic growth and social progress takes into account the government's commitment to implementing SDG 13. SDG 13 requires urgent action to combat climate change and its impacts.

Chapter 2: Collaborative Working

Introduction

2.1 Adaptation to a changing climate will require a mixture of actions at international, national and local levels. Government has a leading and an integral part to play in both effective climate change adaptation and the appropriate management of climate change risks and opportunities.

2.2 Effective climate change adaptation and resilience, however, cannot be achieved by government alone. Adaptation to a changing climate is essentially a collective challenge with a shared responsibility for all sectors of society.

2.3 Stakeholders, within each sector, will have complementary roles to play in managing risks and adapting to climate change. The extent to which NI is able to meet the challenges and opportunities of climate change will require collaborative actions by everyone including:

- local government (local Councils);
- civil society (academics, community and voluntary organisations, and the private sector industries and businesses); and
- individuals.

Government Role

2.4 Government remains committed to implementing the important role of expanding the climate change knowledge base and providing and sharing up to date climate change information. This will ensure that all sectors of society are informed of ongoing developments in understanding of projected climate change risks. It will allow for these sectors to take appropriate adaptation action in response to the impacts of a changing climate.

2.5 Government departments will continue to provide climate change adaptation leadership in NI by:

- fulfilling the statutory duties in response to the latest climate change risks and opportunities, including production of an adaptation programme which sets governments' approach and response;
- working in partnership across government, and with relevant stakeholders, to strengthen and develop policies, strategies and actions which will cope with the risks and exploit the opportunities identified by the NI Evidence Report;

- raising awareness of the likely effects of climate change, promoting climate change dialogue, networking and action;
- promoting and supporting the enhancement of scientific evidence and sector specific data collection that will address climate change adaptation needs;
- engaging with other administrations at national and international level, in order to ensure the sharing of climate change adaptation best practice; and
- supporting Climate NI to provide a cross-sectoral network dedicated to increasing understanding of climate change impacts and risks within NI and promoting adaptation actions across all sectors.

Climate NI

2.6 Climate NI is an inter-sectoral network devoted to increasing understanding of climate change impacts and risks within NI and promoting the adaptation actions necessary to address them. It is governed by a Steering Group composed of organisations from a wide range of sectors. These sectors include central and local government, businesses, voluntary communities and academia. The aim of Climate NI is to; share good practice, increase the understanding of the impacts of climate change in NI, share knowledge, promote action and provide independent advice. Climate NI provides a vital link between the voluntary and community sectors, private business sectors, academics and government.

2.7 Climate NI is funded by DAERA to help government fulfil obligations to address climate change adaptation in NI.

Climate NI carries out the following climate change adaptation functions throughout NI:

- promoting and facilitating stakeholder engagement and input across all sectors of society on climate change adaptation to meet the requirements of the Climate Change Act;
- bringing together members from a range of key sectors to share good practice;
- increasing the understanding of the impacts of climate change in NI and promoting positive action in order to enable sectors to understand and manage their climate change risks;

- promoting and supporting adaptation engagement and capacity building within NI to encourage individual and sectoral actions; and
- gathering and sharing climate change adaptation information to raise awareness of the impacts of climate change within organisations and the general public, equipping them with the information needed to effectively adapt.

Role of Sectors outside Government

2.8 Adapting to a changing climate is a collective challenge with a shared responsibility for all sectors. Government has worked with a range of external stakeholders in delivering adaptation programmes and strategies which will address our climate change risks and opportunities. Adaptation action is also undertaken, outside of government involvement.

2.9 In recognition of this, Climate NI was commissioned by DAERA to work with stakeholders outside of government to develop their response to the climate change risks and opportunities identified in the NI Evidence Report.

2.10 Climate NI, in conjunction with outside government stakeholders, have developed a chapter within NICCAP2 titled 'Civil Society and Local Government Adapts'. The chapter provides adaptation outcome objective delivery plans, with actions listed, that will be undertaken by Civil Society and Local Government. These delivery plans and actions will contribute to the delivery of NICCAP2 outcome objectives.

2.11 The ownership and sign off, of the 'Civil Society and Local Government Adapts' chapter and its contents sits outside of government as it belongs to Climate NI and the outside government stakeholders who contributed to its development.

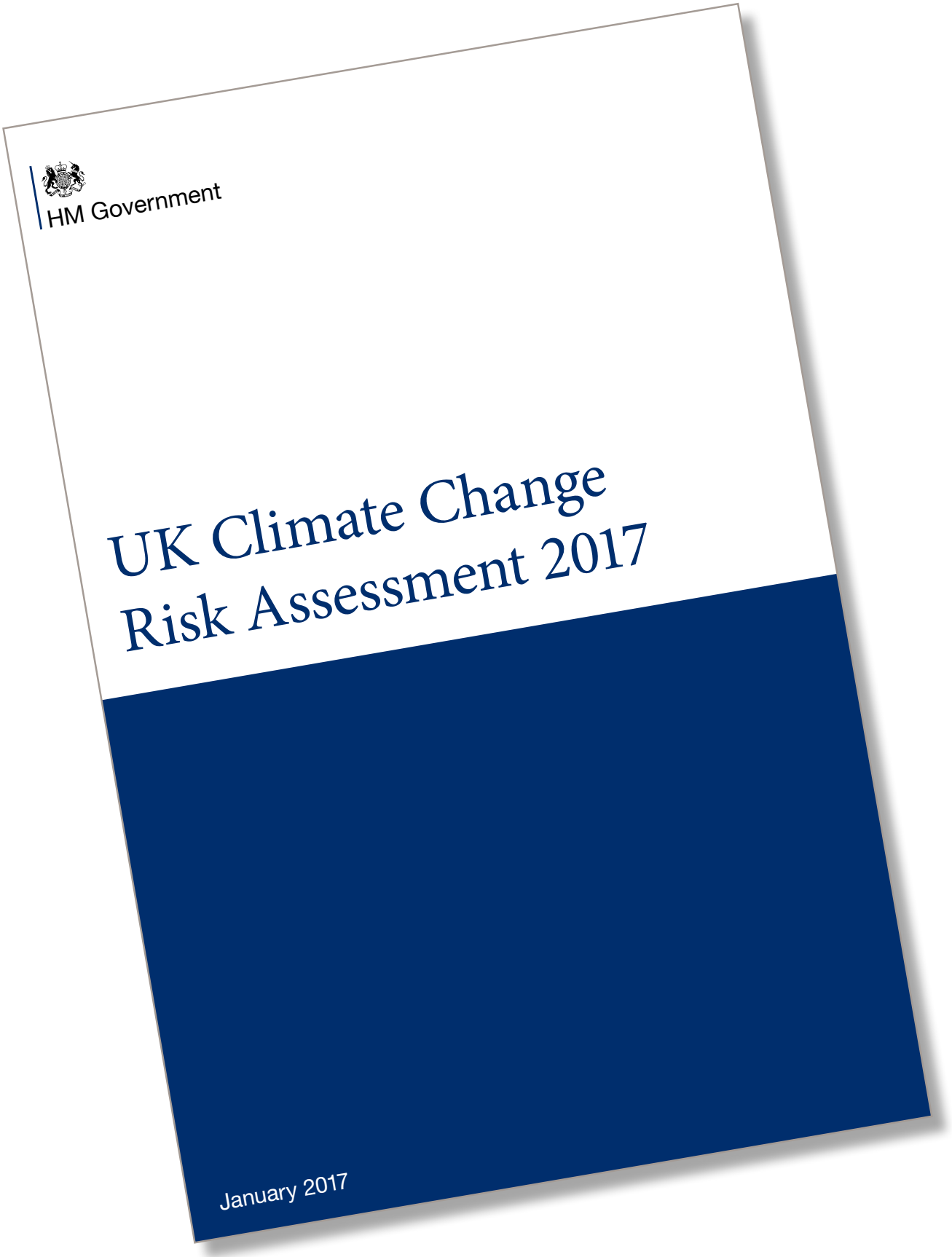
2.12 It is intended that the inclusion of this chapter within NICCAP2 will further promote and raise awareness in wider society outside of government, of the need to adapt to our changing climate. It is hoped also, it will encourage commitment from civil society and local government to contribute to addressing the opportunities and challenges of our changing climate.

2.13 It is intended that it will encourage sectors outside of government, to continue to consider, implement, monitor, review and adjust as necessary their adaptation actions in light of the most recent evidence on climate change impacts.

2.14 Climate NI has also developed, and separately published, a 'Civil Society and Local Government Adapts Supporting Document (Supporting Document)' for use as a reference paper to the 'Civil Society and Local Government Adapts' chapter. The document can be accessed at the following link on the Climate NI website: www.climatenorthernireland.org/cmsfiles/NICCAP-Civil-Society-and-Local-Government-Adapts.pdf

2.15 The Supporting Document and its contents, although a referencing paper, sits outside NICCAP2, and outside government. The ownership and sign off of this supporting document and its contents, belongs to Climate NI and the outside government stakeholders who contributed to it.

Chapter 3: Climate Change Risk



Introduction

3.1 The Climate Change Act stipulates that the government must assess 'the risks for the United Kingdom from the current and predicted impacts of climate change'. The UK government is required under the Act, in a five yearly cycle, to publish and lay before Parliament a UK-wide CCRA.

CCRA 2017

3.2 The most recent CCRA was laid before parliament in January 2017 (CCRA 2017). The purpose of the CCRA 2017 is to outline the UK and DAs views on the key climate change risks and opportunities that we are likely to encounter.

3.3 These views have been informed primarily by an independent assessment of the available evidence on climate risks and opportunities. This assessment was commissioned by the UK government and DAs from the Adaptation Sub-Committee of the Committee on Climate Change (ASC)[5]. The assessment is known as 'UK Climate Change Risk Assessment 2017 Evidence Report' (UK Evidence Report). The UK Evidence Report provided the most up to date information available based on the latest scientific evidence and understanding of observed and projected climate change for the UK.

3.4 CCRA 2017 draws primarily on and endorses the findings of the UK Evidence Report.

The production of the CCRA 2017:

- fulfilled the requirement of the Climate Change Act for the government to lay before Parliament a five-yearly assessment of the risks for the UK of the current and predicted impacts of climate change;
- provided an independent assessment of the available evidence on climate risks and opportunities;
- considered the magnitude of the risk now and in the future;
- took into account policies and adaptation plans already in place to manage the risks;
- considered the potential benefits of further action; and
- updated the findings of the previous CCRA published in 2012.

5 The Adaptation Sub-Committee of the Committee on Climate Change provides advice to the Government on climate change risks and opportunities for the UK, and evaluates progress on adaptation.

Evidence Report

3.5 Hundreds of leading scientists participated in the development of the UK Evidence Report as authors and reviewers. It drew on a wealth of research from the UK's world-leading academic institutes as well as a range of other expert sources.

3.6 The UK Evidence Report includes technical chapters, an overarching Synthesis Report, and National summaries.

The Northern Ireland National Summary

3.7 The National summary for NI is titled the 'UK Climate Change Risk Assessment Evidence Report Summary for Northern Ireland' (NI Evidence Report).

3.8 The NI Evidence Report presents the NI specific evidence and detail of the climate change risks and opportunities provided as part of the overall UK Evidence Report.

3.9 Full details of NI's climate change risks, the opportunities and the associated rationales presented by the NI Evidence Report can be accessed at the following link.

3.10 As stated within the CCRA 2017, detailed responses and actions to the findings and recommendations in NI Evidence Report have contributed to the development of NICCAP2.

Development

3.11 NI government officials and non-government experts were given an opportunity to provide input to the NI Evidence Report.

3.12 Climate NI, on behalf of government, organised and carried out four sectoral workshops in June 2015, in collaboration with the 'Institution of Civil Engineers', 'Business in the Community' and 'NI Environment Link' (NIEL). The sectoral workshops addressed the following areas; 'Infrastructure'; 'Business and Industry'; 'Natural Environment and Rural Economy'; and 'People and Built Environment'.

3.13 The workshops provided a unique opportunity for NI government officials and non-government experts, to exchange views and concerns on the potential climate change risks to NI. The workshops resulted in the identification of a number of key local climate change risks specific to NI. The findings of these workshops were provided to the UK Climate Change Committee[6] (CCC) and fed into the development of the NI Evidence Report.

6 The UK Climate Change Committee provides independent advice to government on building a low-carbon economy and preparing for climate change.

Content

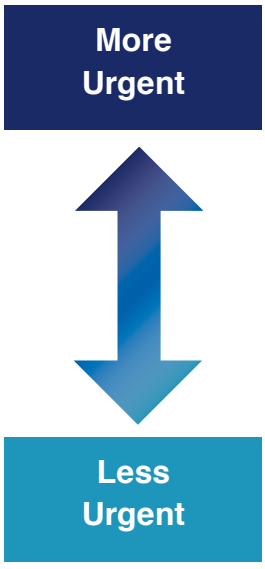
Evidence Report Urgency Categories

3.14 The NI Evidence Report provided the most recent assessment of risk and opportunities available to NI. It also assessed the urgency of further action to tackle current and future risks and realise opportunities, arising specifically for NI from climate change.

3.15 The Report determined where more action is needed, where action is recommended to be at least sustained, where evidence in areas should be kept under review and where research is needed to fill current evidence gaps. NI Evidence Report urgency categories are shown in Figure 3.1.

3.16 One of the four 'urgency categories' has been assigned to each NI specific climate change risk or opportunity identified in the NI Evidence Report (see Figure 3.2).

Figure 3.1: Urgency categories applied within NI Evidence Report



MORE ACTION NEEDED	New, stronger or different government policies or implementation activities - over and above those already planned - are needed in the next five years to reduce long-term vulnerability to climate change.
RESEARCH PRIORITY	Research is needed to fill significant evidence gaps or reduce the uncertainty in the current level of understanding in order to assess the need for additional action.
SUSTAIN CURRENT ACTION	Current or planned levels of activity are appropriate, but continued implementation of these policies or plans is needed to ensure that the risk continues to be managed in the future. This includes any existing plans to increase or change the current level of activity.
WATCHING BRIEF	The evidence in these areas should be kept under review, with long-term monitoring of risk levels and adaptation activity so that further action can be taken if necessary.

Note: Whilst there will be specific evidence gaps and uncertainties in almost every area, the *'research priority'* category is reserved for those risks and opportunities where further evidence is needed to determine whether more action is needed, current levels of action should be sustained, or for now things can be kept under review (watching brief).

3.17 In most cases, the urgency score assigned to a climate change risk or opportunity for NI was the same as for the UK as a whole. In other areas, the magnitude or the type of risks and opportunities from climate change vary in NI and across the UK. This is due to such factors as, geographical differences, policy framework differences, and variation in the projected changes to the climate across different countries of the UK.

Figure 3.2: Urgency Scoring of NI Evidence Report climate change risks and opportunities.

Risk/Opportunity	Urgency Scoring			
	More Action	**Research**	**Sustain**	**Watch**
	NE1 Risks to Species and habitats due to inability to respond to changing climatic conditions.	NE3 Risks and Opportunities from changes in agricultural & forestry productivity & land suitability.	NE9 Risks to agriculture, forestry, landscapes & wildlife from pests, pathogens & invasive species.	NE11 Risks to aquifers, agriculture land & habitats from salt water intrusion.
	NE2 Opportunities from new species colonisations.	NE7 Risks to freshwater species from higher water temperatures.	NE10 Risks to agriculture, forestry, wildlife & heritage from change in frequency and/ or magnitude of extreme weather & wildfire events.	NE14 Risks & opportunities from changes in landscape character.
	NE4 Risks to soils from increased seasonal aridity & wetness.	NE13 Risks to & opportunities for marine species, fisheries & marine heritage from ocean acidification & higher water temperatures.	IN9 Risks to public water supplies from drought & low river flows.	IN7 Risks to hydroelectric generation from low or high river flows.
	NE5 Risks to natural carbon stores & carbon sequestration.	IN3 Risks to infrastructure services from coastal flooding & erosion.	IN13 Risks to transport, digital & energy infrastructure from extreme heat.	IN8 Risks to subterranean & surface infrastructure from subsidence.
	NE6 Risks to agriculture & wildlife from drought & flooding.	IN5 Risks to bridges & pipelines from high river flows & bank erosion.	IN14 Potential benefits to water, transport, digital & energy infrastructure from reduced extreme cold events.	IN10 Risks to electricity generation from drought & low river flows.

Risk/Opportunity

Urgency Scoring			
More Action	**Research**	**Sustain**	**Watch**
NE8 Risks of land management practices exacerbating flood risk.	IN11 Risks to energy, transport & digital infrastructure from high winds & lightning.	PB13 Risks to health from poor water quality.	IN12 Risks to offshore infrastructure from storms & high waves.
NE12 Risks to habitats & heritage in the coastal zone from sea-level rise: & loss of natural flood protection.	PB1 Risks to health & wellbeing from high temperatures.	PB14 Risk of household water supply interruptions.	PB2 Risks to passengers from high temperatures on public transport.
IN1 Risks of cascading failures from interdependent infrastructure networks.	PB5 Risks to people, communities & buildings from flooding.	BU3 Risks to business operations from water scarcity.	PB3 Opportunities for increased outdoor activities from higher temperature.
IN2 Risks to infrastructure services from river, surface, water and groundwater flooding.	PB6 Risks to the viability of coastal communities from sea level rise.	BU6 Risks to business from disruption to supply chains & distribution networks.	PB12 Risk of foodborne disease cases/outbreaks.
IN4 Risks of sewer flooding due to heavy rainfall.	PB7 Risks to building fabric from moisture, wind & driving rain.		BU4 Risks to busines
IN6 Risks to transport networks from slope & embankment failure.	PB8 Risks to culturally valued structures & the wider historic environment.		BU7 Risks & opportunities for business from changes in demand for goods & services.
PB4 Potential benefits to health & wellbeing from reduced cold.	PB9 Risks to health & social care delivery.		
IT1 Risks from weather-related shocks to international food production & trade.	PB10 Risks to health from changes in air quality.		

	Urgency Scoring			
	More Action	**Research**	**Sustain**	**Watch**
Risk/Opportunity		PB11 Risks to health from vector-borne pathogens.		
		BU1 Risks to business sites from flooding.		
		BU2 Risks to business from loss of coastal locations & infrastructure.		
		BU5 Risks to business from reduced employee productivity, due to infrastructure disruption & higher temperatures in working environments.		
		It2 Imported food safety risks.		
		It3 Risks & opportunities from long-term, climate-related changes in global food production.		

*Key: Colour Code of NI Evidence Report Areas of Risk and Opportunities

Natural Environment
Infrastructure
People & Built Environment
Business & Industry
International

Chapter 4: Northern Ireland Climate Change Adaptation Programme

Northern Ireland Climate Change Adaptation Programme 2014-2019

4.1 The first Northern Ireland Climate Change Adaptation Programme (NICCAP1) was published in January 2014. It provided the NI strategic climate change adaptation objectives and the proposals and policies by which each department was to meet these objectives for the period 2014-2019. The programme provided Departments' response to the risks and opportunities identified in the CCRA for NI that was part of the overall UK CCRA published in January 2012.

Northern Ireland Climate Change Adaptation Programme 2019-2024

4.2 This document (NICCAP2) is the second Northern Ireland Climate Change Adaptation Programme to be published. NICCAP2 sets out NI's climate change adaptation approach and actions for the period 2019-2024. The programme primarily addresses governments' response to the climate change risks and opportunities identified in the NI Evidence Report.

4.3 Section 60 of the Climate Change Act requires an assessment of progress made towards implementing the objectives, proposals and policies set out in earlier adaptation programmes. An evaluation and assessment for NICCAP1 is provided by NICCAP2 in Chapter 15: NICCAP1 Evaluation.

4.4 NICCAP2 also contains a chapter dedicated to outlining the adaptation work and actions carried out by the civil society and local government sectors which contributes to addressing the relevant risks and opportunities in the NI Evidence Report. As highlighted previously, this chapter sits outside government and is the ownership of Climate NI and the outside government stakeholders who contributed to its development.

Development Process

4.5 NICCAP2 has been developed and written in collaboration with all other NI government departments and through Climate NI stakeholder engagement.

4.6 Government cross-departmental input has been sought and agreed through the NI Climate Change Adaptation Sub-group (ASG)[7] of the Cross-Departmental Working Group on Climate Change[8] (CDWG CC).

7 The Adaptation Sub Group is one of three sub-groups of the Cross-Departmental Working Group on Climate Change (CDWG CC). It is chaired by a DAERA official and consists of representatives from all departments. A Mitigation Sub Group and Analyst Sub Group of the CDWG CC also take forward work on climate change.

8 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.

4.7 ASG terms of reference are:

- to support the preparation of an assessment of the risks to the UK of the current and predicted impact of climate change;

- to evaluate the climate change risks and opportunities for NI and prepare and deliver a cross-departmental adaptation programme on climate change;

- to review cross-departmental action on adaptation on an annual basis and report to the CDWG CC on progress; and

- to make recommendations and/or decisions on wider climate change adaptation issues as appropriate.

4.8 The ASG analysed the findings from its assessment of NICCAP1, feedback from the Climate NI stakeholder workshops and ASC's independent reviews of the UK National and the Scottish Adaptation Programmes.

From this analysis ASG agreed that NICCAP2 would:

- set priorities for adaptation- making sure the most important and urgent issues are being addressed;

- ensure objectives are specific, outcome-focused, and measurable objectives will describe priority outcomes rather than centre on process and activities;

- focus on the set of policies and actions that will have the biggest impact- each with specific goals, responsibilities and timing; and

- where possible, bring on board local communities and engagement with businesses so that local organisations and interests can play a role in delivery.

NICCAP2 Aim; Key Priority Areas; and Outcome Objectives

4.9 DAERA undertook extensive engagement with other government departments and Climate NI facilitated engagement with stakeholders on the NICCAP2 aims, key priority areas and outcome objectives. All feedback from the engagement processes was collated and the following was agreed for NICCAP2 by the ASG:

Aim:

4.10 ‘A resilient Northern Ireland which will take timely and well-informed decisions to address the socio-economic and environmental impacts of climate change’.

Key Priority Areas:

4.11 The key priority areas under which climate change adaptation actions are required over the next five years are as shown in Figure 4.1.

Figure 4.1: Key priority areas under which climate change adaption actions are required over the next five years.

	1. **NC:** Natural Capital, including Terrestrial/Coastal/Marine/Freshwater ecosystems, soils and biodiversity.
	2. **IF:** Infrastructure Services.
	3. **P:** People and Built Environment.
	4. **B:** Disruption to Businesses & Supply Chains.
	5. **I:** Food Security/Global Food Production.

The five priority areas correlate closely to the chapters of the NI Evidence Report.

Outcome Objectives:

4.12 Under the five key priority areas of the NICCAP2 seven strategic ‘Outcome Objectives’ are identified (see Figure 4.2). These outcome objectives are statements of improvement (‘Visions’) for NI and when taken together, they aim to increase the resilience of NI to a changing climate.

The five priority areas correlate closely to the chapters of the NI Evidence Report.

Figure 4.2: NICCAP2 key priority areas and associated strategic 'Outcome Objectives'

Key Priority Areas	Outcome Objectives (i.e. Visions - which are statements of the improvement which NI is seeking to address effects of Climate Change)
NC Natural Capital, including Terrestrial/Coastal/Marine/ Freshwater ecosystems, soils and biodiversity 	- **NC1:** We will have species, habitats and water bodies that are resilient to the impacts of climate change.
	- **NC2:** We have coastal communities, habitats, landforms and infrastructure that are resilient to impacts of climate change.
	- **NC3:** We have soils and woodland that are resilient to the impacts of climate change.
IF Infrastructure Services 	- **IF1:** We have Transport & Network Services that are resilient to the impacts of Flooding & extreme weather.
P People & Built Environment. 	- **P1:** We have people, homes, buildings and communities that are resilient to the impacts of flooding & extremes of weather.
B Disruption to Businesses & Supply Chains. 	- **B1:** We have businesses that can adapt to impacts of Climate Change & extreme weather.
I Food Security/ Global Food Production. 	- **I1:** We have a food system that is resilient to impacts of climate change.

Mapping Outcome Objectives

4.13 On establishment of NICCAP2's key priority areas and outcome objectives, DAERA identified the relevant NI Evidence Report's risks and opportunities which fall under each of the NICCAP2 outcome objectives (see Annex A Outcomes Framework Mapping).

4.14 This mapping exercise allowed for the determination of how the risks and opportunities will be addressed through the delivery of the outcome objectives.

Indicators

4.15 Climate change adaptation is a long term challenge which is required to be flexible in response to both known and unknown impacts of a changing climate. However, we must monitor our adaptation progress in a way which will inform us of the effect of our adaptation actions. This will also help us understand how these actions are impacting on the delivery of NICCAP2 outcome objectives.

4.16 Climate change adaptation action can occur at both national and local levels. Finding appropriate indicators of success that are meaningful can be problematic. Extensive work was undertaken by the ASG and DAERA's Statistics and Analytical Services Branch on identifying indicators. This is to ensure that NICCAP2 outcome objectives are supported by appropriate indicators which can be used to assess how well NI is adapting to a changing climate.

