

April 2023

Adapting to climate change

Progress in Northern Ireland



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Foreword

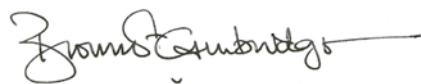
In 2022, Northern Ireland experienced its warmest year on record, a reflection of the changing climate we are facing. In the same year, the Climate Change Act (Northern Ireland) was passed, outlining ambitious emissions reduction targets and a new role for the Climate Change Committee to assess Northern Ireland's progress on adapting to climate change. My Committee welcomes the ambition of the Act and its commitment to embed climate resilience within wider climate planning. Even if Net Zero is achieved globally, our climate will continue to warm in the short-term, and sea level will continue to rise for centuries. Northern Ireland must plan for this reality.

This is the Committee's first adaptation progress report for Northern Ireland. Ahead of new statutory duties to assess progress on adapting to climate change in Northern Ireland, the Department of Agriculture, Environment and Rural Affairs (DAERA) requested a review of the current Northern Ireland Climate Change Adaptation Programme (NICCAP2) to inform the development of the next Programme. We have welcomed this request to provide input on the next adaptation programme for Northern Ireland (NICCAP3).

NICCAP2 is framed around a set of objectives which together make up a vision of a well-adapted Northern Ireland and includes some indicators to measure progress against the objectives. This is a positive and necessary first step in developing an adaptation programme and a framework to monitor progress.

However, planning for climate change remains at an early stage in Northern Ireland. NICCAP3 must go further than its predecessor to drive deeper changes across sectors to ensure that people, businesses and the natural environment are resilient and prepared for the effects of the changing climate. There is also an opportunity, with the renewed focus on achieving Net Zero, to embed climate resilience into planning now and avoid locking in decisions that can result in irreversible changes, increased damages, or higher costs when larger and faster action is required later.

We will continue to support the Northern Ireland Executive as you develop an ambitious programme for adapting to the effects of climate change. We will look forward to our first statutory review expected in 2027.



Baroness Brown
Chair of the Adaptation Committee, Climate Change Committee

The Committee



Baroness Brown of Cambridge DBE FRS
Chair, Adaptation Committee

Baroness Brown of Cambridge DBE FREng FRS (Julia King) is an engineer, with a career spanning senior engineering and leadership roles in industry and academia. She currently serves as Chair of the CCC's Adaptation Committee; non-executive director of Ceres Power, Ørsted and Frontier IP; Chair of the Carbon Trust; and Chair of the House of Lords Science and Technology Select Committee.



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Ben Caldecott is the founding Director of the Oxford Sustainable Finance Group and the inaugural Lombard Odier Associate Professor of Sustainable Finance at the University of Oxford. Ben is also the founding Director and Principal Investigator of the UK Centre for Greening Finance & Investment (CGFI), established by UK Research and Innovation in 2021 as the national centre to accelerate the adoption and use of climate and environmental data and analytics by financial institutions internationally.



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Michael Davies is Professor of Building Physics and Environment at the UCL Institute for Environmental Design and Engineering (IEDE). At UCL his research interests relate to the complex relationship between the built environment and human wellbeing. He is also Director of the Complex Built Environment Systems Group at UCL and a member of the Scientific Advisory Committee of 'Healthy Polis'.



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Richard Dawson is Professor of Earth Systems Engineering and Director of Research in the School of Engineering at Newcastle University. Over the last two decades his research has focused on the analysis and management of climatic risks to civil engineering systems, including the development of systems modelling of risks to cities, catchments and infrastructure networks.



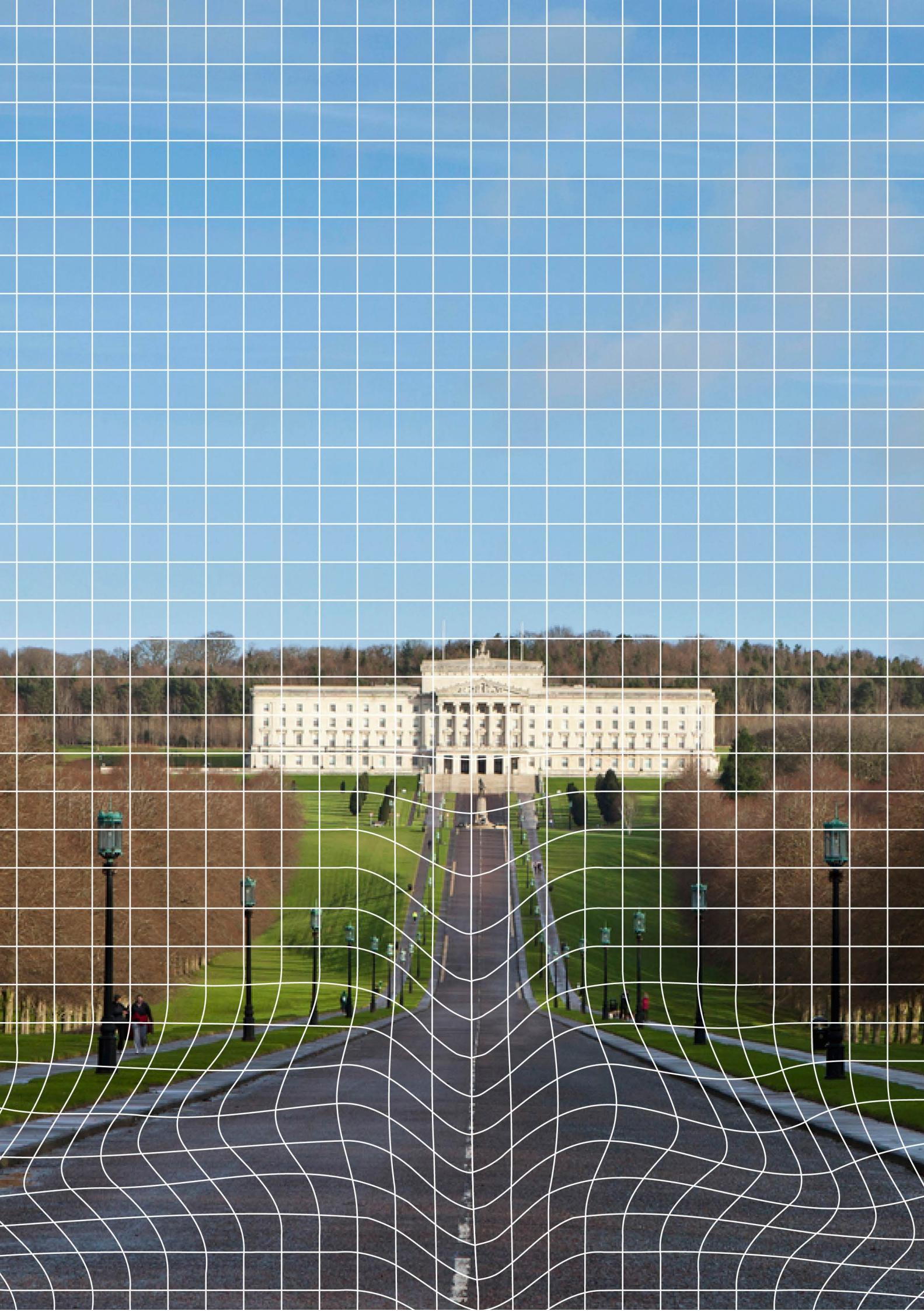
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Nathalie Seddon is Professor of Biodiversity and Founding Director of the Nature-based Solutions Initiative in the Department of Biology at the University of Oxford. Nathalie trained as an ecologist at Cambridge University and has over 25 years of research experience in a range of ecosystems across the globe. As a University Research Fellow of the Royal Society, she developed broad research interests in the origins and maintenance of biodiversity and its relationship with global change.



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Executive summary

<u>1. Adaptation progress in Northern Ireland</u>	14
<u>2. Priorities for the next NICCAP</u>	20

Northern Ireland experienced its warmest year on record in 2022 and recorded its highest temperature of 31.3°C in Castlederg in 2021. Continued climate changes will bring risks across Northern Ireland's ecosystems, infrastructure, communities and economy. Northern Ireland now has a Climate Change Act which will require real action to deliver a climate resilient Net Zero. The next Northern Ireland Climate Change Adaptation programme (NICCAP3) is due in 2024. It is essential that NICCAP3 goes further than its predecessor, driving deeper changes across a wider range of sectors to prepare people and businesses for the changing climate.

In this report we assess adaptation progress in Northern Ireland and in the Northern Ireland Climate Change Adaptation Programme (NICCAP2).

This report sets out the Climate Change Committee's independent assessment of progress in adapting to climate change in Northern Ireland. We provide this assessment during the second Northern Ireland Climate Change Adaptation Programme (NICCAP2) and ahead of the next NICCAP which is expected in 2024.

The key messages in our assessment are:

- **NICCAP2 has some of the elements required for a vision of a well-adapted Northern Ireland.** The current NICCAP objectives envisage a Northern Ireland that is adapted to climate change across seven areas. Most of the seven areas have one or more key performance indicators. This vision-centred structure is welcome. Further development of the programme structure is needed to make this vision operational and to drive policy creation and delivery. The seven areas do not span all the aspects of climate change that are critical to Northern Ireland and the current indicators are insufficient to demonstrate how each objective is being delivered.
- **Planning for climate change in Northern Ireland remains at an early stage.** Across key areas of adaptation most of the critical policy and planning milestones that we identify as important for delivering adaptation are not in place. Preparation for climate change in areas falling outside of the scope of NICCAP2 is noticeably poorer than for areas within the programme. There are opportunities to address this, with several key policies currently in development.
- **Despite the critical importance of adapting to climate change, there is only limited evidence of delivery, and data gaps in key areas are unacceptably large.** The absence of relevant data is a key barrier to assessing all aspects relevant to delivery and implementation of adaptation policy. For almost two-thirds of the adaptation outcomes we look at in this report, the lack of relevant indicator data prevents us making a judgement on progress in delivery and implementation. This needs to be addressed with urgency.
- **The next NICCAP must go much further than its predecessor.** It must increase its scope to include the full range of sectors and policy areas which require adaptation, and critical data gaps need to be closed. The development of the programme is an opportunity to increase understanding and awareness of adaptation needs across government departments, local government, civil society and the public. It should seek to provide a clearer and more compelling link between the actions named in the NICCAP and delivery of the vision of being well-adapted to climate change. It is also an opportunity to embed climate resilience within upcoming plans for Net Zero being developed under the recent Climate Change Act.

The rest of this executive summary is laid out in two sections:

1. Adaptation progress in Northern Ireland
2. Priorities for the next NICCAP

1. Adaptation progress in Northern Ireland

(a) The second Northern Ireland Climate Change Adaptation Programme

The second NICCAP provided a vision of Northern Ireland's adaptation to key aspects of the changing climate. It identifies five priority areas and seven outcomes for the programme (Figure 1). This approach provides a positive framing for a well-adapted Northern Ireland.

Figure 1 Priority areas and outcomes of NICCAP2

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.

Source: DAERA (2019) Northern Ireland Climate Change Adaptation Programme 2019-2024.

The outcome objectives are a promising basis on which to build an effective adaptation programme but the extent to which they are operationalised leaves room for improvement.

- **Scope.** The identified outcomes under each priority area do not cover all the aspects of climate change that are critical to Northern Ireland. For example, there is no dedicated outcome focused on domestic agriculture production or critical infrastructure such as energy systems, although these are contained within broader outcomes.
- **Specificity.** The identified outcomes under each priority area are not specific enough to drive real change. The outcomes are currently not backed up by specific and time bound targets that allow them to be evaluated.

- **Monitoring.** The identification of at least one key performance indicator associated with most outcomes is welcome. This aspect of NICCAP2 is more advanced than other approaches to monitoring within national adaptation programmes across the UK. However, the current selection of indicators under each outcome provides only very partial coverage of the many relevant aspects of adaptation that are required to achieve each outcome. A clear theory of change leading to a stronger indicator set to assess the delivery of the outcomes is required.

(b) Assessment findings

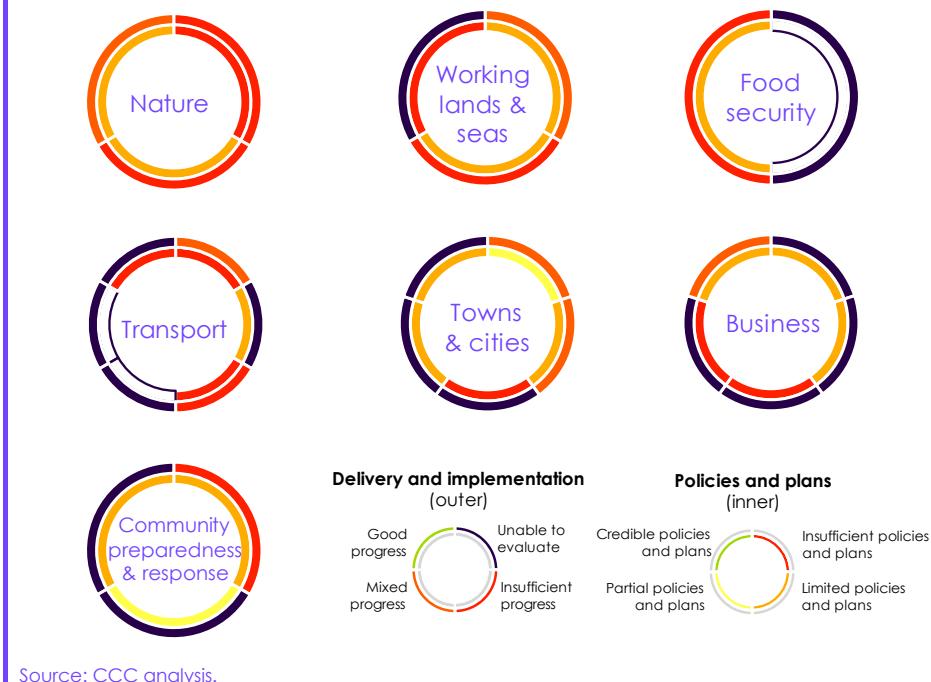
This report is the Committee's first assessment of progress in delivering the current (second) Northern Ireland Climate Change Adaptation Programme (NICCAP2) which runs from 2019-2024. In this report we assess all relevant policy development from across the period of NICCAP2, whether or not it is formally included within the programme document. This allows our assessment to provide more comprehensive coverage of all relevant aspects of adaptation policy and planning.

Our assessment report finds that most planning for adaptation is in its infancy across sectors and evidence of adaptation delivery and implementation is very limited.

- **Adaptation outcomes included in NICCAP2.** For the areas which were covered under the NICCAP2 outcomes, credible policies and plans needed to drive delivery are largely not yet in place, although for several sectors key policy milestones have been drafted or are currently being developed but are not yet published. There is insufficient evidence across sectors that reductions in climate exposure and vulnerability are happening to manage risk appropriately (Figure 2).
- **Adaptation outcomes not included in NICCAP2.** These outcomes show a low level of planning and it was not possible to evaluate much of the delivery and implementation (Figure 3). Preparation for climate change in areas falling largely outside of the scope of NICCAP2 is noticeably poorer than for areas within the programme scope.

The absence of relevant data is a key barrier to assessing all aspects relevant to delivery and implementation of adaptation policy in Northern Ireland. For more than 60% of adaptation outcomes, the lack of relevant indicator data prevents us making an overall judgement on progress in delivery and implementation. Datasets to evaluate elements of resilience either do not exist, or where they do exist, are not publicly available, are not sufficiently comprehensive in scope or only provide a point-in-time snapshot preventing trends being identified in aspects of climate vulnerability and exposure.

Figure 2 Overview of adaptation areas covered by NICCAP2



Source: CCC analysis.

Notes: Each segment of the charts corresponds to an identified climate resilience outcome within our framework. The outer ring assesses delivery and implementation, while the inner ring assesses policies and plans. 'Unable to evaluate' for the delivery and implementation score is used when sufficient relevant indicator datasets are not available, up to date, or do not allow a trend to be robustly estimated. Segments are left white where policy is largely reserved.

Figure 3 Overview of adaptation areas with limited or no actions in NICCAP2



Source: CCC analysis.

Notes: Each segment of the charts corresponds to an identified climate resilience outcome within our framework. The outer ring assesses delivery and implementation, while the inner ring assesses policies and plans. 'Unable to evaluate' for the delivery and implementation score is used when sufficient relevant indicator datasets are not available, up to date, or do not allow a trend to be robustly estimated. Segments are left white where policy is largely reserved.

For each sector covered by the NICCAP2 programme the main conclusions from our assessment are:

- **Nature.** Available indicators for the overall ecological health of terrestrial and freshwater habitats are either showing some improvement from a low base or declining. Marine and coastal habitats show a more mixed picture, with the extent of Marine Protected Areas exceeding targets but most coastal habitats in unfavourable condition. The Environment Strategy, Green Growth Strategy, River Basin Management Plan, Peatland Strategy and Marine Strategy are all in advanced stages of development but have not been published as they require Executive approval.
- **Working land and seas.** Indicators for climate resilient agriculture; forestry; fisheries; and aquaculture are extremely limited, making it difficult to assess the delivery and implementation of adaptation for these sectors. While there are some plans and policies for climate-resilient agriculture, there is no sustainable land management strategy or updated legislation for agriculture in Northern Ireland after the UK's departure from the EU. Plans and policies for climate resilient forestry and fisheries were very limited.
- **Food security.** Household food insecurity (not due to climate change) is at a high level, leaving households more vulnerable to food price spikes. Although some support for low-income households is available, it appears to fall short of demand.
- **Transport.** Monitoring of the rail network is increasing but there is no reporting on weather related delays or incidents. Available indicators for roads are limited and showed poor condition for local roads. While there is some consideration of climate projections within the design manual for strategic roads, there is limited adaptation planning in place and insufficient plans for local roads and rail. There was no evidence that interdependencies across infrastructure sectors are being managed.
- **Towns and cities.** Monitoring of properties at risk and coastal defence assets shows some progress in adaptation delivery and there have been positive developments in planning for river and coastal flooding. While there has been progress on removing impermeable surfaces, data on uptake of sustainable urban drainage systems remains limited and urban heat issues are not receiving detailed consideration at local level. Planning policy (and therefore potentially the new local development plans) are not sufficiently strong in their language to ensure meaningful action on climate adaptation in every decision. There is no legislation on managing coastal change and the lack of long-term coastal management plans is a key gap for coastal communities. Significant research on coastal change has been completed, which should be used to develop plans.
- **Buildings.** Data to assess overheating in buildings are not being collected. An update to the building regulations which would include overheating is under consideration, but there are currently no strategic policies or plans for overheating in residential or non-residential buildings. While there is a gap in data to track property level flood resilience, there are several schemes in place to offer financial support for properties which have been flooded.
- **Business.** There is a lack of time-series data to assess business sites at risk from flooding and lack of analysis of climate supply chain risks for Northern Ireland businesses. There has been progress to engage and educate SMEs across NI on climate change, but adaptation is currently not a strong focus.

Financial support packages are available but are currently small scale and focus on grant funding rather than building the full suite of options needed to implement business adaptation.

- **Community preparedness and response.** Data on awareness and preparedness at community level, as well as recovery time from extreme weather events, are largely unavailable. Civil contingencies structures are extensive, and policies and plans cover many of the key areas required for appropriate response to climate and weather shocks, although there is no regional flood warning system. Data on risks to cultural heritage were limited but some risk assessment guidance has been published and the new public body reporting duty should increase information in future.

We also provide assessment conclusions for areas largely falling outside of NICCAP2:

- **Health.** There has been a particular lack of adaptation progress in relation to both population health and the health and social care system in Northern Ireland. Only one action on health was included in NICCAP2, and arm's length bodies in the Public Health Agency and Health and Social Care Trusts have no clear direction on how best to address the impacts of climate change on health. There are no health plans or strategies which consider climate change impacts on delivery of health and social care.
- **Energy.** There are minimal considerations of climate resilience in legislation, regulations and plans but generation capacity, flexibility and redundancy are being considered. Data to evaluate reduced vulnerability and system level security of supply were very limited. There was no evidence that interdependencies across infrastructure sectors are being managed.
- **Water supply.** Reducing per capita consumption for domestic users has not been prioritised in Northern Ireland, despite projections of future resource constraints in some parts of the country by the 2080s. There are limited data on household use and no per capita consumption targets are set at household level. There are efficiency targets and there has been an improvement in leakage reduction. Further indicators are required on system performance. There was no evidence that interdependencies across infrastructure sectors are being managed.
- **Telecommunications and ICT.** Regulation of telecommunications and ICT is reserved to UK Government, but the impacts from climate risks will be felt by people and businesses in Northern Ireland. No plans were found from the UK Government, NI Executive, or industry to manage climate risks to this sector. It was not possible to evaluate progress on any adaptation outcomes for this sector due to a lack of data.
- **Finance.** Financial services regulation is reserved, but the role of both private and public financial institutions is key in supporting adaptation action in NI. There is a lack of data to assess progress in reducing assets at high-risk from climate change managed by financial institutions in Northern Ireland and aggregate estimates of adaptation financing gaps. There is some financial support for implementing adaptation measures, though mainly focused on households. Major national strategies such as '10X Economy' and the 'Green Growth Strategy' currently lack specifics for adaptation.

There have also been wider political challenges that have affected the ability to deliver NICCAP2 across sectors. Since February 2022, the Northern Ireland Assembly has been suspended, meaning an Executive could not be formed. In the absence of an Executive, new policies and strategies are not necessarily able to be published, hampering progress. In several cases relevant policies for adaptation have been drafted and gone out to public consultation but are not yet published as final versions, preventing implementation.

2. Priorities for the next NICCAP

The need for an effective response to climate change in Northern Ireland is clear. Compared to average conditions in the 1970s, the average temperature in Northern Ireland has risen by 0.7°C, rainfall in Northern Ireland has increased by 6.4% and sea level around the UK has risen by 16 cm to date. In recent years Northern Ireland has experienced its warmest year on record in 2022 and recorded its highest temperature of 31.3°C in mid-July 2021 in Castlederg in Tyrone. Northern Ireland has also experienced drought over recent years, most recently in 2021 and 2022.

Continued climate changes will bring warmer and drier summers and warmer and wetter winters alongside rising sea levels. These changes will bring risks across Northern Ireland's ecosystems, infrastructure, communities and economy. The most recent Climate Change Risk Assessment identified 61 risks and opportunities from climate change to Northern Ireland, with 31 requiring urgent action by the next NICCAP to help reduce future risks.

The next Northern Ireland Climate Change Adaptation programme (NICCAP3) is due in 2024. It is essential that NICCAP3 goes further than its predecessor, driving deeper changes across a wider range of sectors. The key requirements for the next adaptation programme are:

- **A refined vision.** NICCAP3 needs to build on the elements of a vision for a well-adapted Northern Ireland that began under NICCAP2 and operationalise them further. The next programme should seek to provide a clearer and more compelling linkage between the actions named in the NICCAP and delivery of the objectives of being well-adapted to climate change. More specific and quantitative targets also need to be established as top-level goals for the programme, linked to identified key performance indicators.
- **Increased scope.** NICCAP3 should cover the full range of sectors and policy areas which require adaptation, including outcomes, actions and indicators for the energy sector; water supply; telecommunications and ICT; health; buildings; and finance, as well as interdependencies between sectors, which largely fall outside the scope of NICCAP2. These sectors need to be included in the programme to address all the risks identified under the third Climate Change Risk Assessment.
- **Engagement through the development process.** The development of NICCAP3 is a valuable opportunity to engage further with government departments across different policy areas; civil society and local government; and the public more widely to raise awareness and understanding of climate risks. Our assessment found that awareness of how adaptation relates to different policy areas varies across the Northern Ireland Government, which means that policy leads find it challenging to embed adaptation into their areas. NICCAP3 should seek to build on the work of civil society and local government actors, identifying co-benefits and synergies to deliver effective adaptation in practice. A public consultation on NICCAP3 would support increased public understanding, local engagement, and co-development of adaptation outcomes.

- **Strengthened monitoring and evaluation:** While indicators relating to the outcome objectives were included in NICCAP2, the monitoring and evaluation for the next programme needs to be strengthened and expanded to fill the significant gap in data for assessing the effectiveness of adaptation actions. These indicators must be more comprehensive, maintained to a high quality, and updated at least annually. Our assessment found it was not possible to evaluate 29 out of 45 outcomes due to data gaps. These data gaps come from insufficient inclusion and identification of indicators in NICCAP2, gaps in data collection, non-public data sets and datasets that do not allow trends over time to be estimated. The data availability to assess adaptation delivery in Northern Ireland is lagging behind the rest of the UK and needs to be urgently addressed by the next programme.

Effective delivery of adaptation under the next NICCAP also depends on overcoming broader governance challenges. In several sectors, we have identified areas where new policy or new legislation will be required to make progress on adaptation within the NICCAP3 period. This will be dependent on an Executive being in place. Due to its shared geography with the Republic of Ireland, adaptation delivery and implementation in Northern Ireland will also require strong cross-border collaboration in areas such as agriculture and fisheries; nature restoration; supply chains; transport; energy; and vector-borne disease surveillance. Creating mechanisms for this sectoral cross-border collaboration on adaptation should be a priority under NICCAP3.

In 2022 Northern Ireland legislated its own Climate Change Act. This Act includes significant new provisions for addressing climate change and is an opportunity to integrate adaptation more effectively with efforts to reduce greenhouse gas emissions. The Committee recommends prioritising the following actions:

- The new Northern Ireland Climate Commissioner should ensure that climate resilience is embedded into Net Zero planning;
- The Department of Agriculture, Environment and Rural Affairs should ensure that synergies between the Act's Climate Action Plan (CAP) and NICCAP3 are fully considered in the planning and delivery of both strategies
- The Just Transition Commission and the Just Transition Fund for Agriculture established by the Act should have adaptation included within their remits to address the distributional effects of climate change; and,
- The public body reporting duty should include effective reporting on how public bodies are managing their climate risks, with guidance developed to support high-quality reporting.

The Committee is required to provide statutory reports on progress on adaptation under the Act and will provide a first assessment on the design, implementation, and delivery of NICCAP3 in 2027.



Chapter 1

Context, methodology and design of NICCAP3

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Introduction

This report assesses preparation for the effects of climate change in Northern Ireland, under the current (second) Northern Ireland Climate Change Adaptation Programme (NICCAP2). This chapter summarises the evidence of past and expected future climate change in Northern Ireland and the relevant aspects of governance and policy frameworks for adaptation in Northern Ireland as the context to our assessment. The assessment framework used across this report is also summarised. The chapter concludes with key recommendations for the design of the next Northern Ireland Climate Change Adaptation Programme due in 2024.

The key messages of this chapter are:

- **There are increasing observations of changes in the climate in Northern Ireland.** Recent temperature records are consistent with long-term warming trends driven by human emissions of greenhouse gases. Winters will continue to become, on average, warmer and wetter and summers hotter and drier until mid-century at least. Sea levels will continue to rise over the whole century.
- **NICCAP2 has some elements of a vision for addressing climate change.** The current NICCAP identifies visions of what being well-adapted to climate change means across seven areas. Most of the seven areas have one or multiple key performance indicators identified. The seven areas do not span all the aspects of climate change relevant to Northern Ireland and the identified indicators only enable a partial view of whether this vision is being delivered.
- **We use an assessment framework focused on tracking both policy and planning, and progress on delivery and implementation.** In this report we consider what is needed to be well adapted to climate change across thirteen different areas, which together span the range of risks identified in the latest Climate Change Risk Assessment. In each sector, we identify a set of key outcomes needed to build climate resilience, the enabling conditions necessary to achieve these outcomes and the role of policy action in bringing them about. This is needed to help track adaptation action more effectively as it moves from being focused mainly on planning and risk assessment towards an increased focus on delivery.
- **The next NICCAP must now go further than its predecessor.** It must increase its scope to include the full range of sectors and policy areas which require adaptation, and critical data gaps need to be closed. It should seek to provide a clearer and more compelling linkage between the actions named in the NICCAP and delivery of the identified visions of being well-adapted to climate change. NICCAP3 must also be integrated with efforts under the recent Climate Change Act to embed climate resilience into Net Zero.

This chapter is set out in four sections:

1. Observed and projected climate change in Northern Ireland
2. Adaptation policy in Northern Ireland
3. Assessment approach
4. The next Northern Ireland Climate Change Adaptation Programme

1. Observed & projected climate change in Northern Ireland

This section covers the latest evidence regarding observed and projected changes in Northern Ireland's weather and climate. It highlights that several recent trends can be linked to human-induced climate change, with further changes expected in the coming decades.