4.17 An initial set of indicators has been developed and assigned against a relevant NICCAP2 outcome objective. An indicator is derived from existing statistical data. As more statistical data becomes available it is hoped to build upon this initial set of indicators and develop a fuller suite.

4.18 At NICCAP2's mid-programme review and end-of-programme evaluation, analysis of this statistical data will gauge how well we are performing against our delivery plans. This approach will provide a basis for monitoring progress over the lifetime of the NICCAP2. Figure 4.3 provides a list of the initial set of adaptation indicators assigned against the relevant outcome objective.

Figure 4.3: Adaption indicators and relevant outcome objectives

NICCAP2 Key Priority Areas	NICCAP2 Outcome Objectives	NICCAP2 Indicators
NC Natural Capital, including Terrestrial/ Coastal/Marine/ Freshwater ecosystems, soils and biodiversity 	- **NC1:** We will have species, habitats and water bodies that are resilient to the impacts of climate change.	- % of terrestrial protected area under favourable management. - % of marine protected area under favourable management. - % of water bodies at 'good' status (published every 3 years).
	- **NC2:** We have coastal communities, habitats, landforms and infrastructure that are resilient to impacts of climate change.	- Area of in-shore water protected for nature conservation. - % of sea wall in each structural condition code.
	- **NC3:** We have soils and woodland that are resilient to the impacts of climate change.	- New Woodland Planted.
IF Infrastructure Services 	- **IF1:** We have Transport & Network Services that are resilient to the impacts of Flooding & extreme weather.	- Number of properties removed from the 'Out of Sewer Flooding' Register. - % uptake of Sustainable Drainage Systems for new Article 161 Sewer Adoption Agreements. - Amount spent on structural drainage.
P People & Built Environment. 	- **P1:** We have people, homes, buildings and communities that are resilient to the impacts of flooding & extremes of weather.	- % uptake of Sustainable Drainage Systems for new Article 161 Sewer Adoption Agreements. - % of properties at risk of flooding in NI. - Number of Local Development Plans (Plan Strategy/Local Policies Plan) which take account of climate change adaptation considerations in accordance with the provisions of the Strategic Planning Policy Statement and have been adopted post Independent Examination.

NICCAP2 Key Priority Areas	NICCAP2 Outcome Objectives	NICCAP2 Indicators
B Disruption to Businesses & supply chains. 	- **B1:** We have businesses that can adapt to impacts of Climate Change & extreme weather.	- Number of non-residential properties at risk of flooding.
I Food Security/ Global Food Production. 	- **I1:** We have a food system that is resilient to impacts of climate change.	- Sourcing of an appropriate Indicator ongoing.

Strategies, Policies, Adaptation Actions, Delivery Plans and Case Studies

High level strategies, polices, actions and delivery plans

4.19 Through the ASG, relevant experts from each government department identified and provided input on high level strategies, policies and actions. When implemented over the next five years these strategies, policies and actions will contribute to delivering NICCAP2 outcome objectives. From the input received, delivery plans (see Annex A Government Delivery Plans) were developed for each outcome objective. Outcome objective delivery plans contain the following details:

- title of the key priority area;
- assigned identification letter and number of the outcome objective;
- the relevant vision for the outcome objective;
- the relevant indicators;
- the list of actions with implementation time lines and responsible named department; and
- NI Evidence Report climate change risks/opportunities to which the relevant action contributes to addressing.

Case studies

4.20 Climate change adaptation actions have been established and have become integrated into government's policies and strategies. It is important to illustrate how NI has begun the process of adapting to our changing climate. Government departments provided input on case studies for inclusion in NICCAP2. These case studies contain examples of some of the success of adaptation actions which were carried out under NICCAP1. Some of these case study actions are ongoing and will continue over the life time of NICCAP2.

Reporting on Progress

4.21 Climate change is a dynamic process and the risk it poses will change over time with a level of uncertainty around impacts. In recognition of this, NICCAP2 is expected to evolve. To enable monitoring of NICCAP2 there will be a comprehensive mid-programme review that will provide an assessment of:

- the progress of actions implemented/ to be implemented;
- the effectiveness of adaptation indicators; and
- progress on delivering the outcome objectives.

4.22 The review will give flexibility to NI's climate change adaptation approach over NICCAP2's five year period (2019-2024). It will provide an opportunity to monitor the programme and update delivery plans and indicators prior to the completion of the programme.

4.23 On completion of the programme an evaluation will be carried out to ascertain how effective the programme has been. Lessons learned and knowledge gained during this evaluation process will provide the basis for the development of subsequent NICCAPs.

Improving Evidence Base

4.24 Within the UK Evidence Report there are approximately 200 evidence gaps identified which fall under the 'research priority' category for the whole of the UK, with 20 specifically identified for NI. These are risks or opportunity areas where further evidence is required in order to determine the best course of action to be taken.

4.25 Government will lead on effective NI adaptive capacity by ensuring climate change adaptation is embedded within their future research programmes. Government will

continue collaborative working, maintaining links with other UK Administrations on research priorities which have UK-wide implications, with particular relevance to NI.

4.26 Not all of NI's research gaps can be addressed by government alone. Expertise from outside government is key in developing a more robust evidence base. Government will develop and build upon the crucial relationships already forged between themselves, scientists, academics and sectoral experts. This will maintain a central pool of experts to help ensure robust, informed, evidence-based decision making. It will also provide opportunities to share best practice when developing respective adaptation programmes, frameworks and indicators. Ultimately we will gain better understanding of the relevant risks and opportunities for future climate change risk assessments.

Chapter 5: Key Priority Areas

Introduction

This chapter provides details on the five key priority areas within NICCAP2.

NC - Natural Capital; including Terrestrial/Coastal/Marine/Freshwater ecosystems, soils and biodiversity.

5.1 We rely on our natural environment to sustain our lives. From our natural environment we derive a wide range of vital goods and services including food, energy, clean air, water and pollination, raw materials, recreational facilities and natural flood alleviation/protection, as well as other economic inputs.

5.2 Collectively these vital goods and services are known as 'Ecosystem Services'. Ecosystem services are closely linked to our health and well-being, and our economic prosperity is dependent upon healthy ecosystems and their components.

5.3 The Natural Capital Committee defines natural capital as 'the elements of nature that produce value or benefits to people (directly and indirectly), such as the stock of forests, rivers, land, minerals and oceans, as well as the natural processes and functions that underpin their operation'. Natural Capital contributes significantly to our quality of life, economy and prosperity.

5.4 Our natural environment is changing. It is also subject to stresses from historic and on-going pressures such as spread of invasive species, draining of wetlands and pollution. Changes to the natural environment can be caused and exacerbated by climate change. Climate change has potential to lead to a net loss in natural capital and negatively impact our ecosystem services resulting in species loss and habitat degradation.

5.5 There may be potential opportunities such as extended growing seasons arising from a modest level of climate change. The UK Evidence Report however concluded, that these opportunities will only be fully realised if limiting factors such as water availability, soil health and pests and diseases are effectively managed.

IF - Infrastructure Services

5.6 Infrastructure can be defined as the basic physical and organisational structures, and facilities, needed for the successful operation of society or enterprise. It is composed of public and private physical elements such as roads, bridges, tunnels, water supply,

sewers, electrical grids and telecommunications. The elements are the combination of interrelated systems and services which are essential to enable, sustain and develop all aspects of our society.

5.7 Infrastructure sectors tend to be interdependent so that when one sector fails it impacts other areas of infrastructure also. The interdependencies are often simple. The supply of electricity, for example, is crucial for pumping sewage to waste water treatment works and if the supply of electricity fails untreated sewage can cause human health issues and environmental pollution.

5.8 Current variability in weather experienced in NI is already having an impact on NI's infrastructure. During August 2017, for example, approximately 60-70mm of rain, equivalent to 63% of the average August rainfall fell in Counties Derry-Londonderry and Tyrone in the space of 8-9 hours. This resulted in many watercourses rising to unprecedented levels in a very short period of time. Hundreds of homes and businesses were flooded. Extensive damage to roads and bridges occurred with five bridges being washed away; City of Derry Airport had to be closed for nearly two days due to the terminal being flooded.

5.9 Adaptation to climate change under this key priority area requires two forms of response: dealing with the long-term effects on infrastructure such as rising sea levels, and also developing resilience to acute and extreme weather events such as flash flooding.

5.10 Some infrastructure services such as digital and electricity operate independently from government. They have a responsibility to develop and monitor their own climate change resilience strategies. This includes responsibility for their own business continuity measures in relation to climate change impacts, such as the provision of essential services which enables them and their customers to function.

P - People and Built Environment

5.11 Environmental factors such as temperature, air and water quality are integral determinants of our health and wellbeing. Climate change due to global warming is altering our environment, increasing the risk of extreme weather events such as heat waves and flooding incidents, rising sea levels and modified rainfall patterns. These impacts have the potential to give rise to multiple negative effects on communities, buildings and essential infrastructure, all of which are intimately linked to the health, safety and wellbeing of people.

5.12 Building resilience to and living with a changing climate for our people and built environment will require taking effective action across a number of sectors. It will involve processes as diverse as planning, water, health, buildings, and infrastructure.

5.13 This work needs to be cognisant of its impact on culturally valued structures and the wider historic environment because this is a unique resource. Such work may include recording new archaeological sites exposed by changes as well as work to ensure that the impact on heritage assets and appropriate mitigation measures are well understood.

B - Disruption to business and supply chains

5.14 A wide range of businesses and supply chains must consider the effects of future climate change. This could bring a range of both positive and negative impacts. Some of these impacts will mean new or potentially higher business risks while others may provide new opportunities and benefits such as new services/markets.

5.15 Impacts may be local, for example, damage caused to business assets including buildings and vehicles as a result of extreme weather events and/or flooding. Businesses can also be indirectly impacted because of their dependency upon international supply chains or markets.

5.16 Extreme weather events and/or flooding can cause disruption of supply chains and power supply and have a negative impact on transportation routes. This can have an adverse effect on business logistics, finances and continuity of service delivery. Businesses may also be affected because of staff and customer absences due to extreme weather events.

5.17 Although there is a degree of uncertainty, planning for potential impacts of extreme weather events is still advantageous as potential risks can be better managed. It is more likely to be cost effective for businesses to manage the risks of climate change impacts rather than simply reacting to such impacts as they happen.

5.18 Both government and the business community have an important and complementary role in building resilience to a changing climate. Businesses will have to take action to build their own climate change adaptive capacity. Businesses are generally best placed to manage climate change risks associated with their particular assets and economic context. Independent organisations and professional bodies who represent, support or regulate businesses will also have an important role to play.

I - Food Security/Global Food Production

5.19 The Committee on World Food Security defines food security as the condition in which all people at all times have physical, social and economic access to sufficient safe and nutritious food. The UK Evidence Report highlighted that impacts are interconnected. It also highlighted that risks are mainly 'through price spikes, which affect availability and affordability; trade, including balance between imports, exports and domestic production; and health impacts, including both nutrition and food safety'.

5.20 Climate change impacts such as global droughts and floods have contributed to the uncertainty over food production. Experts have forecasted more extreme weather events in the years ahead.

5.21 The unpredictability of weather patterns can impact agriculture and food security, leading to reduced production and lower incomes in vulnerable areas.

5.22 Agriculture may need to change and introduce new systems to protect productivity, using resources efficiently, and which are resilient to risks, shocks and long term climate variability. Any transformation of our NI agricultural systems will need to be accomplished without depleting the natural resource base.

Chapter 6: Government Functions under Key Priority Areas

6.1 This chapter outlines the key role and functions of Government under the priority areas.

NC - Natural Capital; including Terrestrial/Coastal/Marine/Freshwater ecosystems, soils and biodiversity

6.2 Government remains committed to working on improving the resilience of our Natural Capital to climate change; such as Terrestrial/Coastal/Marine/Freshwater ecosystems, plant health monitoring and management, soils and biodiversity.

6.3 Government departments do this already by adhering to a number of EU Directives and international commitments that seek to protect and enhance the natural environment and contribute to adapting to climate change. These include the Convention on Biological Diversity, the Ramsar Convention, the Water Framework Directive, Habitats Directive, Plant Health Directive, Floods Directive, Birds Directive, and the Marine Strategy Framework Directive.

6.4 In NI, DAERA is primarily responsible for the protection, conservation and enhancement of the natural environment, which it does through a variety of statutory and non-statutory means. These include the protection and management of designated protected sites, and through the development of specific management plans. DAERA promotes biodiversity conservation and gathering of evidence to increase knowledge and understanding of the natural environment. DAERA also plays a key role in land management, and is also responsible for fisheries. Plant health protection is becoming increasingly important because of pests and pathogens which have been identified as key risks to our natural capital.

6.5 Department for Infrastructure (DfI) has a role to play in maintaining and improving our natural capital which is resilient to the impacts of climate change. In exercising its functions, DfI consider the potential consequences to the built and natural environment which includes terrestrial and coastal ecosystems. DfI retains responsibility for regional planning policy and legislation as well as the determination of regionally significant and called-in applications. It also has a local development plan oversight role.

6.6 Responsibility for the management of NI's coast falls to a number of different government departments. DAERA has responsibility for nature conservation protection and marine licensing, while DfI is responsible for the maintenance of 26km of designated coastal flood defences.

IF - Infrastructure Services

6.7 Government continues to play a key role in improving resilience of our infrastructure to a changing climate.

6.8 DfI has a range of responsibilities including regional & strategic planning; policy and legislation; management and maintenance of all public roads; river and coastal flooding; as well as water, sewerage and drainage.

6.9 DfI has incorporated climate change adaptation into its significant policies and strategies insuring that any new infrastructure projects carried out by the department take climate change adaptation into account.

6.10 In addition, DfI is the only shareholder for NI Water Ltd which provides essential water and sewerage services by treating 560 million litres of clean water and 320 million litres of wastewater every day.

6.11 DfI also sponsors and is accountable for the NI Transport Holding Company. The NI Transport Holding Company is responsible for the operation of its subsidiary companies, including Ulsterbus, Metro and NI Railways, trading jointly as Translink. It is authorised to run its business as if it were a commercial enterprise.

6.12 Airports and seaports in NI are public trust organisations which are commercially independent. Responsibility for aviation matters, shipping services, navigation and marine safety remain reserved functions of the Department for Transport (DfT) in London and the Maritime and Coastguard Agency. DfT continues to work with the transport sector to increase climate resilience in the planning and design of transport infrastructure and incorporating adaptation into its major plans and strategies. DfI exercises a stewardship role over the trust ports to the five commercial seaports in NI, at Belfast, Larne, Derry-Londonderry, Warrenpoint and Coleraine to ensure that, in undertaking their fiduciary duties, they adhere to good practice.

P - People and Built Environment

6.13 Increasing temperatures, rising sea levels, changing rainfall patterns, and extreme weather events present risks to people and the built environment. Responsibilities for adaptation actions under this priority area falls under a number of government departments.

6.14 DfI has responsibility for managing flood risk from rivers and the sea by undertaking sustainable watercourse and coastal flood risk management. It is the lead department for flood emergency events throughout NI. The department also leads on policy in relation to the water and sewerage sector as the sole shareholder in NI Water Ltd, NI's only sewerage and drinking water services provider. DfI also takes responsibility for, inland waterways, and strategic planning. DfI is the NI Executive sponsor department for Waterways Ireland, the North-South Implementation Body responsible for the management, maintenance development and promotion of the navigable waterways on the island of Ireland.

6.15 The Department for Communities (DfC) has strategic responsibility for equality and poverty issues, the historic environment, housing and the community and voluntary sectors. DfC works with stakeholders to ensure that its investment is cognisant of potential climate change impacts and develops advice and guidance on the ways that owners can mitigate the impact of climate change on the historic environment,[9] particularly the impact of flooding.

6.16 The Department of Health (DoH) has three main responsibilities:

1. Health and Social Care, including policy and legislation for hospitals, family practitioner services and community health and personal social services;

2. Public Health, which covers policy, legislation and administrative action to promote and protect the health and well-being of the population; and

3. Public Safety, which covers policy and legislation for fire and rescue services.

6.17 The Department of Finance (DoF) has policy and legislation responsibility for Building Regulations which set minimum standards for work carried out to buildings. Technical guidance, standards and regulations are generally set to follow those of England, following research led at UK government level. DoF continues to monitor developments across the UK and elsewhere (particularly in relation to energy efficiency, ventilation, moisture and wind loads) with a view to bringing forward uplifts to local Building Regulations where necessary to adapt to climate change impacts.

6.18 Civil contingency plans are in place by the government in relation to emergency planning and response arrangements within the public sector. This is to protect the population and the environment from natural and man-made risks and to prepare an effective, coordinated response to any emergency that occurs.

9 The historic environment is that part of our environment which has been affected by the action of man. The term highlights the wider context in which heritage assets are located and which can be relevant to their appropriate management.

B - Disruption to business and supply chains

6.19 In NI responsibility for activities that fall within the business sector is shared across a number of government departments. These include Department for the Economy (DfE) (tourism, energy and supporting business); DfI (planning, infrastructure, water provision and flood risk management) and DAERA (farming, biodiversity).

6.20 Invest NI is the regional business development Agency of DfE. It provides government support for businesses by delivering the government's economic development strategies.

6.21 The UK government, through HM Treasury, leads on financial regulation and the impacts of climate change on the mortgage and insurance industries on a UK wide basis.

I - Food Security/Global Food Production

6.22 The UK needs to ensure a sustainable supply of food for the UK market and for exporting. Food in the UK is a devolved matter and national policies focus on domestic production while overarching goals on UK-wide food security are reserved. In NI, government sets strategic regional land management policies to determine the most productive use of land.

6.23 The Food Standards Agency (FSA) is an independent government department working across England, Wales and NI to protect public health and consumers' wider interests in food. The main objective of the FSA, as set out in the Food Standards Act 1999, is to protect public health from risks which may arise in connection with the consumption of food (including risks caused by the way in which it is produced or supplied) and to protect the interests of consumers in relation to food.

6.24 DAERA carries out meat and dairy hygiene inspections programmes in NI on behalf of the FSA. The policy for animal feeding stuffs rests with the FSA, DAERA is the competent authority for enforcement of animal feed law.

6.25 Agri-food policies in NI are underpinned by evidence-based research conducted within the Agri-Food and Biosciences Institute (AFBI), NI Universities and with many global partners. As challenges in this priority area are global, DAERA has developed research partnerships across the world working closely with the network of NI Bureaux in Beijing, Brussels and Washington.

Chapter 7: Outcome Objective NC1

Introduction

7.1 This chapter covers Outcome Objective NC1 under key priority NC 'Natural Capital' including Terrestrial/Coastal/Marine/Freshwater ecosystems, soils and biodiversity. It provides the vision for this outcome objective and a snapshot summary of some of the relevant climate change risks and opportunities related to this objective.

7.2 The chapter also contains examples of high level policies, strategies, and actions which will contribute to the delivery of the objective, and to the management of the relevant NI Evidence Report risks and opportunities listed in Annex A (Outcomes Framework Mapping) and Annex B (Government Delivery Plans).

Outcome Objective NC1

7.3 Outcome Objective NC1 is that *'we have species, habitats and water bodies that are resilient to the impacts of climate change.'*

Associated climate change risks and opportunities

7.4 NI has a diverse range of species and a wide variety of habitats that support them, including peatlands, heathlands, grasslands, woodlands, wetlands, freshwater loughs and marine and coastal habitats. Collectively these play a major role in defining NI as a region and they deliver a variety of ecosystem services. These services include water supply and purification, pollination, natural flood and erosion management and other non-material benefits such as recreational use. All of these services collectively support our wellbeing and economic livelihoods.

7.5 Historical and ongoing pressures on our natural environment including changes such as land management practices and the arrival of invasive species, can constrain the natural resilience of our species, habitats and water bodies and their ability to adjust and adapt to a changing climate. Increased temperatures, more extreme weather events and incremental change due to a changing climate will likely further exacerbate these pressures. It is expected that climate change will be a driver for more widespread changes to our wildlife, habitats and water bodies in the future.

7.6 It is important to recognise that our habitats and the species they contain are dynamic rather than static systems, and that they change over time. While actions can be taken to make habitats as favourable as possible, climatic change in itself may be enough to alter

the distribution of particular species; i.e. species gains and losses are to be expected. This is already evident in certain groups such as birds, where species traditionally associated with southern Europe are now breeding in NI. While wildfowl that previously migrated to winter within NI are now staying in continental Europe due to milder conditions.

7.7 The risks and opportunities identified in the NI Evidence Report where further action is required are shown in Figure 7.1.

Figure 7.1: NI Evidence Report risks and opportunities identified where future action is required

NE1: Risks to species and habitats due to inability to respond to climatic conditions.	**NE2:** Opportunities from new species colonisations.	**NE6:** Risks to agriculture and wildlife from drought and flooding.

Policies and Strategies

7.8 Several high level policies and strategies instigated and delivered by government to help meet international obligations and local targets, contribute to addressing and managing the risks and opportunities of climate change under Outcome Objective NC1.

7.9 The following are examples of policies and strategies which contribute to the delivery of Outcome Objective NC1:

- The 'Valuing Nature, A Biodiversity Strategy for Northern Ireland to 2020' sets out how NI plans to meet its national and international obligations. It provides a range of targets to assist the protection of our natural biodiversity. Reducing the impact of climate change is one of seven high-level challenges identified by the strategy.

- An 'Invasive Alien Species Strategy for Northern Ireland' was published in May 2013. Invasive alien species reduce the resilience of natural habitats, to climate change. Conversely, climate change reduces the resilience of habitats to biological invasions. The overarching aim of the Strategy is to minimise the risk posed, and reduce the negative impacts caused, by invasive alien species in NI. Waterways Ireland, a North South Implementation Body sponsored by DfI, works with other stakeholders and boat owners to control the spread of alien invasive species.

- The 'Sustainable Water - A Long-Term Water Strategy for Northern Ireland (2015-2040)'* was launched in 2016. The strategy sets out a clear framework for the implementation of a range of initiatives aimed at delivering the long-term vision to have a sustainable

water sector in NI. This includes encouraging a sustainable approach to managing all of our different water needs in a way which promotes regional development, without compromising the environment or increasing flood risk. This strategy also takes into account climate change and how this will likely impact the water sector. It seeks to mitigate the impacts of climate change by managing water and wastewater in a more sustainable and environmentally friendly way.
*This strategy also contributes to delivery of Outcome Objectives IF1 and B1.

- The 'Regional Development Strategy 2035'* sets out both a framework and guidelines to provide long term policy direction with a strategic spatial perspective. The Strategy informs the spatial aspects of the strategies of all government and the supporting guidance it contains is designed to deal with the major issues of climate change, population growth and movements, transportation and how investment should be focused on the main hubs and clusters.
  *This strategy also contributes to delivery of Outcome Objectives NC2, NC3, IF1 and P1.

- The 'Strategic Planning Policy Statement 2015'* (SPPS) is a key document, particularly for the delivery of the reformed two tier planning system that was introduced in April 2015 by DfI. The SPPS is in general conformity with the Regional Development Strategy 2035 (discussed in the above point). It emphasises that NI's planning system can further sustainable development by mitigating and adapting to climate change, whilst improving air quality. The provisions of the SPPS apply to the whole of NI. The provisions must be taken into account in the preparation of 'Local Development Plans', it is also material to all decisions on individual planning applications and appeals. Both documents assist with, inter alia, building resilience into the built and natural environment and addressing and managing significant flood risk across NI.
  *This strategy also contributes to delivery of Outcome Objectives NC2, NC3, IF1, and P1.

- Livestock diseases are covered by the 'EU Animal Health Strategy'. The Animal and Plant Health Agency, the Forestry Commission and Forest Service (DAERA) are responsible for monitoring and responding to pests and disease threats to agriculture and forestry. Climate change is embedded into these NI planning and surveillance arrangements.

Delivery Plan Actions

7.10 The following are examples of actions that government will take forward under Outcome Objective NC1's delivery plan (full delivery plan can be obtained in Annex B). These actions will contribute to both the delivery of the objective, and the management of the relevant NI Evidence Report climate change risks and opportunities:

7.11 Conservation Management Plans

DAERA is committed to leading on the production of Conservation Management Plans (CMPs) for 95% of Special Areas of Conservation by December 2020 across NI. The CMPs detail what actions are required to move sites towards or maintain them at favourable condition.

Addressing the issues identified in the CMPs will have a positive impact on biodiversity, water and land management. Production of the CMPs will also complement the Environmental Farming Scheme (discussed in point Figure 7.1: below), by providing detailed guidance on appropriate agri-environment management.

CMPs will aim to help maintain NI's network of habitats by contributing to their resilience and by helping to support a full range of biological diversity. The CMPs will help to address risks to species and habitats' ability to respond to changing climatic conditions. They will also contribute to NI's ability to exploit opportunities gained from new species colonisation.

7.12 Environmental Farming Scheme

The Environmental Farming Scheme (EFS) is a voluntary scheme that supports farmers and land managers to carry out environmentally beneficial farming practices on agricultural land. This includes actions that aim to contribute to climate change adaptation by supporting farmers and land managers to restore, preserve and enhance biodiversity; improve water management and water quality; reduce soil erosion and improve soil management (further discussed in Chapter 9 Outcome Objective NC3). By carrying out these functions, EFS may contribute to NI addressing the climate change risks to our species and habitats.

7.13 Management Plans for Marine Protected Areas

DAERA is committed to establishing an ecologically coherent network of well management marine protected areas. Management plans will be developed through the INTERREG VA MarPAMM[10] (Marine Protected Area Management and Monitoring) project and other related projects.

7.14 Priority Species List

Priority species require conservation action because of their decline, rarity and importance. The Priority Species list forms the basis for selecting species requiring NI Species Action Plans. These plans will help to address the risks to species and habitats due to inability to respond to changing climatic conditions and exploit opportunities from new species colonisations.

7.15 River Basin Management Plans

River basin management planning is a key statutory requirement in taking an integrated approach to the protection, improvement and sustainable use of the water environment in NI. It applies to all of NI's groundwater and surface water bodies, including rivers, lakes, transitional (estuarine) and coastal waters out to one nautical mile.

The River Basin Management Plans (RBMPs) take consideration of the latest CCRA findings at the time, regarding current and anticipated NI climate change impacts on the water environment. The plans also integrate programmes of measures to address these impacts.

Although DAERA leads on RBMPs, the implementation of some 136 measures required by RBMPs depend on cross-departmental co-operation and a number of organisations have parts to play in the implementation of the RBMPs.

7.16 Collaborative Oceanography and Monitoring for Protected Areas and Species (COMPASS) INTERREG VA

The COMPASS project is a five year project which will establish and deliver the first fully coherent network of monitoring buoys (moorings) across the regional seas of NI, the Republic of Ireland and West of Scotland.

The network will produce new marine monitoring data for emerging areas of environmental concern including the climate change impact of ocean acidification.

10 The MarPAMM Project is an environment project which will be completed by 31 March 2022. The project will develop tools for monitoring and managing a number of protected coastal marine environments in Northern Ireland, Ireland and Western Scotland. The MarPAMM project will specifically consider the impact of future climate changes scenarios on key seabird species to inform marine protected area management options.

COMPASS will deliver a clearer understanding of what changes in the oceanographic climate have on underwater habitats, fauna and flora across the region. Output of this will be used to inform and develop long-term monitoring strategies and will provide essential infrastructure for baseline oceanographic monitoring.

This will contribute to NI fulfilling International, European and National biodiversity obligations and will address risks to, and opportunities for, marine species, fisheries and marine heritage from ocean acidification and higher water temperatures.

7.17 Water Resource and Supply Resilience Plan*

NI Water Ltd is required to produce a 'Water Resource & Supply Resilience Plan'. The Plan sets out how NI Water Ltd intends to maintain the balance between supply and demand for water for all its NI customers over the long-term. It will also maintain operational and management options and activities available to respond to short-term critical events. This plan will take account of climate change and include the projected changes to rainfall and temperatures over the lifetime of the plan.

*This plan also contributes to delivery of Outcome Objectives IF1 and B1

7.18 Sustainable Catchment Area Management Planning Project

The 'Sustainable Catchment Area Management Planning NI (SCaMP NI) project' aims to improve the quality and reliability of the water through sustainable catchment-based solutions that focus on protecting and enhancing the natural environment. This not only improves raw water quality, but also restores valuable habitats and natural drainage systems making these more resilient to long-term climate change.

7.19 All-Ireland Pollinator Plan

The All-Ireland Pollinator Plan provides an important framework to bring together pollinator initiatives from NI and the Republic of Ireland. It is the start of a process by which positive steps can be taken to protect our pollinators and the services they provide into the future. The plan aims to halt pollinator losses by creating a pollinator friendly landscape which will enable pollinators to survive and thrive. The plan will help to address the risks to native pollinator species and their habitats by helping them adapt to changing climatic conditions.

7.10 EU INTERREG System for Bathing Water Quality Monitoring Project

The EU-funded project (EU INTERREG) 'System for Bathing Water Quality Monitoring' (SWIM) will investigate and model the linkage between heavy rainfall events and poor bathing water quality. Observations are that NI is experiencing more incidences of heavy

and more intense flash flood rainfall events during the summer bathing season. These findings are in line with climate change predictions. The project covers six of NI's identified bathing waters along with three from the Republic of Ireland. The aim is to develop a live system to check water quality so that bathers are fully informed through social media or a specially designed mobile phone app before bathing. This is an adaptation measure that contributes to minimising risks to health from poor water quality.

7.11 Plant Health Risk Register

DAERA has developed and maintained the NI Plant Health Risk Register which is a local prioritised list in which plant diseases and pests are prioritised based on local NI factors. It is a tool for government, industry and other stakeholders to prioritise action against pests and pathogens which threaten our crops, trees, gardens and countryside. Climate change can bring an increased threat from a wide range of plant diseases and pests. This register provides an important step in protecting our agriculture, horticulture, forestry, landscapes and the wider environment wildlife from pests, pathogens and invasive species by identifying these threats.

Case Study

Government are building on the success of actions carried out under NICCAP1. The following case study is an example of adaptation work carried out under NICCAP1.

Case Study: The Environmental Farming Scheme

The Environmental Farming Scheme opened in 2017. It has three levels:-

1. 'Wider Level' to deliver benefits across the countryside outside of environmentally designated areas;
2. 'Higher Level', primarily for environmentally designated sites; and
3. 'Group Level' to support co-operative action by farmers in specific areas such as a river catchment or priority habitat.

The scheme has been designed to address specific environmental needs, primarily relating to biodiversity and water quality. However, it will also help habitats, species and water bodies to be more resilient to climate change.

Within the Higher Level, site specific Remedial Management Plans (ssRMPs) will be implemented on environmentally designated land and priority habitat that is entered into the scheme. The ssRMPs aim to protect and enhance the condition of this land and the species on it. This will aim to improve the land's biodiversity, and also make it, and the species on the land, more resilient to the impact of climate change.

Within the Wider Level, options include creation of riparian strips on land along waterways. These strips help to prevent agricultural diffuse pollution from entering waterways, thereby protecting and enhancing the water quality. They also create additional habitat to support biodiversity. This, in turn, helps the waterways to be more robust to the impact of climate change.

Group Level projects aim to bring groups of farmers together to deliver environmental management on a landscape or water catchment scale. Therefore, Environmental Farming Scheme habitat, species and water quality measures will be implemented across larger joined-up areas, aiming to enhance resilience to climate change in these areas.

Chapter 8: Outcome Objective NC2

Introduction

8.1 This chapter covers Outcome Objective NC2 under key priority NC 'Natural Capital' including Terrestrial/Coastal/Marine/Freshwater ecosystems, soils and biodiversity. It provides the vision for this outcome objective and a snapshot summary of some of the relevant climate change risks and opportunities related to this objective.

8.2 The chapter also contains examples of high level policies, strategies, and actions which will contribute to the delivery of the objective, and to the management of the relevant NI Evidence Report risks and opportunities listed in Annex A (Outcomes Framework Mapping) and Annex B (Government Delivery Plans).

Outcome Objective NC2

8.3 Outcome Objective NC2 is that *'we have coastal communities, habitats, landforms and infrastructure that are resilient to the impacts of climate change.'*

Associated Climate change risks and opportunities

8.4 NI's coastal waters, landforms and habitats provide us with a wide range of environmental services including contributing to the livelihoods of generations of coastal communities, tourism and leisure provision. Our coastal habitats and landforms are also extremely valuable for wildlife and they deliver protection from coastal flooding and storm surges.

8.5 Climate change has potential to put pressure on the resilience of our coastal habitats and to reshape our coastlines. The UK Evidence Report highlighted that direct climate change impacts on the distribution of UK biodiversity and the composition of coastal habitats have already been detected. It has been observed, for example, that there is a shift of typically warmer 'southern' species towards more northerly regions and with colder, typically 'northern' species declining around the UK. Both the UK Evidence Report and UKCP18 have indicated that there will be a continuation of increasing rates of sea level rise around the UK. This has potential for the possibility of loss of some of the natural buffering resilience of coastal habitats and landforms.

8.6 The NI Evidence Report found that coastal erosion although a natural process, which is currently being experienced by NI, may be exacerbated by rising sea levels, higher wave heights and more extreme storm surge events. However, the nature and scale of the issues arising from coastal erosion in NI are currently not definitively known, as there is no

legislation on coastal erosion in NI and consequently no Department with responsibility. The NI Evidence Report at the time of publication suggested about 30% of future risk is uncertain and there is potential that some natural buffering resilience of coastal habitats and landforms is being lost.

8.7 Rising sea levels may also exacerbate the risk of coastal flooding, and along with coastal erosion, may have the potential to affect coastal infrastructure assets and networks in NI. This has potential to impact built sea defences, coastal roads and railways. The risk to the viability of NI coastal communities from climate driven sea level rise was considered low by the NI Evidence Report.

The risks in the NI Evidence Report where further action is required shown in Figure 8.1.

Figure 8.1: NI Evidence Report risks identified where further action is required

NE12: Risks to habitats and heritage in the coastal zone from sea level rise: and loss of natural flood protection

Policies and Strategies

8.8 Several high level policies and strategies instigated and delivered by government to help meet international obligations and local targets contribute to addressing and managing the risks and opportunities of climate change under this Outcome Objective.

8.9 The following are examples of government policies and strategies which contribute to the delivery of meeting Outcome Objective NC2:

- The 'Regional Development Strategy 2035'*. Detail in Chapter 7 Outcome Objective NC1.
  *This strategy also contributes to delivery of Outcome Objectives NC3, IF1, and P1.

- The 'Strategic Planning Policy Statement 2015' *. Detail in Chapter 7 Outcome Objective NC1.
  *This policy statement also contributes to delivery of Outcome Objectives NC3, IF1, and P1.

- The 'UK Marine Policy Statement' (UK MPS) provides the high level policy context within which marine plans in NI are developed. A Marine Plan for NI is currently under development and a draft Plan was published in April 2018. The UK MPS (as the current

marine policy document) provides the policy framework for taking decisions affecting the marine area in NI. The UK MPS requires decisions that affect or might affect the marine area to be in accordance with the UK MPS, when taking into account the impacts of climate change. It is therefore an important tool for meeting the long term challenges posed by climate change.

Actions

8.10 The following are examples of actions that government will take forward under Outcome Objective NC2's delivery plan (full delivery plan can be obtained in Annex B). These actions will contribute to both the delivery of the objective and the management of the relevant NI Evidence Report climate change risks and opportunities:

8.11 Baseline Study/Gap Analysis of Coastal Erosion Risk Management in NI

The 'Baseline Study & Gap Analysis of Coastal Erosion Risk Management in NI' was published on 7 January 2019. It is an initial assessment which comprises a factual appraisal and analysis of all publicly available reports and studies on coastal erosion in NI. It includes a high level desktop assessment of the vulnerability of NI's coast to coastal erosion, identifying those areas where it is considered coastal erosion may pose a significant risk. It also identifies gaps in current information and considers potential future areas of work required to inform policy on coastal erosion.

The Report is currently being considered by departments, and it is anticipated that further action will be agreed through the Coastal Forum.

8.12 Surveys along coastline to assess the impact of coastal erosion

DfI and Translink perform annual, and where necessary, post storm inspections of coastal road and rail sea defences to inform their routine or capital maintenance works programme. Work is also ongoing to establish a baseline drone to map survey and to carry out flyover map surveys after storm events. This will allow a comparison to the baseline to help identify storm damage and areas requiring a detailed inspection with the key focus being the structural integrity of the coastal roads and rail lines. Translink plans to complete a study on the effects of expected sea level rise on our coastal assets following recent update to the UK Climate Projections (UKCP18) which it will use to inform long term decisions on its management of track assets.

8.13 UK-wide project Coastal Flood Boundary

NI joined a UK Environment Agency/Scottish Environmental Protection Agency project entitled 'Coastal Flood Boundary Conditions for the UK Mainland and Islands' to update a chain of coastal extreme tide conditions at 2 km spacing around the whole of the UK coastline. Further detail on the background is given in the Case Study within this chapter.

It is envisaged that the new coastal extreme boundary dataset will be able to be used in conjunction with UK Climate Impacts Programme[11] (UKCIP) information to further develop flood mapping along the NI coastline for extreme tidal conditions based on up to date research. This will in turn, lead to better informed NI flood risk assessment and planning and when combined with UKCIP information, will take into account a changing climate. This project will help address the risks to the vulnerability of coastal communities from sea level rise.

8.14 INTERREG VA MarPAMM project

The MarPAMM project will undertake coastal processes assessments within Murlough special area of conservation (SAC) and adjoining coastal areas which will examine future scenarios and model future shoreline behaviour in the context of projected climate and sea level changes.

11 The UK Climate Impacts Programme provides scenarios 'that show how our climate might change and coordinates research on dealing with our future climate.

Case Study

Government are building on the success of actions carried out under NICCAP1. The following case study is an example of adaptation work carried out under NICCAP1.

Case Study Title: 'Coastal Flood Boundary Conditions for the UK Mainland and Islands'

In 2017 the DfI joined an UK Environment Agency/Scottish Environment Protection Agency project entitled 'Coastal Flood Boundary Conditions for the UK Mainland and Islands'. The project is to update a chain of coastal extreme tide conditions at 2 km spacing around the whole of the UK coastline. This research was first undertaken for Great Britain in 2011 and at that time NI was not included. Subsequently, DfI took the opportunity to become involved in the project expanding it UK-wide. Tide data from several local tide gauging sites around NI have been provided to the project for inclusion in analyses. It is expected that the project will conclude in 2019 with a report and new dataset of coastal extreme boundary conditions.

With respect to the impacts of climate change on coastal flood risk, it is envisaged that the new coastal extreme boundary dataset will be able to be used in conjunction with UKCIP information. This will enable further development of flood mapping along the NI coastline for extreme tidal conditions based on up to date research which will in turn, lead to better informed flood risk assessment and planning and when combined with UKCIP information, will take into account a changing climate.

Chapter 9: Outcome Objective NC3

Introduction

9.1 This chapter covers Outcome Objective NC3 under key priority NC 'Natural Capital' including Terrestrial/Coastal/Marine/Freshwater ecosystems, soils and biodiversity. It provides the vision for this outcome objective and a snapshot summary of some of the relevant climate change risks and opportunities related to this objective.

9.2 The chapter also contains examples of high level policies, strategies, and actions which will contribute to the delivery of the objective, and to the management of the relevant NI Evidence Report risks and opportunities listed in Annex A (Outcomes Framework Mapping) and Annex B (Government Delivery Plans).

Outcome Objective NC3

9.3 Outcome Objective NC3 is that *'we have soils and land types that are resilient to the impacts of climate change.'*

Associated climate change risks and opportunities

9.4 The NI Evidence Report highlighted that climate change is a contributing factor to altering the NI landscape over the past few decades and it also presents both potential risk and opportunities to our soils and land types.

9.5 As the climate changes the natural world is forced to rearrange itself. Adaptation is vital in ensuring resilient soils and that land types are preserved, while in turn contributing to building the resilience of our ecosystems and communities that depend upon them.

9.6 A potential opportunity highlighted by the NI Evidence Report is that a warming climate allows for a possible expansion of land used for agriculture and forestry. The UK Evidence Report stated that higher temperatures and longer growing seasons will undoubtedly increase productivity in these areas, but only if water and soils are managed sustainably. However, this is not the case for all types of crops and those that are heat sensitive and/or high water demanding may be negatively impacted in terms of productivity.

9.7 The benefits of climate change can be counteracted by other negative impacts. For example, an extended growing season may provide opportunities for longer outdoor grazing of animals. Opportunities however could be counteracted by impacts of extreme weather events such as an increased risk of damage to swards and resulting effect on potential of winter yields of stored grass feeds for livestock.

9.8 The NI Evidence Report also highlighted that increased temperatures and decreased precipitation in summer months may contribute to a higher frequency, and increased intensity, of uncontrolled fires. The NI Evidence Report highlighted that wildfire incidence in NI is a sporadic risk. It does however present a serious risk to our natural environment and can result in extensive damage to biodiversity.

The risks identified in the NI Evidence Report requiring further action are as follows:

NE4: Risks to soil from increased soil aridity & wetness.	**NE5:** Risks to natural carbon stores and carbon sequestration.	**NE8:** Risks of land management practices exacerbating flood risk.

Policies and Strategies

9.9 Several high level policies and strategies instigated and delivered by government to help meet international obligations and local targets contribute to addressing and managing the risks and opportunities of climate change under Outcome Objective NC3.

9.10 The following are examples of policies and strategies which contribute to the delivery of Outcome Objective NC3:

- The 'Northern Ireland Rural Development Programme' 2014-2020 (NIRDP) is delivered under the EU's Common Agricultural Policy (CAP), which contributes to the protection of soil from erosion and the maintenance of soil organic matter and soil structure.

  A key element of the NIRDP is the EFS (discussed previously in Chapter 7 Outcome Objective NC1), offering support to farmers and land managers to carry out environmentally beneficial farming practices on agricultural land. One objective of EFS is to reduce soil erosion and improve soil management.

- An industry led strategic action plan - 'Going for Growth'* in support of the NI Agri-Food industry', developed by the industry led Agri-Food Strategy Board, was published in May 2012.

  The strategic action plan specifically recommended the development of a strategic land management policy. It also emphasised that agricultural productivity must be considered in parallel with the need for our Agri-Food Industry to maintain and enhance environmental performance. An independent Expert Working Group was established in 2014 with members from the agri-food, environmental and government sectors. Their

aim was to produce a 'Sustainable Agricultural Land Management Strategy for Northern Ireland' which would outline how the ambition of 'Going for Growth' would be achieved in a way that improved farm incomes and environmental performance simultaneously.

The Expert Working Group published their strategy document entitled 'Delivering our future, Valuing our Soils: A Sustainable Agricultural Land Management Strategy for Northern Ireland' in 2016. Prior to leaving office, the then DAERA Minister (Michelle McIlveen) wrote to the Expert Working Group and provided them with a document outlining DAERA's initial proposed approach to implementing the strategy. This document outlined a series of DAERA initial actions to be tested through a series of pilot initiatives to ensure that the Expert Working Group recommendations were suitable for wider implementation. This work is currently on-going across a number of key recommendations, including AFBI-led research on soil health and pilot soil sampling initiatives in targeted catchments. Improved soil health is more resilient to a changing climate and they reduce run-off from flash flooding.
*This strategic plan also contributes to delivery NICCAP2 Outcome Objective I1.

- The 'Regional Development Strategy 2035'*. Detail on the strategy is in Chapter 7 Outcome Objective NC1.
  *This strategy also contributes to the delivery of Outcome Objectives NC2, IF1, and P1.

- The Department's 'Strategic Planning Policy Statement 2015'*. Further detail on the policy statement is in Chapter 7 Outcome Objective NC1.
  *This strategic policy statement also contributes to the delivery of Outcome Objectives NC2, IF1, and P1.

Actions

9.11 The following are examples of actions that government will take forward under Outcome Objective NC3's delivery plan (full delivery plan can be obtained in Annex B). These actions will contribute to both the delivery of the objective and the management of the relevant NI Evidence Report climate change risks and opportunities:

9.12 The Environmental Farming Scheme

EFS, as discussed previously in Chapter 7 Outcome Objective NC1, is a voluntary scheme that supports farmers and land managers to carry out environmentally beneficial

farming practices on agricultural land. They include actions that encourage farmers to implement practices to reduce soil erosion, improve soil management and foster carbon conservation and sequestration in agriculture. The scheme therefore contributes to addressing climate change adaptation risks to soil natural carbon stores and carbon sequestration.

9.13 Maintain an emergency Forest Service fire plan and monitor and report the extent of fire damage to forest and open ground (hectares) on Forest Service managed property.

DAERA Forest Service is one of the largest landowners in NI, and it manages a natural capital asset of approximately 75,000 hectares of productive forest and open ground valued at some £300 million. Just over 25% of land it manages is covered by European and National conservation designations including Special Areas of Conservation, Special Protected Areas and Areas of Special Scientific Interest. As custodians of the forest estate, Forest Service has a responsibility to protect this asset as well as those people who work in and visit the forest.

Forest fires have been an issue for forestry since the major re-afforestation programme started in the middle of the twentieth century. However, there is evidence in the NI Evidence Report that climate change may lead to a trend of progressive increases in wildfire incidents and impacts. To mitigate this risk, Forest Service maintains an Emergency Fire Plan to deal with fire incidents including risks posed to public safety and property. This is achieved through co-operation with the NI Fire and Rescue Service. Forest Service monitors wildfire damage to its forests and open ground and reports the area and value of forest damaged by wildfire in its annual reports.

9.14 Forest Expansion Scheme

The Forest Expansion Scheme encourages the creation of new forests blocks of at least 5 hectares and larger. The main benefit delivered under the scheme is to increase carbon capture (sequestration), and reduce the amount of carbon dioxide in the atmosphere. However secondary climate change adaptation benefits from the scheme also include improved biodiversity. The scheme encourages creation of new resilient woodland of at least 5 hectares and larger by promoting projects with a wide variety of tree species and larger woodland areas. This enhances the ability of individual species to endure climate change. Forests are known to help reduce flooding as they absorb more water than other

vegetation types. They also contribute to flood alleviation risk by enhancing soil's ability to store rainwater and by holding back and delaying the passage of rainwater to streams and rivers.

9.15 Complete 23 catchment studies as part of the SCaMP NI project*:

The ScaMP NI project (discussed previously in Chapter 7 Outcome Objective NC1) applies sustainable catchment-based solutions that focus on protecting and enhancing the natural environment by reducing contaminants washed into our drinking water sources. This is achieved through sustainable catchment management activities. These activities include: managing livestock to prevent over-grazing; restoring areas of eroded/ exposed peat; improving farm management practices to reduce pesticide and fertiliser run-off; and education and public awareness campaigns. The activities have a secondary climate change adaptation benefit as they also contribute to the management of risks and opportunities arising from changes in agricultural and land suitability, and the risks to soil from increased soil aridity or wetness.

*This project also contributes to delivery of Outcome Objective NC1.

Case Study

Government are building on the success of actions carried out under NICCAP1. The following case study is an example of adaptation work carried out under NICCAP1.

Case Study Title: Forest Expansion Scheme

Woodlands cover 8% of NI and our long-term aim is to increase this to 12%. All people can benefit from the wide range of ecological, economic and social benefits that forests have to offer and to encourage the sustainable management of forests.

One significant challenge to sustainable forest management is climate change and its inherent uncertainties. Generally at a country level forests are resilient to climate change. Experience however tells us that this is not always the case at a local scale for individual tree species and forest ecosystems. Climate change can impact on forest health, through pests and diseases, tree establishment, growth and productivity and forest ecosystem services. These threats will require landowners to think about how to establish and manage better adapted woodland. Support to create such woodland is available from the Forest Expansion Scheme which requires owners to develop forest plans that identify and mitigate these risks.

Key factors for achieving improved woodland resilience include:

- creating larger woodlands or reducing woodland fragmentation by linking existing woodland areas;
- improving diversity of planted tree/shrub species and the genetic diversity within tree species; and
- ensuring that tree/shrub species selected for planting are adapted to current climate conditions and predicted changes.

These factors are considered within the scheme eligibility and scoring criteria so that available funding targets well planned woodlands offering the best value for money.

For example, Mid Ulster District Council were successful in their bid to create a 6 hectare community woodland in 2018 at Ballymacombs. Their woodland includes twelve different tree and shrub species, including birch, alder, cherry, rowan, hazel and aspen along with smaller numbers of maple, hornbeam, guelder rose, wych elm, willow and scots pine. The project is adjacent to an existing woodland and will help create an even larger forest area. The combination of these factors will help create a woodland better adapted to future climate change.

• *Forest Expansion Scheme*

Chapter 10: Outcome Objective IF1

Introduction

10.1 This chapter covers Outcome Objective IF1 under key priority IF 'Infrastructure Services'. It provides the vision for this outcome objective and a snapshot summary of some of the relevant climate change risks and opportunities related to this objective.

10.2 The chapter also contains examples of high level policies, strategies, and actions which will contribute to the delivery of the objective, and to the management of the relevant NI Evidence Report risks and opportunities listed in Annex A (Outcomes Framework Mapping) and Annex B (Government Delivery Plans).

Outcome Objective IF1

10.3 Outcome Objective IF1 is that *'we have transport and network services that are resilient to the impacts of flooding and extreme weather'*

Associated Climate change risks and opportunities

10.4 The CCC in the NI Evidence Report cites flooding as the greatest long-term risk to infrastructure performance from climate change. Flooding and coastal erosion are natural processes that have shaped our landscape and cannot be entirely eradicated.

10.5 There is currently sufficient water in NI to cope with the demands of the population. On occasions however demand for water rises. For example, during a period of hot weather in summer 2018 demand for water increased by up to 25%.

10.6 A positive impact of higher temperatures and dry weather may be the improvement of wastewater treatment as lower flows will allow longer retention of sewage in settlement tanks, reducing the loading on further treatment stages. However the combination of dry, warm weather could reduce river flows and increase the influence of treated wastewater to the waterway which may require wastewater to undergo higher levels of treatment.