(a) Observed climate change

Record temperatures have been seen in Northern Ireland over recent years.

These recent records are consistent with long-term trends driven by climate change.

Recent years have consistently broken previous records for warmest surface temperature recorded in the UK, as well as in Northern Ireland. Seven of the ten warmest years for Northern Ireland have occurred since 2000. 2022 was the warmest year on record for Northern Ireland.¹

The latest observations of weather and climate demonstrate several clear trends:

- **Warmer average temperature.** Annual average temperature between 2010 – 2019 was on average 0.7°C warmer than the average in the 1970s.
- **Higher average sea levels.** Average sea level has risen by 16 cm in the United Kingdom from the beginning of the 20th century.
- **Temperature extremes.** The shifting climate and weather patterns are having a clear impact on observed temperature extremes. Met Office reporting identified that until July 2021, the highest Northern Ireland temperature recorded was 30.8°C in July 1983. However, the hot weather conditions on 17 July 2021 broke this record with a temperature of 31.2°C in County Down. Within a week, the new record was also exceeded with 31.3°C recorded in Castlederg, which is the record highest temperature in Northern Ireland currently.

(b) Projected climate change

Trends towards warmer, wetter winters and hotter, drier summers will continue at least until the middle of the century and seas will continue to rise for much longer.

The UK's Third Climate Change Risk Assessment (CCRA3) was published in 2021. CCRA3 provide a detailed assessment of changes in climate and weather across UK, as well as Northern Ireland more specifically.² The expected changes in climate by the middle of the century are:

- **Warmer and wetter winters.** Winters will be warmer and winter rainfall is expected to increase by around 3% by 2050 (relative to average conditions around 1990).
- **Drier and hotter summers.** Summers are expected to be hotter in Northern Ireland and summer rainfall is projected to decrease by around 11% by mid-century. More intense summer rainfall is more likely despite the trend for the season as a whole.
- **Continued sea-level rise.** Sea levels in Belfast could rise by around 15 cm by 2050.

2. Adaptation policy in Northern Ireland

This section summarises governance structures related to the delivery of adaptation to climate change in Northern Ireland. The first sub-section covers general features of Government and policy making in Northern Ireland before subsequent sections focus on the details of the current adaptation policy programme, and the recent Northern Ireland Climate Change Act.

(a) Government in Northern Ireland

Northern Ireland has a unique Government set up amongst the UK's devolved administrations.

The Northern Ireland Executive is the devolved government of Northern Ireland. The Executive is formed of the First Minister and deputy First Minister and eight other ministers. Arrangements of the Northern Ireland Executive are distinct from other devolved administrations in Scotland and Wales, reflecting the specific historical and administrative structures in Northern Ireland. Some powers remain with the UK Government; these are either reserved matters, which may be transferred to Northern Ireland Assembly in future, or excepted matters, which will remain with the UK Government indefinitely. This means that the extent to which responsibility for adaptation is devolved varies across areas. The Northern Ireland Executive is not currently formed (Box 1.1). Cross-border collaboration on the island of Ireland is also important for several areas of adaptation. Habitats and ecosystems are not bound by administrative borders and the flow of trade and people means that adaptation planning needs to be at an all-island scale.

Box 1.1

Current status of the Northern Ireland Executive

There has been no First Minister or Deputy First Minister in Northern Ireland since February 2022 following the resignation of the First Minister. Subsequently, through an amendment to the Northern Ireland Act 1998 in February 2022, Ministers were appointed on a 'caretaker' basis from before the May 2022 election for an 'Executive formation period'. Following the May 2022 election, a new speaker for the Assembly was not appointed and a new Government could not be formed. When the 24 week Ministerial 'caretaker' period came to an end in October 2022 all Ministers ceased to hold office.

In the absence of Ministers, senior civil servants within Northern Ireland government departments can take certain decisions which would ordinarily be taken by Ministers to uphold governance and protect the public interest under the provisions of the Northern Ireland (Executive Formation etc) Act 2022. Supporting decision making guidance has been provided by the UK Government to support departments in considering those decisions and exercising their functions whilst the Act remains in effect. However, new policies and strategies cannot necessarily be published without a functioning Executive, in particular where they are cross cutting. In several cases, policies which would deliver climate change adaptation benefits have been drafted and have gone out to public consultation, but are not yet published as final versions as they await sign off.

(b) The second Northern Ireland Climate Change Adaptation Programme (NICCAP2)

The second Northern Ireland Climate Change Adaptation Programme was published in 2019 and is structured around five priority areas.

NICCAP2 was published in September 2019 and covers the period 2019-2024. It forms the response to the risks and opportunities relevant to Northern Ireland as identified in the second UK Climate Change Risk Assessment (CCRA2, published in 2017).

The delivery of NICCAP2 is coordinated by DAERA, and the programme contains cross-department actions to address the risks and opportunities identified in CCRA2. The NICCAP2 programme was also informed by external stakeholder engagement and input coordinated through Climate NI (the DAERA-funded climate network supporting policy development and action). NICCAP2 focused on priority areas which were identified as requiring urgent adaptation action over the next five years, with specified outcomes and indicators associated (Figure 1.1).

Figure 1.1 NICCAP2 Priority areas and indicator set

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.
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.

Source: DAERA (2019) Northern Ireland Climate Change Adaptation Programme 2019-2024.

(c) Climate Change Act (Northern Ireland) 2022

A new Climate Change Act passed in 2022 has strengthened Northern Ireland's policy architecture on planning for climate change.

The current NICCAP2 programme has its legal basis within the UK Climate Change Act (2008). In 2022 the Northern Ireland Assembly passed primary legislation for tackling climate change. The Climate Change Act (Northern Ireland) 2022 requires the Northern Ireland government to set greenhouse gas emission reduction targets in line with reaching Net Zero in 2050. It introduces a number of key innovations to the Northern Ireland climate change policy landscape (Box 1.2).

Box 1.2

Key features of the Climate Change Act (Northern Ireland) 2022

Key features of the Act include:

- **Five-year Climate Action Plan to support delivery of carbon budgets and must also support a just transition.** Government departments are tasked with publishing plans for different sectors.* The Climate Action Plan required under the Act must account for a Just Transition, which includes provisions such as: supporting jobs and the growth of jobs that are climate resilient and environmentally and socially sustainable, the use of nature-based solutions, consideration of the future-generations principle, supporting persons who are most affected by climate change, particularly those who may have done the least to cause it or may be the least equipped to adapt.
- **Just Transition Commission.** The Act places a duty on DAERA to establish this commission to oversee just transition elements within the Act and advise government departments to ensure all proposals, policies, strategies, and plans comply with the just transition principle. The Just Transition Fund for Agriculture has also been established by the Act. The just transition principle within the scope of the Act includes: tackling inequality, supporting the creation of secure green jobs, supporting people employed in high carbon industries with the transition, supporting a transition to a green economy with Net Zero investments and infrastructure.
- **Northern Ireland Climate Commissioner.** The Act created an independent office for a Climate Commissioner, whose role is to oversee the implementation and report on the progress of targets in the Act.
- **Public Body Reporting Duty.** The Act requires government to make new regulations that require climate change reporting by a specified list of public bodies, which must come into effect before December 2023. Reporting on information must include an assessment of current and predicted impact of climate change, proposals for adapting to climate change, timescale of those policies and assessment of progress on any proposals from previous reports.

The Act creates new progress reporting responsibilities for the CCC, including on adaptation.

The Climate Change Committee (CCC) has been designated responsibility to assess progress on climate change in two ways: assessment of Northern Ireland's carbon budgets and emissions reduction targets, and assessment of progress in implementing Northern Ireland's Climate Change Adaptation Programmes. The Committee must provide progress reports for the NICCAP cycles, no later than three years into the five-year cycle. This statutory progress reporting will be initiated by the Committee for the next 2024-29 cycle of NICCAP3.

* These plans are known as sectoral plans and will outline how specific sectors will contribute to targets in the Act. Sectoral plans are expected for: energy, transport, infrastructure, waste management, agriculture, fisheries and industrial processes. The first sectoral plans will be published by the end of 2023.

3. Assessment approach

This report has been commissioned to assess the second Northern Ireland Climate Change Adaptation Programme.

We apply the CCC's adaptation monitoring framework to track progress.

This assessment was commissioned by the Department of Agriculture, Environment and Rural Affairs (DAERA) as a non-statutory request to review the delivery of the NICCAP2 outcomes and identify key gaps. The Committee has welcomed this request as an opportunity to provide its advice ahead of the development of NICCAP3. It is the Committee's first assessment of progress in delivering NICCAP2, which runs from 2019 – 2024. The sub-sections below document aspects of our assessment framework for this report.

(a) Adaptation areas

This report utilises the CCC's adaptation monitoring framework to assess the NICCAP2 programme progress and also to identify areas for further consideration during development of NICCAP3. We assess progress in preparing for climate change across thirteen chapters and integrate consideration of the NICCAP2 priority areas within these (Box 1.3).

Box 1.3

Areas of adaptation covered within each chapter of this report

The areas of adaptation covered within each chapter of this report are:

- **Nature** (Chapter 2): This chapter covers protecting Northern Ireland's terrestrial (including on farmland), freshwater and marine habitats and biodiversity from climate change. Policy in this area is largely devolved. Marine and coastal policy is devolved in relation to Northern Ireland's inshore waters. UK Parliament legislates for offshore waters.
- **Working lands and seas** (Chapter 3): This chapter covers the necessary adaptation needed to ensure that NI agriculture, forestry and fisheries remain economically productive under changing climate conditions. Policy in this area is largely devolved. Fisheries are legislated under the UK Fisheries Act 2020 and through the joint fisheries statement, but licensing for fishing boats is devolved and fisheries management plans may be published by Devolved Administrations. UK Parliament legislates for offshore waters.
- **Food security** (Chapter 4): This chapter covers NI's domestic and imported food supply chains and their climate resilience, as well as the vulnerability of society to climate-related food disruption. Food policy is largely devolved, but international trade policy is reserved to the UK Government.
- **Water supply** (Chapter 5): The chapter covers the public water system which supplies households and businesses. Policy in this area is fully devolved.
- **Energy** (Chapter 6): This chapter covers adaptation within the key energy systems – the electricity system (transmission, distribution, and generation), gas networks and novel sources of energy supply (such as hydrogen) as they develop. Policy in these areas is fully devolved, but requires collaboration with the Republic of Ireland.
- **Telecoms & ICT** (Chapter 7): This chapter covers the communications and ICT infrastructure (data centres, networks and other critical national infrastructure) that needs to be climate resilient. Policy in this area is reserved to the UK Government.
- **Transport** (Chapter 8): This chapter covers the road networks (both the national strategic road network and local roads), railways, ports and airports. Policy in this area is partially devolved. Policy on ports and airports is reserved to the UK Government.
- **Towns and cities** (Chapter 9): This chapter covers adaptation needed within, or for, the built environment. Only settlement scale adaptation is covered in this chapter.

This includes flood defences to protect people and property, urban design to limit urban heat islands and surface water flooding, coastal protection for settlements on the coast and the planning system. Adaptation responses to heat and flood at the household level are covered in the Buildings chapter, and response and recovery are covered within the Community preparedness and response chapter. Policy in this area is fully devolved.

- **Buildings** (Chapter 10): This chapter covers building-level interventions to ensure that they are protected from overheating and flooding. Policy in this area is fully devolved.
- **Health** (Chapter 11): This chapter covers actions needed to ensure public health is maintained and improved despite climate change. This includes mortality and morbidity risks from overheating as well as climate-sensitive vector-borne diseases and the delivery of health care during periods of extreme weather. Policy in this area is fully devolved.
- **Community preparedness and response** (Chapter 12): This chapter covers the preparedness of communities for climate impacts, including the ability to protect cultural heritage, and their ability to effectively respond when climate and weather-related disruptions occur. Policy in this area is fully devolved, but emergency response duties are governed by the UK Civil Contingencies Act.
- **Business** (Chapter 13): This chapter covers the adaptation that is required of business, specific to their function as a commercial entity. This includes adapting their supply chains (both domestic and international), their business sites and assets, access to capital and productivity impacts. Policy in this area is largely devolved.
- **Finance** (Chapter 14): This chapter covers adapting the UK's financial system so that systemic risks from climate change are minimised and it can effectively support the economy in investing in necessary adaptation actions. Policy in this area is largely reserved to the UK Government.

Source: CCC analysis.

These chapters are structured around assets or systems impacted by climate risks. Often key assets and systems are impacted by multiple risks and require joined up policy responses to manage them adequately. Together these chapters cover all 61 risks and opportunities identified by CCRA3, including risks from climate change outside of the UK where relevant.

(b) Assessment methodology

We set out a monitoring map for each chapter to structure our assessment around and to evaluate progress against.

- **A monitoring map**, which lays out an indicative high-level goal or vision for what being resilient to climate change in this area might mean and identifies tangible key outcomes that the Committee believes will need to be in place to help deliver this. We also identify a set of enabling factors (which are important to the realisation of the outcomes), policy and planning milestones which need to be in place and contextual factors (things which are largely independent of policy action but will nonetheless affect the ability for the identified adaptation outcomes to be delivered).
- **Evaluation of relevant delivery and implementation indicators** that we identify for each top-level adaptation outcome identified within the monitoring map. This helps track progress towards the delivery of the identified outcomes and the extent to which key enabling factors are in place. Typically, available indicators only tell a partial story and multiple indicators often need to be considered together to provide an overall picture.

We evaluate relevant indicators and assess the extent to which these are moving in the right direction. In many instances there are important data gaps or indicators are not sufficiently up to date to provide a current understanding of trends.

- **An assessment of progress against policy and planning requirements** described in the monitoring map. We document recent developments in relevant policies and plans and assess to what extent the relevant policy milestones identified on the monitoring maps are in place, to what extent they are appropriately ambitious, and whether there is appropriate monitoring and evaluation to allow them to function effectively.

Full details of our assessment methodology are provided in a supporting publication.

A separate publication, [CCC Adaptation Monitoring Framework](#) explains in detail the approach of the updated assessment framework applied within each chapter of this report.³

(c) Scoring

For each identified adaptation outcome, we score 'delivery and implementation' and 'policies and plans' separately.

Within this report, we score progress in preparing for climate change at the level of the identified key outcomes within each chapter. For each outcome we identify two summary scores, one for 'Delivery and implementation' (Table 1.1) and one for 'Policies and plans' (Table 1.2). This allows us to distinguish between important policy developments that help put in place or strengthen the key identified policy milestones within the monitoring map, and evidence that adaptation outcomes are being delivered on the ground.* While the criteria below are followed to determine scores, inevitably some judgement is required to synthesise all the available evidence into one score. The Committee makes these judgements as necessary and describes our reasoning where possible.

Table 1.1
Scoring criteria for delivery and implementation

Score	Criteria
Good progress	Indicators are moving in the right direction or being maintained at a high level
Mixed progress	Some indicators are moving in the right direction, others are stagnant at a low level or moving in the wrong direction
Insufficient progress	Indicators are stagnant at a low level or are moving in the wrong direction
Unable to evaluate	Limited or no available data

* For our policy and plans assessment we include policy published up until mid-March 2023.

Table 1.2

Scoring criteria for policies and plans

Score	Criteria
Credible policies and plans	Policy milestones: <ul style="list-style-type: none">• are almost entirely achieved or in place• are comprehensive and appropriately ambitious• include monitoring and evaluation
Partial policies and plans	Policy milestones: <ul style="list-style-type: none">• are achieved or in place for key milestones but some gaps remain• cover most important elements, could be more ambitious• include some monitoring and evaluation
Limited policies and plans	Policy milestones: <ul style="list-style-type: none">• are partially achieved or in place with some key milestones missing• cover some important elements, could be more ambitious• include some monitoring and evaluation
Insufficient policies and plans	Policy milestones: <ul style="list-style-type: none">• are mostly not achieved, only minor policies in place• lack important elements, do not cover key areas or lack ambition• have minimal monitoring and evaluation

Whilst most policy areas that are relevant to climate change adaptation are devolved, some areas are certain reserved to the UK Government. For this assessment we have considered the actions that the Northern Ireland Executive could take within this regulatory context in the scoring. We also highlight relevant major actions at a UK-Level that will impact Northern Ireland adaptation, though this is not included in the scoring of progress.* The CCC separately undertakes an assessment of the UK National Adaptation Programme every two years which covers those reserved matters in more detail.⁴

(d) Recommendations

We provide a set of recommendations for each chapter to close identified policy gaps.

Targeted recommendations on further policy actions that are required within each adaptation area to close gaps are provided in the relevant chapters of this report, and in a separate document published alongside. We identify owners for these recommendations within Government and implementing agencies and timelines by which they need to be delivered.

* The UK operates a single financial services market and financial institutions are regulated at a UK-level. Telecommunications is a reserved matter with the UK Government Department for Digital, Culture, Media, and Sport (DCMS) responsible for policy. Aviation and shipping are reserved.

(e) Interdependencies

The assessment within this report is conducted separately for each chapter.

Interdependencies between different areas and systems mean that climate impacts can cascade and interact with other areas. For example, overheating that causes disruption to transport services can then affect businesses.

However, there are a complex set of dependencies between different areas and systems that mean that climate impacts in one system can cascade and interact with others – with recent examples demonstrated in Northern Ireland (Box 1.4). An important part of adaptation planning is identifying and managing these interdependences when assessing climate risk.

Box 1.4

Multiple impacts of severe flooding in 2017

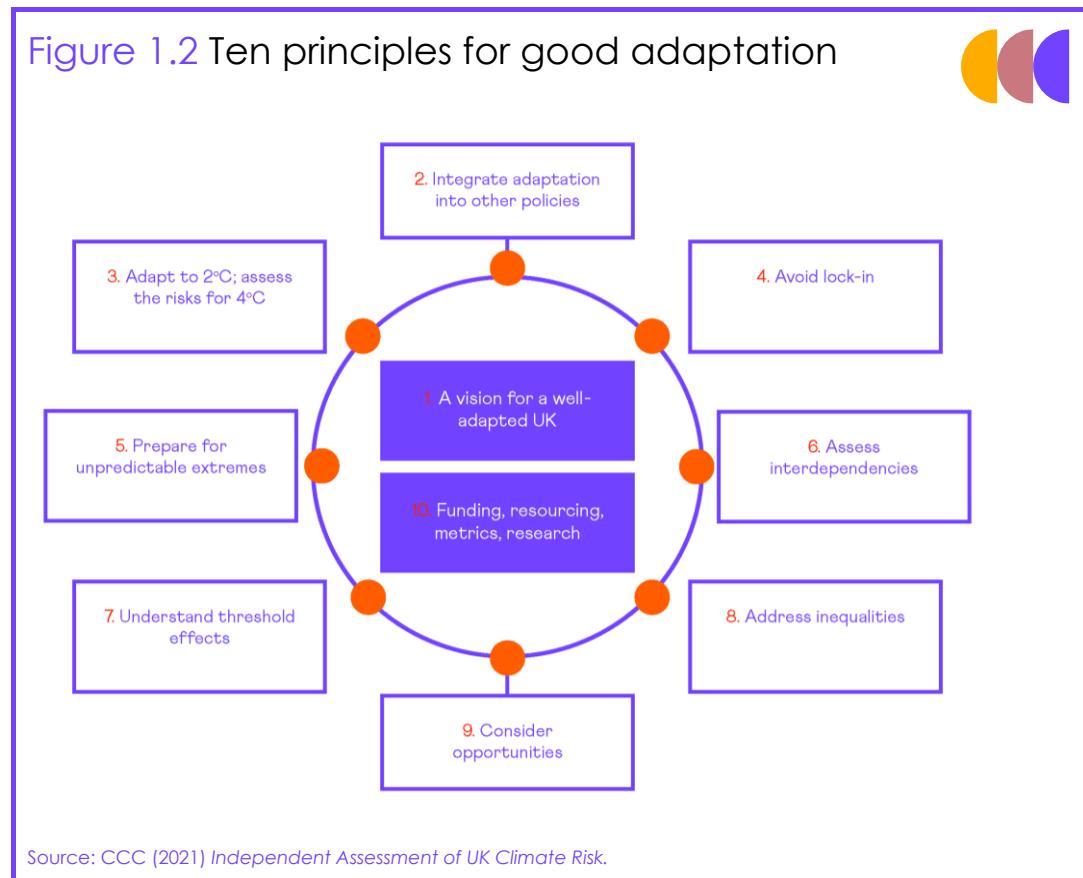
In August 2017, severe flooding affected the northwest of Northern Ireland. The flooding was due to heavy and persistent rainfall on 22nd and 23rd August.

- 60-70 mm of rain, equivalent to 63% of the average August rainfall, fell in the space of eight to nine hours causing many watercourses to rise, in some areas, to unprecedented levels in a very short period. Some 400 homes were flooded, with some residents unable to return to their homes for more than a year.
- The severe flooding had a profound, and in many cases lasting, impact on businesses. The Ballynameen Bridge in Claudy was one of 89 bridges damaged in the floods, and for more than a year, a four-mile diversion was in place. Local business owners were quoted as saying they had suffered dramatically from a significant downturn in trade. Issues were raised in relation to businesses being unable to claim for hardship payments like those provided to homeowners.
- Impacts to agricultural land were also significant due to large amounts of debris being washed onto the land. 220 farm businesses were impacted, and fences were washed away in many locations. Livestock were lost, with reports of over 300 sheep and a significant number of cattle drowned. In the Glenelly Valley, a very significant series of landslides occurred as a result of the heavy rainfall and many of the fields affected remain covered in a thick layer of debris. The landslides, which engineering geology experts have advised were a one in 3000 year event, occurred when heavy rain made the peat on the side of the glen unstable. Water built up in a non-porous mineral layer under the peat and the pressure then caused the supersaturated peat to slide off it and down the mountain into the valley.

Source: DfI (2018) *North West Flooding Review*⁵; CCRA3 Northern Ireland National Summary.

(f) Principles of good adaptation

The Committee has developed ten principles to define the process for good quality decision-making to realise a vision for a well-adapted UK (Figure 1.2).



The updated assessment framework outlined above enables easier consideration of the ten principles.

- **Vision.** The monitoring map for each chapter provides an indicative vision for what good adaptation looks like in that area.
- **Integration.** Adaptation should be integrated into other policies to ensure that assets, infrastructure, financial incentives, and essential services are both resilient, and increasing resilience to, the changing climate.
- **Interdependencies.** Each chapter provides some indication of the main interdependencies with other chapters. This is easier for some chapters than others. For example, chapters such as Nature, Working Lands and Seas or Energy are more self-contained, while others like Health, Food and Buildings have a broader range of key interdependencies. Actions are assigned to a chapter based on the scale of where a particular intervention takes place; so, whether a flooding intervention takes place at property level, spatial planning level or at the community scale.
- **Inequalities.** Principles for good adaptation link with principles for a fair transition. Reduction of inequality is embedded within many outcomes and indicators throughout the monitoring maps, including lists of contextual factors which should be considered in the chapters. Fairness should always be integrated at a detailed policy level and during implementation;

Fairness should be integrated into policy and during implementation of adaptation actions, including engagement and co-development with communities on interventions that affect them.

considering inequalities arising from different experiences of climate risks across society and seeking to address the inequalities that it may create. This extends to the need for genuine engagement and co-development with communities on actions and interventions which affect them, ensuring they understand and buy-in to the vision for their area.

- **Thresholds and Metrics.** The monitoring maps provide a suite of consistent, although not exhaustive, metrics which should apply across UK jurisdictions. In addition, the assessment of progress on delivery within this report offers some insight into thresholds for further research or action. It is important that thresholds are considered in decision-making at a variety of levels, as these can be location specific.
- **Opportunities.** Climate adaptation is often focused on risk reduction, but policies and plans will fail to prepare society for climate impacts if they do not adequately grasp the benefits which come from good quality adaptation. These can be financial benefits, but in many cases communities and institutions could see improvements to a range of issues through more holistic, co-developed and locally empowered decision-making.

Some of the principles are less explicit within the monitoring framework used in this report as they apply more to the detail of policy making.

- **Preparing for unpredictable extremes.** Precautionary planning is one of the criteria which the Committee use in defining the quality of policies and plans. This is linked to thresholds and scenario planning, and where unpredictable extremes may occur, considering what contingencies and additional capacity may be available to draw upon.
- **Scenario planning.** Decision-making in uncertainty is not easy, and especially for major capital spend, it can be a challenge to understand changes to a wide range of variables both in the climate system and across society. However, planning for a range of futures, adapting for 2°C and understanding the additional stresses and shocks of a 4°C world, must become a standard practice in decision-making. This can be qualitative, quantitative, or blended analysis depending on the resources, sensitivity and scale of the project or plan; but it must be considered.
- **Avoiding lock-in.** One of the most important methods for making decisions in uncertainty, is to design flexibility into the system. This can be done in a variety of ways, including designing an asset or service so it can be easily adapted, altering financial strategies, enhanced skills and training, ensuring more flexible and responsive planning and monitoring processes, and scenario planning to understand a range of potential interventions and the thresholds for action.

4. The next Climate Change Adaptation Programme

Planning for the next Northern Ireland Climate Change Adaptation Programme is now beginning.

The next (third) Northern Ireland Climate Change Adaptation Programme (NICCAP3) is due in 2024. It is an opportunity to close gaps from NICCAP2 and build on the progress made in other areas of the programme.

This report includes recommendations relevant for specific areas of adaptation which could be addressed through NICCAP3, within each relevant chapter. Here we present recommendations for the design of NICCAP3 overall. These include recommendations about ambition; the development process; data and monitoring needs; integration with Net Zero and other cross-cutting issues.

(a) Ambition and scope

More ambitious actions in NICCAP3 are essential.

Ambitious and clearly defined actions are needed in NICCAP3. NICCAP3 should move away from a list of loosely structured actions as in NICCAP2 and towards a comprehensive set of actions linked to key adaptation outcomes with an explicit theory of change linking them. Each outcome should have clear owners within Government and relevant indicators to track progress.

NICCAP3 should also cover the areas of adaptation that were missing from NICCAP2.

NICCAP3 should aim to cover the full range of sectors and policy areas which require adaptation, including areas which had either limited or no actions in NICCAP2. Additional areas that should be priorities for inclusion in NICCAP3 are:

- **Energy.** NICCAP2 did not include any actions on the resilience of the energy system. Energy systems are undergoing a large-scale transformation to reduce emissions, which requires major investment and turnover of assets and networks. There is an opportunity to improve resilience to climate change in the energy system at the same time.
- **Water supply.** There was limited inclusion of water in NICCAP2. While Northern Ireland is not expected to face water supply shortages as severe as in other parts of the UK, it is still important to include consideration of climate risks in water supply plans.
- **Telecommunications and ICT.** NICCAP2 did not include any actions to ensure telecommunications and ICT infrastructure are resilient to climate risks. Given the growing reliance on these types of infrastructure and the interconnection with other types of infrastructure, this is a key gap which should be addressed in NICCAP3.
- **Health.** There has been a particular lack of adaptation progress in relation to both population health and the health and social care system in Northern Ireland. Action is urgently required to fill the gaps in information and policy.
- **Buildings.** Adaptation of buildings is an area with very limited work underway, particularly in terms of monitoring and standards related to overheating. Progress is needed on data and regulations, for example, to ensure that new buildings and residential retrofits are designed to cope with a warmer, wetter climate.
- **Finance.** Access to finance to implement adaptation for both households and businesses needs to be further integrated into the next NICCAP.

Further assessment is needed on Northern Ireland's financial exposure to climate risks such as flooding which impacts on insurance, mortgages, and investment.

(b) Development process

An inclusive approach to development is key to a successful programme.

A priority for NICCAP3 should be getting the full range of Government departments adequately engaged in managing climate risks.

Targeted engagement during the development of NICCAP3 would be beneficial for the next iteration of the programme to ensure it delivers on needs most effectively.

There are three key audiences that need to be engaged.