10.7 Transport networks are at risk of damage or disruption from extreme weather events but there is already resilience built into in the system because of existing multiple travel routes and modes of transport. Disruptive impacts may arise due to fluvial flooding of roads and rail and bridges, landslides, coastal erosion, an increase in road maintenance due to higher summer temperatures and high winds which may lead to road closure or speed restriction on some roads and bridges for high sided vehicles. The higher

summer temperatures on the rail network may result in speed restrictions to reduce the risk of track buckles. Also high winds on the rail network can result in speed restrictions and line closures with fallen trees and vegetation.

10.8 The risks identified in the NI Evidence Report where further action is required is shown in Figure 9.1.

Figure 9.1: NI Evidence Report risks identified where further action is required.

IN1: Risks of cascading failures from interdependent infrastructure networks.	**IN2:** Risks to infrastructure services from river, surface, water and groundwater flooding	**IN4:** Risks of sewer flooding due to heavy rainfall.	**IN6:** Risks to transport networks from slope & embankment failure.

Policies and Strategies

10.9 Several high level policies and strategies instigated and delivered by government to help meet international obligations and local targets contribute to addressing and managing the risks and opportunities of climate change under Outcome Objective IF1.

10.10 The following are examples of policies and strategies which contribute to the delivery of Outcome Objective IF1.

- The 'Regional Development Strategy 2035'*. Detail of this strategy is in Chapter 7 Outcome Objective NC1.
  *This strategy also contributes to the delivery of Outcome Objectives NC2, NC3, and P1.

- The 'Strategic Planning Policy Statement 2015' *. Detail of this statement is in Chapter 7 Outcome Objective NC1.
  *This strategic policy statement also contributes to the delivery of Outcome Objectives NC2, NC3, and P1.

- The 'Sustainable Water - A Long-Term Water Strategy for Northern Ireland (2015-2040)'* recognises that extreme weather resulting in flooding of properties and infrastructure is expected to be a significant long-term risk associated with climate change for NI. It states all policies must factor in the future implications of climate change on both quality and quantity of water resources and ensure that measures are put in place to preserve service delivery during extreme weather events.

*This strategy also contributes to the delivery of Outcome Objectives NC1 and B1.

- Climate Change adaptation is also underpinned by NI infrastructure related legislation, for example 'The Water and Sewerage Services Act (NI) 2016'. This act requires the preparation and review of a Water Resource and Supply Resilience Plan, which takes into account adaptation measures in response to climate change predictions to calculate supply/demand balance for our water supply. The Act contributes to making our transport and network services resilient to the impacts of flooding and extreme weather.

Actions

10.11 The following are examples of actions that government will take forward under Outcome Objective IF1's delivery plan (full delivery plan can be obtained in Annex B). These actions will contribute to both the delivery of the objective and the management of the relevant NI Evidence Report climate change risks and opportunities:

10.12 Design Manual for Roads and Bridges

The 'Design Manual for Roads and Bridges' is a series of standards, advice notes and other documents relating to the design, assessment and operation of roads in the UK. It includes allowances which must be made to adapt to climate change. DfI is contributing to the review and update of the manual which will take into account the latest climate change projections from UKCP18. This ensures that climate change risks are embedded into the planning, design and maintenance of NI's roads infrastructure to create a road network which is resilient to the impacts of climate change.

10.13 Publication of the Water Resource and Supply Resilience Plan*

Detail of this plan is in Chapter 7 Outcome Objective NC1.

*This plan also contributes to delivery of NICCAP2 Outcome Objective B1.

10.14 Remove properties from the 'Out of Sewer Flooding Register'

NI Water Ltd is investing in a number of engineering schemes to help remove properties which suffer from internal out of sewer flooding from the risk register. This could be achieved by reducing the amount of surface water runoff from the combined sewerage systems, increasing sewer capacity or finding more sustainable methods of attenuating stormwater in the sewer network.

10.15 Increase the number of Sustainable Drainage Systems* introduced in new developments.

Sustainable Drainage Systems (SuDs) reduce the risk of surface water flooding. It achieves this by slowing down the flow of run off through the use of permeable surfaces, storage tanks and ponds. Some SuDs systems also have the added benefit where they can help improve water quality, biodiversity and create landscape features whilst helping transport and network services to become resilient to the impacts of flooding and extreme weather.

*SuDs also contributes to the delivery of Outcome Objective P1.

10.65 Local Development Plan policies

DfI engage with local councils to assist them in bringing forward Local Development Plan policies and proposals that take account of climate change adaptation considerations in accordance with the provisions of the SPPS and any other policies or advice in guidance issued by the DfI.

Case Study

Government are building on the success of actions carried out under NICCAP1. The following case study is an example of adaptation work carried out under NICCAP1.

Case Study: Connswater Community Greenway (Belfast) Urban rivers project

The Connswater Community Greenway Project has created a park through East Belfast, aiming to connect green areas and revitalise polluted river systems on the Connswater, Knock and Loop Rivers. Extreme, intense rainfall events in NI in the last decade caused widespread flooding in East Belfast.

Project partners

- Connswater Community Greenway Trust;
- Belfast City Council;
- Department for Communities;
- Department for Infrastructure - Rivers;
- Department of Agriculture Environment and Rural Affairs - NI Environment Agency.

The project included realignment of the Knock River involving moving the channel further into Orangefield Park to improve access to the channel; as well as construction of river pathways, improving connectivity of the river to the surrounding landscape. The project was completed in 2017 creating a vibrant, attractive, parkland with £13m dedicated to flood protection for local properties.

The flood protection element of the scheme was delivered in three distinct parts or phases:

1. Phase 1 primarily involved realignment of the Knock River from its existing flow path to a more meandering flow path through Orangefield Park and Victoria Park.

2. Phase 2 involved the provision of flood protection to properties by increasing the capacity for flow within the river channel, constructing flood bunds and walls and by creating additional flood storage areas.

3. Department for Infrastructure- Rivers managed and funded a third ‘Standalone’ phase of the overall scheme and this was constructed under a separate contract in conjunction with the Phase 2 works. These ‘Standalone’ works addressed under-capacity problems relating to existing culverts at critical locations primarily under main roads.

During the course of this project climate change allowance was developed in accordance with the most recent Defra guidance available at the time of assessment.

The following summarises the adopted approach to climate for each of the scheme’s flood risk management measures:

- Increased culvert capacity: Precautionary Approach;
- Channel realignment: Precautionary Approach;
- Flood walls: Adaptive Approach;
- Flood embankments: Adaptive Approach.

The project has helped minimise flood risk, as well as habitat creation and increased biodiversity. Success of the project was monitored, and recorded a significant return on economic investment. Ecologically, indicators have shown water quality and biodiversity improvements, and the project plans to continue monitoring these indicators.

• Connswater Community Greenway

Chapter 11: Outcome Objective P1

Introduction

11.1 This chapter covers Outcome Objective P1 under key priority P 'People and Built Environment'. It provides the vision for this outcome objective and a snapshot summary of some of the relevant climate change risks and opportunities related to this objective.

11.2 The chapter also contains examples of high level policies, strategies, and actions which will contribute to the delivery of the objective, and to the management of the relevant NI Evidence Report risks and opportunities listed in Annex A (Outcomes Framework Mapping) and Annex B (Government Delivery Plans).

Outcome Objective P1

11.3 Outcome Objective P1 is that *'we have people, homes, buildings and communities resilient to the impacts of flooding & extremes of weather.'*

Climate Change Risks and opportunities: overview

11.4 The UK Evidence Report projected that increasing temperatures, rising sea-levels and modified rainfall, will change the climate-related risks to people and the built environment. The built environment refers to historic and contemporary buildings and the spaces between them, including parks, streets and housing.

11.5 Climate change is expected to increase the frequency, severity and extent of flooding and extreme weather events. These risks can interact and impact across multiple sectors including; buildings, infrastructure, health, service delivery (through effects on staff, buildings and equipment), local councils, communities, and individuals.

11.6 Climate change presents challenges to those working in planning, community development, the health and social care system, flood and water management, and emergency preparedness.

11.7 The NI Evidence Report has projected that flooding risk will increase in the future in NI with increases in annual damage to residential properties and other buildings such as culturally valued buildings. All income groups are at risk of the adverse consequences of flooding; and social impacts could include lack of access to services, loss of work and school days. Potentially flooding may have adverse effects on mental health and wellbeing of those effected.

11.8 The NI Evidence Report characterised the risk in regard to heat waves in NI as currently considered low. The future projections may however change. High temperatures and overheating of buildings and public transport can potentially have a negative effect on human health and wellbeing.

11.9 The NI Evidence Report highlighted potential opportunities and benefits of higher temperatures on health and wellbeing such as increased outdoor activities, and health benefits from warmer winters. The NI Evidence Report also highlighted that more action on fuel poverty in NI is required to manage current risks to people because of cold temperatures.

The opportunities identified in the NI Evidence Report where further action is required is shown in Figure 11.1.

Figure 11.1: NI Evidence Report opportunities identified where further action is required

PB4: Potential benefits to health and wellbeing from reduced cold.

Policies and Strategies

11.10 Several high level policies and strategies instigated and delivered by government to help meet international obligations and local targets contribute to addressing and managing the impacts (risks and opportunities) of climate change under Outcome Objective P1.

11.11 The following are examples of policies and strategies which contribute to the delivery of Outcome Objective P1:

- The 'Regional Development Strategy 2035'*. Detail in Chapter 7 Outcome Objective NC1.
  *This strategy also contributes to the delivery of Outcome Objectives NC2, NC3, and IF1.

- The 'Strategic Planning Policy Statement 2015'*. Detail in Chapter 7 Outcome Objective NC1.
  *This strategic policy statement also contributes to the delivery of Outcome Objectives NC2, NC3, and IF1.

- Government is committed to setting a good example in regard to the built heritage in its care. This is set out in the joint NI Executive, DfC publication 'Protocol for the Care of the Government Historic Estate'. The protocol requires all government 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 climate change impacts.

- The 'Warmer Healthier Homes - a new Fuel Poverty Strategy for Northern Ireland' is implemented by DfC mainly through the 'Affordable Warmth Scheme'. The Scheme targets low income households and provides a range of heating and insulation measures to improve the energy efficiency of the home. It contributes to the management of risks from cold temperatures, in which extremes of which maybe more frequent in a changing climate, to the most vulnerable of our NI society.

- As the competent authority DfI is leading the delivery of the requirements of the EU Floods Directive for NI. The EU Floods Directive process requires EU Member States to undertake a 'Preliminary Flood Risk Assessment' to identify areas of significant flood risk within their territories, to develop 'Flood Hazard and Flood Risk Maps' and to produce 'Flood Risk Management Plans' to address significant flood risks.

  The Directive's processes operate on a six yearly cycle and the 1st planning cycle culminated with the publication of 'Flood Risk Management Plans for NI' (FRMPs) in December 2015. These Plans included objectives and measures to alleviate flood risk in areas of NI where the risk of flooding is considered to be most significant. FRMPs encompass measures such as, flood alleviation schemes; improving community awareness of and resilience to flood risks; elements of the 'Living with Water Programme' (programme further discussed in Actions Section - point 11.14 (below) of this chapter), and annual maintenance programmes for rivers and drainage infrastructure. The Directive requires that the likely impact of climate change on the occurrence of floods shall be taken into account in this planning process. The 2nd cycle of Flood Risk Management Planning is underway.

Actions

11.12 The following are examples of actions that government will take forward under Outcome Objective P1's delivery plan (full delivery plan can be obtained in Annex B).

These actions will contribute to both the delivery of the objective and the management of the relevant NI Evidence Report climate change risks and opportunities:

11.13 Climate change and health information platform

DoH intends over the lifetime of this programme to work with Climate NI, and in partnership with Belfast Healthy Cities and the wider Climate NI Health and Wellbeing Network, to establish and maintain an online climate change and health information exchange platform. The platform will aim to allow organisations and individuals interested in climate and health issues to access and share information and learning on risks as well as potential responses and solutions.

11.14 Living with Water Plan

In July 2014 the NI Executive agreed to develop a strategic drainage infrastructure plan for Belfast. DfI is leading the development of the plan and it is now known as the 'Living with Water Programme'. The programme aims to protect against flooding, enhance the environment and support economic growth by improving capacity for new connections.

The work of the programme is initially focused on greater Belfast due to the need for an agreed plan for that area. The programme is also however, developing an integrated drainage investment planning guide for use throughout NI.

11.15 Flood Risk Management Plans

As mentioned previously, DfI is the competent authority for the implementation of the Floods Directive in NI. The final part of the Floods Directive process is the production of FRMPs.

The FRMPs for NI highlight the flood hazards and risks in the areas where there is the most significant flood risk from rivers, the sea, surface water and reservoirs. They identify objectives and measures that will be undertaken over the six year Floods Directive planning cycle to address flooding and they set out how the relevant competent authorities will work together with communities to reduce the flood risks. The FRMPs are important in planning future flood risk management actions, promoting awareness and understanding of flood risk, and in guiding funding and resources to where the risk is greatest. Consideration of climate change is a legislative requirement in the Floods Directive planning cycle.

11.16 Strategy on Climate Change and the Historic Environment

DfC Historic Environment Division in 2013 commissioned from the University of Ulster a baseline assessment on the potential impact of climate change on the historic

environment. This considered the threats to the historic environment in four landscape settings: coastal and marine; lowland river valleys; freshwater loughs; and uplands, and made recommendations on the ongoing monitoring of this threat and the development of risk assessments for heritage assets.

The need to improve records and ensure that data is available for risk modelling and to provide relevant advice on risk assessments were identified as a key priorities from this work. Such data is now publically accessible and is updated as resources allow. Drawing on work from elsewhere, the Division is also refining how risk assessments for individual heritage assets can be carried out in an efficient way.

In addition, the Division is developing and updating its guidance for owners in regard to:

- Heritage and Energy Efficiency;
- Climate Change Guidance for Buildings and upstanding Monuments;
- Climate Change Guidance for archaeological sites; and
- Heritage Assets and Flooding.

11.17 Sustainable Drainage Systems

SuDS* help protect watercourses and groundwater from pollution by treating surface water runoff in a more sustainable and natural manner. These systems can help maintain natural river flows by the slow release of water. They can also protect areas further downstream from flooding, as runoff is managed at source and slowed down through attenuation and storage.

In NI, SuDS have been introduced in many different forms in a range of new infrastructure including at all new Strategic Road Schemes and Park & Ride sites. There has recently been a pilot SuDS project developed in a primary school (see Case Study within this chapter).

In 2016, DfI changed the legislation regarding connection to the public sewer network, to provide a new power for NI Water Ltd to refuse a surface water connection if alternative means of dealing with surface water have not been considered. This has seen a substantial increase in the use of SuDS to attenuate stormwater flows in new residential and business developments. Further work on the promotion and implementation of SuDS is being led by the cross-departmental Stormwater Management Group. Work is also

ongoing to ensure that SuDS are included within the Local Development Plans currently being prepared by the local councils. These systems will help address the risks of out of sewer flooding due to heavy rainfall.

*SuDs also contributes to the delivery of Outcome Objective IF1.

11.18 Technical Flood Risk Guidance

DfI is in the process of updating guidance on climate change allowances for Flood Risk Management Infrastructure in NI. The rest of the UK has recently taken account of up to date research coming from UKCP to update allowances in design of flood risk management infrastructure to accommodate climate change. It therefore follows that NI should do likewise. Revising these allowances also aligns with the intentions of the EU Floods Directive which requires climate change to be considered in its 2nd cycle planning process.

New guidance on allowances is essential to ensure that river and drainage infrastructure which is constructed is future-proofed. The guidance feeds into the development of up to date flood hazard and risk mapping to accommodate climate change. These maps are used for example, to aid determination of where flood hazards and flood risks are greatest, to advise NI's development control and planning process to ensure development does not take place in areas of high risk, and to enable better emergency planning for extreme events.

Case Study

Government are building on the success of actions carried out under NICCAP1. The following case study is an example of adaptation work carried out under NICCAP1.

Case Study Title: Clandeboye children learn about managing water sustainably.

In January 2018, a novel rainwater garden was launched within the grounds of Clandeboye Primary School. This garden is the first of its kind in NI and was developed through a partnership between NI Water Ltd, Department for Infrastructure, Department of Education and the Education Authority.

The £70,000 rainwater garden was constructed within the grounds of the school, largely to reduce flooding in the local area. This helps to contribute to the NICCAP 2 Outcome Objective P1 of having people, homes and communities resilient to the impacts of flooding and extreme weather.

This Sustainable Drainage Systems holds around 80m3 of stormwater from the school roof and playground which previously went into the combined sewer system. The scheme was built as part of an overall investment of £10 million to improve the sewer network in the wider Bangor area and improve the bathing water quality in the local beaches.

The rainwater garden is a simple concept, which collects water run-off from the school roof and playground area. Rainwater from the roof is collected in an underground storage tank disguised as a turtle. When the water within the storage tank builds up to a certain level, a valve opens and allows the water to run down a channel, which is being used by the school children as a ‘duck run’ play facility.

The rainwater then travels into two split-level ponds which reduce the rate at which the storm water reaches the nearby watercourse, the Clandeboye Stream, and lowers the risk of flooding in this area of Clandeboye, to the benefit of the local residents.

The rainwater garden has had positive benefits not only to the local community but also to the pupils in the school. The school has reported that the garden has had the added benefit of helping the children to socialise better during play and learn about biodiversity and the sustainable use of water.

More information on the rainwater garden can be found through a promotional video which can be accessed here (https://www.youtube.com/watch?v=PsLEZpmvQEw).

• *Clandeboye*

Chapter 12: Outcome Objective B1

Courtesy of Visit Belfast,
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Introduction

12.1 This chapter covers Outcome Objective B1 under key priority B 'Disruption to business and supply chains'. It provides the vision for this outcome objective and a snapshot summary of some of the relevant climate change risks and opportunities related to this objective.

12.2 The chapter also contains examples of high level policies, strategies, and actions which will contribute to the delivery of the objective, and to the management of the relevant NI Evidence Report risks and opportunities listed in Annex A (Outcomes Framework Mapping) and Annex B (Government Delivery Plans).

Outcome Objective B1

12.3 Outcome Objective B1 is that *'we have businesses that can adapt to the impacts of climate change & extreme weather.'*

Associated Climate change risks and opportunities

12.4 The NI Evidence Report projected that climate risks are already having a growing impact on businesses in NI. It also highlighted that the greatest climate change risks to businesses in NI now, and in the future, are risks of flooding and extreme weather events resulting in damage to assets and disruption to business operations such as distribution to networks and service deliveries.

12.5 NI businesses have already experienced at first-hand the direct impacts of severe weather events on their premises and operations and supply chains. Impacts experienced have included flooding and the disruption caused to infrastructure on which they rely such as road networks, information and communication technology and electricity supply. Other impacts have included reduced customer access to premises and staff absences due to infrastructure disruption. NI businesses are also exposed to the indirect impacts of climate change due to their dependence upon the wider European and Global economy.

12.6 The NI Evidence Report highlighted that the NI economy is unique compared to the rest of the UK as it is dominated by 'Small and Medium Sized Enterprises' (SMEs), which account for 99.9% of the total number of businesses. SMEs can be particularly vulnerable to climate change and extreme weather impacts can be highly damaging. SMEs are likely to have a have a lower adaptive capacity and may have the most difficulty recovering due to not being 'as well-resourced' as much larger enterprises.

12.7 Tourism industry is also a significant driver and contributor to the NI Economy with tourism being currently worth 5.2% of NI's Gross Domestic Product and sustaining over 61,000 jobs (2015 NI Census of Employment). The Evidence Report highlighted that opportunities for this sector can arise due to a changing climate with warmer temperatures and a possible extension of the tourist season.

12.8 There may be negative impacts due to potential coastal and river flooding, erosion, and degradation of natural assets such as beaches, areas of interest and tourist facilities.

Policies and Strategies

12.9 Several high level policies and strategies instigated and delivered by government to help meet international obligations and local targets, contribute to addressing and managing the impacts of (risks and opportunities) climate change under Outcome Objective B1.

12.10 The following are examples of policies and strategies which contribute to the delivery of Outcome Objective B1:

- The 'Sustainable Water - A Long-Term Water Strategy for Northern Ireland (2015-2040)'*. Detail in Chapter 7 Outcome Objective NC1. *This strategy also contributes to the delivery of Outcome Objective IF1.

- In March 2016, the NI Executive introduced new legislation, the Water and Sewerage Services Act (NI) 2016. Provisions within this legislation seek to reduce the volume of surface water entering the public combined sewerage system by placing restrictions on the right to connect to public sewers on the basis that there is a suitable alternative means of dealing with the surface water or that such a means could reasonably be provided. This has led to a substantial increase the number of SuDS systems included in new developments which help to slow the flow of surface water at times of heavy rainfall and reduce the potential for flooding in houses or businesses.

- Working in partnership with other bodies, Invest NI (a delivery arm of DfE), through the nibusinessinfo.co.uk platform, will maintain and develop 'Adapt your business to climate change' guidance to reflect emerging climate change outcomes, response planning and government strategy. This will include coordinating the development and online publication of case studies showcasing local businesses discussing their experience of making climate change adaptations, and active communication of climate adaptation support and business-related initiatives via a Business News section, Events Finder, Business Support Finder, monthly newsletter and social media channels.

Actions

12.11 The following are examples of actions that government will take forward under Outcome Objective B1's delivery plan (full delivery plan can be obtained in Annex B). These actions will contribute to both the delivery of the objective and the management of the relevant NI Evidence Report climate change risks and opportunities:

12.12 Publish the Water Resource and Supply Resilience Plan*

Detail of this plan is in Annex B Outcome Objective NC1. *This plan also contributes to delivery of Outcome Objectives IF1.

12.13 DfE liaise with the Oil, Gas and Electricity Industries to promote and encourage thinking on climate change issues.

As part of routine engagement on resilience planning, DfE encourages the oil, gas and electricity industries to be aware of climate change impacts. The Oil, Gas and Electricity sectors will be encouraged to plan for the future, and have regard for possible impacts due to severe weather, and in particular to consider flooding risks.

12.14 Invest NI, through the nibusinessinfo.co.uk platform, will maintain and develop 'Adapt your business to climate change' guidance

Working in partnership with DfE and others, Invest NI, through the nibusinessinfo.co.uk platform, will maintain and develop 'Adapt your business to climate change' guidance to reflect emerging climate change outcomes, response planning and government strategy. This will include coordinating the development and online publication of case studies showcasing local businesses discussing their experience of making climate change adaptations, and active communication of climate adaptation support and business-related initiatives via the nibusinesses.co.uk platform's Business News section, Events Finder, Business Support Finder, monthly newsletter and social media channels.

Chapter 13: Outcome Objective I1

Introduction

13.1 This chapter covers Outcome Objective I1 under key priority I 'Food Security/Global Food production'. It provides the vision for this outcome objective and a snapshot summary of some of the relevant climate change risks and opportunities related to this objective.

13.2 The chapter also contains examples of high level policies, strategies, and actions which will contribute to the delivery of the objective, and to the management of the relevant NI Evidence Report risks and opportunities listed in Annex A (Outcomes Framework and Mapping) and Annex B (Government Delivery Plans).

Outcome Objective I1

13.3 Outcome Objective I1 is that *'we have a food system that is resilient to impacts of climate change'.*

Associated Climate change risks and opportunities

13.4 While local domestic food production and manufacturing are devolved policy areas in NI the resilience of the food system in NI also depends on UK-wide policies.

13.5 The NI Evidence Report identified that there are likely to be opportunities and risks from climate change impacts locally on our food system including production and trade. It highlighted that NI may have an increased advantage in specific areas of agricultural production in the future. This opportunity however will depend on trends in global agricultural production and also on the future sustainability of local agriculture in NI, especially in terms of water and soil resources.

13.6 The UK Evidence Report identified some risk from weather-related shocks to international/ global food production and trade. This was in terms, not of availability locally, but of issues related to price and trade with global markets impacting potentially on local sectors. The Evidence report also identified that climate change impacts could amplify existing quality and safety issues. This relates to supply chains from outside imports such as, environmental contamination associated with increased flooding, increased pesticide and foodborne pathogens.

13.7 The NI Evidence Report projected that the future level of risk of foodborne disease cases/ outbreaks is currently low for NI.

13.8 The NI Evidence Report has identified that more action needs to be taken to mitigate against the risks from weather related shocks to international food production and trade, and that more research is needed to look at the impacts of climate change on food safety, food quality and changes in global food production.

The risks in the NI Evidence Report where further action is required is shown in Figure 13.1.

Figure 13.1: NI Evidence Report risks identified where further action is required.

It1: Risks from weather-related shocks to international food production and trade.

Policies and Strategies

13.9 Several high level policies and strategies instigated and delivered by government to help meet international obligations and local targets contribute to addressing and managing the impacts (risks and opportunities) of climate change under Outcome Objective I1.

13.10 The following are examples of policies and strategies which contribute to the delivery of Outcome Objective I1.

- 'Going for Growth* - An industry led strategic action plan in support of the NI Agri-Food Industry', developed by the industry led Agri-Food Strategy Board. It was published in May 2012 and outlined a vision of 'Growing a sustainable, profitable and integrated Agri-Food supply chain, focused on delivering the needs of the market'.

  The plan set the following objectives for sustainable development of the NI Agri-Food sector; growing market share, working together, sustainable growth, innovation, entrepreneurship and skills, better regulation, financing growth and food fortress.

  The plan recognised that climate change has contributed to the future uncertainty in global food production as a result of droughts and floods and leading to more frequent weather related food price spikes.

  It determined that while there are likely to be some risks to food production in NI such as the impact of flooding on crop production and the introduction of new pests, diseases and plant toxin contamination, yield modelling has identified that climate change will have an overall benefit to some aspects of agricultural production.
  *This strategic plan also contributes to delivery of Outcome Objective NC3.

- The NI Executive Response to strategic action plan 'Going for Growth' was published in October 2014, and set out an agreed action plan to address 81 recommendations. This included actions to support sustainable growth by way of involvement in the development of a 'Sustainable Agricultural Land Management for Northern Ireland', the development of new Agri-Environment Schemes to promote biodiversity within our production systems, and commissioning research through the 'Evidence and Innovation Strategy'.

- The FSA commissioned a report; 'Food and climate change: A review of the effects of climate change on food within the remit of the Food Standards agency' to assess the risks of climate change on food. It identified policy implications for food safety and nutrition.

Actions

13.11 The following are examples of actions that government will take forward under Outcome Objective I1's delivery plan (full delivery plan can be obtained in Annex B). These actions will contribute to both the delivery of the objective and the management of the relevant NI Evidence Report climate change risks and opportunities:

13.12 FSA is developing a strategic approach to surveillance in the food system drawing on a wide range of data and inputs to better identify and to anticipate rather than react to food safety risks. Imported foods risks are a specific area of consideration in this strategy. The approach includes but is not confined to risks associated with climate change.

13.13 FSA is working to improve its understanding of global food system risks with a wider and longer-term foresight approach, complementing the nearer-term approach in surveillance. It is working with its Science Council (i) to update and develop the understanding of the future food system and the associated risks and opportunities for food safety and authenticity in the UK, and the opportunities, and (ii) to identify how FSA can strengthen its capability in food system foresight. Again, this includes but is not limited to climate change and its impacts.

13.14 FSA will continue to examine the trends and new risks in relation to food-borne illness, working with expert advisers, other departments, and other partners, in the UK and internationally.

Outside Government

Chapter 14: Civil Society and Local Government Adapts

Introduction

14.1 Voluntary and community organisations, businesses, researchers and local councils play an important and interconnected role in land use, infrastructure networks, the built environment and other vital societal support structures. It is therefore imperative that central government, local government and civil society take a collaborative approach to considering climate change impacts, undertaking climate change adaptation planning, implementing practical actions and monitoring progress.

14.2 Climate NI was commissioned by DAERA to develop this 'Civil Society and Local Government Adapts'[12] chapter. The inclusion of this chapter (for which the content ownership is primarily outside central government) within NICCAP2 aims to:

- Outline the important work planned by civil society and local government to contribute to the delivery of the outcome objectives of NICCAP2; and
- Raise awareness among civil society and local government of the necessity to undertake organisational vulnerability assessments, planning and actions to manage climate change risks and opportunities.

14.3 This chapter provides an illustration of the considerable number and variety of climate change adaptation activities undertaken by civil society and local government which contribute to meeting the NICCAP2 outcome objectives. Whilst not a definitive picture, this first exercise in mapping the climate change adaptation activities[13] undertaken across civil society and local government provides a strong starting point for coordinated action. Climate NI aims to continue to map existing, and encourage new, adaptation actions during the lifetime of NICCAP2. To enable the NICCAP2 to reflect this mapping, there will be an opportunity to incorporate additional actions (including research projects) into the programme at a set mid-programme review stage.

12 Civil society is the aggregate network of non-governmental actors and institutions that have a presence in public life, expressing the interests and civic values of members in society. For the chapter titled 'Civil Society and Local Government Adapts', the concept of civil society refers to, and includes, academics, community and voluntary organisations, and the private sector.

13 Information contributed and outlined in the chapter does not provide a complete overview of resilience and adaptation efforts in a given sector. Rather, it is a reflection of civil society and their approach to addressing the impacts of climate change in Northern Ireland.

Approach

14.4 Chapter contents[14] were developed by Climate NI in partnership with businesses, voluntary and community organisations, academics and the local government sector. Contributors were identified using a variety of methods, including a stakeholder mapping exercise (undertaken in partnership with Climate NI steering group[15] and wider networks). Engagement methods facilitated participation from a range of sectors and stakeholders.

14.5 Contributions for the civil society section were gathered using an online submission form which provided participants with information about the climate risks and opportunities facing NI and asked for submissions of future projects which aim to prepare for these. Contributors were also asked to provide case studies to illustrate the climate change adaptation work which has already been completed in NI.

14.6 The local government section was developed in partnership with the Northern Ireland Local Government Association (NILGA), Sustainable Northern Ireland and local government representatives. A mapping exercise of climate change adaptation planning and activities was undertaken in collaboration with local councils and used as a basis on which to develop strategic actions for the sector.

Chapter structure

14.7 This chapter provides a summary of the NICCAP2 contributions planned by civil society and local government. These are presented in the following two sections:

- Civil Society Adapts (academic, voluntary and community, and private sectors); and
- Local Government Adapts.

14.8 Projects[16] (which undertake adaptations actions) and case studies are listed under the section (academic, voluntary and community, private sector) to which the reporting organisation belongs. The chapter is supported by the following documents which provide further detail of the actions proposed, and how they address the risks outlined in the NI Evidence Report.

14 Ownership of the content of this chapter is with Climate Northern Ireland and the listed contributors from civil society and local government.
15 Climate NI work is guided by a cross-sectoral steering group, for further information please see website www.climatenorthernireland.org.uk/aboutus/steering-group.php.
16 Projects listed are identified as either as research, strategic or practical. All academic projects are listed as research projects. For private sector and community and voluntary sector stakeholders, projects that are undertaking adaptation planning and research are listed as strategic, whilst projects implementing adaptation activities are deemed as practical.

- **Civil Society and Local Government Delivery Plans (Annex D):** Civil Society and Local Government NICCAP2 Delivery Plans have been developed for each NICCAP2 outcome objective. The plans[17] set out a summary of the relevant projects and associated adaptation actions planned by civil society and local government, which will contribute to the delivery of the relevant outcome objective. Delivery plans detail the risks and opportunities (from the NI Evidence Report) that each project and associated action addresses. Implementation timescales for the projects and actions are included, along with a list of collaborating organisations and funders.

- **NICCAP2 Supporting Document[18]:** This document provides further information about each of the actions and case studies listed in this chapter and explains how the actions contribute to delivering the NICCAP2 outcome objectives. The supporting document can be accessed via hyperlinks from the listed projects in this chapter, or on the Climate NI website at the following link: www.climatenorthernireland.org/cmsfiles/NICCAP-Civil-Society-and-Local-Government-Adapts.pdf.

Supporting and collaborating with government

14.9 Civil society and local government also provide valuable skills and expertise to support work planned and undertaken by government departments. These supporting contributions made by civil society and local government are outlined in the 'NICCAP2 Supporting Document'.

NICCAP online platform

14.10 An online NICCAP platform hosted on the Climate NI website will be developed during the first year of this programme. The platform will aim to raise awareness of good practice climate change adaptation work across NI and encourage coordinated adaptation action across all sectors. It will also present[19] the methods, progress and outcomes of the work completed as civil society and local government undertake the activities outlined in this programme.

Monitoring and reporting of progress

14.11 Climate NI will facilitate a mid-programme review and end-of-programme evaluation (2021 and 2023). During this review, workshops will be facilitated by Climate NI at which civil society and local government contributors to this chapter will be asked to present

17 Adaptation actions listed in the delivery plans are excerpts from the text submitted by contributors. Please see the relevant project description outlined in this Supporting Document for the full details of each action.
18 The content of the NICCAP2 Supporting Document is the ownership of Climate Northern Ireland and the civil society and local government contributors to this chapter.
19 Further information on activities will be provided on the Climate NI website by agreement of the organisations and individuals involved.

information on the progress of implementing their NICCAP2 actions and to illustrate how these actions have contributed to delivering the relevant NICCAP2 outcome objectives.

14.12 The mid-programme review process will also provide an opportunity to gather information on additional climate change adaptation work being undertaken in NI and include these as actions in NICCAP2.

14.13 Based on findings of the mid-programme review, Climate NI will prepare a report and update NICCAP2. Climate NI will also provide an end-of-programme evaluation of the delivery of NICCAP2 actions outlined in this chapter, and their contribution to delivery of the NICCAP2 outcome objectives.

Input to future Climate Change Risk Assessments

14.14 As required by the Climate Change Act, during the lifetime of this programme, a third CCRA will be prepared. Climate NI will continue to work alongside government departments, civil society and local government stakeholders to encourage development and sharing of the vital climate change evidence required to inform this risk assessment.

Civil Society Adapts

14.15 Community and voluntary organisations, the private sector and academics play a significant role in shaping politics, society and local communities. They bring a wealth of knowledge, expertise and experience to climate change adaptation work. While government planning and actions are vital for providing a strategic approach to climate change, it is imperative that civil society is engaged at an individual, organisational and strategic level in planning for, and adapting to, climate change risks and opportunities. It is also important that their contributions are recognised as a vital part of the collaborative climate change resilience effort. Many NI civil society stakeholders are already experiencing, documenting and carrying out actions to adapt to the impacts of climate change.

14.16 Civil society stakeholders in NI have planned a variety of climate change adaptation actions over the lifetime of this programme. This section outlines how the following civil society sectors plan to contribute to the NICCAP2 objectives:

- Academic Sector,
- Community and voluntary organisations, and
- Private Sector.

14.17 For each stakeholder group, planned projects for the period 2019-2024 are listed which will address the risks and opportunities outlined in the NI Evidence Report. A delivery plan for each of these projects is included in Annex D. Case studies are included to illustrate the outcomes of previous efforts by civil society to increase resilience to the impacts of climate change across NI.

Academic Sector

14.18 The NI Evidence Report and the NICCAP2 are only as robust as the quality of evidence on which they are based. Research[20] exploring the risks and opportunities NI faces from climate change is necessary to provide valuable evidence to guide climate change adaptation planning, preparation and action. Case studies are included to illustrate some of the research recently undertaken which has developed relevant methods for examining the impacts of a changing climate.

14.19 As outlined by the NI Evidence Report, there are many aspects of potential climate risk facing NI for which sufficient research has not been completed. Without this, government and non-government stakeholders cannot undertake the vital evidence based planning and decision-making necessary to prepare NI society for climate change. Therefore, the contributions from researchers in this programme are critical as they will provide robust evidence on which future climate change risks assessments and adaptation plans will be based.

Academic Sector Adaptation Actions

14.20 This section outlines the research projects through which climate change adaptation actions will be undertaken. These actions will contribute to the delivery of NICCAP2 outcome objectives[21].

14.21 Table 1 lists academic projects and illustrates that they will contribute to NICCAP2 Outcome Objectives NC1, NC2, NC3, IF1 and P1. Delivery plans in Annex D outline the specific actions which will be delivered by each project, the NI Evidence Report risks and/or opportunities that they aim to address, project collaborators and project funders.

For further information on the project, click on the project number in the table (embedded hyperlinks) to be directed to the relevant section in the NICCAP2 Supporting Document.

20 It is also important to recognise the relevance of information gathered from local stakeholders (such as local government and community groups who understand the existing capacity and responses of geographical areas or communities to weather events).
21 A full delivery plan summary (including academic, voluntary sector and business projects) for each objective is provided in Annex D.

Table 1: Overview of NICCAP2 outcome objective(s) addressed by each academic sector project

No.	Research project through which Adaptation Actions will be undertaken. *Click on the project number (embedded hyperlinks) for further information*	NICCAP2 Outcome Objective to which adaptation actions will contribute						
		NC1	NC2	NC3	IF1	P1	B1	I1
NC1.1	**Research Project: Maritime, Ocean Sector and Ecosystem Sustainability (MOSES)** Dr Wesley, Flannery, Queen's University Belfast.	✓						
NC1.2	**Research Project: Mitigating Animal Health Impacts of Climatic Variation** Professor Eric Morgan, Queen's University Belfast.	✓						
NC1.3	**Research Project: SALine INntrusion in coastal Aquifers: Hydrodynamic Assessment and Prediction of Dynamic Response (SALINA)** Dr Raymond Flynn, Queen's University Belfast.	✓						
NC1.4 NC3.1	**Research Project: Towards Quantification of Blanket Bog Ecosystem Services to Water (QUBBES)** Dr Raymond Flynn, Queen's University Belfast.	✓		✓				
NC2.1	**Research Project: UrbanARK: Assessment, Risk Management, & Knowledge for Coastal Flood Risk Management in Urban Areas** Dr Ulrich Ofterdinger, Queen's University Belfast.		✓					
NC3.2	**Research Project: Weathering Below Blanket Bogs** Dr Raymond Flynn, Queen's University Belfast.			✓				
IF1.1	**Research Project: Investigate the impact of flooding on the stability of small single and multi-span masonry arch bridges** Dr Brian Solan, Ulster University.				✓			
P1.1	**Research Project: Impact of 20mph Speed Limits on health (including modelling of climatic changes).** Dr Ruth Hunter, Queen's University Belfast					✓		

14.22 Whilst these actions will not address all of the evidence gaps identified in the NI Evidence Report, they will provide an important resource for future planning and adaptation activities. To encourage researchers to focus on areas where evidence is required to guide risk assessments and planning, Climate NI will develop an online record of evidence gaps and work to raise awareness of the need for research to address these.

Community and Voluntary Organisation Sector

14.23 Community and voluntary organisations provide access to a variety of networks and stakeholders as well as bringing a wealth of knowledge, expertise and experience. These are a vital resource when working to increase understanding of the impacts of climate change within local geographical areas and communities. Community and voluntary organisations also undertake a variety of practical, on the ground projects that deliver increased resilience to climate risks.

Community and Voluntary Organisation Adaptation Sector Actions

14.24 This section outlines projects which community and voluntary organisations will undertake which will work toward addressing the relevant outcome objectives[22] of this programme. Table 2 lists community and voluntary projects and illustrates that they will contribute to NICCAP2 Outcome Objectives NC1, NC2, NC3 and P1. Delivery plans in Annex D outline the specific actions which will be delivered by each project, the NI Evidence Report risks and/or opportunities that they aim to address, project collaborators and project funders.

14.24 For further information on the project, click on the project number in the table (embedded hyperlinks) to be directed to the relevant section in the NICCAP2 Supporting Document.

22 A full delivery plan summary (including academic, voluntary sector and business projects) for each objective is provided in Annex D.

Table 2: Overview of NICCAP2 outcome objective(s) addressed by each community and voluntary sector project

No.	Projects which will deliver Adaptation Actions *Click on the project number (embedded hyperlinks) for further information*	NICCAP2 Outcome Objective to which adaptation actions will contribute						
		NC1	NC2	NC3	IF1	P1	B1	I1
NC1.5 NC3.3	**Practical and Strategic Project: Ancient Woodland Restoration and New Woodland Creation** Woodland Trust	✓		✓				
NC1.6 NC3.4	**Practical and Strategic Project: Co-operation Across Borders for Biodiversity (CABB)** RSPB NI	✓		✓				
NC1.7 NC3.5	**Practical Project: Collaborative Action for Natura Network (CANN)** Ulster Wildlife reporting on behalf of Newry, Mourne and Down District Council	✓		✓				
NC1.8 NC2.2	**Strategic Project: Living Seas Work including Sea Deep** Ulster Wildlife	✓	✓					
NC1.9	**Strategic Project: Northern Ireland Marine Task Force (NIMTF)** Ulster Wildlife	✓						
NC1.10 NC2.3	**Strategic Project: Shifting Shores - Playing our Part on the Coast** National Trust	✓	✓					
P1.2	**Practical Project: Health and Wellbeing Network - Information Platform** Climate NI Health and Wellbeing Network					✓		

Private Sector

14.25 The private sector provides jobs, goods and services, and shapes our economy. The future of our economy is reliant on businesses and wider society being prepared for the shocks and stresses of climate change. In particular, many NI businesses are reliant on our local, national and international distribution networks, which are at increased risk of

disruption due to climate change. 99.9%[23] of the private sector in NI is made up of SME's and these can be particularly vulnerable to climate change.

14.26 The private sector has considerable influence on NI Society and provides vital expertise to support and deliver government projects on climate change adaptation.

Private Sector Adaptation Action

14.27 This section outlines some of the climate change adaptation actions that the NI private sector plans to contribute to the NICCAP2 outcome objectives[24] within the lifetime of this programme. These actions include efforts to reduce the vulnerability of NI businesses to climate change, and valuable contributions to the resilience of other parts of society. Alongside these actions, Climate NI will continue to source, develop and provide access to tools and resources which can support the private sector in planning for the impacts of climate change.

14.28 Table 3 lists private sector projects and illustrates that they will contribute to NICCAP2 Outcome Objectives NC2, IF1, P1, B1 and I1. Delivery plans in Annex D outline the specific actions which will be delivered by each project, the NI Evidence Report risks and/or opportunities that they aim to address, project collaborators and project funders.

14.29 For further information on the project, click on the project number in the table (embedded hyperlinks) to be directed to the relevant section in the NICCAP2 Supporting Document.

23 Committee on Climate Change (2017) UK Climate Change Risk Assessment 2017: Evidence Report. CCC.
24 A full delivery plan summary (including academic, voluntary sector and business projects) for each objective is provided in Annex D.

Table 3: Overview of NICCAP2 outcome objective(s) addressed by each private sector project

No.	Projects which will deliver Adaptation Actions *Click on the project number (embedded hyperlinks) for further information*	NICCAP2 Outcome Objective to which adaptation actions will contribute						
		NC1	NC2	NC3	IF1	P1	B1	I1
NC2.4 IF1.3	**Strategic Project: Business Continuity Planning** Belfast Harbour Commissioners		✓		✓			
IF1.2 P1.3	**Strategic and Practical Project: Belfast City Airport: Safety and Emergency Planning** Belfast City Airport				✓	✓		
IF1.4	**Strategic Project: Smart Port Initiative** Belfast Harbour Commissioners				✓			
B1.1	**Strategic Project: Business Resilience Toolkit for Dairy Farmers** Lakeland Dairies NI						✓	
I1.1	**Strategic Project: Improving the Safety and Security of the Food Chain** Food Fortress Ltd.							✓

Civil Society Case studies

14.30 The following case studies provide exemplars of the valuable climate change adaptation actions undertaken over recent years by civil society on which this programme builds. These projects have increased the resilience of NI to the impacts of the climate change by providing robust evidence to inform strategic decision making and implementation of adaptation measures.

14.31 For further information on the case studies, click on the case study name in the table (embedded hyperlinks) to be directed to the relevant section in the Civil Society and Local Government Adapts: NICCAP Supporting Document, and referred to as NICCAP Supporting document after this point.

Table 4: Summary of civil society case-studies

Case Study Name and Aim *Click on the case study name (embedded hyperlinks) for further information*	**NI Responsible Organisation (bold) and Collaborating Organisations**
Outcome Objective NC1	
Case Study 1: Investigating the groundwater flow regime of the Sherwood Sandstone Aquifer (2014-2018) To evaluate the impact of dolerite dyke intrusions on regional water availability and identify the impact of saline intrusion into the freshwater Sherwood Sandstone aquifer.	**Dr Ulrich Ofterdinger, Queens University Belfast** University of Aberdeen, Université de Neuchâtel (Switzerland) and the Geological Survey of Northern Ireland
Case Study 2: Documentation for Integrated Hazard Assessment and Sustainable Management (2010-2015) Document the Giant's Causeway to produce a high-resolution digital elevation model to assess the potential impacts of climate change on the natural heritage of the site.	**Causeway Coast and Glens Heritage Trust** Giant's Causeway and Causeway Coast World Heritage Site Steering Group, Queen's University Belfast and the National Trust
Case Study 3: Ballinderry Freshwater Pearl Mussel Rescue Project (2012-2015) To save the Ballinderry Freshwater Pearl Mussel (one of the last six remaining populations in NI) from extinction by addressing the issues in the catchment preventing natural reproduction and to create a resilient habitat for the species to thrive in the river.	**Ballinderry Rivers Trust** Queen's University Belfast and Ulster University
Outcome Objective NC2	
Case Study 4: Review of NI's Sea Defences and Coastal Data (2015-2016; 2017-2018) Two studies assessed the distribution of sea defences in sheltered loughs and open seas around the NI Coast, and reviewed the accessibility of coastal data needed to inform decision making on adaptation measures.	**Professor Andrew Cooper, Ulster University** Professor Derek Jackson, Ulster University and National Trust

Outcome Objective NC2	
Case Study 5: Vulnerability Assessment of Coastal Archaeological Sites, Lough Foyle, NI (2011-2013; 2014-2015; 2016-2017) A series of research studies aimed to identify and assess the quality of the strategic risk mapping of recorded historic sites and monuments located along the Lough Foyle coastline.	**Dr Kieran Westley, Ulster University** Mr Rory McNeary (Formerly Ulster University, currently NI Department for Communities), Ulster University
Outcome Objective B1	
Case Study 6: Business Resilience Toolkit for Dairy Farmers (2017-2018) Provide guidance and support to dairy farmers in NI to address and adapt to the current and projected impacts of climate change.	**Lakeland Dairies NI** Climate NI
Outcome Objective I1	
Case Study 7: Queen's University Belfast Nexus Project (2016-2017) Address potential impacts of climate change and future energy availability on food security in Northern Ireland.	**Dr Wayne Foord, Queen's University Belfast** Institute for Global Food Security, Friends of the Earth NI, and Belfast Food Network

Local Government Adapts

14.32 Local government plays a central role in shaping local places and providing essential services. The 11 NI local councils have a range of roles and responsibilities across their geographical areas, from economic development and park management, through to emergency planning and waste services. Under the reformed two-tier planning system, local councils are responsible for the determination of the majority of planning applications, development planning and enforcement duties. In addition, councils have responsibility for community planning in partnership with other public sector agencies. It is this connection between local and strategic governance, as well as the management of both short-term and long-term development, which makes the work of local councils vital to climate resilience.

14.33 The NI Evidence Report outlines many climate change impacts which are relevant to the responsibilities and services delivered by local government. For example, local councils lead local action to protect communities and businesses from risks posed by severe weather events and are responsible for protecting local areas from development which could increase vulnerability to flooding.

14.34 This 'Local Government Adapts' section is presented in the following two stages:

- Introduction to Local Council Adaptation Planning - This provides information about the process of adaptation planning, and the tools which will be available to guide councils through this process; and
- Strategic actions - Actions required to provide the context within which local government can undertake adaptation planning and undertake adaptation activities.

Climate change adaptation work underway

14.35 During the development of this chapter, an engagement and information gathering exercise was undertaken to map the adaptation activities that local government is already taking. It is clear that local councils already recognise many of the risks posed to their organisations and services, and are taking vital action. Many local council strategies and activities are increasing climate change resilience across built and natural environments, and local communities. See below for some examples of this work:

- Local councils develop Biodiversity Actions Plans under the Biodiversity Duty[25]. These outline measures to encourage resilient species, habitats and water bodies; and
- Local councils are currently preparing their Local Development Plans which will help shape future development and growth as well as provide a local planning policy framework for decision-taking. In bringing forward local planning policies, councils must take account of the SPPS for Northern Ireland which identifies climate change considerations.

14.36 These are only a small number of examples of the many local council activities which are increasing resilience to the impacts of climate change. A key aim of this programme is to showcase this valuable work.