- **Government departments.** The development of NICCAP3 is an opportunity to engage widely with other Government departments who are responsible for delivering adaptation actions. Our assessment found that awareness of how adaptation relates to different policy areas varies across departments. This is likely to hinder policy leads from fully embedding adaptation considerations within department strategies or plans. DAERA in its role of climate change lead should ensure that the development of NICCAP3 is an opportunity to increase the level of engagement on climate change adaptation across other departments and look to establish mechanisms to maintain this over the duration of the Programme.
- **Civil society and local government.** Significant progress is being made on preparation for climate change outside of central Government, for example across local councils as well as other public bodies, academia, private sector, financial institutions and NGOs. NICCAP2 included a chapter on Civil Society and Local Government which recognised the wider engagement that is required to deliver effective adaptation on the ground. DAERA should engage with these groups early on in the NICCAP3 development process, to build on their work in NICCAP2 and identify co-benefits or synergies with actions happening outside of Government. Information on actions being taken by these groups could also inform the detail of NICCAP3.
- **The public.** A public consultation on NICCAP3 and what its vision of being well-adapted to climate change looks like would support increased public understanding, local engagement, and co-development of adaptation outcomes.

(c) Data and monitoring

There was only a limited set of indicators included within NICCAP2 to evaluate progress against its outcomes. Data availability beyond those indicators is a barrier to understanding adaptation progress.

Closing data gaps with well-maintained indicator datasets should be a priority for NICCAP3.

The second Northern Ireland Climate Change Adaptation Programme (NICCAP2) included a series of indicators related to key priority areas. Data on these indicators have been assessed in the relevant chapters of this report. However, for several key areas of adaptation, there were no relevant indicators included in NICCAP2, which made assessment of progress challenging. In other areas, there were some indicators included, but they were limited in their scope and how much meaningful insight into progress against outcomes they could provide.*

High-quality data to measure progress against the delivery and implementation of adaptation outcomes is an important part of any adaptation programme. More consistent, relevant and frequent data collection would help inform Government departments on the effectiveness of policy actions and the extent to which they

* Further discussion of indicators and the key indicator gaps is provided across the relevant chapters.

are delivering the desired adaptation outcomes. For NICCAP3, more specific indicators must be developed, monitored at appropriate frequency (at least annually), and aligned to the identified outcomes of the sector and overall programme. The monitoring maps included in our assessment framework provide some suggested measures to track progress against adaptation outcomes. While other indicators may be more suited to the next NI Adaptation Programme, a clear and comprehensive set of indicators should be outlined in the Programme from the beginning and tracked over time. A data gap of particular significance is the access and use of spatial data from Ordnance Survey of Northern Ireland, which can significantly enhance the ability to plan and deliver effective local adaptation. The Committee recommends that Department of Finance works with the UK government to find a solution that would enable free and long-term use of OSNI data.

(d) Integration with Net Zero and other cross-cutting issues

Integration of adaptation and mitigation policy within DAERA should be a priority.

The new structures required under the Climate Change Act present opportunities to deliver this.

The delivery of other policy goals, including the ambitious decarbonisation targets set under Northern Ireland's new Climate Change Act, will increasingly be at risk if the effects of a changing climate are not integrated into planning.

The development of the first Climate Action Plan (CAP), which is required to meet the Act's decarbonisation targets, is under development by DAERA. DAERA should seek to maximise synergies between the CAP and NICCAP3 wherever possible, including with actions owned by other Government departments – requiring coordination and direction from DAERA. The Act explicitly states that the CAP must support the most vulnerable to adapt to climate impacts, embed the future generations principle and support an environmentally sustainable economy of climate resilient jobs. The Committee provided a set of principles for how to consider the just transition and climate change adaptation together in 2022 (Box 1.5). The other functions of the Act – including the Climate Commissioner, the Just Transition Committee and Just Transition Fund for Agriculture should also have adapting to climate change explicitly included within their remits to support an integrated approach to adaptation and mitigation of climate change.

Box 1.5

The Just Transition and adaptation

Adaptation to a changing climate links closely to the concept of a 'just transition'.

- **Fairness in adaptation is strongly linked to the concept of a just transition.** Just transition is currently more commonly used in relation to reducing greenhouse gas emissions fairly. However, considerations of sharing the effort to tackle climate change across society are also applicable to efforts to adapt to the future climate.
- **Climate impacts and adaptation actions will both have unequal effects.** For many climate impacts it is the most vulnerable in society that will be most impacted and have the least ability to adapt. Adaptation actions to address risks will also have unequal impacts themselves. These may be different to those arising from the climate risks they are seeking to avoid. There is potential for some adaptation actions to have unintended negative effects, increasing exposure of others to climate risks.
- **Fair adaptation requires distributional effects to be considered throughout the policy cycle.** Throughout policy design, implementation and evaluation stages it is necessary to consider fairness and inequalities to ensure that adaptation policy is consistent with a just transition to a well-adapted society. Extensive and regular engagement with all affected stakeholders through the policy cycle is essential.⁶

Source: CCC (2022) *The just transition and climate change adaptation*.

Public Body Reporting on adaptation should be mandatory and high-quality to provide the most useful information on climate risks.

A consultation on regulations for Public Body Reporting under the new Climate Change Act will be undertaken in early 2023. The new public body reporting duty is an opportunity for Government to collect more information on climate risks and how they are being managed across key sectors in Northern Ireland. Reporting should be undertaken regularly, in alignment with NICCAP and CCRA processes, and feed into deliverables within NICCAP3. The Committee recommends that Public Body Reporting should become mandatory for a specified list of public bodies, but open to a wide range of other organisations – to help understand interdependency risks better across the economy.

To support high-quality submissions, guidance will need to be provided to reporting organisations. This guidance should align with the CCC's ten principles for good adaptation.⁷ An analysis of these reports should also be required to synthesise the information and create an overall picture of risk management.

Addressing climate risks that can cascade or compound through interdependencies should be a key theme for NICCAP3.

Beyond Public Body Reporting, interdependencies and cascading climate risks should be explicitly considered within NICCAP3. Government departments should demonstrate consideration of the interdependency mapping in the new Northern Ireland Civil Contingencies Risk Register when developing major policy, and in risk or operational planning.

Endnotes

- ¹ Met Office, *Northern Ireland dataset*,
https://www.metoffice.gov.uk/pub/data/weather/uk/climate/datasets/Tmean/ranked/Northern_Ireland.txt
- ² Climate Northern Ireland (2021), CCRA Evidence Report Northern Ireland Summary,
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- ⁴ CCC (2023) Progress in adapting to climate change – 2023 Report to Parliament,
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Chapter 2

Nature

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Introduction

Table 2.1

Progress summary – Nature

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Terrestrial habitats are in good ecological health	Insufficient progress	Insufficient policies and plans	<ul style="list-style-type: none"> Most terrestrial areas of special scientific interest (ASSIs) are not in favourable condition, although favourable management of terrestrial protected sites has increased significantly in recent years. Woodland areas are increasing but the abundance of breeding birds is declining. There are several strategies in draft form, which would be a positive development once published, but there is little to show actions on the ground are being delivered and funding for projects is limited.
Outcome 2: Freshwater habitats are in good ecological health	Insufficient progress	Limited policies and plans	<ul style="list-style-type: none"> Ecological status of water bodies has flatlined, with only 30% in good or better status, well short of the Government's 70% target. The latest River Basin Management Plan has not incorporated 2°C and 4°C planning scenarios to address possible climate impacts and any external pressures.
Outcome 3: Marine and coastal habitats are in good ecological health	Mixed Progress	Limited policies and plans	<ul style="list-style-type: none"> Most marine habitats are in favourable condition and the extent of Marine Protected Areas has grown to exceed the Government target. However, coastal habitats are in mostly unfavourable condition. A Marine Plan is in advanced stages of development with a planned publication this year, pending executive approval.

Relevant risks from CCRA3:
Risks to terrestrial habitats and species (N1, N2, N3); Risks to soils (N4); Risks and opportunities for natural carbon stores, carbon sequestration and GHG emissions (N5); Risks to freshwater habitats & species (N11, N12); Opportunities to freshwater habitats and species (N13); Risks to marine habitats and species, and fisheries (N14, N16); Opportunities to marine habitats and species, and fisheries (N15); Risks and opportunities to coastal habitats and species (N17); Risks and opportunities to landscape character (N18).

This chapter covers adaptation to climate change for habitats and species native to the terrestrial, freshwater, coastal and marine environments. Terrestrial habitats also include farmland, which makes up 75% of land in Northern Ireland.¹ There has been a shift away from mixed farming in recent decades towards a more intensified livestock-focused system, leading to the loss of semi-natural habitats, hedgerows, and overwintering stubbles.^{*} More than 40% of Northern Ireland's land area now comprises improved grassland.² Whilst there are clear interlinkages between nature and agriculture due to the dominance of agriculture in Northern Ireland's land use, the climate risks to ecosystem provisioning that support farming, forestry and fisheries are covered in Chapter 3 on Working Land and Seas.

The changing climate directly impacts the condition of nature in Northern Ireland (Box 2.1). The 2021 Independent Assessment of UK Climate Risk³ by the Climate Change Committee identified three risks that require urgent immediate action from Government directly pertaining to nature:

* Crop stubbles in fields that can provide a winter food source for birds.

- Risks to viability and diversity of terrestrial and freshwater habitats, species from multiple hazards.
- Risks to soil health from increased flooding and drought.
- Risks to natural carbon stores and sequestration from multiple hazards leading to increased emissions.

Box 2.1

Climate impacts on nature in Northern Ireland

The third climate change risk assessment found that:

- There is considerable evidence of the current and potential future effects of climate change and associated drivers on terrestrial flora and fauna across the UK and the island of Ireland. This includes impacts on individual species and their distribution, as well as the composition and abundance of populations. Expected climate change risks including droughts, flooding and wildfire can lead to losses or gains of species in a community or geographic area, while changes in distribution because of a changing climate can represent both opportunities and threats to wildlife.
- New and emerging pests, diseases, and invasive non-native species (INNS) were identified as important risks due to their negative effect on biodiversity. The future magnitude of this risk in Northern Ireland is assessed as being medium by the 2050s, increasing to high in the 2080s in a +4°C in 2100 scenario.
- Higher water temperatures, reduced water availability and changing river flows due to drier summers and wetter winters, could increase the degradation of freshwater habitats, and compromise the viability of some freshwater species.
- Marine ecosystems are already being impacted by climate change through effects on the distribution and abundance of species groups and changes to their habitats, although more research is needed to determine which species and habitats will be affected most in the future and by how much.

Source: Climate Change Committee (2021) *Evidence Report for the Third Climate Change Risk Assessment Summary on Northern Ireland*.

The fundamental underpinning that nature has on many parts of society and the economy means there are key links between climate adaptation covered in this chapter and elsewhere in the report (Box 2.2). This is particularly the case for climate risks to farming, forestry and fishing, as economic activities dependent on large-scale rural land, water and sea use require healthy and functioning ecosystems; these are covered in Chapter 3 on Working Land and Seas.*

Box 2.2

Inter-relationships of nature with other parts of the assessment

The systems within this report where these links to nature are most pronounced include:

- **Working land and seas.** Around 75% of land in Northern Ireland is used for agriculture.⁴ Land-use change and pollution associated with agriculture, forestry and fisheries drive biodiversity loss, while water abstraction by agriculture can also undermine the health of ecosystems and their ability to function.
- **Food.** The food system depends on a healthy, functioning natural environment. This includes diverse and abundant assemblages of biodiversity which can pollinate crops and control pests. For instance, diverse and abundant soil microbiota can enhance soil fertility, which supports crop yields and healthy grasslands.

* In variation to previous progress reports, farmland habitats are now assessed within the outcome 'Terrestrial habitats are in good ecological condition'.

- **Water.** Measures to improve the condition of nature support its capacity to supply clean water for consumption and use by the public and industry. However, overuse and pollution of water by society can harm nature.
- **Health and community.** Nature helps to keep us healthy in many ways. Trees and hedgerows can improve air quality; access to nature can support mental health; certain plant species can absorb harmful minerals such as lead; and biodiversity has a crucial role to play in mitigating the threat of pests and disease.
- **Flooding, towns and cities, and infrastructure.** Ensuring adequate adaptation plans are in place using nature-based solutions (NbS), such as riverine tree planting, re-meandering rivers, and green / blue infrastructure such as urban ponds, help increase infiltration of water, reducing run-off and downstream flooding that can impact infrastructure and urban areas.

Source: CCC analysis.

Policy levers for nature and farming policies are devolved. In Northern Ireland, primary responsibilities for protection, conservation and enhancement of the natural environment, land management, fisheries and plant health are designated to the Department for Agriculture, Environment and Rural Affairs (DAERA). Key policies for terrestrial, freshwater, marine habitats and species fall within its responsibility. The Northern Ireland Environment Agency also sits within DAERA and aids progress towards protection of habitats and species. The Department for Infrastructure (DfI) considers consequences to the natural environment through a co-ordinated Coastal Forum and oversees Local Development Plans.

Some UK legislations are applicable in Northern Ireland through secondary legislation enacted by the Northern Ireland Assembly (Box 2.3).

Box 2.3

Legislative landscape in Northern Ireland after UK's exit from the European Union

The United Kingdom's departure from the European Union has led to changes in the overall legislative and policy landscape in Northern Ireland. The UK Government has enacted several laws that will impact the ability of these sectors, namely agriculture, forestry, and fisheries, to adapt to climate change. The relevant legislative changes include:

- **Agriculture Act 2020**, which replaces the EU Common Agricultural Policy and is shifting towards paying land managers to produce public goods such as nature restoration. This Act provides a legal basis to continue existing farm support measures in Northern Ireland that were previously supported by mechanisms drawn from the European Union.
 - **Clause 45, Part 7, Agriculture Act 2020** outlines the extent and nature of the application of the Act to Northern Ireland. As a result, provisions within the Act apply to Northern Ireland because there is no primary legislation on agriculture in the country. This Act was passed in the absence of an operational Northern Ireland Assembly, which means there is no 'sunset clause'* or set timeline on when NI's own legislation on agriculture should be developed.
 - **The Agriculture (2020 Act) (Commencement No. 1) Regulations (Northern Ireland) 2022**, which bring into operation paragraph 8 of Part 2 of Schedule 6 (Exceptional market conditions: powers available to DAERA) to the Agriculture Act 2020.
- **Fisheries Act 2020**, which replaces the EU Common Fisheries Policy and aims to build a strong, resilient fisheries sector. This Act designates responsibility of key marine functions to DAERA, who are referred to as the 'Northern Ireland department' within the scope of this Act.

* Sunset clause refers to when a statute or contract provides for certain obligations to stop producing legal effects after a specified date.

- **The Fisheries (Amendment) (Northern Ireland) (EU Exit) Regulations 2019**, sets regulations in exercise of powers conferred within the European Union (Withdrawal) Act 2018 to address areas of retained EU law. These regulations retain pre-existing EU law with some changes, one worth noting is:
 - **Salmon Netting Regulations (Northern Ireland) 2014**. This regulation made references to the EU's Habitats Directive, which were amended to substitute with the Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995.
- **Environment Act 2021**, which acts as the UK's new framework for environmental protection that applies nature protection, water quality, clean air and other environmental protections previously applied from EU legislation or policies. NI provisions are contained within the Act enabling powers for secondary legislation to be created.
- **Environment Order (Northern Ireland) 2022, which is NI's secondary legislation applying the 2021 Act**, also sets statutory duties on DAERA to publish an Environmental Improvement Plan in the form of an Environment Strategy, issue a policy statement on environmental principles. The act also extends the remit of the Office for Environmental Protection (OEP) to include Northern Ireland.

Source: UK Government (2020) *Agriculture Act 2020; Fisheries Act 2020; Environment Act 2020*.

The second NI Climate Change Adaptation Programme (NICCAP2) identified some indicators to assess progress towards building climate resilience for natural capital (Box 2.4). Additional indicators on resilience of species, habitats, and water bodies, as well as coastal habitats are discussed further in this chapter.

Box 2.4

Nature within Northern Ireland's Adaptation Programme (NICCAP2)

NICCAP2 identifies 'Natural Capital' as a key priority area and three 'outcome objectives' within the Natural Capital area with associated indicators:

- **NC1: We will have species, habitats and water bodies that are resilient to the impacts of climate change.**
 - NC1 Indicator (1): Percentage of terrestrial protected area under favourable management.
 - NC1 Indicator (2): Percentage of marine protected area under favourable management.
 - NC1 Indicator (3): Percentage of water bodies at 'good' status.
- **NC2: We have coastal communities, habitats, landforms, and infrastructure that are resilient to impacts of climate change.**
 - NC2 Indicator (1): Area of in-shore water protected for nature conservation.
 - NC2 Indicator (2): Percentage of sea wall in each structural condition code.
- **NC3: We have soils and woodland that are resilient to the impacts of climate change.**
 - NC3 Indicator: New woodlands planted.

There are clear linkages across each of these outcome objectives to this chapter. The indicators for NC1 and NC2 outcome objectives are discussed in this chapter, alongside other relevant indicators we have identified, except for NC2, which is discussed in the towns and cities chapter (Chapter 9). The NC3 outcome objective is also closely linked to working land and seas (Chapter 3), as the resilience of soils and woodland will directly affect the productivity of agriculture and forestry; its indicator is assessed in that chapter.

Source: DAERA (2019) *Northern Ireland Climate Change Adaptation Programme (NICCAP2)*.

1. Monitoring progress towards climate resilient nature

It is important to protect, connect and restore habitats, which support genetic and species diversity, and can help build resilience to the impacts of climate change.

Climate resilience for nature includes having healthy and well-connected ecosystems, as species can withstand pressures and adapt in response to change. A healthy ecosystem means protecting, restoring, and connecting habitats, and reducing the other pressures on ecosystems from pollution, over-exploitation, and invasive species.

A UK-wide non-binding target from Westminster in the G7 Summit and at the Convention on Biological Diversity's 2022 Montreal Agreement has established a target to halt biodiversity loss by 2030. The '30x30' initiative to conserve and protect at least 30% of the land and sea by 2030 was also set in accordance with this target. To achieve this, nature recovery and conservation strategies must consider the impacts of changes in average climate conditions and climate extremes projected over the coming decades.

We focus our assessment on three biome-based outcomes needed to deliver this goal (Figure 2.1):

- **Terrestrial habitats are in good ecological health.** These include natural and semi-natural habitats (native woodland, scrub, grassland, heath, bog) and farmland (arable, pasture, hedgerows, field margins).
- **Freshwater habitats are in good ecological health.** These include rivers, streams, canals, ditches, lakes, and ponds.
- **Coastal and marine habitats are in good ecological health.** These include saltmarshes, sand dunes, maritime cliffs, vegetated shingle, beaches, lagoons, estuaries, mudflats, reefs, seagrass, kelp, and marine sediments in both shallow and deep waters.

We assess the climate resilience of nature using a headline outcome that looks at overall ecological health. Supporting the delivery of this are various sub-outcomes, and enablers such as funding, skills, and monitoring.

These outcomes focus on the overall ecological health of habitats, as habitats that are in good condition are more resilient to climate change. Underpinning these outcomes, we also consider whether certain sub-outcomes associated with reducing the vulnerability of nature to climate change specifically are being achieved. We use a set of sub-outcomes associated with reducing the vulnerability of nature to climate change primarily based on the principles set out in the Lawton Review (2010):^{5,*}

- **Reduced pressure on the natural environment.** External factors that reduce resilience to climate change include pollution, habitat loss, degradation, and fragmentation, spread of disease, pests and invasive species, overuse of natural resources, and coastal squeeze from sea-level rise.
- **Use of nature-based solutions (NbS) for adaptation.**[†] NbS such as riverine planting or peatland restoration can help build nature's resilience to climate change impacts by delivering actions to protect, sustainably manage and restore natural or modified ecosystems.[‡]

* Where feasible, these sub-outcomes are utilised in the 2023 assessment of England's adaptation progress. Please see the CCC report on our website - [Progress in adapting to climate change, 2023 report to Parliament](#).

† Not included in the Lawton Principles.

‡ Please see the CCC report on Investment for a well-adapted UK for a definition of nature-based solutions: <https://www.thecccc.org.uk/publication/investment-for-a-well-adapted-uk/>

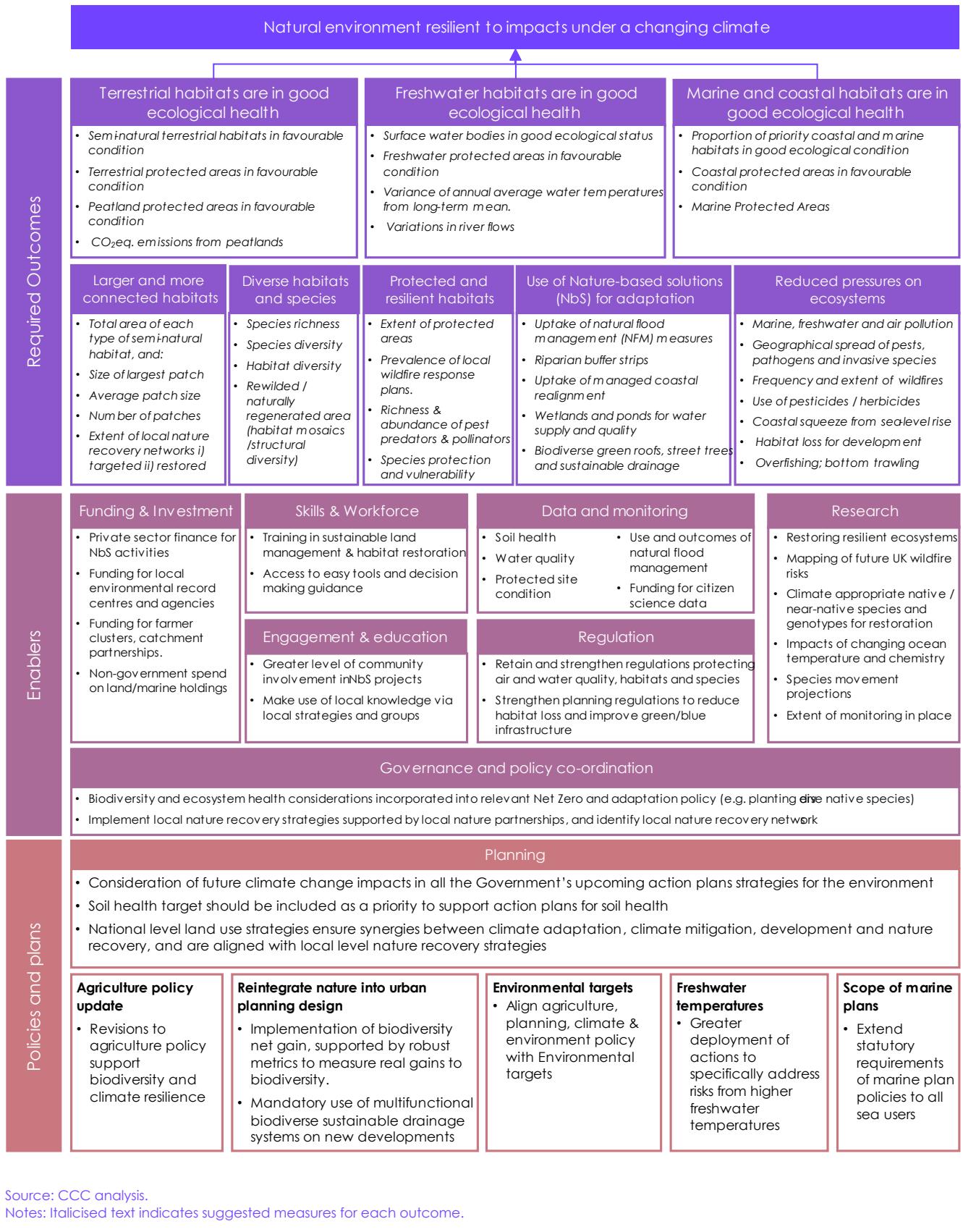
To support the delivery of these outcomes, various enabling factors are needed across the private and public sector. Key enablers we identify are:

- **Funding and investment.** Delivering the outcomes listed above will require funding, such as for nature recovery action, and monitoring. The benefits of adaptation flow to many different beneficiaries and can be difficult to quantify, so sustained public funding is vital. However, as public funding is likely to fall short of needed levels, accessible private investment streams will also be needed. Cross-border collaboration with the Republic of Ireland can be impacted if co-ordinated approaches are undertaken and required funding for these policy areas are not sustained. Public funding streams should be streamlined and clarified to help build certainty to incentivise private investments.
- **Skills and workforce.** More training is needed to build a bigger, skilled workforce to protect and restore nature. This includes help with learning new skills and training with information to implement sustainable land/sea management. Ecosystem restoration approaches as well as measurement and monitor the health of the ecosystems and their biodiversity need to be considered.
- **Engagement and education.** Public understanding of the value of nature and the innumerable benefits it provides is vital to secure the acceptance and adoption of measures to protect and restore it.
- **Data and monitoring.** Improved data for measuring and monitoring ecosystem health across land and seascapes are needed to track if outcomes are being achieved. Ensuring key datasets are publicly available for assessment will enhance transparency. More robust and frequently collected indicators across a wider range of species and ecosystems are needed to monitor progress in reducing climate change risk and the effectiveness of different interventions.
- **Regulation.** Effective and enforced planning regulation is important to protect against new developments and other forms of land-use change resulting in habitat and biodiversity loss and to contribute to improved ecological condition.
- **Research.** More research is needed on the effectiveness of different interventions for restoring ecosystem health and improving climate resilience. Areas where this is particularly critical include: identification of climate-resilient native species; mapping of future UK wildfire risks; effectiveness of NbS for adaptation; impacts of changing ocean temperature and chemistry; and species dispersal projections.
- **Governance and policy co-ordination.** Achieving the outcomes identified for nature in Northern Ireland to be climate resilient depends on the behaviour of natural resource managers such as landowners, farmers, foresters, fishermen and marine managers. These actors need to be listened to, supported, and incentivised to adopt more sustainable practices, such as peatland restoration and the use of natural flood management techniques. Effective policy and governance, through practical and financial support coupled with consistent standards and regulations can help influence shifts to more resilient practices. Cross-border collaboration with the Republic of Ireland is also crucial for some outcomes, so policy needs to be clear on adaptation responsibilities in such projects.

Policies and plans needed to build the resilience of nature to the impacts of changing climatic conditions include:

- **Planning.** Future climate change impacts must be accounted for in all the Government's upcoming action plans and strategies for the environment. The proposed UK Land Use Framework should identify synergies between climate adaptation, climate mitigation, equitable development, and must be aligned with local nature recovery strategies. A soil health target should be also included as a priority in the Government's strategy for soil health.
- **Agriculture policy.** Primary legislation on agriculture in Northern Ireland should be prioritised, and agricultural policy must consider and support biodiversity and climate resilience. Actions that reduce vulnerability and exposure to climate change across all environmental public good outcomes should be rewarded with more targeted agri-environment schemes.
- **Environmental targets.** The wide-ranging benefits delivered through meeting outcome-based targets for the environment, once set, must be clearly linked to the suite of climate, environmental and planning policies that support them.
- **Freshwater and sea temperatures.** There is a need to incorporate 2°C and 4°C warming scenarios based on the UK Climate Projections (UKCP18) in upcoming plans and consider risks identified in CCRA3 to address possible climate impacts and any external pressures. This is lacking in the current River Basin Management Plan (RBMP).
- **Shoreline Management Plans (SMP).** No Shoreline Management Plans are in place in Northern Ireland because there is no primary legislation in Northern Ireland on coastal change, unlike in England and Wales. Shoreline Management Plans are normally utilised to set long-term strategy to prepare for the impact of climate change on coastal habitats and species.
- **Marine plans.** Northern Ireland's Marine Plan will inform regulation and management of the marine area, pending Executive approval. The statutory requirements of marine plan policies should be extended to the decisions of public and private organisations. The consultation report highlights that only public authorities would be bound under law to apply the plan to their policy decisions. This leaves a significant gap in the protections they are designed to provide.

Figure 2.1 Monitoring map for nature



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

(i) Apex target: Natural environment resilient to impacts under a changing climate

Improved metrics for measuring biodiversity and ecosystem health are needed. The monitoring map for nature will be updated as more detailed indicators become available.

Quantitative measures of progress towards climate resilience outcomes for nature have several methodological challenges that need addressing. These include technological challenges of measuring biodiversity and other indicators of ecosystem health above and below ground; having to rely on proxy indicators for some adaptation outcomes; and the lack of long-term, consistent datasets. The below assessments of progress are therefore based on a limited set of fragmented datasets whilst we await more detailed indicator development and monitoring. We will continue to update the monitoring map and indicators as more data become available. The outcomes and indicators are therefore likely to change over time as data improve.