Showcasing local council climate change adaptation

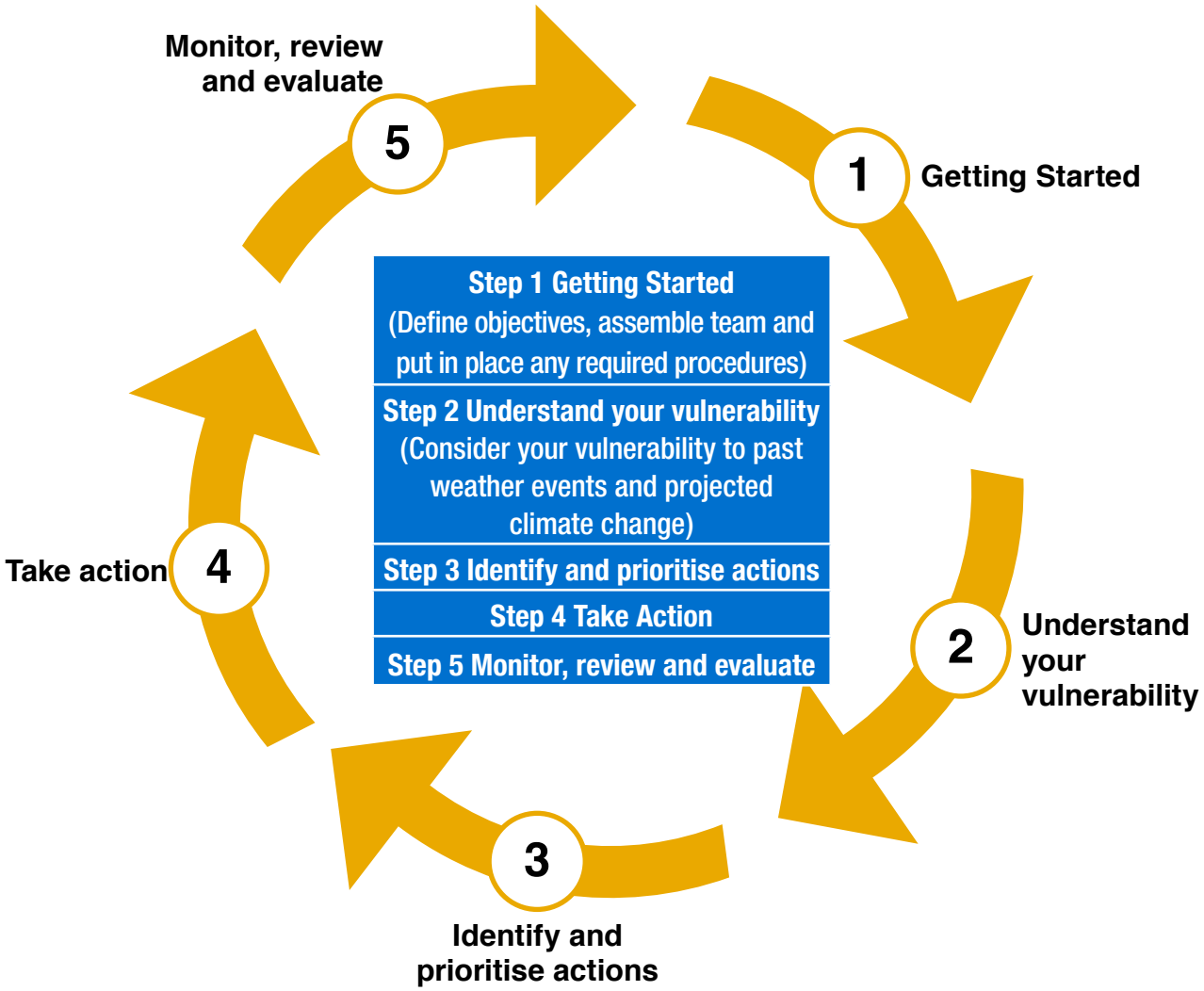
14.37 The NICCAP Civil Society and Local Government online platform (detailed at the beginning of this chapter) will showcase climate change adaptation work undertaken by local councils during this programme. It will also provide an opportunity to present and share good practice and lessons learned.

25 Biodiversity Duty comes under the Wildlife and Natural Environment Act (NI) 2011. For further details, please see: www.legislation.gov.uk/nia/2011/15/section/1

Introduction to Local Council Climate Change Adaptation Planning

14.38 This programme aims to increase the profile of climate change adaptation across councils in NI, and to encourage and support each local council to develop a strategic climate change adaptation plan. Climate change adaptation is an ongoing cycle of activities and adjustments to prepare and adapt to climate risks, which will work toward a resilient society in the context of a changing climate. The adaptation cycle shown in Figure 14.1 illustrates a series of steps which a local council could follow to increase their resilience to the impacts of climate change.

Figure 14.1: Adaptation Cycle[26]



14.39 This approach enables climate change adaptation planning and action alongside an ongoing monitoring and review process, which is necessary to respond to updates in scientific evidence.

26 As NI local councils begin to follow the adaptation cycle, the steps may be adapted to suit the NI context.

Pilot project

14.40 Derry City and Strabane District Council (DCSDC) is leading the way with the development of the first local council adaptation plan in NI. This work is facilitated through the INTERREG VB C.L.I.M.A.T.E. project in partnership with NIEL, the organisation that delivers the Climate NI programme, and other EU partners. This pilot project will deliver the Derry City and Strabane District Council adaptation plan alongside an adaptation tool for local councils in the Northern Peripheries and Arctic (NPA) region. The tool will guide a step-by-step process for local councils in the NPA region to undertake adaptation planning and will help them identify the most appropriate route to adaptation planning within the contexts of regional and local policy, available resources and climate data. This project will enable piloting of the tool in three local councils across Europe, including Derry City and Strabane District Council. The project partners will develop good practice guidance and tools for local council adaptation planning and climate adaptation communication.

14.41 Learning from this project, and links to the adaptation guidance and support tools developed for Northern Periphery and Arctic regions, will be made available on the Climate NI website and the C.L.I.M.A.T.E. project website.

Northern Ireland Climate Change Adaptation Cycle Support Tool

14.42 A local council climate change adaptation guidance and support tool developed specifically for the NI context will be made available by Climate NI in 2020. This will provide step-by-step guidance to enable local councils to follow the adaptation cycle and will be tailored to the policy, scientific knowledge and resource context of Northern Ireland. The tool will be based on guidance and good practice from adaptation support services in other regions and the tools and resources developed through the C.L.I.M.A.T.E. INTERREG NPA project. This work will be guided and supported by the Climate NI steering group.

Strategic Actions

14.43 To encourage and support local councils to engage in strategic adaptation planning, the following actions are planned.

Table 5: Strategic Actions

No	Action	Reporting partners	Implementation Timeline
1	Work with local councils to embed the adaptation cycle across local council planning with the aim of encouraging councils to complete a minimum of step 1 by 2021 and step 4 by 2024.	NILGA, Climate NI, Sustainable NI supported by SOLACE[27]	By 2024
2	Explore the capacity needs within local councils to enable delivery of Action 1 (above) and develop support mechanisms.	Climate NI, Sustainable NI, NILGA	By 2024
3	Develop and pilot a 'monitoring and reporting process' which can be used by local councils to undertake Step 5 of the adaptation cycle.	Climate NI, Sustainable NI	By 2021
4	Share learning from C.L.I.M.A.T.E. NPA INTERREG project on adaptation cycle planning with local councils.	Climate NI and DCSDC	By 2021
5	In bringing forward their Local Development Plans, Councils will take account of climate change adaptation considerations as indicated in the Strategic Planning Policy Statement.	Local councils	Ongoing

These strategic actions aim to develop a context within which local councils are able to play a key role in raising public awareness and increasing local resilience to the impacts of climate change.

Conclusion

This chapter illustrates the growing body of climate change adaptation expertise, planning and action within NI. There is still much work to be done to identify and assess future climate risks, to make necessary plans and take action. Climate NI will continue to work with civil society and local government to support the transition to a society resilient to impacts of climate change.

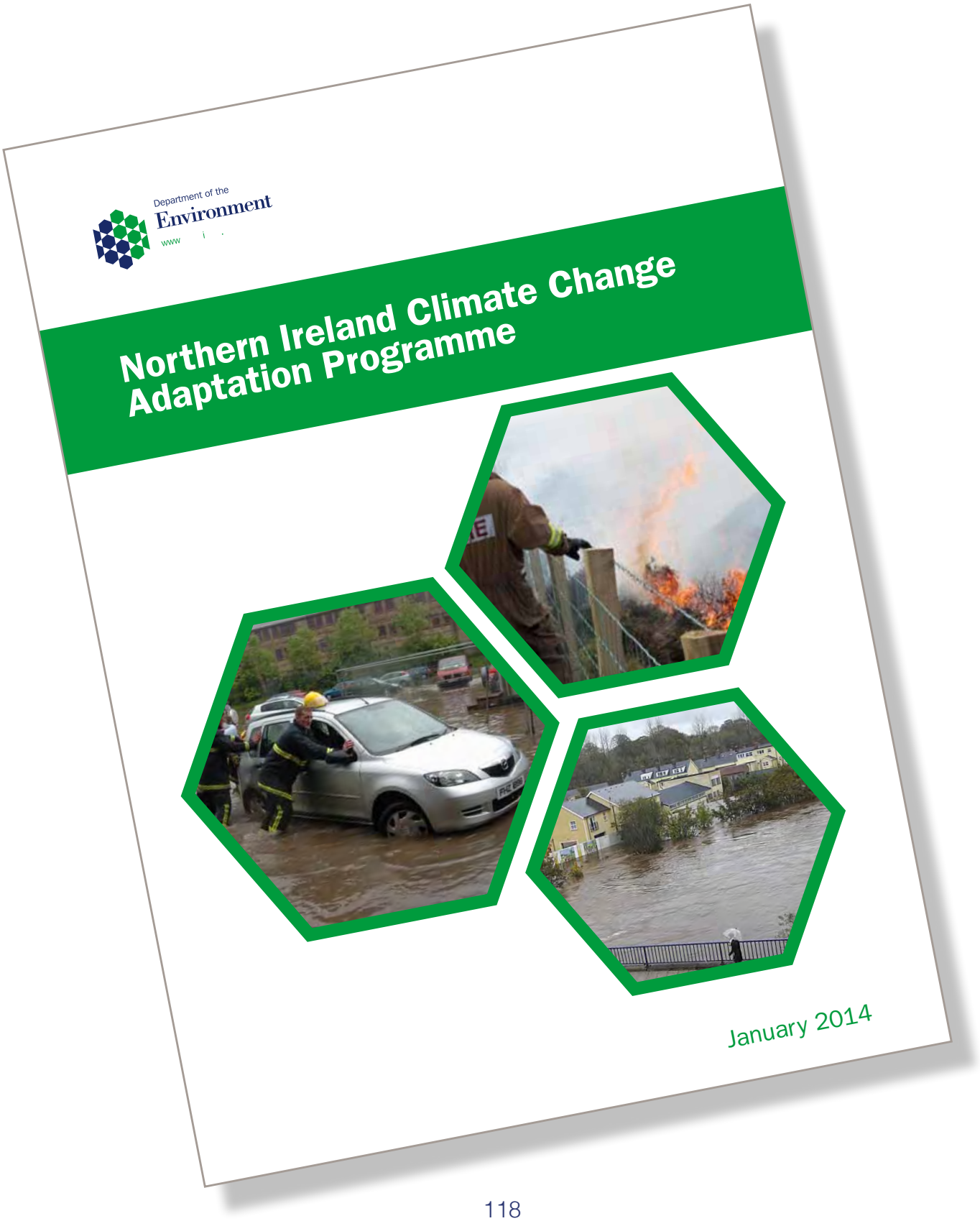
For further details on the actions that will be delivered by the projects listed in this chapter, please see the 'Delivery Plans' in Annex D. For further details on each of the projects and case studies please view the Civil Society and Local Government 'NICCAP2 Supporting Document' and the NICCAP platform on the Climate NI website: www.climatenorthernireland.org/NICCAP.php

27 SOLACE is the Society of Local Authority Chief Executives

Acknowledgements

Climate NI thanks all organisations and individuals who participated in the development of this chapter and the NICCAP2 Supporting Document, and looks forward to working with them, and further contributors over the lifetime of this programme.

For further information on how to participate in this programme going forward or the next UK Climate Change Risk Assessment, please contact info@climatenorthernireland.org.uk


Department of the
Environment
Northern Ireland Climate Change
Adaptation Programme
January 2014

Introduction

15.1 Section 60 of the Climate Change Act requires an assessment of progress made towards implementing previous NI Climate Change Adaptation Programmes to be included in subsequent programmes. NICCAP1 was published in January 2014, and covers the period 2014 to 2019. Its vision 'A resilient NI which will take timely and well-informed decisions that are responsive to the key risks and opportunities presented by climate change' was to be achieved by meeting the following five objectives:

- 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;
- Engage with other administrations.

15.2 The ASG of the CDWG CC was tasked with the delivery of the Adaptation Programme and evaluating how effective the NICCAP1 has been in achieving its five objectives. Measuring the effectiveness of adaptation measures is challenging as the measures often cut across different sectors and are implemented on varying scales and timescales.

15.3 Acknowledging the cross cutting risks and opportunities which climate change presents, four primary areas for climate change adaptation action were identified in the NICCAP1. These were:

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

15.4 High level actions and key activities were assigned to each of the areas which were to be implemented over the period of NICCAP1. Departments were responsible for reporting on progress against the high level activities allocated to them and their agencies in the NICCAP1. The activities carried out by departments over the period of NICCAP1 under each high level action in each primary area are detailed in Annex C (Progress report on the implemenattion of NICCAP1 High Level Actions). The range of activities undertaken by departments in Annex C has contributed to delivering the objectives set out in NICCAP1.

Evaluation of NICCAP1 objectives

Objective 1: Fulfil the statutory duties as set out under the UK Climate Change Act

15.5 Section 60 of Climate Change Act requires the production of an Adaptation Programme containing objectives, proposals and policies to contribute to sustainable development. It also requires an assessment of progress made towards implementing the objectives, proposals and policies is included in subsequent programmes.

15.6 All government departments contributed towards the creation of NICCAP1, published in January 2014 and are assisting in the integration of climate change adaptation policies into their departmental functions.

15.7 Section 56 of the Climate Change Act requires the production of a UK risk assessment. NI government departments and external stakeholders participated in workshops, contributed to research projects and provided data and information into the CCRA.

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 2012 for NI.

15.8 NI departments have worked together on climate change issues through the ASG to cut across departmental remits and put in place policies and proposals for managing the risks and taking advantage of any opportunities which may occur.

15.9 Climate NI provides support for the climate change agenda across government departments and promotes awareness of climate change in society. The partnership provides a primary point of contact and delivers a link to the environmental non-governmental organisations and business sectors, acting as a conduit of information between the sectors and government.

15.10 A number of actions and activities within the NICCAP1 and listed in NICCAP2's Annex C (Report of progress of implementation of NICCAP1 High Level Actions) involved consulting with both internal and external stakeholders by the relevant department. This resulted in a review of policies and strategies that were designed to take into account the implications of climate change.

Objective 3: Raise awareness of the likely effects of climate change and the need for adaptation action

15.11 Government departments have identified and engaged with stakeholders to improve resilience to extreme weather events. Stakeholders with specific sectoral information have been targeted and identified and there has been collaboration in promoting best practice adaptation.

15.12 The government partnership with Climate NI has ensured that the effective promotion and facilitation of climate change stakeholder engagement has taken place via the mechanisms outlined below:

- Promoting stakeholder engagement and input into climate change adaptation policy development and implementation to meet the requirements of the Climate Change Act.
- Facilitating the delivery of forums to support members and others to share climate change adaptation action through networking.
- Climate change adaptation information gathering and sharing to raise awareness of the impacts of climate change within organisations and the general public; and
- Promoting adaptation engagement and capacity building within NI to encourage individual and sectoral action.

Objective 4: Promote and support the enhancement of scientific evidence and sector specific data collection that will address climate change adaptation need.

15.13 NI representatives (in both government and outside government sectors) provided input to the CCRA 2017. This included involvement and input to the various chapters of the UK Evidence Report including the NI Evidence Report, and involvement in the work of the four research projects which were commissioned by the ASC to increase the evidence base for the UK Evidence Report. The magnitude of impact and the urgency of action needed for different NI climate change risks and opportunities was identified and assessed.

15.14 During the development of the NI Evidence Report of the UK Evidence Report the ASG engaged with key NI stakeholders to gather contributions and input from the various CCRA workgroups. This was to ensure NI input including NI specific evidence was considered during development of, and inserted into, the final UK Evidence Report.

15.15 In addition the ASG asked Climate NI to develop a more comprehensive evidence base on the climate change risks and opportunities specific to NI. To meet this request, Climate NI produced a stakeholder engagement report focusing on the chapter topics of the NI Evidence Report; Infrastructure, Business and Industry, Natural Environment and Rural Economy and People and Built Environment.

15.16 The development of this local evidence base report with targeted local adaptation information has helped support the development and implementation of climate change adaptation policies and decision making across all government departments through development of NICCAP2.

Objective 5: Engage with other administrations at national and international level to ensure the sharing of climate change adaptation best practice.

15.17 DAERA has continued to develop links with departments with similar responsibilities in the UK government and Devolved Administrations. Government departmental representatives have been liaising with counterparts in other jurisdictions to share and learn from our programmes of work and experience.

15.18 The CCC is sponsored by the Department for Business, Energy and Industrial Strategy (BEIS), the NI Executive, the Scottish Government and the Welsh Government.

15.19 The ASC a sub group under the CCC also established under the Climate Change Act is jointly sponsored by Defra and the DAs.

15.20 Throughout the period of the NICCAP1 there have been a number of climate change adaptation discussions and initiatives undertaken between officials in the NI Executive and their respective Irish Government counterparts. Likewise best adaptation practices have been discussed between the Environment Protection Agency in the Republic of Ireland and DAERA's Northern Ireland Environment Agency (NIEA).

15.21 Climate Change adaptation was discussed at the British Irish Council Environment work sector meeting held in March 2018. The meeting focused on how the administrations can work together on climate adaptation. All administrations committed to continue to cooperate and share information, experience and best practice and to explore the opportunities for further cooperation.

15.22 Climate NI has been encouraging cross-border research funding applications. An online Climate NI Knowledge Directory showcases climate change expertise on the island of Ireland. Climate NI also shares cross border climate change news, funding and policy developments on the Climate NI website, e-bulletin and social media networks.

Overall assessment of progress in achieving the objectives

15.23 A range of activities undertaken in NICCAP1 contributed to delivering its objectives. Nevertheless government policies, strategies and actions could be strengthened to improve the manner in which NI copes with climate change risks. More work needs to be undertaken to support the enhancement of scientific evidence that will address climate change adaptation needs in NI.

15.24 The activities undertaken in the NICCAP1 contributed to the management of NI climate change risks. However these activities can sometimes be difficult to measure. Reasons include the local nature of some of the activities, the complex interactions between the biophysical and socioeconomic elements of climate change adaptation and defining measurable benefits.

Lessons Learned for NICCAP2

15.25 NICCAP1 adopted a cross-sectoral approach and produced a range of actions which constituted initial steps in preparing for the impacts of climate change. It put in place the framework to meet the NI climate change adaptation challenges and it helped build resilience against current and impending changes to our climate. It was recognised that NICCAP1 was the start of an ongoing climate change adaptation process and that lessons learned from NICCAP1 would be addressed in NICCAP2.

15.26 NICCAP1 contributed to addressing a comprehensive list of over 150 climate change risks and opportunities. It was felt that NICCAP2 needed to focus on a reduced number of NI risks, and to prioritise the most urgent risks.

15.27 The objectives and activities undertaken in NICCAP1 did not enable measurement of adaptation progress in NI. For NICCAP2 an outcome based approach has been adopted. The outcomes based approach, similar to the approach used in the development of NI draft Programme for Government, will focus on the difference that adaptation actions will make. To support this, indicators for NICCAP2 outcome objectives have been identified (where possible) to facilitate measurement of the change that we want to bring about.

Annexes: Government

Annex A: Outcomes Framework Mapping

Key Priority Area: NC - Natural Capital; including Terrestrial/ Coastal/Marine/Freshwater ecosystems, soils and biodiversity

Outcome Objective NC1: We have species, habitats and water bodies that are resilient to the impacts of climate change.

Associated NI Evidence Report Risks & Opportunities
NE1 Risks to Species and habitats due to inability to respond to changing climatic conditions.
NE2 Opportunities from new species colonisations.
NE6 Risks to agriculture & wildlife from drought & flooding.
NE7 Risks to freshwater species from higher water temperatures
NE9 Risks to agriculture, forestry, landscapes and wildlife from pests, pathogens and invasive species.
NE11 Risks to aquifers, agriculture land & habitats from salt water intrusion.
NE13 Risks to & opportunities for marine species, fisheries & marine heritage from ocean acidification & higher water temperatures.
NE14 Risks & opportunities from changes in landscape character.
PB13 Risks to health from poor water quality.
PB14 Risk of household water supply interruptions.

Indicators

% of terrestrial protected area under favourable management.

% of marine protected area under favourable management.

% of water bodies at 'good' status.

Outcome Objective NC2: We have coastal communities, habitats, landforms and infrastructure that are resilient to the impacts of climate change.

Associated NI Evidence Report Risks
NE12 Risks to habitats & heritage in the coastal zone from sea-level rise: & loss of natural flood protection.
IN3 Risks to infrastructure services from coastal flooding & erosion.
PB6 Risks to the viability of coastal communities from sea level rise.

Indicators

Area of in-shore water protected for nature conservation.

% of sea wall in each structural condition code.

Outcome Objective NC3: We have soils and land types that are resilient to the impacts of climate change.

Associated NI Evidence Report Risks & Opportunities
NE4 Risks to soil from increased soil aridity & wetness.
NE5 Risks to natural carbon stores & carbon sequestration.
NE8 Risks of land management practices exacerbating flood risk.
NE3 Risks and opportunities from changes in agricultural and forestry productivity and land suitability.
NE10 Risks to agriculture, forestry, wildlife & heritage from change in frequency and/or magnitude of extreme weather and wildfire events.

Indicators

New Woodland Planted.

Key Priority Area: IF - Infrastructure Services

Outcome Objective IF1: We have transport & network services that are resilient to the impacts of flooding and extreme weather.

Associated NI Evidence Report Risks & Opportunities
IN1 Risks of cascading failures from interdependent infrastructure networks.
IN2 Risks to infrastructure services from river, surface water and groundwater flooding.
IN4 Risks of sewer flooding due to heavy rainfall.
IN6 Risks to transport networks from slope & embankment failure.
IN5 Risks to bridges and pipelines from high river flows & bank erosion
IN11 Risks to energy, transport & digital infrastructure from high winds & lightning.
IN9 Risks to public water supplies from drought and low river flows.
IN13 Risks to transport, digital and energy infrastructure from extreme heat.
IN14 Potential benefits to water, transport, digital and energy infrastructure from reduced extreme cold events.
IN7 Risks to hydroelectric generation from low or high river flows.
IN8 Risks to subterranean & surface infrastructure from subsidence.
IN10 Risks to electricity generation from drought & low river flows.
IN12 Risks to offshore infrastructure from storms and high waves.

Indicators

Number of properties removed from the ‘Out of Sewer Flooding’ Register.

% uptake of Sustainable Drainage Systems for new Article 161 Sewer Adoption Agreements

Amount spent on structural drainage.

Key Priority Area: P - People and Built Environment

Outcome Objective P1: We have people, homes, buildings and communities resilient to the impacts of flooding & extremes of weather.

Associated NI Evidence Report Risks & Opportunities
PB4 Potential benefits to health & wellbeing from reduced cold.
PB1 Risks to health & wellbeing from high temperatures.
PB5 Risks to people, communities & buildings from flooding.
PB7 Risks to building fabric from moisture, wind & driving rain.
PB8 Risks to culturally valued structures & the wider historic environment.
PB9 Risks to health and social care delivery.
PB10 Risks to health from changes in air quality.
PB11 Risks to health from vector-borne pathogens.
PB2 Risks to passengers from high temperatures on public transport.
PB3 Opportunities for increased outdoor activities from higher temperatures.

Indicators

% uptake of Sustainable Drainage Systems for new Article 161 Sewer Adoption Agreements.

% of properties at risk of flooding in NI.

Number of Local Development Plans (Plan Strategy/Local Policies Plan) which take account of climate change adaptation considerations in accordance.

Key Priority Area: B - Disruption to business and supply chains

Outcome Objective B1: We have businesses that can adapt to the impacts of climate change & extreme weather.

Associated NI Evidence Report Risks & Opportunities
BU1 Risks to business sites from flooding.
BU2 Risks to business from loss of coastal locations & infrastructure.
BU5 Risks to business from reduced employee productivity, due to infrastructure disruption & higher temperatures in working environments.
BU3 Risks to business operations from water scarcit.y
BU6 Risks to business from disruption to supply chains & distribution networks.
BU4 Risks to business from reduced access to capital.
BU7 Risks & opportunities for business from changes in demand for goods & services.

Indicators

Number of non-residential properties at risk of flooding.

Key Priority Area: I - Food security/global food production

Outcome Objective I1: We have a food system that is resilient to impacts of climate change.

Associated NI Evidence Report Risks & Opportunities
IT1 Risks from weather related shocks to international food production & trade.
IT2 Imported food safety risks.
IT3 Risks & opportunities from long-term climate-related changes in global food production.
PB12 Risk of food borne disease cases/outbreaks.

Indicators

*Sourcing of suitable indicator ongoing.