Species abundance indicators provide a good indication of the broader condition of the natural environment and can be used as proxy indicators for the vulnerability of habitats to climate change. There are fewer robust trends in species' abundance or distribution for Northern Ireland than for other parts of the UK, due to a lack of long-term monitoring.⁶

- **11% of assessed species from Ireland* are threatened with extinction.** A 2019 'State of Nature' report found that 11% (272) of 2,450 species in the whole of Ireland were formally classified as threatened[†] with the risk of extinction.⁷
- **Northern Ireland has been ranked as having the 12th lowest Biodiversity Intactness,[‡] out of 240 countries that were assessed.**⁸
- **One fifth of monitored bird species are on the Red List and almost half are on the Amber List.** An assessment of 185 bird species that breed or winter in the island of Ireland placed 37 (20%) on the Red List and 90 (49%) on the Amber List.[§] This is an increase from the previous review in 2007.⁹

(a) Outcome 1: Terrestrial habitats are in good ecological health

Some data is available that show a degree of progress, but vital indicators are not demonstrating improvements in ecological health of terrestrial habitats.

Indicators for this outcome demonstrate **insufficient progress** towards ensuring good ecological health of terrestrial habitats. The previous biodiversity strategy, 'The Northern Ireland Biodiversity Strategy 2010 – 2020', made some progress but failed to meet the overall targets that it set. Most terrestrial areas of special scientific interest (ASSIs) are not in favourable condition. Although favourable management of terrestrial protected sites has increased significantly in recent years, it only represents a 20% increase.

* Specific assessments for Northern Ireland are not available.

† Using IUCN Red List criteria.

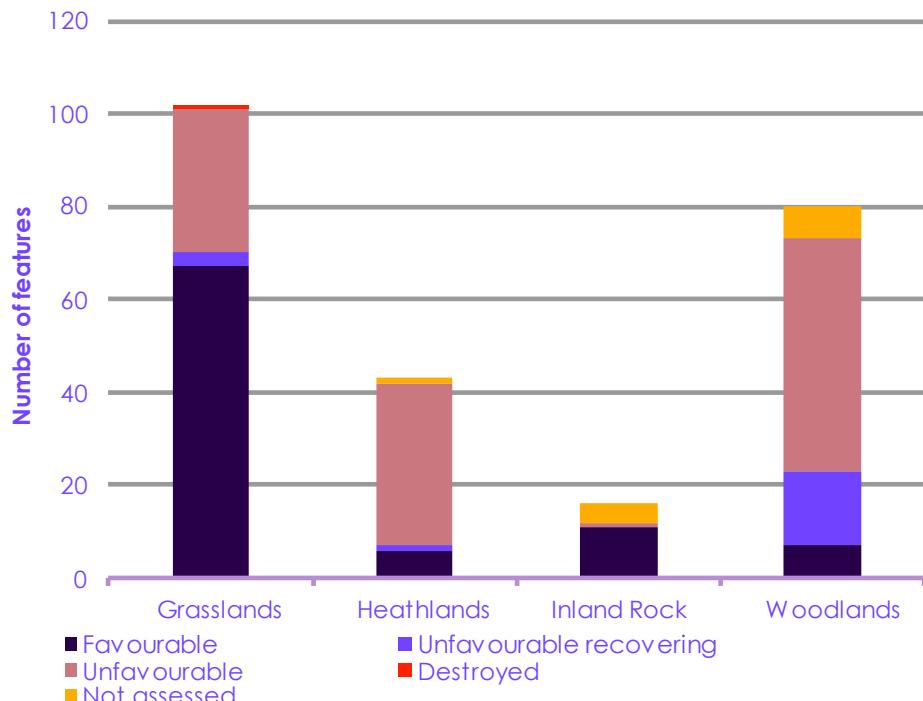
‡ The Biodiversity Intactness Index summarises the chance in ecological communities in response to human pressures. It is an estimated percentage of the original number of species that remain and their abundance in any given areas, despite human impacts.

§ The Red and Amber List criteria here are from the Birds of Conservation Concern in Ireland, which uses different criteria to the IUCN Red List.

Woodland plantation and sustainable management saw positive trends. However, key indicators have not demonstrated positive trends.

- **Most terrestrial areas of special scientific interest are not in favourable condition.** Areas of Special Scientific Interest (ASSIs) are protected areas designated under The Environment (Northern Ireland) Order 2002 for their species, habitat and/or geological features*. Data on the condition of ASSI features are available for bogs, grasslands, heathlands, inland rock, fen, marsh and swamp, and woodlands. Most grassland features (66%) were in favourable condition, while only 9% of woodland features were in favourable condition (Figure 2.2). Overall, only 38% of these features were found to be in favourable condition.¹⁰

Figure 2.2 Condition of features within terrestrial areas of special scientific interest (ASSI) for the six-year rolling period ending March 2022



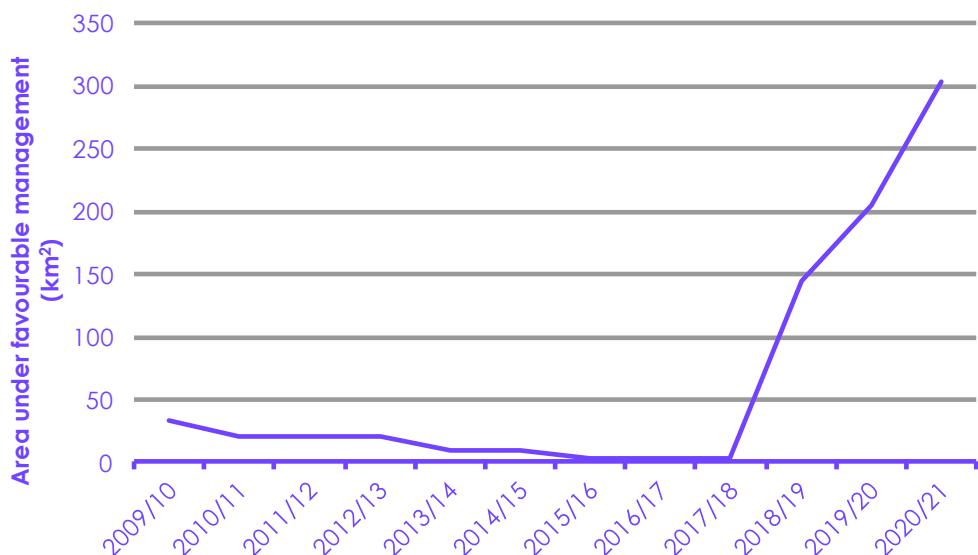
Source: DAERA (2022) Northern Ireland Environmental Statistics Report 2022 Data Tables.

- **Area of terrestrial protected sites under favourable management[†] has increased from previous years, but with only 20%, it remains quite low.** Evidence shows some progress since 2017/18 when the areas of terrestrial protected sites under favourable management increased from 3 km to 304 km in 2020/21, which is 20% of all protected sites (Figure 2.3). The total area of terrestrial protected sites also increased from 1,384 km in 2009/10 to 1,494 km in 2020/21.¹¹

* ASSIs are equivalent to sites of special scientific interest (SSSIs) in the rest of the UK.

[†] Favourable condition means that habitats and features are in a healthy state and are being conserved by appropriate management.

Figure 2.3 Terrestrial protected sites under favourable management



Source: DAERA (2021) Northern Ireland Environmental Statistics Report 2021.

- **Woodland area is increasing, with most being broadleaf woodlands.** Woodland area now represents 8.6% of total land area in Northern Ireland, an increase from 6% in 1998. There has been an increase in tree planting since 2015/16 driven primarily by broadleaf woodlands, which tend to have higher biodiversity than coniferous woodlands.¹² New grant-supported woodland plantings by private landowners and the NI Forest Service - which totalled 330 ha of broadleaf and 92 ha of conifers in 2021/22 - must follow UK Forestry Standards.¹³ Over 52% of forests and woodlands in Northern Ireland are managed by the Forest Service according to UK Forestry Standards.¹⁴
- **Condition of peatlands.** Peatlands cover approximately 12% of land area in Northern Ireland, of which only 14% are classified in good ecological health.¹⁵ No data were found on how the condition of peatlands has changed over time across Northern Ireland. However, a notable project on the Garron Plateau is ongoing.
- **Abundance of monitored breeding birds is declining.** Of 56 species studied annually in Northern Ireland, the abundance index for these species has been declining since 2005, primarily led by the decline of farmland birds.¹⁶ Thirteen percent of species moved to a higher level of concern in the Birds of Conservation Concern list for Ireland.* Breeding waders (including curlews) are declining in most areas, with monitored curlew populations declining more than 80%.¹⁷ However, less is known about bird species' trends in Northern Ireland than in other parts of the UK due to lower coverage in the Breeding Bird Survey.¹⁸

* The Birds of Conservation Concern in Ireland covers the island of Ireland, including Northern Ireland.

- **There are five pests in the highest risk category and 20 in the second-highest risk category.** DAERA maintains a local prioritised list (Northern Ireland Plant Health Risk Register) in which plant diseases and pests are prioritised based on factors local to Northern Ireland. The NI Plant Health Risk Register identifies a total of 1,064 pests.* There are no data from previous years available to assess any changes in the number of high priority pests.† The number of high priority forest pests in the UK Plant Health Risk Register‡ have recently flatlined, though disaggregated data on Northern Ireland are not available. Between 2016 and 2020, the number of recorded high-priority forest pests in the UK increased from 12 to 19, but this has decreased in recent years.¹⁹ Similar trends cannot be evaluated for Northern Ireland because information from previous years is unavailable.

(b) Outcome 2: Freshwater habitats are in good ecological health

The available indicators for ecological health of freshwater habitats are not demonstrating improvements, although there is evidence of prioritisation of these habitats in ongoing projects.

Indicators for this outcome demonstrate **insufficient progress** towards ensuring freshwater habitats being in good ecological health. The number of surface water bodies designated as having good ecological status has decreased, largely driven by the chemical status of water bodies.

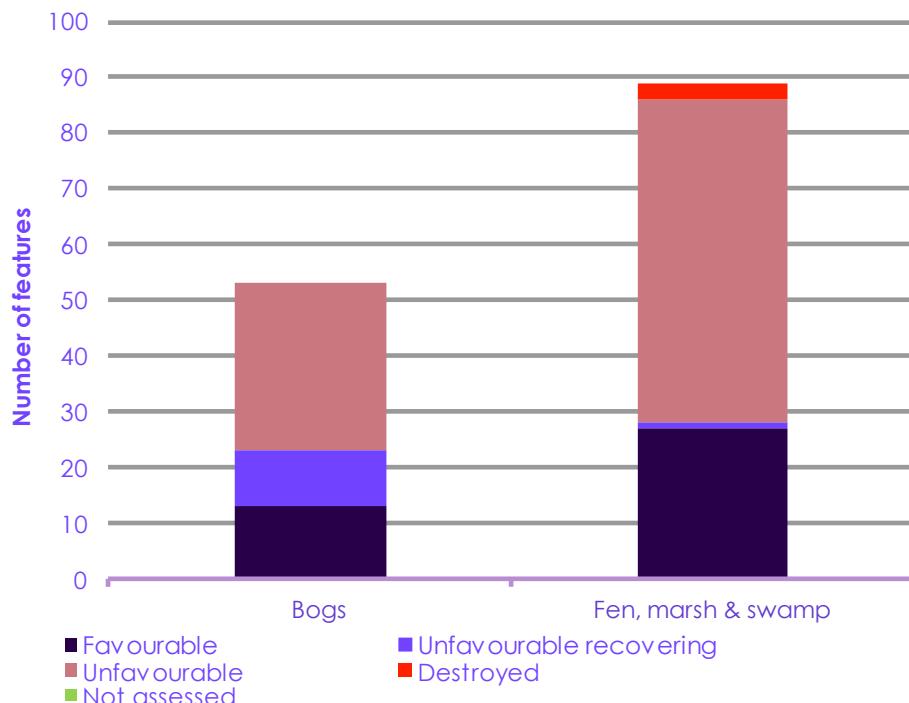
- **The proportion of surface water bodies in good ecological and chemical status has decreased.** The proportion of surface water bodies assessed under the Water Framework Directive in high or good overall status has declined since 2015 and, in 2021, no water body achieved good environmental status. However, this is largely due to the chemical status of water bodies, rather than their ecological status. When considering ecological status alone, the proportion of river water bodies achieving good or high status has stayed relatively constant across 2015 (33%), 2018 (31%) and 2021 (32%), and is still below the Water Framework Directive requirement.²⁰ The lack of progress will put increasing pressure on the Government's ability to meet its stretching target for 70% of surface water bodies to achieve and maintain good ecological status by 2027.²¹
- **Progress made in Sustainable Catchment Area Management Practice Northern Ireland (SCaMP NI).** Riparian planting and fencing practices in the sustainable catchment area management programme helped to reduce the amount of sediment and nutrient runoff into the water, which can be harmful to aquatic habitats. The SCaMP NI programme has supported the sustainable abstraction of water from the environment through catchment-based solutions that focus on protecting and enhancing the natural environment.
- **Most bog areas of special scientific interest (ASSIs) in not in favourable condition.** Only 25% of bog features were in favourable condition, with 57% in unfavourable condition (Figure 2.4).²² Some individual restoration projects have been implemented but further monitoring of restoration rates is required.

* The Plant Health Risk Register maintains a list of pests that could be of high risk to forests – amongst the 1,064 identified, many are not prevalent in Northern Ireland.

† Pests are ranked as high priority if they are assessed as having a mitigated relative risk rating of 15 or more.

‡ The UK Plant Health Register considers pest prevalence across the four countries, including Northern Ireland. If there is prevalence in any one country out of the four, this will be counted into the Register.

Figure 2.4 Condition of features within freshwater areas of special scientific interest (ASSI) for the six-year rolling period ending March 2022



Source: DAERA (2021) Northern Ireland Environmental Statistics Report 2021.

(c) Outcome 3: Marine and coastal habitats are in good ecological health

Substantial progress was made on ensuring good ecological health of marine habitat features, but indicators for coastal habitat features do not demonstrate improvements.

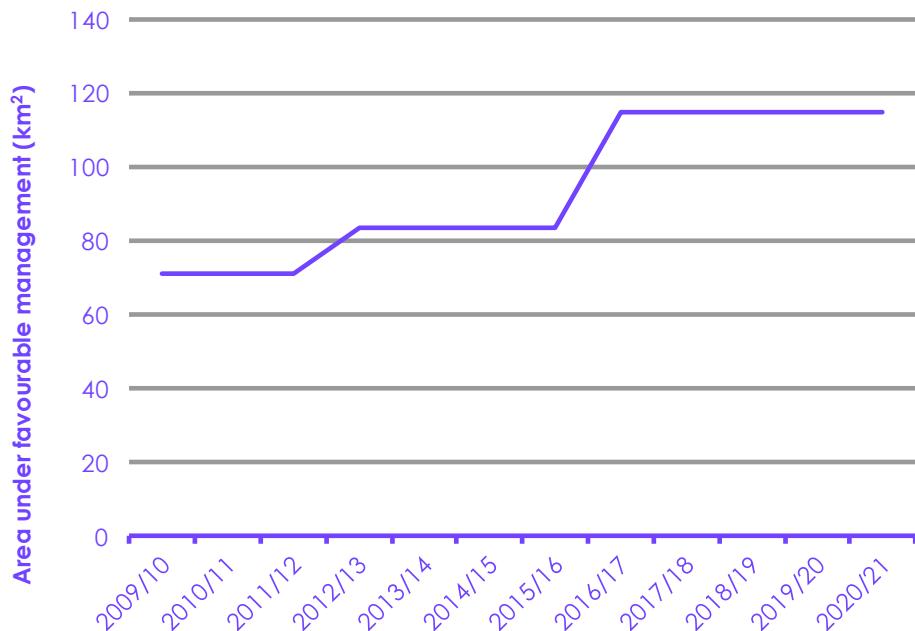
Indicators for this outcome demonstrate **mixed progress**. Most marine habitats are in favourable condition and the extent of Marine Protected Areas has grown to exceed the Government targets. However, the majority of coastal habitats are in unfavourable condition.

- **Extent of Marine Protected Areas has grown and exceeded targets.** Twenty-one inshore Marine Protected Areas (MPAs), totalling 2,022 km² (38% of Northern Ireland's inshore waters), fall within the MPA network.* Northern Ireland has exceeded the target to protect 30% of sea area by 2030 through a combination of large-scale Government and non-government led initiatives.²³ One assessment found the suite of Marine Protected Areas in the Northern Ireland inshore region is very close to delivering an ecologically coherent network in Northern Ireland.²⁴
- **Most marine habitat features are in favourable condition, but coastal habitat features are more likely to be in unfavourable condition.** The proportion of features in favourable condition for the six-year rolling period ending in March 2022 was 37% for coastal habitats and 86% for marine habitats.²⁵

* Inputs from NICCAP2 Indicator Statistics shared by DAERA.

- **Area of marine protected sites under favourable management has remained constant for four years.** Marine protected sites have been designated to protect sensitive and ecologically important species and habitats. The area of marine protected sites under favourable management increased from 71 km² in 2009/10 to 115 km² in 2017/18 and has remained constant since (Figure 2.5).²⁶ The total area of marine protected sites has also increased significantly during that time, from 269 km² to 2,410 km².²⁷

Figure 2.5 Marine protected sites under favourable management



Source: DAERA (2022) Northern Ireland Environmental Statistics Report 2022 Data Tables.

- **Proportion of transitional and coastal water bodies with good ecological status has marginally increased but remains low.** In 2015, one transitional or coastal water body achieved high ecological status and eight (32%) achieved good ecological status. By 2018, that had increased to a total of ten transitional and coastal water bodies achieving good ecological status. However, in 2021, no water bodies achieved good status overall.²⁸

(d) Summary of unavailable indicators

There are limitations on the range of monitoring data for a range of indicators that restrict the ability to track progress towards delivery and implementation outcomes.

There are gaps in available indicators to measure progress against the nature outcomes, which include, but are not limited to, indicators that measure:

- Invasive non-native species established in freshwater habitats.
- Number of incidents of Harmful Algal Blooms.
- Freshwater ASSIs in favourable condition.
- Variance of annual average water temperatures from long-term mean.

- Variations in river flow.
- Pressures on biodiversity, such as overexploitation, habitat change, or pests and diseases.
- Resilience for species, such as genetic diversity.
- Progress related to enablers e.g., skills/workforce, data/monitoring/research.
- Uptake of NbS for adaptation across all headline outcomes.
- Geographic range shifts in communities of species.
- Individual and combined impacts of acidification, temperature, and salinity on marine species.
- Changes in pressures on the seabed from human activity (e.g., bottom trawling or litter).

3. Policy and planning progress

Greater policy coherence is needed across the breadth of strategies being developed by Government departments to integrate biodiversity health into other policy domains including Net Zero, planning and agriculture, and to integrate consideration of climate adaptation into Local Nature Recovery Strategies. Facilitating a participatory approach to landscape and seascape planning will help maximise policy synergies between different goals and manage trade-offs or conflicts.

(a) Outcome 1: Terrestrial habitats are in good ecological health

Many strategies that are relevant to terrestrial habitats are in late stages of development, which once published, could fill gaps in current policies on ecological health of terrestrial habitats. Progress hinges on their ability to incorporate measures on adaptation to improvements in status of terrestrial habitats.

There are **insufficient policies and plans** in place to ensure that terrestrial habitats are in good ecological health. There are several strategies in draft form which would be a positive development once published, but there is little to show actions on the ground are being delivered and funding for projects is limited.

- **The Wildlife and Natural Environment Act (Northern Ireland) 2011 provides some protection to terrestrial habitats and species.** This legislation aims to protect and conserve the natural environment and its wildlife. It includes provisions for the protection of certain habitats and species, establishing a system area of special scientific interest (ASSIs).
- **The Environment (Northern Ireland) Order 2002 seeks to enhance and protect the natural environment.** This legislation sets out a framework for conservation and management. It includes provisions for the conservation of habitats and species of conservation concern and requires public authorities to have regard to the conservation of biodiversity when carrying out their functions.
- **The Green Growth Strategy has gone through public consultation but has not yet been published.** Consultation rounds for this strategy have been completed but it is pending Executive approval. The strategy sets out a vision for sustainable economic growth while protecting and enhancing the natural environment. To achieve this, the strategy includes several actions such as: promoting the restoration and enhancement of degraded or fragmented habitats, developing guidance for the management of protected areas, and promoting the use of green infrastructure to support biodiversity.
- **A draft Environment Strategy has gone out for public consultation but has not yet been published.** The draft includes strategic outcomes on 'excellent air, water, land and neighbourhood quality', 'healthy and accessible environment and landscapes' and 'thriving, resilient and connected nature and wildlife'. Consultation stages are completed but the strategy is pending Executive approval.
- **A new Biodiversity strategy is under development.** The new biodiversity strategy is in early stages of development, following the 15th UN Biodiversity Conference (COP15) in 2022. The previous biodiversity strategy, 'The Northern Ireland Biodiversity Strategy 2010 – 2020', made some progress but failed to meet the overall targets that it set. This failure can be attributed to a range of factors, including lack of funding, insufficient integration into policy and decision-making, limited engagement, and competing priorities.

These factors will need to be addressed in the development of a new biodiversity strategy to ensure that its objectives are met.

- **The peatland strategy has gone through public consultation but not yet been published.** The peatland strategy has gone through consultation but is pending Executive approval before publication. The draft strategy committed to restoring and conserving all semi-natural peatlands to healthy, functioning ecosystems by 2040, which is an ambitious target. There is limited detail on how this will be delivered.
- **The DAERA Environment Fund 2023 – 2028 supports projects which will deliver key environmental outcomes.** The Fund contributes to nature and climate recovery (focusing on building ecological and climate resilience); and connecting people with the environment. This funding is designed to enable delivery of actions on the ground by non-governmental organisations to deliver key adaptation outcomes.
- **The Shared Island Development Fund 2021- 2025 supports nature-based solutions.** €4.3 million of funding was awarded to local authorities across the Republic of Ireland and NI for biodiversity, agri-food, tourism, economic and cultural projects. This North-South collaboration seeks to address strategic challenges and develop the all-island economy.

(b) Outcome 2: Freshwater habitats are in good ecological health

Some policies are in place that consist of objectives on freshwater habitats. However, monitoring data needs to support these objectives and be made publicly available for assessing progress. Furthermore, latest UKCP18 planning scenarios need to be better integrated.

There are **limited policies and plans** in place that help to ensure that terrestrial habitats are in good ecological health. The long-term water strategy has positive policy aims but the latest River Basin Management Plan does not adequately consider climate impacts.

- **The long-term water strategy has objectives for water quality and agriculture but monitoring data could not be found.** The Sustainable Water – Long Term Water Strategy (2015 – 2040) includes some indicators on water for agricultural needs and some adaptation targets across a wide range of stakeholders. However, no monitoring data could be found for this strategy.
- **The latest River Basin Management Plan does not consider climate change.** The third cycle River Basin Management Plan (RBMP) was developed in 2021 and continues until 2027. It was due for publication in April 2022 but was delayed pending Executive approval. The RBMP does not incorporate 2°C and 4°C planning scenarios and therefore does not adequately consider impacts on freshwater habitats from climate change.

(c) Outcome 3: Marine and coastal habitats are in good ecological health

The baseline data analysis on coastal erosion supports the development of the Marine Plan, which will be positive progress once published. However, a significant gap remains because there is no primary legislation on managing coastal change.

There are **limited policies and plans** in place to ensure that marine and coastal habitats are in good ecological health. There is a good network of Marine Protected Areas, and a Marine Plan is being developed, which will be positive once published. There are also good baseline data on coastal erosion and some funding for coastal studies. However, there is no legislation to manage coastal change.

- **There is no primary legislation on coastal change.** There is no legislation on coastal change in NI and no designated Government body responsible for managing coastal change. Other legislation and policies related to coastal management provide some guidance on how to address coastal change issues in the absence of primary legislation.
- **The Marine Act establishes a network of Marine Protected Areas (MPA).** The Marine Act (NI) 2013 requires DAERA to establish a network of MPAs in NI's inshore region to contribute to conservation and improvement of the marine environment. MPAs are designated areas of the sea where specific conservation objectives are set, and activities are restricted or prohibited. The extent of MPAs has exceeded targets.
- **A Marine Plan is being developed.** DAERA is currently developing a new Marine Plan for Northern Ireland, which aims to provide a framework for managing the sustainable use of the marine environment, including addressing coastal change issues. This plan is expected to be finalised in 2023.
- **There are good baseline data on coastal erosion.** A comprehensive baseline has been developed on coastal erosion risks through a LiDAR survey on coastal change.²⁹ This could be further developed by undertaking coastal vulnerability assessments.
- **There is some funding for coastal and marine studies.** The Peace Plus programme, a cross-border initiative between Northern Ireland and the Republic of Ireland, includes a funding allocation of €24 million for coastal and marine studies. Marine Protected Area Management and Monitoring (INTERREG VA – MarPAMM) provides some funding for studying coastal adaptation. This fund is also a cross-border initiative between Northern Ireland and the Republic of Ireland which allocates funding for studies on coastal resilience within its total budget of €4.5 million.

(d) Recommendations

Table 2.2

Recommendations - Nature

Primary responsibility	Recommendation	Date
NI Executive	Consider bringing forward legislation on managing coastal change and designate responsibility to a NICS department to oversee coastal risk management from climate change.	2026
NI Executive	Publish outstanding environmental plans, strategies, and policies.	Ongoing
DAERA	Undertake coastal vulnerability assessments to build on the comprehensive evidence base on coastal erosion.	2024
DAERA	Include changes in average climate conditions and climate extremes expected over the coming decades in any nature recovery conservation strategies.	Ongoing
DAERA	Bring into effect the new Marine Plan and sustain adequately funded monitoring mechanisms to assess progress.	2023-24
DAERA	Set interim adaptation targets to drive early action to improve climate resilience of nature, enable progress assessments, and secure adequate resources (including for green jobs and skills) to facilitate delivery of the targets.	2024
DAERA	Focus attention on improving the ecological health of Northern Ireland's habitats, including supporting their biodiversity and reflecting these indicators within outcomes of the next adaptation programme.	2024
JNCC	JNCC should disaggregate biodiversity monitoring into devolved nations to understand country-level changes rather than the UK as a whole.	Ongoing

Endnotes

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Chapter 3

Working land and seas

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Introduction

Table 3.1

Progress summary – Working land and seas

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Climate-resilient agricultural production	Insufficient progress	Limited policies and plans	<ul style="list-style-type: none"> The area of land organically farmed has stagnated, and the diversity of pollinators saw an increase according to monitoring data for the All-Ireland Pollinator Plan. However, monitoring data specifically for Northern Ireland must be prioritised. Better metrics in adaptation plans need to be identified to assess climate-resilient agricultural production. A wide range of policies and plans are in place on climate resilient agricultural production but monitoring and reporting are not adequately carried out across the range of plans that apply to agricultural production.
Outcome 2: Climate-resilient commercial forestry sector	Insufficient progress	Limited policies and plans	<ul style="list-style-type: none"> Woodland plantation and management indicators show positive trends but total forest cover and percentage under active forest management are still below the target. Main policies are at UK level and guidance from the UK Forestry Standard is applied consistently by the Forest Service in Northern Ireland.
Outcome 3: Climate resilient commercial fisheries and aquaculture sector	Unable to evaluate	Insufficient policies and plans	<ul style="list-style-type: none"> There are no suitable indicators to assess the progress in extent and condition of sustainable harvesting of fish stocks in Northern Ireland. No localised plans exist on climate-resilient fisheries in Northern Ireland, but there is coordinated input into the Joint Fisheries Statement under the Fisheries Act.

Relevant risks from CCRA3:
Risks to soils, Urgency (N4); Risks and opportunities for natural carbon stores, carbon sequestration and GHG emissions (N5); Risks to agriculture and forestry (N6, N7, N8); Opportunities to agriculture and forestry (N9); Risks to aquifers agricultural land (N10); Risks to marine habitats and species, and fisheries (N14, N16); Opportunities to marine habitats and species, and fisheries (N15).

This chapter considers how climate change could affect the productivity of Northern Ireland's working lands and seas (WLS), which includes agriculture, commercial forestry, fisheries, and aquaculture. These sectors provide jobs, vital products, and inputs to other sectors, and bolster food, feed, fibre, timber, and resource security. Weather and climate-related disruptions in these sectors can have significant cascading environmental, economic, and social impacts.

Agricultural land makes up around 75% of land in Northern Ireland (NI),¹ which is slightly above the UK average. Of that, 69% was classified as a Less Favoured Area, meaning characteristics such as geology, altitude and climate make agricultural production more difficult.² There has been a shift away from mixed farming in recent decades towards a more livestock-focused system. As a result, agricultural outputs in Northern Ireland are much higher for milk (33%) and cattle (20%), compared to the UK average (16% and 11%, respectively).[†]

^{*} Farms within Less Favoured Areas are sometimes referred to as upland farms.

[†] These are agricultural outputs for 2021.

In 2021, there were 26,077 active farm businesses across Northern Ireland, which is a 0.7% increase from 2020.³

Climate hazards to working lands and seas are dependent both on risks to the underlying natural systems that these services depend on and the management practices used in the sectors. Other anthropogenic pressures can also impact the sectors and undermine resilience of natural resources to climate change, as well as the ability of these sectors to take advantage of any potential benefits from climate change.* These drivers include environmental pressures, such as water pollution and soil degradation, as well as policy-driven risks to international competitiveness and economic resilience.

There are many climate hazards affecting these sectors. For example, impacts from floods, storms, drought and average temperature rise are already being felt by agriculture, timber production and fisheries, and these impacts are projected to increase. Less predictable precipitation will also impact planting and harvesting times for agriculture.

The CCC's Independent Assessment of UK Climate Risk report identified four high priority risks directly related to Northern Ireland's working land and seas (Box 3.1):

- Risks to crops, livestock, and commercial trees from multiple hazards.
- Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards.
- Risks to soil health from increased flooding and drought.
- Risks to natural carbon stores and sequestration from multiple hazards leading to increased emissions.

Box 3.1

Climate impacts to working lands and seas in Northern Ireland

The third UK climate change risk assessment (CCRA3) identified:

- Increased likelihood of wetter winters and hotter, drier summers. This impacts probability scenarios of consecutive bad farming seasons. Compounded effects on crop growth also increase the likelihood of losses in crop production.
- 'Blue carbon' in marine and coastal habitats that sequester and store carbon risk further degradation. Climate change impacts could cause release in blue carbon or cause carbon sequestration to be hampered, which risks increasing atmospheric carbon dioxide.
- Magnitude of risk increases for natural carbon stores, carbon sequestration and two other greenhouse gases associated with the natural environment, methane and nitrous oxide. Peatland areas are the largest store of carbon-rich soils, and restoration of peatlands are gaining more attention while surveys indicate that much of these areas are in degraded condition.
- Increased risk to agricultural land from flooding, which requires improved Natural Flood Management (NFM) to protect better quality farmland.
- Plantation of non-native tree species in Northern Ireland includes fast-growing species, providing opportunities for enhanced productivity but also leads to additional risks such as wildfires or compromises water supplies.

* Advantages such as from longer growing seasons, production from new crops, and migration of warmer-adapted fish species.

There is also a risk that these plantations harm native ecosystems and their biodiversity, which in turn has knock-on effects on ecosystem services that support working lands and seas.

- Sustained dry weather in Northern Ireland during July 2018 required the Fire and Rescue Service to attend to unprecedented numbers of gorse fires – a 1,053% increase in incidence from the previous year. Trends in annual wildfire occurrence are difficult to identify due to scarce long-term data. However, the CCRA3 evidenced a strong correlation between wildfire incidence and drought conditions.
- Opportunities arise for the development of an effective strategy to address historical agricultural productivity gaps in Northern Ireland that interlinks adaptation and mitigation across the land use sector.

Source: Climate Change Committee (2021) *Evidence Report for the third Climate Change Risk Assessment Summary on Northern Ireland*.

The sectors within Northern Ireland's working lands and seas have intersections with climate adaptation outcomes covered in this chapter and elsewhere in the report (Box 3.2).

WLS heavily depend on healthy natural ecosystems so reducing climate risks to WLS relies in part on reducing climate risks to nature.

Box 3.2

Inter-relationships of working lands and seas with other parts of this assessment

The systems within this report where these links to nature are most pronounced include:

- **Nature.** Healthy ecosystems deliver resources (e.g., food, timber, and fibre) that are fundamental to economic activities in WLS. Healthy ecosystems also provide regulating services (e.g., water filtration, erosion control and flood mitigation) that can protect working lands and seas from the impacts of climate change, and supporting services (e.g., pest control and pollination) that support the production of many crops.
- **Food.** Effective adaptation by the agricultural and fisheries industries will support a climate-resilient food system producing sustainable, nutritious, and high-quality food.
- **Water supply.** The agriculture and aquaculture sectors abstract freshwater from the environment to support production. For the overall water system, including water used by homes and businesses through the public water system, to be resilient to periods of future drought, actions to use water more efficiently and sustainably in WLS are needed.

Source: CCC analysis.

In Northern Ireland, policy levers for agriculture, forestry and fisheries are devolved. All of the respective sectors fall within the remit of the Department for Agriculture, Environment, and Rural Affairs (DAERA). However, some UK legislation is applicable in Northern Ireland through secondary legislation enacted by the Northern Ireland Assembly (Box 3.3).

Box 3.3

Legislative landscape in Northern Ireland after UK's exit from the European Union

The United Kingdom's departure from the European Union has led to changes in the overall legislative and policy landscape in Northern Ireland. The UK Government has enacted several laws that will impact the ability of these sectors, namely agriculture, forestry and fisheries, to adapt to climate change. The relevant legislative changes include:

- **Agriculture Act 2020**, which replaces the EU Common Agricultural Policy and is shifting towards paying land managers to produce public goods such as nature restoration. This Act provides a legal basis to continue existing farm support measures

in Northern Ireland that were previously supported by mechanisms drawn from the European Union.

- Schedule 6, Agriculture Act 2020 designates DAERA as the responsible body to modify 'Direct Payment Regulations'* to simplify and improve operations within Northern Ireland. Powers to collect and share agricultural data and intervene in agricultural markets are also assigned to them within this schedule.
- Clause 45, Part 7, Agriculture Act 2020 outlines the extent and nature of the application of the Act to Northern Ireland. As a result, provisions within the Act apply to Northern Ireland because there is no primary legislation on agriculture in the country. This Act was passed in the absence of an operational Northern Ireland Assembly, which means there is no 'sunset clause'[†] or set timeline on when Northern Ireland's own legislation on agriculture should be developed.
- **Fisheries Act 2020**, which replaces the EU Common Fisheries Policy and aims to build a strong, resilient fisheries sector. This Act designates responsibility of key marine functions to DAERA, who are referred to as the 'Northern Ireland department' within the scope of this Act.
- **The Fisheries (Amendment) (Northern Ireland) (EU Exit) Regulations 2019**, sets regulations in exercise of powers conferred within the European Union (Withdrawal) Act 2018 to address areas of retained EU law. These regulations retain pre-existing EU law with some changes, one worth noting is:
 - **Salmon Netting Regulations (Northern Ireland) 2014**. This regulation made references to the EU's Habitats Directive, which were amended to substitute with the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995.
 - **Environment Act 2021**, which acts as the UK's new framework for environmental protection that applies nature protection, water quality, clean air and other environmental protections previously applied from EU legislation or policies. Northern Ireland provisions are contained within the Act enabling powers for secondary legislation to be created.
- **Environment Order (Northern Ireland) 2022**, which is Northern Ireland's secondary legislation applying the 2021 Act, also sets statutory duties on DAERA to publish an Environmental Improvement Plan in the form of an Environment Strategy, issue a policy statement on environmental principles, and extends the remit of the Office for Environmental Protection (OEP) to include Northern Ireland.

Source: UK Government (2020) *Agriculture Act 2020; Fisheries Act 2020; Environment Act 2020*.

The second Northern Ireland Climate Change Adaptation Programme (NICCAP2) identified indicators to assess progress towards building climate resilience for natural capital (Box 3.4). Only one indicator of the available indicators on resilient soils and woodland in Northern Ireland is relevant to our assessment of working lands and seas.

* Direct Payment Regulations establish rules for direct payments to farmers under support schemes within the framework of the European Union's common agricultural policy, which has been retained in UK legislation on agriculture and still apply to Northern Ireland.

[†] Sunset clause refers to when a statute or contract provides for certain obligations to stop producing legal effects after a specified date.

Box 3.4

Working lands and seas within Northern Ireland's Adaptation Programme (NICCAP2)

NICCAP2 identifies 'Natural Capital' as a key priority area and three 'outcome objectives' within the Natural Capital area with associated indicators:

- **NC1: We will have species, habitats and water bodies that are resilient to the impacts of climate change.**
 - NC1 indicator (1): Percentage of terrestrial protected area under favourable management.
 - NC1 indicator (2): Percentage of marine protected area under favourable management.
 - NC1 indicator (3): Percentage of water bodies at 'good' status.
- **NC2: We have coastal communities, habitats, landforms, and infrastructure that are resilient to impacts of climate change.**
 - NC2 indicator (1): Area of in-shore water protected for nature conservation.
 - NC2 indicator (2): Percentage of sea wall in each structural condition code.
- **NC3: We have soils and woodland that are resilient to the impacts of climate change.**
 - NC3 indicator: New woodland planted.

While there are strong linkages across each of these outcome objectives to working lands and seas, the most relevant is NC3 as the resilience of soils and woodland will directly affect the productivity of agriculture and forestry. The NC3 indicator is assessed in the indicators section of this chapter, alongside other relevant indicators we have identified. NC1 and NC2 outcome objectives are more closely relevant to the Nature chapter and Towns and Cities chapter in this report and their indicators are discussed further in those chapters.

Source: DAERA (2019) Northern Ireland Climate Change Adaptation Programme 2019-2024.

1. Monitoring progress for well-adapted working land and seas

Well-adapted working land and seas are those that remain productive and economically sustainable in a changing climate, with businesses that are resilient even during weather extremes. Within each sector of working lands and seas, we identify key adaptation outcomes to deliver this goal (Figure 3.1):

- **Climate-resilient agricultural production.** Agricultural soils need to be in good condition to support production, particularly under future weather extremes. Sustainable soil management techniques on farms (e.g., reduced tillage, the use of cover crops and incorporation of organic matter to reduce erosion) will help deliver this. These actions will also help increase water-holding capacity within soils, which can be complemented by increasing on-farm water storage capacity (such as via reservoirs) and water-saving farming techniques to fully address drought risks. Pollinators are needed to pollinate crops. On-farm flood risk management and contingency planning will need to be in place. Crop selection must be suitable to climate conditions and include greater crop diversity. Increased agroforestry and hedgerows can provide shade and shelter for livestock during heatwaves and offer co-benefits such as natural flood management and (together with species-rich field margins) habitat for pollinators and pest predators. Integrated pest management* and improved soil health will help improve resilience to climate change-driven increased risks from pests and diseases.
- **Climate-resilient commercial forestry sector.** Commercial woodlands should be under sustainable adaptive management (e.g., meeting the UK Forestry Standard) to help build resilience to climate change. They also need to contain climate-appropriate and ecologically suitable trees (e.g., avoiding water-hungry species or planted on incorrect soils). Having high species and genetic diversity can help reduce risks from pests and diseases, while wildfire risk can be better contained through adaptation actions to thin dense forests, remove forest fuels and establish fire belts.
- **Climate-resilient commercial fisheries and aquaculture sector.** Harvesting fish stocks must be undertaken sustainably to support resilience to climate change. Preventing water pollution (e.g., from discharge of power station cooling water) and controlling water temperatures where possible (e.g., planting along streams and rivers to improve shading) will help protect and improve the quality of water supplies vital to the aquaculture sector. Restricting ecologically damaging offshore fishing practices (e.g., bottom trawling) will ease pressures on the ability of marine habitats to support production. Fishing operations may need to adjust their locations, the species they harvest and practices to adapt to changing species distributions and disease risk associated with changing water temperatures.

* Integrated pest management (IPM) is a coordinated and planned strategy for the prevention, detection and control of pests, weeds, and diseases.

Delivering these outcomes requires enabling factors to be in place, the most critical of which are:

- **Governance and policy coordination.** A comprehensive, joined-up cross-departmental approach to policy is required. This must ensure that climate resilience is considered cohesively alongside other objectives for productive land and seas, such as contributing to Net Zero, nature recovery and food security.
- **Funding and investment.** Access to finance is needed, as actions to support resilient land and seas may have high upfront costs with relatively long periods before returns are fully realised. Agri-environment schemes, grants and funding for R&D will be key to support a just transition to sustainable and climate-resilient working lands and seas. Harmful subsidies that compromise adaptation need to be eliminated or carefully repurposed.
- **Data and monitoring.** Robust data are required to track changes in climate risks, hazards, and improvements in resilience of our working lands and seas, which will help target the most effective interventions. Priorities include metrics to track soil health, impacts of funding and interventions on productivity, nature and climate resilience, and data on missing indicators.
- **Research.** More evidence is needed to understand how a changing climate affects productivity across working lands and seas, which can be used to target interventions that build resilience. This includes spatial variability in climate impacts, researching climate-appropriate species or genotypes for different locations, and understanding the impacts of changing ocean temperature and chemistry on fish stocks. Understanding how to balance multiple goals including food security, climate mitigation, adaptation and nature recovery is also important.
- **Skills and workforce.** More training is needed to build the knowledge, understanding and capacity of practitioners to improve efficiency and build productivity across the sectors. This includes help with training and demonstration of more sustainable land management methods and new uses of land, such as agroforestry), funds to facilitate land manager co-operation and participatory governance, such as farmer clusters and catchment partnerships, and environmental awareness training.

Policies and plans needed to build the resilience of working lands and seas to the impacts of changing climatic conditions include:

- **Planning.** The agriculture sector needs a clear plan outlining the steps needed to ensure it remains productive under the shifting threats from climate change (e.g., drought, flooding, pest, and diseases). Revisions to plans for adapting commercial fisheries and aquaculture must consider climate impacts under a range of warming scenarios.
- **Agriculture policy update.** Revisions to agriculture policy must consider and support biodiversity and consider climate risks to delivery. Greater flexibility is needed in the range of activities under agri-environment schemes (e.g., allowing natural flood management on farmland), while more funding should be committed to support a broader range of activities that support climate resilience (such as for agroecology, hedgerows planting and peatland restoration).

- **Governance and coordinated management.** The proposed UK Land Use Framework must ensure it capitalises on synergies between production, climate adaptation, climate mitigation, development, and nature recovery. Land management standards must be strengthened, while the management arrangement for fisheries must be made more flexible to ensure effectiveness under a changing climate.
- **Green Finance.** Green finance schemes such as carbon credits and nature offsets must adhere to high environmental standards and codes. The forthcoming Green Growth Strategy, together with NICCAP3, should clarify where the NI Government expects adaptation actions will be funded through public sources and where private investment is expected.
- **Support delivery of the Fisheries Act objectives.** Sufficient support must be made available to ensure provisions to improve the ability of the fisheries and aquaculture sector to adapt to climate change are effectively actioned.

We will continue to update the monitoring map (Figure 3.1) and indicators to match this merged system. The outcomes and indicators are therefore likely to change over time as data improves for the relevant industries.

Figure 3.1 Monitoring map for working land and seas



Sustainable and climate-resilient working land and seas			
Required Outcomes	<h3>Climate resilient agricultural production</h3> <ul style="list-style-type: none"> Livestock mortality (%) and crop failure (per hectare) due to climate impacts. Abundance and diversity of pollinators and pest predators <h3>Take up of sustainable farming measures</h3> <ul style="list-style-type: none"> Area of cropland under cover crops, reduced tillage, addition of compost or manure Area of agroforestry, hedgerows buffer strips and species-rich field margins Reduced use of pesticides / synthetic fertilisers Greater on-farm water storage capacity/lower abstraction Appropriate slurry store /silage clamp engineering Overgrazing/stocking rates <h3>Healthy soils</h3> <ul style="list-style-type: none"> Soil erosion rates (t/ha/yr) Increase in soil organic carbon, natural soil biota diversity/abundance and soil infiltration 		
	<h3>Climate resilient commercial forestry sector</h3> <ul style="list-style-type: none"> Area of commercial forestry under sustainable adaptive management meeting UK Forestry Standard Area of commercial forestry planted with climate appropriate and ecologically suitable tree species (avoiding invasive or water-hungry species and damage to native biodiversity) Genetic diversity and species diversity of trees in commercial forests 	<h3>Climate resilient commercial fisheries and aquaculture sector</h3> <ul style="list-style-type: none"> UK fish stocks maintained at healthy status UK aquaculture stocks healthy and resilient Freshwater, marine and estuarine waters achieve good quality Water temperatures controlled 	<h3>Responsible practices</h3> <ul style="list-style-type: none"> Sustainable harvesting of UK fish stocks in line with scientific evidence Sustainable adaptive management of aquaculture production Restrict/ban bottom trawling activities
	<h3>Effective wildfire planning in place</h3> <ul style="list-style-type: none"> Prevalence of local wildfire response plans, and sufficient fire-fighting equipment /personnel levels Management of vegetation and fuels (but minimising adverse biodiversity impacts) For carbon offsets, plant sufficient area to account for risk of reversal due to fires etc. 	<h3>Climate resilient operations</h3> <ul style="list-style-type: none"> Safe and secure vessel and aquaculture operations Reduced vulnerability of vessels and ports 	
	<h3>Manage and reduce the impacts from pests, diseases and invasive non-native species</h3> <ul style="list-style-type: none"> Geographical spread of different climate-sensitive pests and pathogens Number of high priority pests and diseases recorded as present in UK plant health risk registers 		
	<h3>Funding & Investment</h3> <ul style="list-style-type: none"> Agri-environment scheme uptake Payments for ecosystem services R&D funding for agroecology and agricultural adaptation Small port resilience infrastructure Public-private partnerships 	<h3>Data and monitoring</h3> <ul style="list-style-type: none"> Soil health/erosion Agri-env scheme or natural flood management uptake and outcomes Pollinators/pest predator populations 	<h3>Skills and workforce</h3> <ul style="list-style-type: none"> Training and demonstration in sustainable land management & agroforestry Funds to facilitate land manager cooperation (e.g. farmer clusters). Fisheries science and environmental awareness training
	<h3>Governance and policy co-ordination</h3> <ul style="list-style-type: none"> Climate resilience incorporated into relevant Net Zero policies Synergies with nature recovery targets maximised and trade-offs minimised, e.g. use of diverse native species in plantations 		
	<h3>Planning</h3> <ul style="list-style-type: none"> Plan to ensure the agricultural sector remains productive under climate changes Plans for adapting commercial fisheries and aquaculture consider climate impacts under a range of warming scenarios 	<h3>Agriculture policy revisions</h3> <ul style="list-style-type: none"> New agriculture policy supports biodiversity and climate resilience Flexible agri-environment schemes e.g. allowing natural flood management on farmland Funding support for agroecology, farm water infrastructure, hedgerows and agroforestry 	<h3>Research</h3> <ul style="list-style-type: none"> Climate appropriate species research Tree and biomass crop productivity Impact of changing ocean temperature and chemistry on fisheries' productivity Agroecology and agroforestry R&D Climate impacts by location
Policies and plans	<h3>Governance and co-ordinated management</h3> <ul style="list-style-type: none"> Comprehensive UK land use strategies ensuring synergies between production/climate adaptation, climate mitigation/development and nature recovery Improved land management standards Flexible fisheries management arrangements Better protection for Marine Protected Areas/nurseries to replenish fish stocks 	<h3>Green Finance</h3> <ul style="list-style-type: none"> High environmental codes and standards to underpin private finance 	<h3>Fisheries Act provisions</h3> <ul style="list-style-type: none"> Support delivery of climate objectives outlined in UK Fisheries Act

Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

(a) Outcome 1: Climate resilient agricultural production

Some data are available to support progress assessment, but they need to be supported through better monitoring of Northern Ireland specific indicators and improved uses of existing data collection tools.

There are limited indicators within Northern Ireland's agricultural policies and reporting to measure how resilient the agricultural sector is to a changing climate. Available indicators show **insufficient progress** for this outcome.

Existing data on diversity of pollinator species and organically farmed land area are available to support progress assessment, but they need to be supported through better monitoring of Northern Ireland specific indicators and improved uses of existing data collection tools. For instance, the 2021 Agricultural Census in Northern Ireland does not collect any relevant datasets on climate resilient agricultural production. Furthermore, despite metered water use on each farm in Northern Ireland, data on the efficiency of water use within the industry is not collected at a sub-regional or national level.

- **Area of land organically farmed in Northern Ireland remained at 8,000 hectares between 2016 – 2021.** This compares to an increase in the UK overall from 489,000 hectares in 2020 to 507,000 hectares in 2021.⁴ Northern Ireland has the lowest proportion of farmland under organic management in the UK.
- **Distribution of pollinator species is improving across the island of Ireland, but many pollinator species are at risk.** An increase in the number of bee species from 13 in 2006 to 90 by 2022 was reported by the National Biodiversity Data Centre monitoring the All-Ireland Pollinator Plan. There are no historical data to assess changes in abundance or diversity of other common wild pollinator species. However, an IUCN assessment in 2006 found that one-third of which are threatened with extinction.* Three species that occur in Ireland are threatened with extinction, and four are near threatened.⁵
- **Initial soil health analysis is being carried out across all or at least the majority of farms across the country, but data are not currently available to assess the health of soils.** Recent analysis from the Climate Change Committee in 2021 found that less than 10% of farmland in Northern Ireland has an up-to-date soil analysis and 64% of soils are at optimum pH level.⁶ The new Soil Health Nutrient Scheme has 95% uptake of farms in Zone one (Southeast Northern Ireland)⁷ and will aim to cover the other three pending zones across the country in four years. Soil erosion is accelerated by clearance of natural vegetation for agriculture, which can lead to a reduction in soil quality and, in turn, overall productivity of agriculture crops but there are insufficient data on soil erosion to assess progress. There are also insufficient data on soil organic carbon, natural soil biodiversity and abundance and soil infiltration.

* All Ireland Pollinator Plan 2021 – 2025.

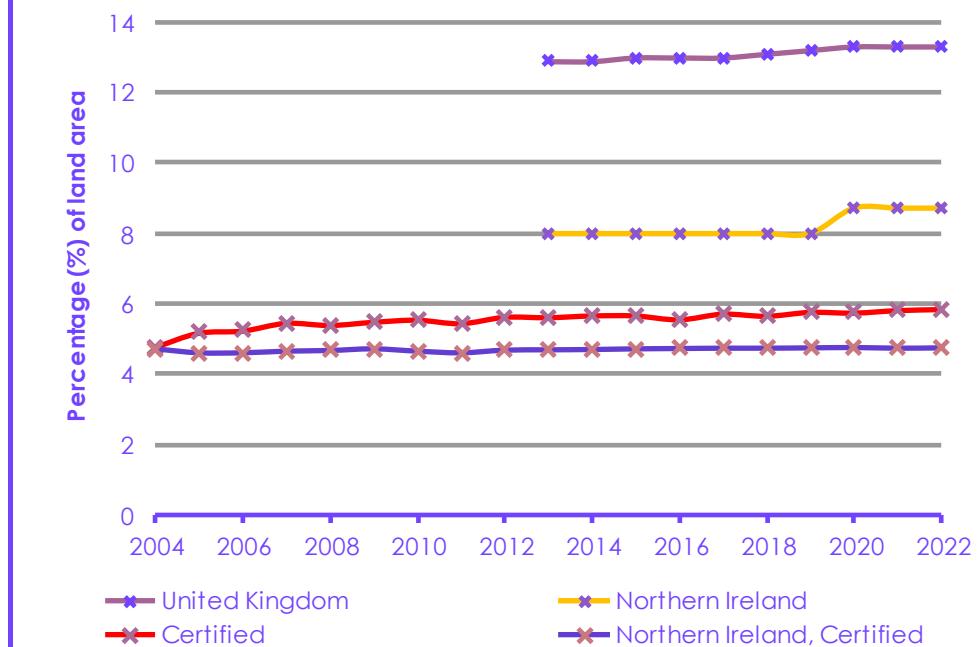
(b) Outcome 2: Climate-resilient forestry

Improved metrics are needed to assess resilience of forests against climate change. Woodland plantation and management indicators show positive trends but total forest cover and percentage under active forest management are still below the target.

Significant gaps remain in availability of data across indicators required to measure how the resilience of forests is changing in relation to climate change. Therefore, this outcome is being scored as **insufficient progress**. Woodland plantation and management indicators show positive trends but total forest cover and percentage under active forest management are still below the target. Once published, if adaptation actions are adequately targeted, the Wildfire Strategy could demonstrate progress preparedness of woodlands to climate risks.

- **Sustainable management of woodland in Northern Ireland remains at a similar level to 2004** (Figure 3.2). Woodland cover has incrementally increased to 8.7% from 2019 onwards, an increase of 0.72% from prior records.⁸ Certified woodland constitutes nearly 4.75% of this figure in 2022 and evidence from previous years show similar levels of sustainable management.⁹ Northern Ireland has one of the lowest woodland covers in Europe. Over 52% of forests and woodland in Northern Ireland are managed by the Forest Service, which requires accordance to the UK Forestry Standards (UKFS).¹⁰ Forestry grants are provided by DAERA through the Forest for our Future programme. Woodlands planted by the Northern Ireland Forest Service must comply with the UK Forestry Standard to be eligible for forestry grants.

Figure 3.2 Percentage of sustainably managed woodland area compared to total land area certified in Northern Ireland and across UK

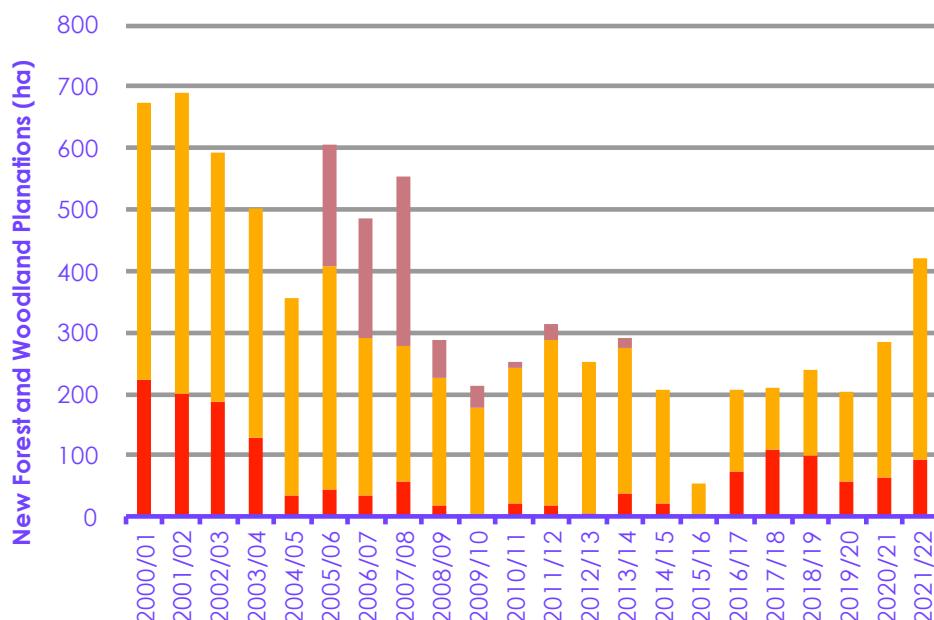


Source: Forest Research, Office for National Statistics (ONS).

Notes: All forest and woodland area over 0.5 hectare with a minimum of 20% canopy cover (25% in Northern Ireland) (or the potential to achieve it) and a minimum width of 20 metres, including areas of new planting, clearfell, windblow and restocked areas. Certified woodland refers to sustainable management practices as per agreed environmental standards. Certification requires that wood products are harvested legally and sustainably, and that important wildlife habitats are identified and are not negatively impacted by management. Certified refers to UK certified.