Annex B: Government Delivery Plans

Government Outcome Objective NC1 Delivery Plan

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
1	NE1 NE2	Produce conservation management plans for 95% of Special Areas of Conservation in: 1. Terrestrial European Protected Sites. 2. Marine European Protected sites.	DAERA	By end of 2020
2	NE1	DAERA as a Statutory Consultee will advise Local Planning Authorities and DfI about Habitat Regulations Assessment and Strategic Environmental Assessment requirements for new Local Development Plans.	DAERA	By end of 2020
4	NE1	Produce and implement management plans for Marine Protected Areas.	DAERA	By end of 2021
5	NE1 NE2	Review Priority Species List and provide advice.	DAERA	Ongoing
6	NE1 NE2	Undertake legislative changes to Wildlife Order (Northern Ireland) 1985 in relation to a review of priority species.	DAERA	By end of 2019
7	NE6	Deliver 136 measures in River Basin Management Plans by 2021 to contribute towards the target of up to 70% of water bodies (Rivers, lakes, transitional, coastal and groundwater) at 'good' status according to Water Framework Directive requirements.	DAERA	By end of 2021

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
8	NE7	Creation of riverine riparian native tree planting areas where river habitat enhancement schemes are carried out by Inland Fisheries.	DAERA	Future areas for planting will be identified in 2019/ 20. Business plans subject to resources being in place and the necessary landowner permissions.
9	NE13	Deliver the Collaborative Oceanography and Monitoring for Protected Areas and Species (COMPASS INTERREG VA project).	AFBI/DAERA	The COMPASS project has been initiated and will be complete in March 2022.
10	NE9	Carry out fish stock assessment work to capture changes to marine vertebrates including commercial species and the economic consequences of such changes.	DAERA	Ongoing- Stock assessments completed on an annual basis.
11	NE9	Continue to update the NI Plant Health Risk Register and implement contingency plans as necessary. Update will include any changes to the plant health risk (pests and pathogens) which may be contributed to by the impact of Climate Change.	DAERA	The NI Plant Health Risk Register updated on a monthly basis and published on the web.
12	NE6	Publish the Water Resource and Supply Resilience Plan.	NI Water Ltd/ DfI	March 2020
13	NE1	Complete 23 catchment studies as part of the Sustainable Catchment Area Management Planning Northern Ireland (SCaMP NI) project.	NI Water Ltd/ DfI	By end of 2021

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
14	NE7	Investigate the possibility of securing baseline stock level data for climate change susceptible lake freshwater fish species, accounting for other short term causes of variation.	DAERA	Continue with current annual assessment of stock and recruitment for pollan in 2019 on Lough Neagh
15	NE6	Review NI Water Ltd Abstraction licences on water bodies with potential seasonal vulnerability to water resource availability.	DAERA	Ongoing- Stock assessments completed on an annual basis.
16	NE1	Engage with councils to assist them in bringing forward Local Development Plan policies and proposals that take account of climate change adaptation considerations in accordance with the provisions of the Strategic Planning Policy Statement and any other policies or advice in guidance issued by DfI.	DfI- Planning	By end of 2021
17	NE1 NE2	Implement the All-Ireland Pollinator Plan 2015 - 2020.	DAERA	Ongoing - In accordance with Local Council Development Plan timetables.
18	PB13	EU INTERREG SWIM Project. To develop a System for Bathing Water Quality Monitoring to predict poor bathing water quality events associated with rainfall. This is to inform bathers prior to swimming.	AFBI/DAERA	By end of 2020

Government Outcome Objective NC2 Delivery Plan

No	NI Evidence Report Risk(s) to be addressed	Action	Responsibility	Implementation Timeline
1	NE12	Provide a baseline study and gap analysis of coastal erosion risk management in NI.	DAERA/ DfI	By end of 2020
2	IN3	Carry out surveys along the coastline to assess the impact of coastal erosion on sea walls and verges adjacent to the carriageway.	DfI	By end of 2019
3	PB6	Contribute to UK-wide project - 'Coastal Flood Boundary Conditions for the UK Mainland and Islands - 2016 Update' which will include the updating of coastal extreme boundary conditions for the NI coastline.	DfI	By end of 2019
4	IN3 PB6	Engage with councils to assist them in bringing forward Local Development Plan policies and proposals that take account of climate change adaptation considerations in accordance with the provisions of the Strategic Planning Policy Statement and any other policies or advice in guidance issued by DfI.	DfI Planning	Ongoing- In accordance with Local Council Development Plan timetables.
5	PB6	Implement the Flood Risk Management Plans for NI.	DfI	Ongoing

No	NI Evidence Report Risk(s) to be addressed	Action	Responsibility	Implementation Timeline
6	PB6	Introduce the updated Technical Flood Risk Guidance in relation to Allowances for Climate Change in NI which relates to the inclusion of allowances for climate change in design of river and drainage infrastructure and advice on flood risk provided for development planning.	DfI	By end of 2019
7	PB6	Consider implications of the UK Climate Projections 2018 project outputs for drainage and flood risk management.	DfI	By end of 2024
8	NE12 IN3 PB6	In accordance with the UK Marine Policy Statement and Marine Plan for NI (once adopted) all public authorities must consider the potential impact of proposals on greenhouse gas emissions and the proposals ability to adapt to a changing climate.	DAERA	Ongoing
9	NE12	The INTERREG VA MarPAMM* project will undertake coastal processes assessments with Murlough special area of conservation and adjoining coastal areas which will examine future scenarios and model future shoreline behaviour in the context of projected climate and sea level changes.	AFBI /DAERA	By end of 2022

Government Outcome Objective NC3 Delivery Plan

No	NI Evidence Report Risk(s) to be addressed	Action	Responsibility	Implementation Timeline
1	NE4 NE5	Implement the Environmental Farming Scheme as part of the NI Rural Development Programme.	DAERA	By end of 2020
2	NE5	DAERA as a Statutory Consultee will advise Local Planning Authorities and DfI about Habitat Regulations Assessment and Strategic Environmental Assessment requirements for new Local Development Plans.	DAERA	By end of 2019
3	NE8	Maintain an emergency Forest Service fire plan and monitor and report the extent of fire damage to forest and open ground (hectares) on Forest Service managed property annually.	DAERA	Ongoing- In accordance with Local Council Development Plan timetables.
4	NE5 NE8	Encourage creation of new resilient woodland (hectares) through the Forest Expansion Scheme by favouring projects with a wider variety of tree species and larger woodland areas to enhance ability of individual species to endure climate change.	DAERA	Ongoing- Reported annually in July for the proceeding financial year.
5	NE3 NE4	Complete 23 catchment studies as part of the as part of the Sustainable Catchment Area Management Planning Northern Ireland (SCaMP NI) project.	NI Water Ltd	By end of 2021

No	NI Evidence Report Risk(s) to be addressed	Action	Responsibility	Implementation Timeline
6	NE8	Engage with councils to assist them in bringing forward Local Development Plan policies and proposals that take account of climate change adaptation considerations in accordance with the provisions of the Strategic Planning Policy Statement and any other policies or advice in guidance issued by DfI.	DfI Planning	Ongoing- In accordance with Council Local Development Plan timetables.
7	NE10	Engage with stakeholders to explore potential to develop a strategy to manage, prioritise and coordinate intervention, prevention and response measures for wildfires.	DAERA	Ongoing

Government Outcome Objective IF1 Delivery Plan

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
1	IN1 IN9	Publish the Water Resource and Supply Resilience Plan.	NI Water Ltd/DfI	March 2020
2	IN4	Remove properties from the 'Out of Sewer Flooding Register'.	NI Water Ltd/DfI	By end of 2021
3	IN4	Increase the number of Sustainable Drainage Systems introduced in new developments.	NI Water Ltd/DfI	By end of 2024
4	IN1 IN2 IN5	Risks to bridges and pipelines from high river flows & bank erosion- Monitor, inspect and maintain road and rail/bridge network and implement action plans.	DfI & Translink	Ongoing
5	NE3 NE4	Future bridge design will take into account climate change.	DfI & Translink	Ongoing
6	IN1 IN2 IN6	Risks to transport networks from slope & embankment failure - Continue geotechnical inspection regime for road and rail embankments and prioritise actions.	DfI & Translink	Ongoing
7	IN2 IN4	Engage with councils to assist them in bringing forward Local Development Plan policies and proposals that take account of climate change adaptation considerations in accordance with the provisions of the Strategic Planning Policy Statement and any other policies or advice in guidance issued by the DfI.	DfI Planning	Ongoing - In accordance with Council Local Development Plan timetables.

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
8	IN1 IN2 IN4 IN5 IN6	Provide input to review and update of the 'Design Manual for Roads and Bridges' which will include addressing climate change adaptation.	DfI	By end of 2020
9	IN11	Carry out a detailed tree survey which will examine the risk of tree related incidents due to high wind events.	Translink/DfI	By end of 2020
10	IN13	Carry out a project to update the Stress Free Temperatures records of its rails to identify locations that could be at risk during extreme heat.	Translink/DfI	By end of 2020

Government Outcome Objective P1 Delivery Plan

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
1	PB1	Implement the Fuel Poverty Strategy in NI.	DfC	By end of 2023
2	PB1	Establish an online climate change and health information exchange platform for health practitioners.	DoH/Climate NI	Launch of platform by the end of 2019 and maintain platform from 2019 onwards.
3	PB5	Carry out review of the Preliminary Flood Risk Assessment.	DfI	By end of 2019
4	PB5	Remove properties from the out of sewer flooding register.	NI Water Ltd/DfI	By end of 2021
5	PB5	Develop models for sewer risk and sewer capacity mapping.	NI Water Ltd/DfI	By end of 2021
6	PB5 PB8	Engage with councils to assist them in bringing forward Local Development Plan policies and proposals that take account of climate change adaptation considerations in accordance with the provisions of the Strategic Planning Policy Statement and any other policies or advice in guidance issued by DfI.	DfI Planning	Ongoing
7	PB5	Increase the number of Sustainable Drainage Systems introduced in new developments.	NI Water Ltd/DfI	By end of 2024
8	PB5	Develop the 'Living with Water' Project Plan.	DfI/NI Water Ltd	By end of 2019

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
9	PB8	Conduct condition surveys at NI Water's Historic Sites taking into account climate change.	NI Water Ltd/DfI	By end of 2021
10	PB5 PB8 PB9	Implement the Flood Risk Management Plans for NI.	DfI	Ongoing
11	PB5	Introduce the updated Technical Flood Risk Guidance in relation to Allowances for Climate Change in NI which relates to the inclusion of allowances for climate change in design of river and drainage infrastructure and advice on flood risk provided for development planning.	DfI	By end of 2019
12	PB5	Consider implications of the UK Climate Projections 2018 project outputs for drainage and flood risk management.	DfI	By end of 2024
13	PB8	Develop a strategy on Climate Change and the historic environment to include research and the development of appropriate guidance.	DfC	By end of 2019
14	PB7	Monitor research and development of uplifts to the Building Regulations in other regions of the UK and Republic of Ireland, and assess need for local measures.	DoF	Ongoing

Government Outcome Objective B1 Delivery Plan

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
1	BU3	Publish the Water Resource and Supply Resilience Plan.	NI Water Ltd/DfI	March 2020
2	BU1 BU2 BU5 BU6 BU7	DfE Energy Branch will liaise with the Oil, Gas and Electricity Industries to promote and encourage thinking on climate change issues. The sectors will be encouraged to plan for the future, and have regard for possible impacts due to severe weather, and in particular to consider flooding risks.	DfE	Ongoing - once a year at Industry Security of Supply Meetings.
3	BU1 BU2 BU5 BU6 BU7	Invest NI through the nibusinessinfo.co.uk platform, working in partnership with other bodies, will maintain and develop 'Adapt your business to climate change' guidance to reflect emerging climate change outcomes, response planning and government strategy.	Invest NI	Ongoing

Government Outcome Objective I1 Delivery Plan

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
1	IT1 IT2	Development of a strategic approach to surveillance in the food system. The approach includes but is not confined to risks associated with climate change.	FSA	Initial phase of surveillance strategy to be implemented by end of 2019.
2	IT1 IT2 IT3	Food Standards Agency to continue working to improve its understanding of global food system risks with a wider and longer-term foresight approach, complementing the nearer-term approach in surveillance. Food Standards Agency to continue working with its Science Council to:	FSA	Report from Science Council and Food Standards Agency response agreed by end of 2019.
		(i) update and develop the understanding of the future food system and the associated risks and opportunities for food safety and authenticity in the UK, and the opportunities; and (ii) identify how Food Standards Agency can strengthen its capability in food system foresight. Includes but is not limited to climate change and its impacts.		

No	NI Evidence Report Risk(s)/ Opportunity(-ties) to be addressed	Action	Responsibility	Implementation Timeline
3	PB12	Food Standards Agency to continue to examine the trends and new risks in relation to food-borne illness, working with expert advisers, other government departments, and other partners, in the UK and internationally.	FSA	On-going

Annex C: Progress Report on the implementation of NICCAP1 High Level Actions

Annex C

Report of progress of implementation of NICCAP1 High Level Actions

Primary area for action: Flooding

High Level Action	Action Taken
Develop and implement sustainable strategies to explore, address and manage significant flood risk.	1. Strategic Planning Policy Statement for NI - Planning for Sustainable Development provides a robust strategic policy for the protection of people, property and the environment from flooding. 2. Flood hazard maps and flood risk maps have been prepared for 1st cycle of Flood Risk Management Planning. 3. Flood Risk Management Plans have been developed for 1st cycle of Flood Risk Management Planning. 4. The Reservoirs Act (Northern Ireland) 2015 enacted. 5. The Long Term Water Strategy published March 2016.
Build resilience of infrastructure to flooding and implement appropriate inspection and monitoring programmes.	1. The programme of measures for the first cycle River Basin Management Plans were delivered. 2. Social and Environmental guidance for Water and Sewerage Services published. 3. Flood defences and drainage infrastructure maintained according to risk and resources 4. Surveys are carried out to assess the impact on coastal erosion on sea walls and verges adjacent to the carriageway. 5. Road and bridge network is monitored and maintained in line with policy.
Identify and implement measures to reduce the impact of significant flood risk to people, property and the environment.	1. Recommendations contained within the Performance and Efficiency Delivery Unit (PEDU) report have been implemented by DfI, Department of Justice (DoJ), DoF and NI Water Ltd. 2. Health and Social Care engage with relevant regional multi agency groups which assist to prepare for the health impacts of severe weather. 3. Health and Social Care design guidance requires that new project developments undertake flood risk assessments to identify if proposed development is likely to be impacted by current or projected flooding and whether the development will increase the risk overall. 4. Department of Education (DE) continues to engage with the Education Authority to ensure schools are made aware of any inherent flood risk. 5. Sustainable design promoted by DoF Construction & Procurement Delivery.

High Level Action	Action Taken
Develop stakeholder understanding and awareness of significant flood risk and potential adaptation measures.	1. Departmental Business Continuity Plans are reviewed annually and take into consideration flood risk. 2. NI Direct and DAERA websites signpost guidance for the public relating to climate change and severe weather events. 3. Awareness was raised through internal briefings to staff on flood risk functional responsibility. 4. 10 Community Resilience Groups have been established to raise community and public awareness of flood risk and resilience measures. 5. Strong links have been formed between Met Office, Civil Contingencies, DfI Rivers and other flood planning stakeholders. 6. Health and Social Care and NI Fire and Rescue Service received Met Office updates and Natural Hazards Partnership Summaries to assist in preparation for severe weather. 7. Strong links have been formed between Met Office, Civil Contingencies, DfE and other emergency planning stakeholders. 8. DfE regularly engage with industry on security of supply to ensure they are aware of flood risk. 9. Annual reminders issued to schools regarding the need to have an action plan in place in case of severe weather. 10. DfC is supporting Councils to develop their flood response capacity by funding the Civil Contingencies Grant on an annual basis. 11. DfC activates the Scheme of Emergency Financial Assistance to householders which have suffered flooding so that they can make their homes habitable as soon as possible.
Identify future significant flood risk to explore the consequences of climate change on built heritage.	1. The protocol for the Care of the Government Historic Estate is implemented across the estates of all Government Departments and Arm's length bodies. DfC produces a summary report every two years to the Communities Committee of the NI Assembly. 2. Climate Change Adaptation was the theme of the Listed Buildings Owners Forum and ensured that the issues, and options for tackling these, were communicated to affected parties.

Annex C

Primary area for action: Natural Environment

High Level Action	Action Taken
Identify and implement opportunities to build resilience into the natural environment.	1. Collaborative working between NI and Republic Of Ireland on Invasive Species Ireland project. 2. The guidance document 'The Biodiversity Duty' was published to assist public bodies in fulfilling their biodiversity duty. 3. The 2nd round of River Basin Management Plans makes specific reference to climate change. 4. Catchment Ecosystem Modelling is being trialed in pilot catchments 5. Delivery of the programme of measures for first cycle River Basin Management Plans. 6. Research papers published 'The role of the seedbank in the recovery in the role of temperate heath and blanket bog following wildfires' and 'Quantifying the impact of wildfires in NI'. 7. Biodiversity Strategy published. 8. Operational management plans for NIEA managed sites are incorporating monitoring for climate change where appropriate. 9. Strategic Planning Policy Statement for NI - Planning for Sustainable Development provides a robust strategic policy for the protection, conservation and enhancement of our region's natural environment. 10. NI Water Ltd has a risk based Drainage Area Planning process which considers climate change. 11. NIEA participate in the UK Biodiversity Indicators Steering Group which aims to measure resilience of species, habitats and water bodies to the impacts of climate change.
Explore environmental research opportunities and the development of assessment tools.	1. Research Paper 'A wildfire risk management system for UK Forestry - moving to operational practice' was published. 2. Fish Passability tool developed to assess barriers to fish migration. 3. 3 research projects funded by the Natural Heritage Research Partnership and provided evidence on the impact on climate change on biodiversity were published by Quercus. 4. Contribution to North Atlantic Salmon Conservation Organisation research by AFBI.

High Level Action	Action Taken
Identify, develop and review terrestrial and freshwater environment surveillance and monitoring programmes.	1. The evidence base for policy development is continually improved through ongoing programmes of evidence gathering. 2. NIEA participate in the UK Biodiversity Indicators Steering Group which aims to measure resilience of species, habitats and water bodies to the impacts of climate change. 3. Operational management plans for all NIEA managed sites updated to monitor and assess the impacts of sea level rise and storminess on coastal Nature Reserves and Country Parks. 4. Climate change issues have been addressed in country park and nature reserve policy position statements.
Support land managers in building a resilient natural environment and implement best practice.	1. The ongoing management and habitat improvement of the public angling estate helps build natural resilience within fish population. 2. The measures under the Environmental Farming Scheme help support the management of habitats and species.
Protection and enhancement of the management of habitats and species.	1. Fishery Management Plans have been drafted to ensure the sustainable use and protection of the Inland Fisheries. 2. DAERA continue to work with AFBI to develop new and enhancement of existing tests for the detection and management of emerging diseases to inform Disease Control Strategies. 3. Strategic Planning Policy Statement for NI - Planning for Sustainable Development provides a robust strategic policy for the protection, conservation and enhancement of our region's natural environment. 4. The development of new habitats programmes via INTERREG Va has resulted in two consortiums delivering a project to bring 4,500ha of land under favourable management. 5. The implications of climate change is being taken into account during the development of Natura 2000 management plans. 6. 17 new ASSI's (Area of Special Scientific Interest) and 1 SPA (Special Protection Area) have been designated increasing the level of protection from climate change.

High Level Action	Action Taken
Increase adaptation awareness and motivate stakeholder action in the natural environment.	1. Stakeholders have been engaged in the development of the Marine Plan. 2. DAERA provides advice to planning applications referred. 3. Stakeholder workshops have been held to promote a better understanding of the risks posed by wildfires. 4. Scientific studies are ongoing to help inform policy on the on the commercial harvesting of fresh water fish on Loughs Neagh and Erne and recreational harvesting of wild fish species in lakes in rivers. 5. NI Water Ltd has implemented recommendations from the Eastern Mournes Wildfire Report to reduce wildfire risk and engages with stakeholders through the SCAMP NI project on this issue. 6. NI Fire and Rescue Service have worked with stakeholders to develop prevention and intervention strategies to reduce the risk and impact of wildfires.
Ensure marine planning considers the impacts of climate change.	1. Draft Marine Plan for NI published for consultation. 2. A baseline study and gap analysis of coastal erosion risk management has been commissioned. 3. 5 Marine Conservation Zones were designated. 4. Marine Strategy Framework Directive assessment on target to meet delivery deadline.

Primary area for action: Water

High Level Action	Action Taken
Implement ongoing water resource management measures.	1. The water resource management measures in the 1st cycle River Basin Management Plans were completed. 2. The draft Water Resource and Supply Resilience Plan includes Supply Demand Assessments an assessment of the likely climate change impact on the Deployable Outputs for each water resource zone.
Identify opportunities to improve resilience of the water resource and infrastructure.	1. The 2nd cycle River Basin Management Plans have been published included a specific section to climate change. 2. The Long Term Water Strategy published March 2016. 3. Strategic Planning Policy Statement for NI - Planning for Sustainable Development provides a robust strategic policy for the protection of people, property and the environment from flooding 4. Pilot storm water separation projects have progressed using innovative sustainable design. 5. The draft Water Resource and Supply Resilience Plan includes Supply Demand Assessments an assessment of the likely climate change impact on the Deployable Outputs for each water resource zone.
Improve water efficiency and manage the water resource sustainability to meet need.	1. Management of the NI Hydrometric Network by DfI Rivers enables the collection of data to be analysed for flood risk management, water quality and water resource purposes. 2. Social and Environmental guidance for Water and Sewerage Services published. 3. The NI Water Ltd Education Teams promote water efficiency. 4. The Sustainable Development Support Programme offers NI businesses support on water efficiency measures.
Encourage and implement appropriate water monitoring programmes and modelling.	1. Catchment Ecosystem Modelling is being trialled in pilot catchments. 2. Low Flow Enterprise Model used to provide evidence to underpin abstraction licence conditions. 3. Risk based approach has been applied to Water Framework Directive 2nd cycle marine monitoring programmes.

High Level Action	Action Taken
Maintain and enhance the quality of the water.	1. Geographical Information Systems to identify nutrient runoff have been used to inform the development and targeting of agri-environmental schemes. 2. The Urban Waste Water Treatment Directive is implemented through an extensive monitoring programme to assess compliance. 3. Shellfish Water Pollution Reduction Programmes have been published. 4. The Nitrates Action Programme published in 2014 contain measures which will assist the agricultural industry to adapt to climate change. 5. The prioritisation of flow monitoring at wastewater treatment works has been included in NI Water Ltd business plan for the investment cycle 2015-2021. 6. NI Water Ltd are delivering wastewater treatment and sewerage improvements for the investment cycle 2015 - 2021.
Raise awareness of water issues and develop understanding to motivate adaptation action.	1. DAERA provides advice to planning applications referred. 2. The Long Term Water Strategy published March 2016. 3. The EU INTERREG VA programme will consider the impact of climate change on drinking water quality and pilot ways to adapt to climate change. 4. The Drinking Water and Health Guidance is reviewed annually and contains action to be taken should drinking water quality fall below health based criteria.

Primary area for action: Agriculture and Forestry

High Level Action	Action Taken
Increase awareness of climate change adaptation and develop best practise for land managers.	1. College of Agricultural Food and Rural Enterprise (CAFRE)CAP are delivering training programmes and evaluating new farm and horticulture technologies that may reduce GHG emissions. 2. 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 report published.
Research and identify climate resilient grasses and crops.	1. Investigation of the effect of harvest moisture content of wheat affected by poor weather conditions & how to accurately predict its nutritive value for broilers was completed in 2014. 2. Evaluation of the extent and nature of compaction of soils under grassland in NI and farmer survey was completed. 3. Project carried out looking at the resilience of difference varieties of apples and pears growing under Irish conditions.
Identify measures to support adaptation in agriculture.	1. Environmental Farming Scheme developed and rolled out. 2. Climate change adaptation measures have been integrated into the NI Rural Development Programme. 3. Adaptation measures were incorporated into the Nitrates Action Programme.
Improve the resilience woodland.	1. The Forest Expansion Scheme favoured projects with a wide variety of tree species to increase resilience to climate change. 2. Forest Service woodlands comply with the UK Woodland Assurance Standard. 3. Aerial monitoring of tree disease symptoms has been carried out to assist implementation of phytosanitary measures to reduce disease spread and manage affected woodland.
Support and encourage land managers in reducing the risk of impacts from wildfires.	1. The Wildfires Stakeholder Group has developed and initiated actions to reduce the threat of wildfires and to raise awareness of the issues. 2. NI Water Ltd has implemented recommendations from the Eastern Mournes Wildfire Report to reduce wildfire risk. 3. NI Fire and Rescue Service have worked with stakeholders to develop prevention and intervention strategies to reduce the risk and impact of wildfires.

Annex: Outside Government - Civil Society and Local Government

Annex D: Outside Government - Civil Society and Local Government Delivery Plans

Civil Society Outcome Objective NC1 Delivery Plan

Key Priority Area: NC - Natural Capital; including Terrestrial/Coastal/ Marine/Freshwater ecosystems, soils and biodiversity

Outcome Objective NC1: We have species, habitats and water bodies that are resilient to the impacts of climate change.