- **Planting rates have been increasing since 2019, with a beneficial prioritisation of broadleaved plantation.** Evidence suggests that greater biodiversity of plant species within a broadleaved wood supports climate resilience by providing a better ecological environment for the species it supports.¹¹ There has been a consistent increase in tree planting in Northern Ireland since 2019/20, primarily driven by an increase in broadleaved trees being planted. The area of new woodland planted in 2021-22 was 422 hectares, up from 284 hectares the year before.* This was partly funded by the European Commission under the Forestry Grant Schemes. The proportion of new broadleaf woodland area is consistently higher than conifer and has further increased in the last three years, with 92 hectares conifer versus 330 hectares broadleaf planted in 2021-22 (Figure 3.3).¹²

Figure 3.3 Planting rates of new trees in forest and woodland plantations in Northern Ireland, 2022



Source: DAERA (2022) Northern Ireland Environmental Statistics Report 2022.

- **Data on the number of wildfire incidents across woodland and forests could not be found.** Adaptation actions to mitigate forest wildfire risk involve better management of vegetation and other natural material to fuel fires and the creation of woodland buffer zones to limit the spread of wildfire.
- **There are now more local wildfire response plans and coordination to improve availability of fire-fighting equipment, as well as personnel.** Strategic planning on coordination with the Northern Ireland Fire and Rescue Service (NIFRS) has progressed, supported by a five-year action plan that includes fire and rescue responses, public and land-owners engagement, land management techniques and identifies opportunities for cross-border coordination with the Irish Fire Service. Vehicles for easier access of NIFRS to sensitive sites have also been prioritised. This progress is also shared with the Civil Contingencies Branch of The Executive Office.

* The NICCAP indicator data on area of new woodland planted is utilised to determine planting diversity.

- No evidence could be identified on whether climate change considerations are included in these response plans.

(c) Outcome 3: Climate-resilient fisheries and aquaculture

Metrics to assess progress in climate resilience of fisheries and aquaculture are needed.

There are no suitable datasets to assess the progress in adapting the commercial fisheries and aquaculture sector in Northern Ireland to climate change. We are therefore **unable to evaluate** this outcome. Further work is needed in the sector to measure adaptation progress over time. Data could include:

- The percentage of fish caught using sustainable harvesting methods in line with scientific evidence.
- Adaptive management of aquaculture production and fisheries harvests.
- Northern Ireland commercially important fish stocks maintained at healthy status.
- Temperature and chemistry trends within Northern Ireland's seas and oceans.
- Tracking populations of commercially important fish stocks in NI waters to determine if and how they are moving in response to climate change.

(d) Progress on enablers

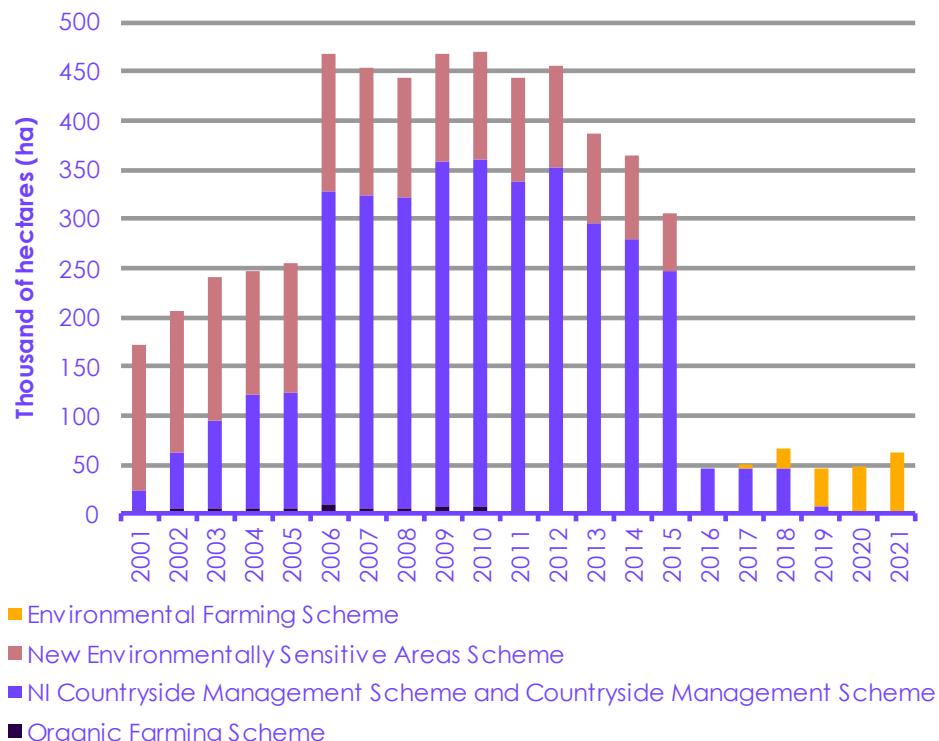
Indicators relating to enabling factors demonstrate some progress towards the outcomes, although data are only available for very few indicators identified in the monitoring map (Figure 3.1).

Many enabler indicators from the monitoring map need further datasets to enable an assessment of progress. Some information on enablers is available, but monitoring targets need to be set and reported on.

(i) Funding and investment

- **Land coverage of agri-environment schemes has reduced.** In 2017, the Environmental Farming Scheme¹³ was launched, replacing previous agri-environment schemes. The area of land covered by agri-environment schemes dropped significantly from 2016 (Figure 3.4), while the area of land managed through agri-environment schemes also reduced from 85% to approximately 5% between 2015 and 2016.¹⁴ This was due to the expiration of the 10-year agreements for older agri-environment schemes, such as the Countryside Management Scheme (CMS) and Environmentally Sensitive Areas Scheme (ESAS). The Northern Ireland Countryside Management Scheme (NICMS) agreements also came to an end on 31 December 2019.

Figure 3.4 Area of land under previous and new targeted agri-environment schemes



Source: DAERA (2022) Northern Ireland Environmental Statistics Report 2022.

(ii) Data and monitoring

There is good cross-border collaboration to support pollinators but monitoring data is not available. The next cycle of the All-Ireland Pollinator Plan from 2020-2025 continues to monitor and engage a wide array of sectors aiming to reverse the decline of pollinator populations across Ireland. Northern Ireland and Republic of Ireland participate in the outcomes of this cross-border strategy. There is a lack of publicly available monitoring data from the previous 2015-2020 cycle, so it is not possible to assess the impact of the plan.

(e) Summary of unavailable indicators

There are significant gaps in the availability of indicators and data to measure progress against the outcomes. Key indicators we would like to track but are unable to due to a lack of data include:

- Most of the enabler indicators to:
 - Assess impacts of extreme, unpredictable, and unseasonal weather, such as: yield and profit changes; crop and livestock losses to agriculture due to flooding, heat stress and drought; and losses of fish stocks and shellfish due to sea temperature rises and ocean acidification.
 - Inform the assessment of resilience of commercial species, such as genetic diversity of crops, livestock, trees, and fish.

- Determine the prevalence of local wildfire plans in place and capacity of local firefighters to address wildfires in agriculture and forestry.
 - Assess management of fuel load to mitigate wildfires.
 - Track localised, fine-scale marine and coastal water temperatures and acidification.
 - Assess cost and yield consequences of extreme weather events on agriculture, forestry, and fisheries.
- Assess soil erosion, soil organic matter, soil biodiversity and a range of soil types and uses.
- Monitor the number of local fish species extinctions and new fish species appearing in Northern Ireland.
- Identify progress on extent and condition of sustainable harvesting of fish stocks in Northern Ireland.
- Collect data that support monitoring of pests, pathogens and invasive non-native species for forests, fisheries, and agriculture.

3. Policy and planning progress

The current policy landscape presents a mixed picture of climate adaptation progress for working lands and seas. Emerging plans from the commercial forestry and fisheries sectors indicate both are taking steps to meet the risks and opportunities from changing climate conditions, although agriculture lacks an effective plan. Furthermore, an acute lack of data means it is challenging to undertake a comprehensive assessment of the rate and effectiveness of implementation of adaptation policy within the respective sectors.

(a) Outcome 1: Climate-resilient agricultural production

Current legislation in Northern Ireland will continue the Basic Payments Scheme indefinitely, which could undermine productivity and will not support payments for ecosystem services.

There are **limited policies and plans** on climate-resilient agricultural production. Current legislation in Northern Ireland will continue the Basic Payments Scheme indefinitely, which could undermine productivity and will not support payments for ecosystem services. There is no Sustainable Land Management Strategy for Northern Ireland and the rural development programme has now ended, though the forthcoming UK Land Use Framework may help guide sustainable land decisions. There is a pollinator plan and a long-term water strategy but monitoring data for both are unavailable. Participation in the Environmental Farming Scheme is increasing and a soil health baseline is being produced.

- **Northern Ireland legislation has not been updated to adopt new payment schemes which will incentivise farmers and landowners to make changes that produce environment benefits.** Since the UK exited the European Union, Northern Ireland has not enacted any primary legislation on agriculture. Instead, despite agriculture being a devolved policy area, it is governed through provisions from the Agriculture Act 2020 that apply to Northern Ireland. There is no 'sunset clause' for the provisions applying to Northern Ireland, due to the lack of an operational Assembly when the Act came into effect, presenting a risk that current agricultural policy continues indefinitely.¹⁵ The provisions for Northern Ireland under the Agriculture Act continue the Basic Payments Scheme following retained EU legislation which was previously criticised by the UK Government for inhibiting productivity by undermining incentives to adopt best practice.¹⁶ Elsewhere in the UK, the Basic Payments Scheme will be phased out in favour of new schemes to pay farmers and land managers for providing environmental and climate goods and services.
- **There is no Sustainable Land Management Strategy for Northern Ireland.** In 2016, the independent Expert Working Group on Sustainable Land Management delivered their report on a sustainable land management strategy for Northern Ireland, 'Delivering Our Future, Valuing Our Soils'. The group also subsequently published a report on ammonia ('Making Ammonia Visible'). DAERA provided a response to the report on ammonia, accepting many of the recommendations, but no further work has been published on a land management strategy.
- **A draft Ammonia Strategy has gone out for consultation but not been published.** The strategy was out for public consultation until September 2021. The primary focus of the draft plan is on reducing ammonia emissions from agricultural sources. While the draft plan does not explicitly discuss adaptation measures, some of the measures proposed may have co-benefits for climate resilience and adaptation. Ammonia emissions can

have negative impacts on human health, climate, biodiversity, and water quality.

- **An All-Ireland Pollinator Plan (AIPP) is in place to support bees, other pollinating insects, and wider biodiversity.** This is a cross-border collaboration with the Republic of Ireland and is the second AIPP in place, running for five years from 2021-2025. The plan has five objectives, one of which is to make farmland pollinator friendly. Twelve sites in Northern Ireland were monitored in 2022 as part of the UK Pollinator Monitoring Scheme, which is compatible with the Ireland National Pollinator Monitoring Scheme, enabling island-wide analyses in future years.¹⁷
- **The long-term Water Strategy has objectives for agriculture but monitoring data could not be found.** This strategy, the Sustainable Water – Long Term Water Strategy (2015 – 2040), includes some policy aims for agriculture, for example, to support sustainable agricultural practices to reduce surface water run-off and leaching. The framework also includes some indicators on water for agricultural needs and some adaptation targets across a wide range of stakeholders. However, no monitoring data could be found for this strategy.
- **The Rural Development Programme, which aimed to restore and enhance ecosystems as well as manage risks to farms, has come to an end.** The Northern Ireland Rural Development Programme ran from 2000 – 2020, under the EU's Common Agricultural Policy. Under the various periods of the programme, a range of agri-environment schemes were funded, with over 40% of eligible farmland covered by an agri-environment scheme by the end of the programme.¹⁸ The most recent cycle of the programme from 2014-2020 had six priorities for rural development: knowledge transfer and innovation in agriculture, forestry and rural areas; farm competitiveness and risk management; food chain organisation; restoring and enhancing ecosystems; promoting resource efficiency; social inclusion, poverty reduction and rural economic development.¹⁹ No equivalent replacement programme has yet been announced.
- **Participation in the Environmental Farming Scheme (EFS) is growing.** This scheme enables voluntary participation of farmers in a five-year agreement to deliver a range of environment needs, primarily related to biodiversity, climate change and water quality to deliver benefits to the environment and value for money. There are three tiers of support within the scheme.
- **The Soil Health Nutrient Scheme will create a baseline for soil health.** The DAERA-funded Soil Health Nutrient Scheme of up to £45 million, managed by the Agri-Food and Biosciences Institute aims to create a baseline on soil nutrient status for Northern Ireland's agricultural land.²⁰ The scheme will provide detailed information on the nutrient status of soils, runoff risk maps for nutrient loss to waterbodies, estimates of carbon stored in soils and as biomass, and training on the interpretation of soil nutrient reports. While the details of the scheme do not include reference to managing future climate risks, data on soil health will be useful in future to assess climate resilience. The scheme will conclude in 2026 and targets 93% of agricultural land in Zone 1 of Northern Ireland by providing soil analysis and assessment of soil carbon content.* There are a total of four zones that this scheme will target.

* Soil Health Nutrient Scheme discussion with AFBI.

(b) Outcome 2: Climate-resilient forestry

The Wildfire Strategy is in development, which could support progress towards this outcome when published. This will remain contingent on inclusion of adaptation actions to manage risks from wildfire.

There are **limited policies and plans** in place on climate resilient forestry in Northern Ireland, the main policies are at UK level and guidance from the UK Forestry Standard is applied consistently by the Forest Service in Northern Ireland. The Wildfire Strategy is in development, which could support progress towards this outcome when published. This will remain contingent on inclusion of adaptation actions to manage risks from wildfire.

- **The UK Forestry Standard Practice Guide.** The guidance covers adapting forest and woodland management to climate change, which is developed at UK level and has a positive influence on forest management practices in Northern Ireland. This guide provides information on how to assess the risks associated with climate change and to plan and adapt forest and woodland management. The guide represents a step forward for adaptation, but its effectiveness will rely on uptake by forestry and woodland managers and it is unclear if or how this uptake is being monitored.
- **The Forests for our Future programme support sustainable forest management.** Forestry grants to encourage afforestation include a requirement for non-Forest Service woodland managers to follow UK Forestry Standard sustainable management guidance under the Forests for our Future programme.
- **A draft Wildfire Strategy is expected in 2023.** The draft strategy is expected to be published for public consultation in early 2023.

(c) Outcome 3: Climate-resilient fisheries and aquaculture

The Joint Fisheries Statement lacks detail on actions the industry must take to remain productive under changing climate conditions.

There are **insufficient policies and plans** on climate-resilient fisheries in Northern Ireland, however, there is coordinated input into the Joint Fisheries Statement under the Fisheries Act.

- **The Joint Fisheries Statement (JFS) commits to identifying climate risks but lacks details on actions.** Under the Fisheries Act 2020, fisheries policy authorities must produce a JFS setting out the respective policies for achieving, or contributing to the achievement of, the Act's eight fisheries objectives, including climate adaptation. The JFS does commit to identifying climate risks to fisheries and aquaculture and to make the findings accessible to affected stakeholders and incorporated into its decision-making processes. However, it lacks detail on the actions the industry must take to remain productive under changing climate conditions.

(d) Recommendations

Table 3.2 lists the recommendations for improving climate resilience of WLS. This should be read in conjunction with the recommendations in the Nature chapter given their interdependencies.

Table 2.2

Recommendations - Working land and seas

Primary responsibility	Recommendation	Date
DAERA	The agricultural census questionnaire on Northern Ireland should include questions on livestock mortality and crop failure from climate impacts to develop a dataset on the extent to which climate could be impacting agriculture.	2024
DAERA, in coordination with The Executive Office	<p>Significantly more investment is needed in data, monitoring, innovation, skills training, advisory services, and R&D in the agricultural, forestry and fisheries sectors to improve climate resilience.</p> <ul style="list-style-type: none"> – Increase investment for monitoring data on indicators that assess soil health and commercial fishery metrics across Northern Ireland. – Monitoring data from the implementation of the All-Ireland Pollinator Plan should be tracked. – Increase uptake of agri-environment schemes to incentivise sustainable farming practice in Northern Ireland. 	Ongoing
DAERA, in coordination with farming unions	Monitor impact of funding on WLS productivity, socio-economic, nature and climate goals, adjusting funding where necessary.	2024
DAERA	Undertake risk assessments of the agriculture, forestry, and fisheries sector-dependencies on internationally sourced inputs and how these could change under various climate scenarios and develop plans to mitigate supply chain risks.	Ongoing
DAERA	Research into maximising co-benefits and minimising trade-offs between the multiple uses of lands and seas, such as for renewable energy, climate resilience, nature recovery, food/feed/timber/fibre production and recreation.	2025
DAERA	Improve policy coherence on areas related to the management of lands and seas to deliver synergies between policy goals.	Ongoing
DAERA	Stronger, urgent action to reduce sewage discharges into rivers and seas to protect the health of commercial fisheries through a legal obligation on water companies to reduce discharges by a significant percentage (e.g., 50%) by 2030, coupled with sufficient resources for monitoring and enforcing regulations.	2025
DAERA, NED	Publish the nationwide wildfire strategy, which will include managing wildfires on agricultural and forestry land. This strategy should consider likelihood of future impact from climate change and include adaptation measures to manage wildfire risk.	2024

Endnotes

- ¹ National Biodiversity Network (2019) State of Nature Summary for Northern Ireland. <https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-Northern-Ireland-summary.pdf>
- ² DAERA (2021) Statistical Review of Northern Ireland Agriculture. <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/22.23.050%20Stats%20Review%20for%202021%20Final%20V2.pdf>.
- ³ DAERA (2021) Statistical Review of Northern Ireland Agriculture. <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/22.23.050%20Stats%20Review%20for%202021%20Final%20V2.pdf>.
- ⁴ DAERA (2021) Statistical Review of Northern Ireland Agriculture. <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/22.23.050%20Stats%20Review%20for%202021%20Final%20V2.pdf>.
- ⁵ National Biodiversity Data Centre (2022) All-Ireland Pollinator Plan 2021-2025 Year 2 Review. <https://maps.biodiversityireland.ie/Dataset/5#DatasetBrowserDetailStatisticsTab>.
- ⁶ CCC (2021) Evidence Report for Third Climate Change Risk Assessment (CCRA3) Summary on Northern Ireland.
- ⁷ Northern Ireland Executive (2023) Update on DAERA's Soil Health Nutrient Scheme Zone 1. <https://www.northernireland.gov.uk/news/update-daeras-zone-1-soil-nutrient-health-scheme-0>
- ⁸ UK Indicators for the Sustainable Development Goals. <https://sdgdata.gov.uk/15-1-1>.
- ⁹ UK Indicators for the Sustainable Development Goals. <https://sdgdata.gov.uk/15-1-1>.
- ¹⁰ DAERA (2022) Northern Ireland Environmental Statistics Report 2022, <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/ni-environmental-statistics-report-2022.pdf>.
- ¹¹ DAERA (2022) Northern Ireland Environmental Statistics Report 2022, <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/ni-environmental-statistics-report-2022.pdf>.
- ¹² DAERA (2022) Northern Ireland Environmental Statistics Report 2022, <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/ni-environmental-statistics-report-2022.pdf>.
- ¹³ DAERA (2022) Environmental Farming Scheme, <https://www.daera-ni.gov.uk/topics/rural-development/environmental-farming-scheme-efs>.
- ¹⁴ DAERA (2021) Statistical Review of Northern Ireland Agriculture, <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/22.23.050%20Stats%20Review%20for%202021%20Final%20V2.pdf>.
- ¹⁵ Northern Ireland Environment Link, UK Agriculture Bill, and Northern Ireland – Written evidence to the AERA committee from NIEL. <http://www.niassembly.gov.uk/globalassets/committee-blocks/agriculture-environment-and-rural-affairs/2017---2022/niel-briefing-paper-on-uk-agriculture-bill-.pdf>.
- ¹⁶ Defra (2018) Moving away from Direct Payments, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740669/agri-bill-evidence-slide-pack-direct-payments.pdf.
- ¹⁷ National Biodiversity Data Centre (2022) All-Ireland Pollinator Plan 2021-2025 Year 2 Review.

¹⁸ DAERA Environmentally Sensitive Areas Scheme (ESA) and Countryside Management Scheme (CMS), accessed on 26 March 2023, <https://www.daera-ni.gov.uk/articles/environmentally-sensitive-areas-scheme-esa-and-countryside-management-scheme-cms>.

¹⁹ DAERA 2014-2020 Rural Development Programme, <https://www.daera-ni.gov.uk/articles/2014-2020-rural-development-programme>.

²⁰ Northern Ireland Executive (2023) Update on DAERA's Soil Health Nutrient Scheme Zone 1. <https://www.northernireland.gov.uk/news/update-daeras-zone-1-soil-nutrient-health-scheme-0>



Chapter 4

Food security

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Introduction

Table 4.1

Progress summary – Food security

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Disruption to food and feed import supply chains due to climate change is minimised	Unable to evaluate	Mostly reserved	<ul style="list-style-type: none"> Reporting by private sector companies is very limited so it is not possible to evaluate progress. Recent shortages of imported vegetables have highlighted the fragility of food supply chains. Most of the policy levers for this area are reserved. The proposed NI Food Strategy Framework would be a positive development for supply chain resilience if adopted.
Outcome 2: Vulnerability to food price shocks is reduced	Insufficient progress	Limited policies and plans	<ul style="list-style-type: none"> Household food insecurity (while not currently driven by climate change) has stayed at a high level, leaving households vulnerable to food price spikes. Some support for low-income households is available

Relevant risks from CCRA3:
ID1 Risks to UK food availability, safety, and quality from climate change overseas; ID2 Opportunities for UK food availability and exports from climate impacts overseas; ID6 Opportunities from climate change on international trade routes; ID7 Risks associated with international trade routes; H9 Risks to food safety and food security; B6 Risks to business from disruption to supply chains and distribution networks; N4 Risk to soils from changing climatic conditions, including seasonal aridity and wetness; N10 Risks to aquifers and agricultural land from sea level rise, saltwater intrusion.

This chapter considers how Northern Ireland's domestic and international food and feed supply chains can be made resilient to climate change. Access to high quality and reasonably priced food despite climate and weather extremes is also covered here, as well as climate-related changes in nutritional quality of food and food-borne diseases. Climate risks to domestic food production are covered in depth in Chapter 3.

Domestic and international food supply chains may be disrupted by extreme weather.

Food security will be affected by climate hazards in places overseas, from which the UK imports food and feed,* as well as climate hazards affecting the supply chains (domestic and international) for food and feed and cascading impacts from indirect hazards (Box 4.2). Food supply chains can be impacted by many types of weather extremes and climate conditions. This includes regions which don't export directly to the UK but are important for setting international food commodity prices, and regions which are important for the production of critical inputs to food production, such as fertilizer. Extreme heat, flooding, drought, sea level rise and increased agricultural pests and diseases associated with increasing global mean temperature are likely to affect crops, livestock, aquaculture and fisheries yields around the world. The last UK Climate Change Risk Assessment (CCRA3) found that the potential for systemic risks is growing through a more interconnected world, where risk cascades can lead to system-wide consequences (see Box 4.2). The resulting risks to food security in the UK will be varying access to food associated with supply-side disruptions and the potential for cascading and interacting risks, resulting in food price spikes. Diversity of supply can also improve resilience by allowing one production area to substitute for another.

* For livestock and fish.

The risk to UK food availability, safety and quality from climate change impacts overseas was scored as high in the present day and medium to high under future conditions, with more action needed.¹ The urgency of dealing with this risk has increased since CCRA2 due to more evidence of specific events and their impact on food availability and food prices; and the growing evidence of a lack of systemic resilience.

CCRA3 found that the risk to UK food availability, safety, and quality from climate change impacts overseas is high.

Global patterns of climate change may also alter the comparative advantage of the UK in trading food. The impact of climate change on global production patterns depends on the relative importance of extreme events to more gradual changes in climate, which may vary geographically. For example, new areas may open for production due to gradual warming, so long as extreme events do not disrupt agricultural productivity, supply chains and food storage. However, the evidence at present does not suggest that food production opportunities will be the norm. The magnitude of this opportunity is considered low now and in the future.²

Box 4.1

Food security within the Northern Ireland Climate Change Adaptation Programme (NICCAP2)

NICCAP2 identifies 'Food Security/Global Food Production' as a key priority area and one associated 'outcome objective':

- II1: We have a food system that is resilient to impacts of climate change

This is in line with the key outcomes the Committee has identified for the food system. No indicators were identified associated with this outcome objective. The following actions were included in NICCAP2 under this priority area:

- The Food Standards Agency (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.
- 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.
- 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.

Source: DAERA (2019) Northern Ireland Climate Change Adaptation Programme 2019-2024.

Responsibility for the food system cuts across multiple areas of policy. Responsibility for food is largely devolved to Northern Ireland. International trade policy is reserved to the UK Government, while matters relating to agriculture and fisheries are mostly devolved.* The role of Government includes setting standards for food quality and environmental impact; supporting domestic food production as part of food security; setting trade policy to enable diverse food supply chains; and supporting access to food, particularly for vulnerable groups.

* Fisheries are legislated under the UK Fisheries Act 2020 and through the joint fisheries statement, but licensing for fishing boats is devolved and fisheries management plans may be published by Devolved Administrations under the Act. UK Parliament legislates for offshore waters.

Outside of these roles Government does not directly participate in the food system with most roles falling to the private sector.

Box 4.2

Northern Ireland exposure to complex climate risks to the international food system

Northern Ireland is embedded within a complex international food system.

- Around 50% of food consumed in the UK is imported. Much higher import shares are seen for fruit and vegetables (65% of the fruit and vegetables consumed are imported,³ and 84% of fresh fruit is imported),⁴ and at particular times of year, for example, lettuce imports decline significantly in summer compared to winter.
- In 2021, 34% of Northern Ireland's imports from the Republic of Ireland (£975 million) was food and live animals.⁵ Of the share of UK food imports, 9% from EU and 5% from non-EU countries are imported through Belfast Port.⁶ These data exclude food imported to Great Britain and then brought across to Northern Ireland.
- The UK imports approximately 50% of its ammonium nitrate (an important agricultural fertiliser), with 75% of imports for fertiliser use coming from the EU (predominantly Lithuania, Poland, and the Netherlands) and the remaining 25% from Georgia and Russia. There is only one UK manufacturer of ammonium nitrate fertiliser, which is in Great Britain, so Northern Ireland is reliant on fertiliser imported from outside the UK or transported across the Irish sea from Great Britain.
- £21.4 billion worth of food, feed and drink is exported from the UK, with the largest share (18%) exported to the Republic of Ireland.⁷ It is unclear how much of this is exported via Northern Ireland or directly to the Republic of Ireland. In 2021, food and live animals accounted for 30% of Northern Ireland's exports to the Republic of Ireland, valued at £927 million.⁸

The complexity and interlinkages of the food system allow climate change risks to be transmitted through trade, financial, cultural and political connections between countries. This means that an extreme weather event in one country can trigger an impact elsewhere in the world and risks can cascade across the globe in complex ways.⁹

Risks to UK food supply chains from climate changes overseas depend on many factors and can be highly specific to the supply chain or country impacted.

- Some parts of the world will face more severe climate risks to agriculture than others. Many of the countries the UK imports fruit and vegetables from are water stressed or classified as climate vulnerable.¹⁰ The time sensitive nature of these supply chains make them particularly vulnerable to any climate related disruption.
- Some supply chains are geographically concentrated. For example, Spain provides more than 10% of UK fruit and vegetables, and Italy provides between 5% – 10%.¹¹
- Government responses to food system shocks may amplify risks. For example, when faced with a production shock, an exporting country may decide to halt exports which will have knock-on-effects which can exacerbate the shortage.¹²

Resilience planning for food supply chains requires the full range of climate change impacts to be integrated into other strategic considerations.

Source: Carter et al. (2021); Adams et al (2021); Goudie (2023); Defra (2021); Hess and Sutcliffe (2018); Challinor and Benton (2021); NISRA (2021).

1. Monitoring progress towards a well-adapted food system

The food system is key to achieving a wide range of societal goals. These include improving public health, reducing greenhouse gas emissions and restoring nature. In this chapter, we consider the requirements for a food system to be well adapted to climate risks, while recognising the importance and synergies with other goals for the food system.

The key outcomes needed to deliver this climate resilience are:

- **Disruption to food and feed import supply chains due to climate change is minimised.** Large companies within the UK's food supply chains need to manage their operations and dependencies to address climate risks, including building capacity along the supply chain (domestic and international), diversifying sourcing regions and suppliers, increasing redundancy and undergoing contingency planning. A key part of this is UK international trade agreements upholding high food standards to reduce risks to food safety and quality.
- **Vulnerability to food price shocks is reduced.** The impact of climate change on food in the UK will most likely be through food price spikes and temporary reduced availability of particular products. Low-income households, some households with children and other vulnerable groups will be most impacted by these price shocks. Reduced vulnerability of society to these price shocks is part of holistic resilience to climate impacts on the food system.
- **Domestic food production and supply chains are resilient to climate shocks.** Outcomes required to ensure that domestic food production is climate resilient are covered in Chapter 3. Supply chain resilience is covered (for all sectors) in Chapter 13.

Enabling factors that need to be in place to deliver these outcomes will include:

- **Data and monitoring.** As much of the food system relies on the private sector, information on the performance of the food system will be particularly important to understand and guide how well-adapted it is to climate change. Food quality monitoring can provide information on any changes in nutrition or prevalence of food-borne pathogens. Climate stress testing by large food and feed companies would also provide important information on the resilience of the system to climate hazards. Reporting on food waste reduction initiatives is also important to understand the efficiency of the system.
- **Governance.** Monitoring of food quality and surveillance of climate-sensitive food-borne diseases should be undertaken by respective Food Standards Agencies. Regional and local food strategies can support local resilience. Food security should also be included on the national risk register to ensure appropriate oversight and monitoring, given its critical importance.
- **Engagement and education.** Climate risk assessment and supply chain management skills will be needed across large food and feed companies.

Food price spikes may occur as a result of climate change. Low-income households are likely to be impacted more by any price volatility.

Regional and local food strategies can support local resilience.

For SMEs, guidance and tools to support climate resilience would enable better management of their climate risks.

- **Funding and investment.** To reduce vulnerability to food price shocks, low-income households should be included in food support initiatives, either at local or national level. Funding should also be provided for food waste reduction.
- **Research.** Further research is needed on the vulnerability of different households to price shocks from climate impacts across food supply chains. Exposure of the food system and key food staples to climate shocks and stresses outside the UK also needs to be better understood.

Research on the exposure of the food system to climate shocks and extreme weather overseas is needed.

Policies and plans for a well-adapted food system should include:

- **Legislation and regulation.*** Mandatory reporting by large food and feed companies is needed to understand to what extent climate risks are being considered and addressed across key private sector actors. Public sector procurement rules also have a role to play to guarantee quality over cost and avoid undermining UK domestic production standards.
- **Standards.** Minimum environmental and animal welfare protection standards for future free trade agreements are needed to support domestic food production and avoid further exposure to climate risks by encouraging cheaper imports.[†] Resilience standards for supply chains would also be helpful for businesses to manage their climate risks.
- **Planning.** The national food strategy should include consideration of the resilience of food imports to climate risks.
- **Financial instruments.** Targeted support to low-income households is required to reduce vulnerability to food price shocks. While there are many possible policy mechanisms for this kind of support, the mode of delivery is not a critical factor for responding to the climate risk.
- **Information and reporting.** Reporting from the private sector on climate risk management should be regularly reviewed by Government to understand the overall picture[‡]. An annual food security review could include this information as well as considering other data on the resilience of food imports. Related to this, food and feed companies would benefit from data and support to conduct climate risks assessments and understand appropriate actions to take to manage their climate risks.

Regular reporting from food and feed companies could build a greater understanding of the resilience of food and feed supply chains.

The food system is included as a standalone chapter for the first time in this report. The Committee expects this chapter and its monitoring map to continue to develop as further evidence becomes available of climate impacts on food security.

The goal, desired outcomes, enabling factors, key policies and plans and contextual factors for this system are shown in Figure 4.1.

* These policy levers are largely controlled by the UK Government.

[†] Trade policy is reserved to UK Government.

[‡] There are only 80 businesses in Northern Ireland with more than 500 employees which may meet the criteria for reporting under the task force for climate-related financial disclosure and of those, it is not clear how many are food or feed companies. Reporting via TCFD may be limited for Northern Ireland as a result.

Box 4.3

Contextual factors for food security

The UK's food system is exposed to risks from climate change overseas by its reliance on food imports, through the supply chains (domestic and international) used within the food system and through transboundary climate risks. Climate risks to domestic production of food are covered separately in the Working Land and Seas chapter.

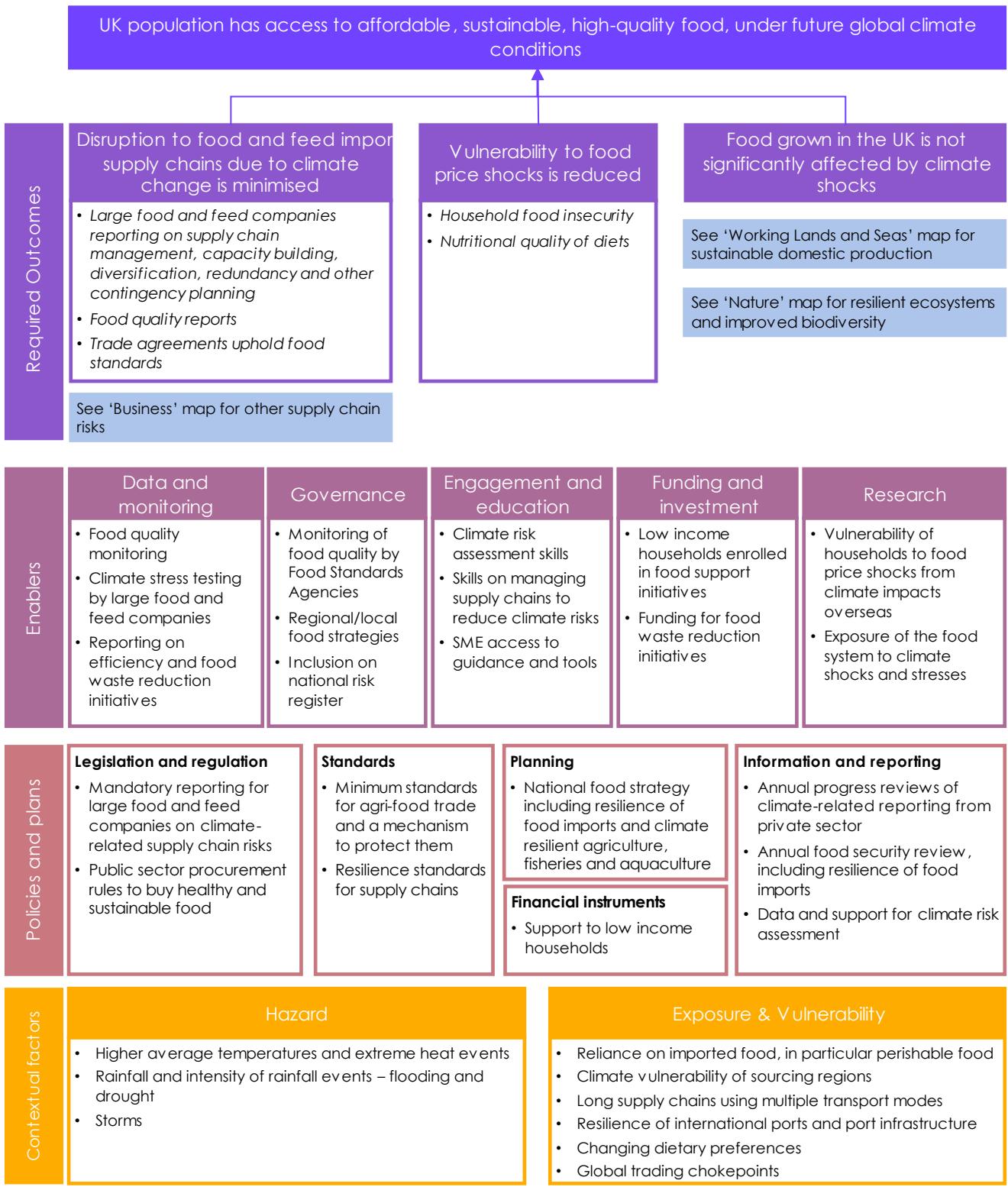
The total supply of fruit and vegetables produced domestically and imported is currently insufficient to allow UK citizens to eat the UK dietary recommended guidelines of seven fruit and vegetables a day.¹³ In order to meet nutritional guidelines, demand for fruits and vegetables would increase significantly, even though current supply is already exposed to climate risks. In addition, the types of food consumers prefer is important. Between 1987 and 2013 there has been an increase in consumption of tropical fruits (such as bananas) and decreased consumption of some traditionally grown UK vegetables such as cabbage and peas.¹⁴ The supply of legumes is also increasingly sourced from climate vulnerable countries.¹⁵ The combination of preference and price impacts consumption, as some changes in preference have occurred due to lower prices for food imports as the global food system has evolved.

The resilience of international ports, domestic port and hinterland infrastructure, and global trading choke points also influence the exposure and vulnerability* of the food system to climate risks. For example, in 2019, 18.5 million tonnes of sea freight crossed the Irish sea between Great Britain to Northern Ireland, representing 50% of the total sea freight across. 52% of that freight stayed in Northern Ireland, while the rest was forwarded on to other destinations.¹⁶ Maritime trade routes are particularly vulnerable to climate change due to dependence on overseas maritime infrastructure and the future viability of maritime routes.¹⁷

Source: Goudie (2023); Scheelbeek et al. (2020); Verschuur et al. (2020); NISRA (2021).

* Exposure and vulnerability are not separated for this system as the distinction between them is sometimes indefinite and largely inconsequential.

Figure 4.1 Monitoring map for food security



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

This section documents available evidence on progress towards delivery and implementation of each of the climate resilience outcomes identified in the previous section.

(a) Outcome 1: Disruption to food and feed import supply chains due to climate change is minimised

Indicators for this outcome are currently very limited. Private sector reporting is very limited, and we are therefore **unable to evaluate** progress against this outcome. Recent shortages in early 2023 of imported vegetables in part due to extreme weather conditions affecting production and supply chains indicate that food supply chains are not currently resilient to climate change.

- **Private sector reporting is limited.** Mandatory reporting which will soon come into force for large UK companies is unlikely to apply to many companies in Northern Ireland, due to the eligibility criteria for size and turnover. While reporting from major UK supermarkets and companies working across the food supply chain would improve information gaps, the data may not be disaggregated to Northern Ireland. Some major food and feed companies may be managing their operations and dependencies to address climate risks along the supply chain (domestic and international) but without public reporting it is not possible to assess the extent to which this is the norm, and it remains difficult to 'stress test' their resilience.
- **Recent supermarket shortages have highlighted fragile supply chains.** In February 2023, some UK supermarkets announced shortages of imported fresh vegetables, including tomatoes, peppers, cucumbers and lettuces. The shortages were caused by several interacting factors, including unusual weather conditions in Spain (unexpected cold) and Morocco (heavy rain and flooding) and transport disruption with cancelled or delayed ferries due to storms.¹⁸ Other factors not related to climate change are also likely to have contributed to the shortages (such as higher energy and fertiliser prices leading to reduced domestic production), demonstrating the complexity of interacting risks (see Box 4.2). Some news reports indicated that independent greengrocers in Northern Ireland were less affected by shortages as they were more likely to buy from wholesalers who import their produce via the Republic of Ireland, whereas supermarket products are arrive via Great Britain.¹⁹

Shortages of imported vegetables in early 2023 have highlighted that supply chains may not be resilience to extreme weather overseas.

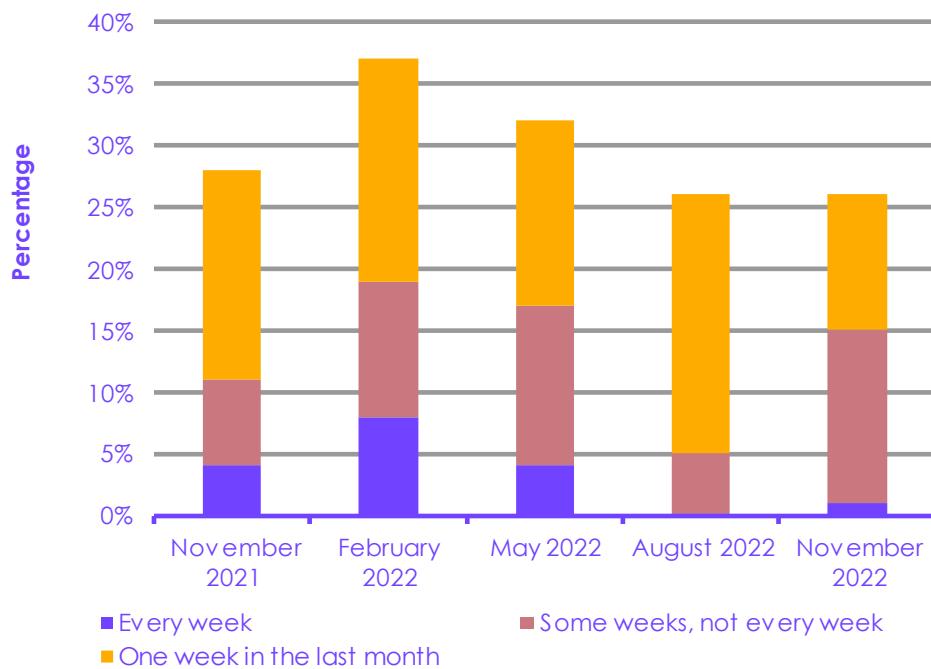
(b) Outcome 2: Vulnerability to food price shocks is reduced

This outcome is scored as **insufficient progress**. Indicators for this outcome demonstrate a broadly stable, but still significant rate of household food insecurity in Northern Ireland.

- **Household food insecurity went up in February 2022, but then returned to similar levels to the year before.** While current trends in food insecurity are not driven by climate change, household food insecurity still provides an indication of the vulnerability of households to food price shocks overall, including food price shocks from climate-related disruption.

The poorest 20% of households in the UK spend a higher proportion of their income on food and are therefore more exposed to changes in food prices.²⁰ 26% of respondents in Northern Ireland in November 2022 said they had skipped meals or had smaller meals during at least one week in the last month, compared to 28% in November 2021 (see Figure 4.2 below).

**Figure 4.2 Food insecurity in Northern Ireland:
Households reducing meal size or skipping meals**



Source: Food Standards Agency.

Notes: Response to survey question 'In the last month have you cut down the size of your meals or skipped meals because you did not have enough money to buy food'.

(c) Progress on enablers

There are very limited data available relating to enabling factors, although fewer people have been accessing food support schemes in recent years (not for climate-related reasons), potentially indicating a reducing need.

There are limited data available to assess the enabling factors required for a resilient food system.

- **Fewer people are relying on food support schemes.** Some data are available relating to food support schemes, such as Free School Meals and Healthy Start Vouchers. The percentage of pupils eligible for Free School Meals has slightly decreased in Northern Ireland since 2017, with 28.4% of pupils eligible in the year 2020-2021. Similarly, the take-up rate decreased between 2019 and 2021 from 59% to 56% for Healthy Start Vouchers, a scheme to provide prenatal vitamins, infant milk formula, and healthy food for young children to people on low incomes.²¹
- **Food quality monitoring is being taken forward by the Food Standards Agency.** As part of the mid programme progress review, the Food Standards Agency (FSA) reported that they have continued to evolve their work on strategic surveillance, including providing specific information on climate related risks like aflatoxins (a type of fungi found on agricultural crops).²²

3. Policy and planning progress

(a) Outcome 1: Food and feed import supply chains are well managed and quality assured against climate-related disruption

Key policy milestones for this outcome are largely outside of the Government of Northern Ireland's direct control, for example, mandatory reporting, public sector procurement rules, minimum food standards for trade and resilience standards for supply chains. This outcome is therefore not scored.

Policies and planning actions which are devolved to Northern Ireland include:

The draft Food Strategy Framework includes risk management along the food chain, which is positive.

- **The draft Food Strategy Framework considers risks to the food system, but it is not yet published.** In September 2021, the Northern Ireland Food Strategy Framework went out for public consultation, proposing a new food systems approach. The vision for the proposed Framework is 'A transformed food system that protects natural resources for future generations, is economically and environmentally sustainable and provides safe, nourishing, accessible food to people, who make informed healthy choices', which aligns well with the goal identified in our monitoring map for food security. The framework lays out six priorities, one of which is 'Building and maintaining appropriate Emergency Contingency plans across the supply chain', which was added in the wake of the COVID-19 pandemic and associated challenges in supply chains. The Framework identifies the Department for Communities, Department of Health, Food Standards Agency, DAERA, Department for the Economy and Invest NI as key partners for this priority and describes success as 'The Northern Ireland food system will proactively manage risk along the entire food chain. It will include accessibility to food by people who live here, the safety and integrity of food, and protection of the food system economy.' While the Framework does not go into detail on specific actions, the inclusion of this priority and its comprehensive definition of success are extremely positive and could clearly include consideration of climate risks to the food system (although this is not explicitly stated). The final Food Strategy Framework has not yet been approved and published as it requires ministerial approval.
- **Some support is available for supply chain risk management, but not related to climate risks.** Invest NI provides advisory and some financial support for supply chain risk management, but this currently covers disruptions caused by following the COVID-19 pandemic, EU Exit and current global environment, rather than climate risks.²³ Some information is available to support businesses in conducting climate risks assessments, for example, through the Group on Earth Observations Global Agricultural Monitoring (GEOGLAM) initiative which provides crop monitoring for major food types. Global initiatives can also support improved decision making based on agricultural data and modelling, such as AgMIP, which aims to assess the sustainability of agricultural systems, including impacts of climate variability and change.²⁴

(b) Outcome 2: Vulnerability to food price shocks is reduced

This outcome is scored **limited policies and plans**. Policies to reduce vulnerability of households to food price volatility are in place but may be insufficient to fully insulate vulnerable groups from price shocks.

There is some support for low-income households to access food, which may reduce their vulnerability to price volatility.

- **Some support to low-income households is in place.** Some support schemes are in place for low-income households, including Free Schools Meals and Healthy Start Vouchers. However, the continued high rate of food insecurity in Northern Ireland indicates that Government support schemes are falling short of demand, leaving households vulnerable.

(c) Recommendations

Based on the assessment of policy and planning progress, we have identified recommendations to close key policy gaps for food security (Table 4.2).

Table 4.2

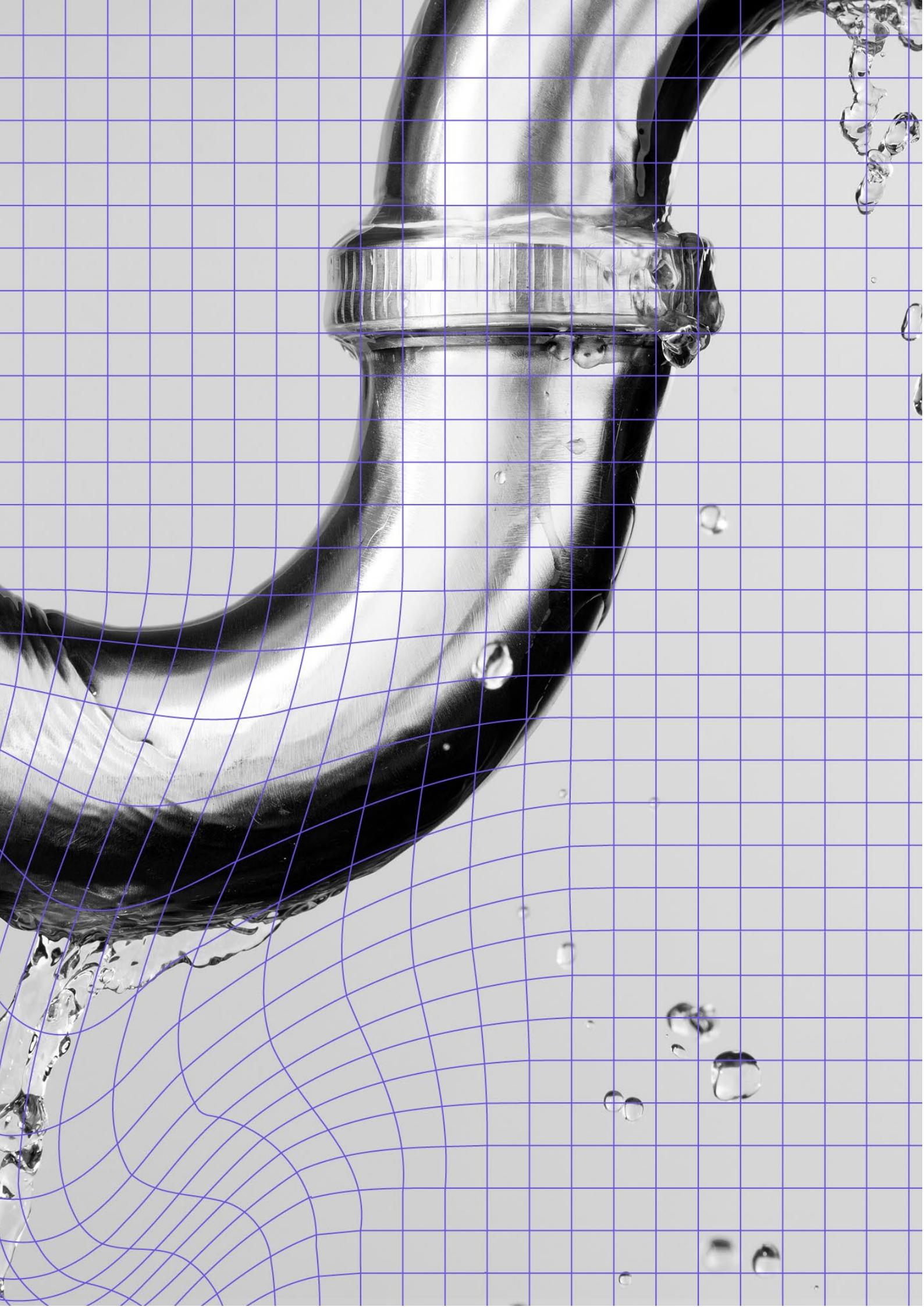
Recommendations - Food security

Primary responsibility	Recommendation	Date
DAERA	The Food Strategy Framework should be finalised and published. Consideration of climate risks to food security should be included in the priority on supply chains.	2024
DAERA	DAERA should aim to include the Food Strategy Framework in NICCAP3 as a key policy for food security to climate risks.	2024

Endnotes

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Chapter 5

Water supply

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Introduction

Table 5.1

Progress summary – Water supply

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Reduced demand	Unable to evaluate	Limited policies and plans	<ul style="list-style-type: none"> Per capita consumption rates are not projected to change much from 2014 baselines.¹ However, we lack evidence on annual household consumption levels. Better indicators are needed to monitor progress. Some key policy targets are in place for reduction of demand in Northern Ireland, but there are no per capita consumption targets across any policies and plans, as well as limited uptake of smart metering.
Outcome 2: Improved system performance	Insufficient progress	Partial policies and plans	<ul style="list-style-type: none"> Further indicators are required on system performance as risks to public water assets increase with climate change. However, there has been an improvement in leakage reduction, and this is regularly monitored. There are no available data on weather-related disruption to supply. Planning actions consistently include active leakage reduction, among other service improvements. NI Water has annual targets for leakage, determined through the investment mechanism 'PC21', in coordination with the Utility Regulator. Annual leakage reduction levels have not met the targeted level of leakage reduction, although the net difference is decreasing.
Outcome 3: Increased supply	Unable to evaluate	Limited policies and plans	<ul style="list-style-type: none"> Key indicators on reservoir capacity and connectivity capacity within and between regions were not available. Impacts on public water supplies are informed by the Water Resource and Supply Resilience Plan and the climate change scenario modelling carried out by NI Water to underpin their planning. This includes the Water Resource Management Plan – which contains the legislative requirement for NI Water to forecast supply and demand over at least the statutory minimum of 25 years. However, current plans and policies do not address risks to capacity of public water assets from climate change, such as on reservoir capacity or connectivity between regions. There is some evidence that progress is being made on reduced supply interruptions to customers, through the Interruptions to Supply Strategy.
Outcome 4: Interdependencies identified and managed	Unable to evaluate	Insufficient policies and plans	<ul style="list-style-type: none"> No risk assessments or adaptation action plans are published. There is therefore a lack of data on interdependency risks. Some key interdependency areas are identified in the Sustainable Water – Long Term Water Strategy, but infrastructure interdependencies are not considered in high-demand or supply shortage scenarios.
<p>Relevant risks from CCRA3:</p> <p>Risks to infrastructure networks (water, energy, transport, ICT) from cascading failures (I1); Risks to infrastructure services from river, surface water and groundwater flooding (I2); Risks to infrastructure services from coastal flooding and erosion (I3); Risks to subterranean and surface infrastructure from subsidence (I7); Risks to public water supplies from reduced water availability (I8); Risks to health from poor water quality and household supply interruptions (H10).</p>			

The uninterrupted provision of clean water to households needs to be maintained in a changing climate.

This chapter covers adaptation to climate change for public water supply. As less than 1% of water in Northern Ireland comes from private water supplies, this has been excluded from our analysis.² Non-domestic consumption is discussed in the Business chapter of this report.

Almost 90% of the freshwater abstracted from rivers and aquifers in Northern Ireland is used for public water supply.³ Abstraction of freshwater is also required for energy and industrial processes, as well as a small amount for agriculture.* At the same time, sufficient river flow levels need to be maintained for environmental health. This means that the resilience of the public water system is inherently linked to water management practices in these other sectors, and a whole system approach is required to assess the water system's climate resilience.

Though climate impacts on the water supply system in Northern Ireland are generally expected to be less severe than in other parts of the UK, expected changes in several hazards still need to be planned for:

- decreases in summer rainfall, increased summer temperatures and heatwave events, leading to drought conditions and increasing water demand.
- increases in winter rainfall, extreme rainfall events and sea level rise leading to flooding, shrink-swell, soil erosion.
- cold weather events (though these are predicted to become less frequent) causing damage to supply pipes (Box 5.1).

While climate impacts to Northern Ireland's water supply system are less severe than other parts of the UK, higher than expected demand and shortage of daily supply has already occurred in some parts of the country.

Box 5.1

Changes in hazards and impact on water supply system

Drought. Water supply in Northern Ireland typically exceeds demand in today's climate.⁴ Despite this, recent periods of hot, dry weather have resulted in the identification of vulnerabilities in Northern Ireland's water supply. For example, NI Water applied for drought order measures to protect water supplies during recent prolonged hot, dry weather in 2021.⁵ While all water resource zones in Northern Ireland are expected to remain in surplus by the mid-century under plausible warming scenarios, parts of Northern Ireland are projected to have an insufficient supply of water by the late century under both 2°C and 4°C warming scenarios.[†]

Flooding. Flooding can cause supply interruptions due to damaged infrastructure. Out of a total of 3,066 water sites,⁶ there are 382 water sites (12% of the water supply infrastructure) in Northern Ireland that are currently exposed to significant risk of surface water flooding and 91 sites (3% of the water supply infrastructure) are currently exposed to significant risk of river flooding.^{7,‡} Projections of future flood risk for the UK's Third Climate Change Risk Assessment (CCRA3) concluded that the risk of surface water flooding could increase by as much as 49% under more extreme warming.[§] The risk of river flooding is not projected to change. A small number of water sites 0.35% are currently exposed to significant risk of coastal flooding in Northern Ireland,⁸ and this is not projected to increase under climate change warming scenarios of 2°C and 4°C warming scenarios.

* The energy sector in Northern Ireland is very reliant on the abstraction of water for cooling in the production process across three power stations: Ballyumford, Kilroot, and Coolkeeragh. There are also 90 small hydroelectric sites that use over 100 cubic metres of water per day, which also requires an abstraction license.

† Based on current commitments for adaptation, under a central population projection and assuming no additional adaptation.

‡ Significant chance of flood risk in the CCRA3 is defined as a greater than 1 in 75 Annual Exceedance Probability – an average return period of 75 years or less.

§ By 2080s in the +4°C in 2100 scenario evidenced in the CCRA3 Technical Report on Infrastructure Services.

Other hazards. Evidence on the impact of other hazards on water supply in Northern Ireland is limited. In the UK, water companies have identified the potential for increased levels of leakages and burst frequency in water pipes due to shrink-swell damage and subsidence.

Source: Jaroszowski, D., Wood, R., and Chapman, L. (2021) *Infrastructure*. In: *The Third UK Climate Change Risk Assessment Technical Report*. [Betts, R.A., Haward, A.B., Pearson, K.V. (eds)] Prepared for the Climate Change Committee, London.