Associated NI Evidence Report Risks & Opportunities
NE1 Risks to Species and habitats due to inability to respond to changing climatic conditions.
NE2 Opportunities from new species colonisations.
NE6 Risks to agriculture & wildlife from drought & flooding.
NE7 Risks to freshwater species from higher water temperatures.
NE9 Risks to agriculture, forestry, landscapes and wildlife from pests, pathogens and invasive species.
NE11 Risks to aquifers, agriculture land & habitats from salt water intrusion.
NE13 Risks to & opportunities for marine species, fisheries & marine heritage from ocean acidification & higher water temperatures.
NE14 Risks & opportunities from changes in landscape character.
PB13 Risks to health from poor water quality.
PB14 Risk of household water supply interruptions.

Government Actions for Outcome Objective NC1

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[28]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Academic Contribution					
NC1.1	**NE13**	**Research Project: Maritime, Ocean Sector and Ecosystem Sustainability (MOSES)** Develop a common methodology for the quantitative assessment of sectoral pressures on the marine environment and the vulnerability of marine and coastal areas.	**Dr Wesley Flannery, Queen's University Belfast** National University of Ireland, Northern and Western Regional Assembly, Fundacion ATZI, Institut français de recherche pour l'exploitation de la mer, FORO MARITIMO VASCO, Centro Interdisciplinar de Investigação Marinha e Ambiental, Euskal Herriko Unibertsitatea, and Universidad del País Vasco.	INTERREG Atlantic Area Cooperation Programme.	By end of 2021
NC1.2	**NE9**	**Research Project: Mitigating Animal Health Impacts of Climatic Variation** Improve upon methods of forecasting parasite transmission from weather data.	**Professor Eric Morgan, Queen's University Belfast** Newcastle University, University of Bristol, University of Liverpool, University of Calgary (Canada), Livestock Helminth Research Alliance, Star-IDAZ International Research Consortium, Sustainable Control of Parasites in Sheep, and Control of Worms in Cows Sustainably.	European Commission's 7th Framework Programme (FP7), H2020 and Biotechnology and Biological Sciences Research Council (BBSRC).	By end of 2021

28 Please note that the adaptation actions listed are excerpts from the text submitted by contributors as listed in the NICCAP2 Supporting Document: Civil Society and Local Government Adapts.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[29]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Academic Contribution					
NC1.3	**NE11**	**Research Project: SALine INtrusion in coastal Aquifers: Hydrodynamic Assessment and Prediction of Dynamic Response (SALINA)** Produce an early warning mechanism to prevent salt water from contaminating coastal aquifers and provide evidence of how (and if) risks are changing.	**Dr Raymond Flynn, Queen's University Belfast** Imperial College London, Brunel University London and University College Dublin (UCD).	Engineering and Physical Sciences Research Council.	By end of 2020
NC1.4	**NE1**	**Research Project: Towards Quantification of Blanket Bog Ecosystem Services to Water (QUBBES)** Identify links between vegetation maps and hydrological processes to allow critical source areas[30] in blanket bogs to be identified where restoration measures can be implemented.	**Dr Raymond Flynn, Queen's University Belfast** UCD, Ohio State University, National University of Ireland, Dundalk Institute of Technology.	Environmental Protection Agency and Queen's University Belfast.	By end of 2019

29 Please note that the adaptation actions listed are excerpts from the text submitted by contributors as listed in the NICCAP2 Supporting Document: Civil Society and Local Government Adapts.
30 These are areas where any damage to peatland would have a far greater impact on flow and/or water quality than elsewhere in a bog.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[31]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Community and Voluntary Contribution					
NC1.5	**NE1** **NE2** **NE7** **NE9**	**Practical Project: Ancient Woodland Restoration and New Woodland Creation** Create new woodlands, secure, restore and protect existing ancient woodlands.	**Woodland Trust** Forestry Agents, Land Owners, Royal Forestry Society and Local Councils.	Heritage Lottery Fund and Corporate Sector funders.	Ongoing
NC1.6	**NE1** **NE2** **NE14**	**Strategic Project: Co-operation Across Borders for Biodiversity (CABB)** Develop and publish Conservation Action Plans for the Garron Plateau special area of conservation (SAC), Montiaghs Moss SAC in County Antrim, and the Pettigo Plateau SAC in County Fermanagh.	**RSPB NI** BirdWatch Ireland, RSPB Scotland, NI Water, Butterfly Conservation and Moors for the Future.	European Regional Development Fund, NI Executive, Republic of Ireland government, RSPB Scotland and Mines Restoration Limited.	By end of 2021
NC1.7	**NE1** **NE2**	**Practical Project: Collaborative Action for Natura Network (CANN)** Improve the condition of peatland and wetland habitats in Special Areas of Conservation.	**Ulster Wildlife reporting on behalf of Newry, Mourne and Down District Council** Agri-Food and Biosciences Institute (AFBI), Armagh City, Banbridge and Craigavon Borough Council, East Border Region, Ulster University, Golden Eagle Trust, Institute of	EU INTERREG VA Programme, DAERA, Department of Housing, Planning, Community, Local Government in Ireland, and	By end of 2021

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No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[32]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Community and Voluntary Contribution					
			Technology Sligo, Monaghan County Council, Scottish Natural Heritage, (ACT).	Scottish Natural Heritage Trust.	
NC1.8	**NE1** **NE9** **NE13**	**Strategic Project: Living Seas Work including Sea Deep** Map and monitor marine and coastal ecosystems to identify changes and potential impacts including climate change, to provide evidence for implementing conservation adaptation actions.	**Ulster Wildlife** SeaSearch and Queen's University Belfast.	Esmee Fairbairn	Ongoing
NC1.9	**NE1** **NE9** **NE13**	**Strategic Project: NI Marine Task Force (NIMTF)** Collate evidence and commission research for implementing conservation adaptation actions. Identify any additional or alternative actions to be taken.	**Ulster Wildlife** National Trust, RSPB, NI Environment Link (NIEL), Friends of the Earth, Wildfowl and Wetlands Trust (WWT), World Wide Fund for Nature (WWF), and Marine Conservation Society, Keep NI Beautiful, and Irish Whale and Dolphin Group.	Esmee Fairbairn	Ongoing

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No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[33]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Community and Voluntary Contribution					
NC1.10	**NE11** **NE14**	**Strategic Project: Shifting Shores - Playing our Part on the Coast** Promote partnership working and develop coherent strategies to deal with risks to NI's coastal aquifers, habitats and landscape character.	**National Trust** Coastal Local Authorities in NI, Ulster University and local community representatives.	National Trust and other funders as appropriate.	Ongoing

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Civil Society Outcome Objective NC2 Delivery Plan

Key Priority Area: NC - Natural Capital; including Terrestrial/Coastal/Marine/Freshwater ecosystems, soils and biodiversity

Outcome Objective NC2: We have coastal communities, habitats, landforms and infrastructure that are resilient to the impacts of climate change.

Associated NI Evidence Report Risks & Opportunities
NE12 Risks to habitats & heritage in the coastal zone from sea-level rise: & loss of natural flood protection.
IN3 Risks to infrastructure services from coastal flooding & erosion.
PB6 Risks to the viability of coastal communities from sea level rise.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[34]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Academic Contribution					
NC2.1	**IN3** **PB6**	**Research Project: UrbanARK: Assessment, Risk Management, & Knowledge for Coastal Flood Risk Management in Urban Areas** Develop immersive virtual reality applications[35] to enhance emergency management	**Dr Ulrich Ofterdinger, Queen's University Belfast** UCD, New York University, and US-Ireland Research & Development programme.	NI Department for the Economy (for Queen's University Belfast) & Science Foundation Ireland (for UCD) & US National Science	By end of 2022

34 Please note that the adaptation actions listed are excerpts from the text submitted by contributors as listed in the NICCAP2 Supporting Document: Civil Society and Local Government Adapts.
35 Immersion into virtual reality is a perception of being physically present in a non-physical world, created by surrounding the user of the VR system in images and/or other stimuli that provide an engrossing total environment. In the context of the project, these application will be aimed at providing communities in coastal urban centres with a more realistic perception of coastal flood risks.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[36]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Academic Contribution					
		and preparedness of urban communities, including infrastructure assets and networks.		Foundation (for New York University).	
Community and Voluntary Contribution					
NC2.2	**NE12**	**Strategic Project: Living Seas Work including Sea Deep** Map and monitor coastal and marine ecosystems, to identify risks, changes and potential impacts from ocean acidification, temperature shifts, invasive species, sea level rise and coastal erosion. Raise awareness among communities and promote local level action.	**Ulster Wildlife** SeaSearch and Queen's University Belfast.	Esmee Fairbairn	Ongoing
NC2.3	**NE12** **PB6**	**Strategic Project: Shifting Shores - Playing our Part on the Coast** Promote partnership working and develop coherent risk management strategies to deal with risks to habitats, heritage, and coastal communities.	**National Trust** Coastal Local Authorities in NI, Ulster University and local community representatives.	National Trust and other funders as appropriate	Ongoing

36 Please note that the adaptation actions listed are excerpts from the text submitted by contributors as listed in the NICCAP2 Supporting Document: Civil Society and Local Government Adapts.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[37]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Private Sector Contribution					
NC2.4	**IN3**	**Strategic Project: Business Continuity Planning** Incorporate projected climate change and information from modeling into the Business Continuity Planning process, risk management strategies, warning and informing system, operational controls and new developments.	Belfast Harbour Commissioners	Belfast Harbour Commissioners	Commenced and Ongoing

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Civil Society Outcome Objective NC3 Delivery Plan

Key Priority Area: NC - Natural Capital; including Terrestrial/Coastal/Marine/Freshwater ecosystems, soils and biodiversity

Outcome Objective NC3: We have soils and land types that are resilient to the impacts of climate change.

Associated NI Evidence Report Risks & Opportunities
NE4 Risks to soil from increased soil aridity & wetness
NE5 Risks to natural carbon stores & carbon sequestration.
NE8 Risks of land management practices exacerbating flood risk.
NE3 Risks and opportunities from changes in agricultural and forestry productivity and land suitability.
NE10 Risks to agriculture, forestry, wildlife & heritage from change in frequency and/or magnitude of extreme weather and wildfire events.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[38]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Academic Contribution					
NC3.1	**NE3** **NE4** **NE5** **NE8**	**Research Project: Towards Quantification of Blanket Bog Ecosystem Services to Water (QUBBES)** Identify critical source areas in blanket bogs, where land use/ blanket bog restoration	**Dr Raymond Flynn, Queen's University Belfast** UCD, Ohio State University, National University of Ireland and Dundalk Institute of Technology.	Environmental Protection Agency and Queen's University Belfast.	By end of 2019

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No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[39]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Academic Contribution					
		measures can be implemented to restore peatlands and limit losses of dissolved (and sequestered) organic carbon.			
Community and Voluntary Contribution					
NC3.2	**NE4** **NE5** **NE8**	**Research Project: Weathering Below Blanket Bogs** Quantify the capacity of blanket bogs to regulate climate.	**Dr Raymond Flynn, Queen's University Belfast** Environmental Protection Agency.	Queen's University Belfast	By end of 2020
Community and Voluntary Contribution					
NC3.3	**NE4** **NE8**	**Strategic project: Ancient Woodland Restoration and New Woodland Creation** Provide advice to landowners on good practices for plantation of new trees, improving conditions of land and soil, and implementation of sustainable management practices.	**Woodland Trust** Forestry Agents, Land Owners, Royal Forestry Society and Local Councils.	Heritage Lottery Fund and Corporate Sector funders.	Ongoing

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No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[40]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Community and Voluntary Contribution					
NC3.4	**NE5** **NE4**	**Practical and Strategic Project: on Co-operation Across Borders for Biodiversity (CABB)** Improve the conditions and restore blanket bogs, fens and raised bogs across three sites in NI. Include restoration and protection measures in the Conservation Action Plans for the Garron Plateau SAC, Montiaghs Moss SAC in County Antrim, and the Pettigo Plateau SAC in County Fermanagh.	**RSPB NI** BirdWatch Ireland, RSPB Scotland, NI Water, Butterfly Conservation and Moors for the Future.	European Regional Development Fund, NI Executive, Republic of Ireland government, RSPB Scotland and Mines Restoration Limited.	By end of 2021
NC3.5	**NE4** **NE5**	**Practical Project on Collaborative Action for Natura Network (CANN)** Co-ordinate and implement targeted soil conservation and peatland restoration.	**Ulster Wildlife reporting on behalf of Newry, Mourne and Down District Council** AFBI, Armagh City, Banbridge and Craigavon Borough Council, East Border Region, Ulster University, Golden Eagle Trust, Institute of Technology Sligo, Monaghan County Council, Scottish Natural Heritage, Argyll & ACT.	EU INTERREG VA Programme, DAERA, Department of Housing, Planning, Community, Local Government in Ireland, and Scottish Natural Heritage Trust.	By end of 2021

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Civil Society Outcome Objective IF1 Delivery Plan

Key Priority Area: IF - Infrastructure services

Outcome Objective IF1: We have transport & network services that are resilient to the impacts of flooding & extreme weather.

Associated NI Evidence Report Risks & Opportunities
IN1 Risks of cascading failures from interdependent infrastructure networks.
IN2 Risks to infrastructure services from river, surface water and groundwater flooding.
IN4 Risks of sewer flooding due to heavy rainfall.
IN6 Risks to transport networks from slope & embankment failure.
IN5 Risks to bridges and pipelines from high river flows & bank erosion.
IN11 Risks to energy, transport & digital infrastructure from high winds & lightning.
IN9 Risks to public water supplies from drought and low river flows.
IN13 Risks to transport, digital and energy infrastructure from extreme heat.
IN14 Potential benefits to water, transport, digital and energy infrastructure from reduced extreme cold events.
IN7 Risks to hydroelectric generation from low or high river flows.
IN8 Risks to subterranean & surface infrastructure from subsidence.
IN10 Risks to electricity generation from drought & low river flows.
IN12 Risks to offshore infrastructure from storms and high waves.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[41]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Academic Contribution					
IF1.1	**IN5** **IN6**	**Research project: Investigating the impact of flooding on the stability of small single and multi-span masonry arch bridges** Quantify climate change impacts, including projected increases in heavier and more frequent rainfall events and bridge scour risk.	**Dr Brian Solan, Ulster University** Professor Robert Ettema, Colorado State University.	Royal Society	Initial research completed in April 2017, with conference paper (Civil Engineering Research Association of Ireland 2018) and Journal paper published in 2018. Further research to continue (Ongoing).
Private Sector Contribution					
IF1.2	**IN11** **IN13**	**Strategic project: Belfast City Airport: Safety and Emergency Planning: Belfast City Airport** Review, assess and amend risks assessments on a quarterly basis in compliance with the EU Aviation Safety Agency.	**Belfast City Airport**	None	Ongoing

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No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[42]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Private Sector Contribution					
IF1.3	**IN1**	**Strategic Project: Business Continuity Planning** Identify, review and assess extreme weather risks to port operations as part of the interdependent infrastructure network. Information to support emergency planning and to be shared by Belfast Harbour to other relevant port stakeholders.	**Belfast Harbour Commissioners.**	Belfast Harbour Commissioners	Comm-enced & Ongoing
IF1.4	**IN1**	**Strategic Project: Smart Port Initiative** Modeling sedimentation risk from coastal change, hydrographic flows and sedimentation will offer accurate projections to inform operational decision-making for long-term action on port infrastructure and operations.	**Belfast Harbour Commissioners** Other partners as appropriate.	Belfast Harbour Commissioners	By end of 2025

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Civil Society Outcome Objective P1 Delivery Plan

Key Priority Area: P - People and built environment

Outcome Objective P1: We have people, homes, buildings and communities resilient to the impacts of flooding & extremes of weather.

Associated NI Evidence Report Risks & Opportunities
PB4 Potential benefits to health & wellbeing from reduced cold.
PB1 Risks to health & wellbeing from high temperatures.
PB5 Risks to people, communities & buildings from flooding.
PB7 Risks to building fabric from moisture, wind & driving rain.
PB8 Risks to culturally valued structures & the wider historic environment.
PB9 Risks to health and social care delivery.
PB10 Risks to health from changes in air quality.
PB11 Risks to health from vector-borne pathogens.
PB2 Risks to passengers from high temperatures on public transport.
PB3 Opportunities for increased outdoor activities from higher temperatures.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[43]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Academic Contribution					
P1.1	**PB10**	**Research Project: Impact of 20mph Speed Limits on health (including modelling of climatic changes)** Assess the impact of the 20mph speed limits in Belfast (within the context of changing wind patterns and blocking episodes) on air quality and associated risks to health.	**Dr Ruth Hunter, Queen's University Belfast** Dr Ruth Jepson (University of Edinburgh), Dr Andrew Williams (University of Exeter), Dr Andy Cope (Sustrans), Dr Charlie Foster (University of Bristol), Dr Graham Baker (University of Edinburgh), Dr James Woodcock (University of Cambridge), Dr Karen Milton (University of East Anglia), Dr Paul Kelly (University of Edinburgh), Mr Neil Craig (NHS Scotland), Professor Frank Kee (Queen's University Belfast), Professor Michael Kelly (University of Cambridge).	National Institute for Health Research	By the end of 2020/2021
Community and Voluntary Contribution					
P1.2	**PB9**	**Practical Project: Health and Wellbeing Network - Information Platform** Provide online platform for the provision of information and guidance on the impacts of climate change in current and future Health and Social care delivery.	**Climate NI Health and Wellbeing Network**	Other funders as appropriate	By end of 2019

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No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[44]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Community and Voluntary Contribution					
P1.3	**PB5**	**Strategic Project: Belfast City Airport: Safety and Emergency Planning: Belfast City Airport** Review data from flood maps to inform safety and emergency planning of the airport. Implementation of flood protection measures.	Belfast City Airport	None	Ongoing

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Civil Society Outcome Objective B1 Delivery Plan

Key Priority Area: B - Disruption to businesses and supply chains

Outcome Objective B1: We have businesses that can adapt to the impacts of climate change & extreme weather.

Associated NI Evidence Report Risks & Opportunities
BU1 Risks to business sites from flooding.
BU2 Risks to business from loss of coastal locations & infrastructure.
BU5 Risks to business from reduced employee productivity, due to infrastructure disruption & higher temperatures in working environments.
BU3 Risks to business operations from water scarcity.
BU6 Risks to business from disruption to supply chains & distribution networks.
BU4 Risks to business from reduced access to capital.
BU7 Risks & opportunities for business from changes in demand for goods & services.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[45]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Private Sector Contribution					
B1.1	**BU1** **BU3** **BU4** **BU5** **BU6** **BU7**	**Strategic Project on Business Resilience Toolkit for Dairy Farmers** Monitor the number of farmers using the Business Resilience toolkit to provide understanding of resilience planning among the 30% of dairy farmers covered by Lakeland Dairies in NI.	Lakeland Dairies NI Climate NI	Lakeland Dairies NI	Ongoing

45 Please note that the adaptation actions listed are excerpts from the text submitted by contributors as listed in the NICCAP2 Supporting Document: Civil Society and Local Government Adapts.

Key Priority Area: I1 - Food security/global food production

Outcome Objective I1: We have a food system that is resilient to impacts of climate change.

Associated NI Evidence Report Risks & Opportunities
IT1 Risks from weather related shocks to international food production & trade.
IT2 Imported food safety risks.
IT3 Risks & opportunities from long-term climate-related changes in global food production.
PB12 Risk of food borne disease cases/outbreaks.

No	NI Evidence Report Risks and Opportunities to be addressed	Adaptation Action[46]	NI Responsible Organisation (in bold) and Collaborating Organisations	Funder	Implementation Timeline
Private Sector Contribution					
I1.1	**IT2**	**Strategic Project: Improving the Safety and Security of the Food Chain** Annually review and update risk assessments to improve the safety and security of the food chain. Provide coordination of a rapid expert advice mechanism for members, regulators and industry partners to respond to risks.	**Food Fortress Ltd.** Institute of Global Food Security (IGFS) at Queens University Belfast and NI Grain Trade Association.	Self-sustaining and funded via membership.	Ongoing

46 Please note that the adaptation actions listed are excerpts from the text submitted by contributors as listed in the NICCAP2 Supporting Document: Civil Society and Local Government Adapts.

Annex D

Local Government Delivery Plan

No	Adaptation Action	NI Responsible Organisations	Implementation Timeline
1	Work with local councils to embed the adaptation cycle across local council planning with the aim of encouraging councils to complete a minimum of step 1 by 2021 and step 4 by 2024.	NILGA, Climate NI, Sustainable NI supported by SOLACE.	By 2024
2	Explore the capacity needs within local councils to enable delivery of Action 1 (above) and develop support mechanisms.	Climate NI, Sustainable NI, NILGA.	By 2024
3	Develop and pilot a 'monitoring and reporting process' which can be used by local councils to undertake Step 5 of the adaptation cycle.	Climate NI, Sustainable NI.	By 2021
4	Share learning from C.L.I.M.A.T.E. NPA INTERREG project on adaptation cycle planning with local councils.	Climate NI & DCSDC.	By 2021
5	In bringing forward their LDPs, Councils will take account of climate change adaptation considerations as indicated in the Strategic Planning Policy Statement.	Local councils.	Ongoing

NICCAP2 List of acronyms

ACT	Argyll & the Isles Coast and Countryside Trust
AFBI	Agri-Food & Biosciences Institute
ASC	Adaptation Sub-Committee of the Committee on Climate Change
ASG	NI Climate Change Adaptation Sub-group of the Cross-Departmental Working Group on Climate Change
ASSI	Area of Special Scientific Interest
BBSRC	Biotechnology and Biological Sciences Research Council
BEIS	Department for Business, Energy and Industrial Strategy
CABB	Co-operation Across Borders for Biodiversity project
CAFRE	College of Agriculture, Food and Rural Enterprise
CANN	Collaborative Action for Natura Network projec
CAP	Common Agricultural Policy
CCC	Committee on Climate Change
CCRA	Climate Change Risk Assessment
CCRA 2017	UK Climate Change Risk Assessment published in 2017
CDWG CC	Cross-Departmental Working Group on Climate Change
Climate-ADAPT	EU Climate Adaptation Platform
CLIMATE INTERREG project	Collaborative Learning Initiative Managing and Adapting to the Environment INTERREG project
CMPs	Conservation Management Plans
COMPASS	Collaborative Oceanography and Monitoring for Protected Areas and Species
DAs	Devolved Administrations of Northern Ireland, Scotland and Wales
DAERA	Department of Agriculture, Environment and Rural Affairs
DCSDC	Derry City and Strabane District Council
DfC	Department for Communities
DE	Department of Education
DfE	Department for the Economy
DEFRA	Department for Environment, Food and Rural Affairs
DoF	Department of Finance
DoH	Department of Health
DfI	Department for Infrastructure
DoJ	Department of Justice
DfT	Department for Transport

EFS	Environmental Farming Scheme
FP7	European Commission's 7th Framework Programme
EU	European Union
FSA	Food Standards Agency
FRMPs	Flood Risk Management Plans
GHG	Green House Gases
IGFS	Institute of Global Food Security
IPCC	Intergovernmental Panel on Climate Change
LDP	Local Development Plan
MarPAMM	Marine Protected Area Management
MOSES	Maritime, Ocean Sector and Ecosystem Sustainability project
mph	Miles per hour
NCC	Natural Capital Committee
NHS	National Health Service
NI	Northern Ireland
NI CCRA 2012	Climate Change Risk Assessment for NI which was part of the overall UK Climate Change Risk Assessment published in January 2012
NICCAP	Northern Ireland Climate Change Adaptation Programme
NICCAP1	Northern Ireland Climate Change Adaptation Programme 2014-2019
NICCAP2	Northern Ireland Climate Change Adaptation Programme 2019-2024
NIEA	Northern Ireland Environment Agency
NIEL	Northern Ireland Environment Link
NILGA	Northern Ireland Local Government Association
NIMTF	Northern Ireland Marine Task Force
NIRDP	Northern Ireland Rural Development Programme
NPA	Northern Peripheries and Arctic
PEDU	Performance and Efficiency Delivery Unit
QUBBES	Quantification of Blanket Bog Ecosystem Services to Water
RBMP	River Basin Management Plan
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SALINA	SALine INntrusion in coastal Aquifers: Hydrodynamic Assessment and Prediction of Dynamic Response project (Dr. Raymond Flynn, Queen's University Belfast)
SCaMP NI	Sustainable Catchment Area Management Planning NI

SDG	Sustainable Development Goal
SDG 13	Sustainable Development Goal 13
SME	Small and Medium sized Enterprises
SOLACE	Society of Local Authority Chief Executives
SPPS	Strategic Planning Policy Statement
ssRMPs	Site Specific Remedial Management Plans
SuDs	Sustainable Urban Drainage Systems
SWIM	System for Bathing Water Quality Monitoring
UCD	University College Dublin
UK	United Kingdom
UKCP	United Kingdom Climate Projections
UKCP09	United Kingdom Climate Projections published in 2009
UKCP18	United Kingdom Climate Projections published in 2018
UKCIP	UK Climate Impacts Programme
UK MPS	United Kingdom Marine Policy Statement
UN	United Nations
UrbanARK	UrbanARK: Assessment, Risk Management, & Knowledge for Coastal Flood Risk Management in Urban Areas
WWF	World Wide Fund for Nature
WWT	Wildfowl and Wetlands Trust

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