The vulnerability and exposure of the water supply system to climate risks is influenced by the age, condition, and location of water supply infrastructure. Population growth and changes in water needs and usage patterns (for example for Net Zero energy generation or due to increased homeworking) are among the key factors that may make Northern Ireland more vulnerable to water shortages.

Policies related to water supply in Northern Ireland are devolved and responsibility for the water system is shared across several organisations:

- **Northern Ireland Water (NI Water)** is the only water company in Northern Ireland. It is wholly government-owned and overseen by the Department for Infrastructure (DfI).
- **The Water and Drainage Policy Division** in the DfI are responsible for setting water policy.
- **The Utility Regulator** provides economic regulation including price control processes.
- **Northern Ireland Environment Agency (NIEA)** has regulatory powers and responsibilities to ensure environmental compliance by NI Water.

Coverage of climate risks and adaptation for water supply in Northern Ireland Climate Change Adaptation Programme (NICCAP2) is limited (Box 5.2).

Box 5.2

Water within Northern Ireland's Adaptation Programme (NICCAP2)

There are no specific outcomes for water sector resilience in NICCAP2. 'Infrastructure Services' are identified as a key priority area with one 'outcome objective' on transport and network services with associated indicators:

- IF1: We have Transport and Network Services that are resilience to the impacts of flooding and extreme weather.

NICCAP2 does not have any indicators on water supply, however, the Mid Programme Progress Review 2022 identified outputs that are relevant to water supply. These include the publication of the Water Resource and Supply Resilience plan and Geological Survey of Northern Ireland (GSNI) research exploring when and where groundwater could be used for low energy water supply, shallow geothermal heating and cooling, and energy storage.

Source: DAERA (2019) *Northern Ireland Climate Change Adaptation Programme 2019-2024 (NICCAP2)*.

Notes: Network services are not clearly defined in the NICCAP, outcomes delivered within the Mid-Term Programme Review in 2022 signal that water supply and other infrastructure networks can be covered within the scope of this outcome.

1. Monitoring progress towards a well-adapted water system

A package of demand and supply side actions are needed to make the public water supply system more resilient to climate change.

Successful adaptation within the water supply system aims to ensure a plentiful supply of water despite future climate change. This means there is sufficient water for public supply, sustainable energy, industry, and agriculture (see Energy, Business and Working Land and Seas chapters), as well as sufficient water left to support the natural environment (see Nature chapter).

In Figure 5.1 we set out a monitoring map for assessing adaptation progress in the water system. We have identified four key outcomes that are needed for this goal of climate resilience to be delivered:

- **Reduced demand** through behaviour change, more efficient appliances and building standards. Drought conditions are already putting pressure on water supplies. A reduction in demand will be needed to mitigate projected water shortages in some parts of Northern Ireland due to climate change and population growth, particularly under more severe warming scenarios (Box 5.1).
- **Improved system performance** to reduce water lost through leaks and bursts. Reducing water lost through leaks will make water supplies less vulnerable to drought, as well as supporting environmental goals by enabling reduced abstraction from rivers.
- **Increased supply** by increasing reservoir capacity and enabling transfer of water between water regions in times of drought. Even with successful demand reduction and efficiency improvements, there may remain a need for new supply in some parts of Northern Ireland.
- **Interdependencies identified and managed.** Maintaining a sufficient water supply requires reliable energy, telecoms, and transport services, which are similarly exposed to climate risks. Water companies must know and manage their risks from reliance on other infrastructure networks to be resilient to climate change overall. This includes managing supply chain risks.

There are several categories of enabling factors that will be needed to implement the outcomes identified above:

Effective governance, data and monitoring and investment are needed to enable delivery of these actions.

- **Data and monitoring.** Effective monitoring and visibility of the water network enables better identification of where water is going and who is using it, allowing interventions on demand and leakage to be better targeted.
- **Funding and investment.** Infrastructure must be underpinned by fiscally sustainable multi-year funding for planning and delivery. Current price control on NI Water will move to a multi-year funding scheme, determined by the Utility Regulator. Certainty of long-term funding builds a mechanism to deal with any sudden financial shocks. The price control scheme between 2021-2027, PC21, covers maintenance of assets and any impacts to customers if this maintenance is not carried out.

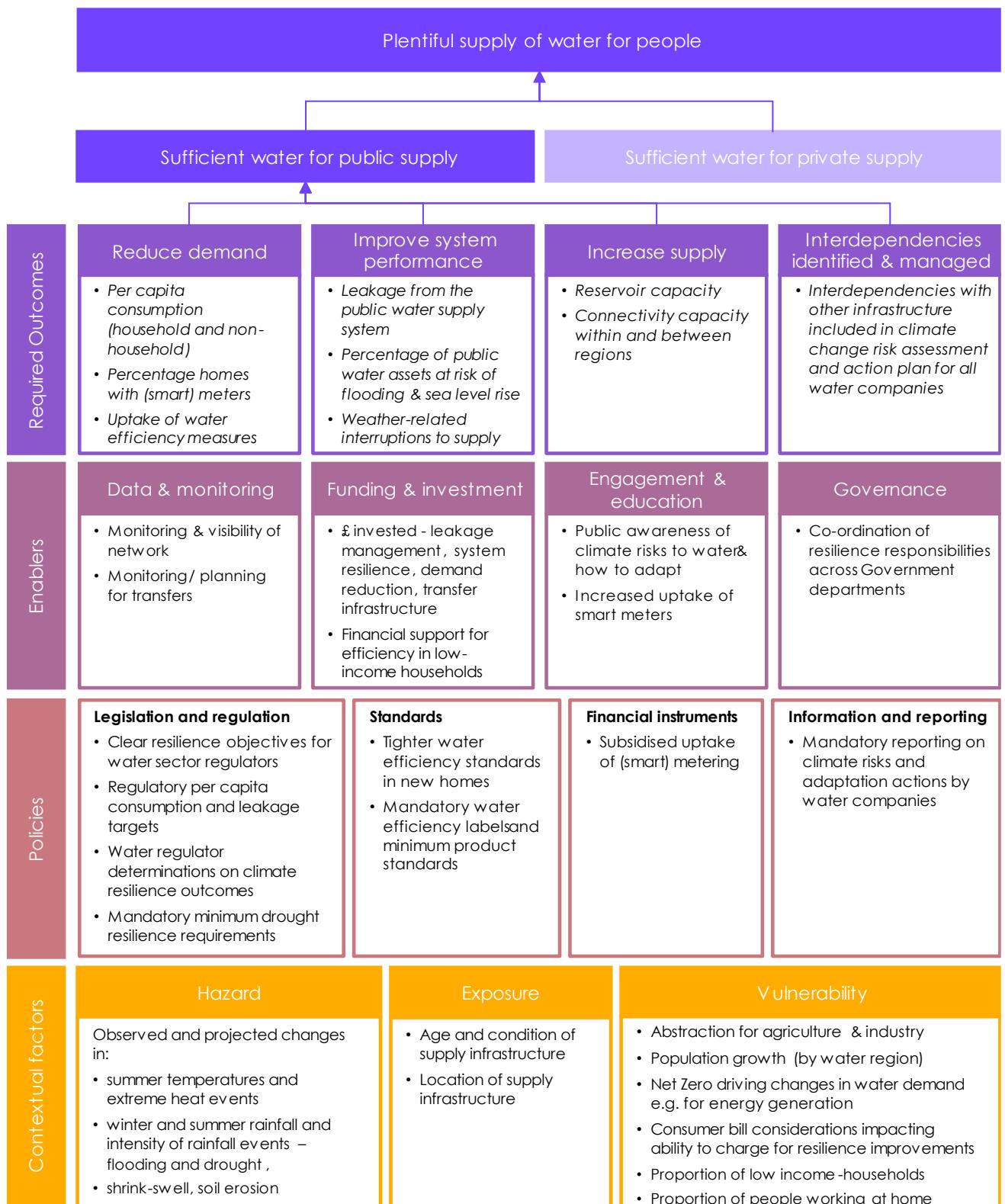
- **Engagement and education.** There is a need for greater public awareness of the risks of future water shortages and actions people can take to reduce their use of water.

Our monitoring framework highlights policy milestones which must be in place to help achieve these required outcomes for a well-adapted water supply and associated enabling factors. These fall under the following categories:

Policy must provide the mechanisms to deliver the required outcomes.

- **Legislation and regulation.** National policy must create legislation which enforces sustainable long-term plans for water management and provides appropriate frameworks for regulation. Planning must span across water catchments to ensure it is at a suitable scale to manage national water shortages. Legislation should also ensure that funding allocation is appropriate to meet adaptation goals.
- **Standards.** Well-adapted water supply will require policy to deliver and extend resilience standards, which deliver a water supply system compatible with future climate conditions.
- **Financial instruments.** Fiscal policy should incentivise adaptation actions (such as reducing demand, minimising losses from the supply system and building system level resilience to climate change) by NI Water, homeowners, and residents. Extra financial support may be needed to enable low-income households to understand and reduce their water use.
- **Information and reporting.** Reporting on some aspects of risk and adaptation planning and delivery should be mandatory. This will improve understanding of the national picture of adaptation in the public supply system, as well as in other sectors upon which the water system relies, including energy, transport and telecoms and ICT.

Figure 5.1 Monitoring map for water supply



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

This section documents available evidence on progress towards delivery and implementation of each climate resilience outcome identified in the previous section. A package of demand-side, supply-side and system-level adaptation measures is needed to ensure sufficient water supply under a changing climate. Significant progress in one outcome may allow for less action in others. Decision makers need to continue to monitor progress and set policies to deliver the most effective combination of measures.

(a) Outcome 1: Reduced demand

Improved availability of timeseries data and disaggregated metrics on household demand need to be identified.

There are no existing indicators that track household consumption of water, so, this outcome is scored as **unable to evaluate**. There are no available data on actual per capita consumption, so reduction of household demand cannot be quantified. Forecasted per capita consumption does not factor in latest climate projections.

Existing indicators target overall demand, which includes domestic and non-domestic water usage, but do not provide insights on disaggregated progress. Evidence suggests that these indicators are stagnant or moving in the wrong direction for some. Furthermore, existing indicators do not factor latest climate projections, such as UKCP18,* to forecast demand for water in Northern Ireland as the climate changes.

Utilising latest climate projections, such as UKCP18, will be an important step in assessing household demand.

- **No data is available to assess reduction of household demand.** Households are not metered and also not charged for water use in Northern Ireland. Therefore, no metrics are currently available to assess household demand specifically. Changes to household demand from extreme weather events in previous years cannot be identified, because of a lack of disaggregated data on domestic and non-domestic water use.
- **Improving the evidence base for household demand is not a targeted outcome for demand reduction.** Reducing household demand has not been a priority in Northern Ireland, as measures to reduce demand focus largely on voluntary reduction supported by awareness campaigns and system improvement from leakage reduction. In peak demand periods, mandated customer restrictions are put in place when there are supply shortages. However, no measures have been introduced to track household water consumption, which would help to assess demand and its links to climate conditions. This will be necessary to assess how climate change impacts the public water system in the mid to late century.

* UK Climate Projections 18 (UKCP18) by the Met Office is the latest set of tools and data that shows how the UK climate may change in the future.

- **There has been some progress over the last decade in with a reduction in overall demand for water.** There has been a reduction in overall demand, from domestic and non-domestic use, by more than 100 litres per day. The Water Resource and Supply Resilience Plan assesses the demand as 570 million litres per day.⁹ The base year (2008/09) demand for the 2012 plan was 677 million litres per day.¹⁰ Therefore, demand has reduced by over 100 Ml/d in the last six years. The reduction in demand is thought to be an outcome of continued levels of active leakage detection, sustained investment into watermains to reduce leakage and reduced non-domestic demand.

Extreme weather events, such as 2020's driest spring on record, resulted in total demand which exceeded demand forecasts by over 10 million litres per day in 2020/21, compared to the previous year. A number of impounding reservoirs were at their lowest level since 1995. Drier and hotter summers have driven dry weather demand higher than planned, increasing supply side pressures.

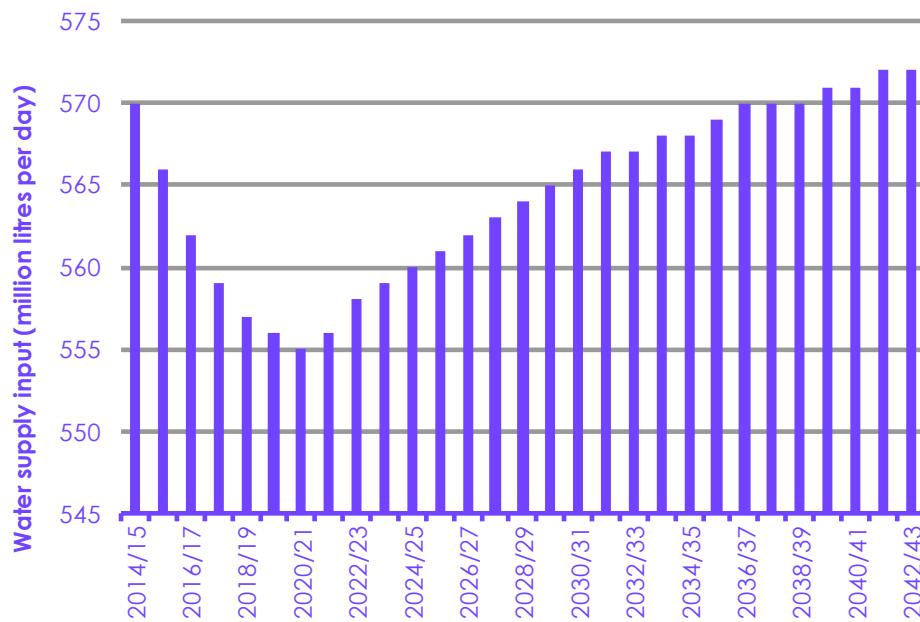
- **Demand in dry weather conditions is forecasted to reduce but, sudden surges in demand added pressures on the water supply infrastructure.*¹¹** The surge in demand during the driest spring on record in May 2020 required NI Water to increase supply of public water by 120 million litres to ensure adequate supply. During the 2020 spring drought, a number of impounding reservoirs were at their lowest level since 1995. Drought conditions, such as in July 2021, there was an increase in average water demand from 570 million to 750 million litres per day, associated with extreme temperatures above 30°C.¹²
- **NI Water's climate modelling in critical periods shows that three Water Resource Zones (South, West and Central) may be in deficit during critical dry year scenarios Dry Year Critical Peak scenarios by 2042.¹³** Climate impacts on water supply are predicted to be greater in the late century when compared to the mid-century. Evidence from HR Wallingford reporting identifies that climate modelling by NI Water may not have identified thresholds in sensitivity to climatic changes that only appear in the late century. High population growth and no additional demand-side adaptation action may also lead to deficits in Northern Ireland too. In these scenarios, reducing household consumption and leakage from networks is unlikely to return all water resource zones to a surplus.
- **Forecasted demand for 2042 shows a minimal increase from current demand but latest UKCP18 population and climate scenarios are not considered.†** Demand is forecasted to increase from the 2020 baseline of 570 million litres per day due to projections for population growth.‡ This increase in demand is minimal, with (one million litres per day), bringing forecasted 2042 demand assessment to be 572 million litres per day (Figure 5.2).¹⁴ Demand has reduced by over 100 Ml/d in the last six years – and forecast is considerably less than 732 Ml/d forecast in the 2012 plan.¹⁵ However, high population growth in varying 2°C – 4°C warming scenarios have not been considered.

* Dry weather average demand is based on trends for previous average demand periods in dry weather conditions.

† Includes household and non-household demand for public water.

‡ Population forecasting is based on NISRA analysis from 2015 with the UK Water Industry Research (UKWIR) methodology.

Figure 5.2 Quantity of public water supply for distribution based on projected demand



Source: Utility Regulator (2021) PC21 Monitoring Plan; NI Water (2022) NI Water's Annual Report & Accounts 2021/22.
Notes: NI Water's supply-side projections based on forecasted demand based. Data projections are based on dry year annual average and the graph starts at 545 million litres per day.

- **Annual per capita consumption data is not available.** Evidence indicates that household per capita consumption was 148.42 litres per head per day in 2014/15,¹⁶ but annual data on per capita consumption is not publicly available. NI Water reporting identified that water consumption by households represents nearly half of total water supply.¹⁷ Domestic water usage charge is covered by a customer subsidy from Government that remains in place till 2027. Metering of household consumption is limited in scope across Northern Ireland, which means there is no explicit objective to reduce household demand. So, assessing progress on this indicator is not feasible.

(b) Outcome 2: Improved system performance

Annual leakage reduction levels have not met targets, although the net difference is decreasing.

Indicators for this outcome demonstrate **insufficient progress** towards improving performance of the public water supply system. Annual leakage reduction levels have not met the targeted level of leakage reduction, although the net difference is decreasing. Climate change will increase flood risk for public water sites, even assuming a low population growth scenario, and will cause additional pressures on system performance.* Weather-related disruption to supply data is not available.

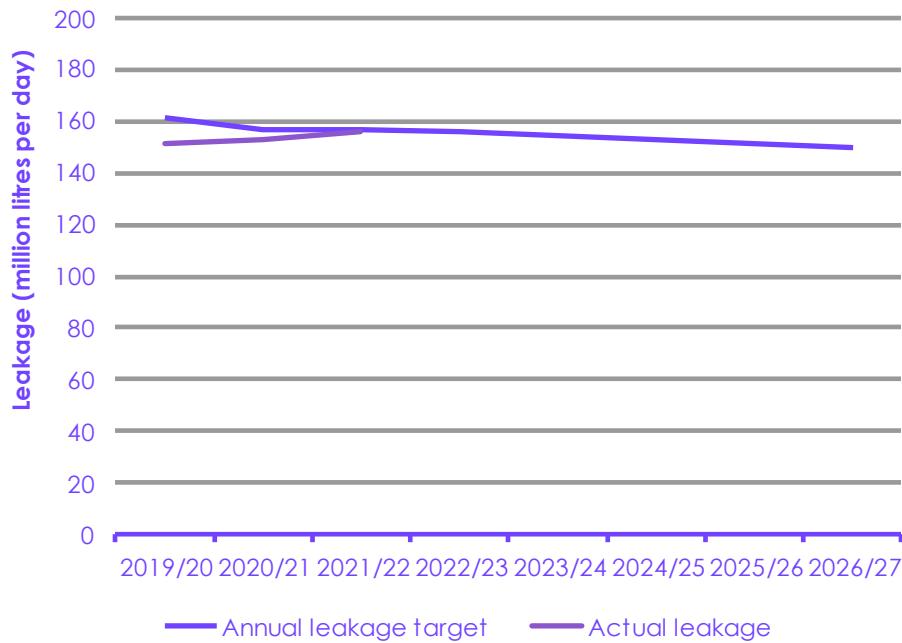
- **NI Water aims to achieve a sustainable economic level of leakage of 150 million litres per day but has consistently not met annual leakage targets.**
†¹⁸ NI Water's reporting shows that the annual target of they missed their reducing leakage by 157 million litres per day in 2021-2022 was just missed. Leakage of public water was reduced by 155.6 million litres per day in 2021-2022. Annual leakage targets from previous years have also been missed.

* Public water supply sites in Northern Ireland includes water distribution and wastewater treatment.

† Sustainable economic level of leakage refers to the point at which the cost of fixing a leak outweighs the benefit.

Going forward, the price control will set leakage reduction targets and the net difference in leakage reduction is decreasing (Figure 5.3). The leakage reduction target is decreasing, which means the net difference may also continue to decrease. However, current leakage reduction targets do not consider the sustainable level of leakage to meet water demands when extreme weather impacts are increasingly felt on water supply.

Figure 5.3 Total leakage reduction target compared with actual reduction achieved (million litres per day)



Source: Utility Regulator (2021) PC21 Monitoring Plan; NI Water (2021) NI Water's Annual Report & Accounts 2021/22.

- **Public water sites are at higher risk from surface water flooding than fluvial and coastal flooding.** There are 694 water sites at some degree of risk from surface water flooding, significantly higher when compared to 207 water sites at risk of fluvial flooding and 26 at risk from coastal flooding.¹⁹
- **Evidence suggests that the risk of surface water flooding to water supply will increase due to climate change.** There are 382 water sites currently at significant risk of surface water flooding, and 102 water sites at moderate risk.* There are a total of 3,066 water sites in Northern Ireland. By the 2050, under a 2°C warming scenario (with current adaptation and low population growth), the number of sites at significant risk is projected to increase by 28%, while the number of sites at moderate risk is projected to increase by 23%. By the 2080s, risk increases by 34% and 29% respectively.²⁰
- **Some initiatives to improve resilience of water supply assets to extreme weather events are ongoing and cannot yet be evaluated.** NI Water is conducting a project to alleviate internal flooding, stormwater management and base maintenance programmes to ensure continued serviceability of NI Water assets.²¹ The expected timeline and delivery indicators for this project were not available.

* Moderate risk of flooding in the CCRA3 is defined as a between 1 in 75 and 1 in 200 Annual Exceedance Probability (AEP) – an average return period of between 75 and 200 years.

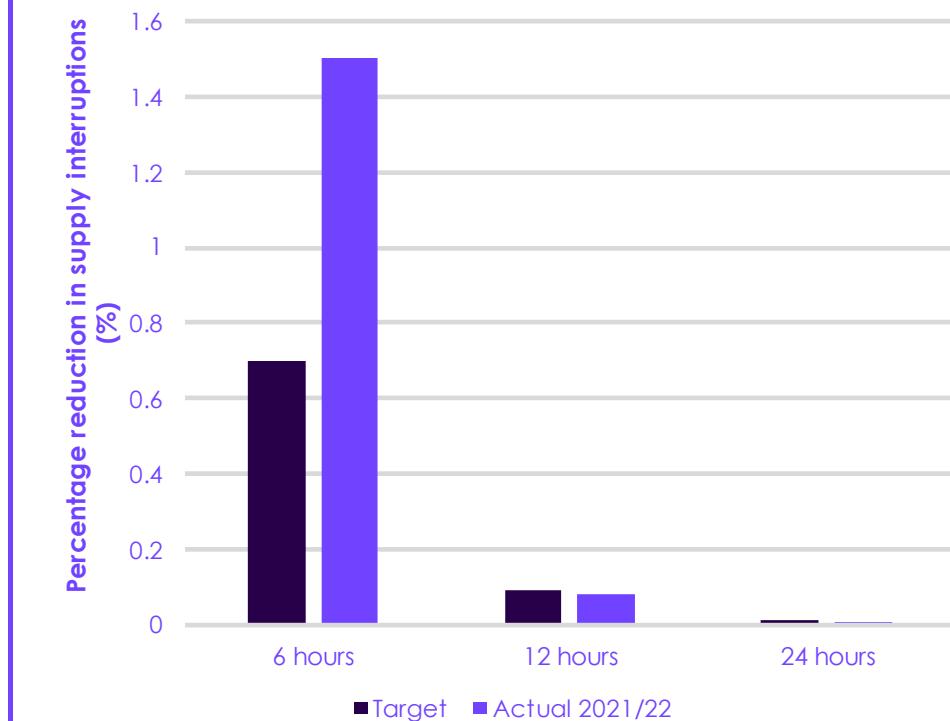
(c) Outcome 3: Increased supply

There are not enough indicators available to assess system performance, so we are **unable to evaluate** the progress of this outcome. Evidence suggests some progress is being made in increasing water supply and in targeted reduction of interruptions to customers. However, data on new supply and connectivity capacity within and between regions are not available.

Metrics to measure increase in supply are needed.

- NI Water has annual targets for reducing interruptions to supply, which were missed in 2021/22 (Figure 5.4). NI Water's strategy aspires to have no long-term supply interruptions at customers' taps. The implementation of the Interruptions to Supply Strategy has supported progress in reducing the number of minutes that a property is affected by water supply interruptions. For example, in 2021/22 there was a 2% reduction in the number of supply interruptions which lasted longer than six hours.

Figure 5.4 Targeted and actual reduction in supply interruptions in excess of 6, 12 and 24 hours in 2021/22.



Source: NI Water (2022) Annual Report 2021-22.

- There is some evidence of improved water storage, with three clear water basins completed in the current PC21 price control period. Investment from the previous PC15 was provided for three clear water basins in Lough Fea, Killyhevlin and Drumaroad water treatment stations to improve the storage resilience of the water supply network.²² These were completed in the early phases of the PC21 period.
- Data on improved reservoir capacity and connectivity between regions is not being reported. There are 370 service reservoirs across Northern Ireland. Data on planned increases in reservoir capacity could not be found.

Limited information is available on improved reservoir capacity and the connectivity between them.

(d) Outcome 4: Interdependencies identified and managed

There has been **insufficient progress** towards this outcome. Understanding of interdependency risks is very limited because no risk assessments or adaptation plans could be found.

There is no available evidence to assess adaptation to interdependency risks in the water supply sector.

- **No risk assessments could be found with interdependency risks being factored.** NI Water has committed to an adaptation action plan, but this has not yet been published.

(e) Progress on enablers

To achieve these four outcomes for a well-adapted water supply, multiple enabling factors must be in place. Enablers for well-adapted water supply are largely absent and there are limited data for monitoring their status.

- **Data and monitoring.** There is a crucial gap in data and indicators which monitor household consumption and demand for water. Understanding impact of climate risks on household demand is crucial for long-term planning, despite the free of cost water services for domestic consumption.
- **Funding and investment.** The water sector in Northern Ireland lacks long-term funding visibility. Monitoring investment would provide indication of whether the sector has a sufficient funding buffer to deal with future financial shocks, such as those resulting from the energy price rises in 2021/22.
- **Engagement and education.** Campaigns to raise awareness for sustainable practices in water consumption have been carried out by NI Water but there are no data to assess how this has impacted public awareness and behaviours.

3. Policy and planning progress

This section assesses progress in policy and planning to deliver the outcomes identified above.

(a) Outcome 1: Reduced demand

Our assessment finds that there are **limited policies and plans** in place to deliver reduced demand for water.

Northern Ireland's long-term planning for public water supply does not consider future climate and population growth scenarios.

Some key policy targets are in place for reduction of demand in Northern Ireland. There are plans targeting demand reduction, though reduction of domestic demand is not included and there are no per capita consumption targets across any policies and plans. The Utility Regulator does not have a statutory remit for climate resilience to regulate NI Water. The existing minimum drought resilience standard for water supply is lower than recommended. Furthermore, a key adaptation gap in Northern Ireland's long-term planning for public water supply is that it does not consider late-century climate change projections and high population growth scenarios.

- **The Utility Regulator does not have a statutory remit** to set climate resilience standards on NI Water.
- **There is a mandatory minimum drought resilience to 1 in 40-year event,²³ which is below the 1 in 500-year standard recommended by the National Infrastructure Commission.** There is no on-going planning to incorporate the 1 in 500-year resilience threshold in water supply for Northern Ireland. A new plan by NI Water is expected to come into effect in 2024 and will incorporate a 1 in 200-year drought resilience.* As demonstrated in recent droughts, it is possible these events may increase pressures on the water supply system in the future.
- **Regulatory per capita consumption targets do not exist in Northern Ireland.** Improved system performance through reduction of leakage is instead relied upon to reach demand reduction targets. The Water and Sewerage Services Act (NI) 2016 requires the preparation and review of a Water Resource and Supply Resilience Plan (WR&SR Plan) that takes into consideration a range of adaptation measures in response to climate change projections. However, none of the measures target reduction of demand for domestic use.
- **The Water Resource and Supply Resilience Plan 2020 has not incorporated UKCP18 projections.** The Plan considers changes in population, housing, and water usage, and incorporates predicted changes to the climate. This includes plans for how water supplies would be maintained during critical periods such as severe winters and droughts but does not incorporate UKCP18 climate projections. The Water Resource Management Plan (WRMP) considers different climate scenarios over the 25-year planning period.²⁴ The main scenario represents conditions when a period of high consumption, low rainfall, and high temperatures, which can result in low river flows in that period and depleted reservoir storage.

* This information is derived from consultation with NI Water, the Plan will be going into public consultation in mid-2023.

- **Both the Water Resource Management Plan and Water Resource & Supply Resilience Plan target reduction of demand – but primarily target non-domestic use.** Both plans target demand reduction through active leakage detection and communication materials to educate users on sustainable level of water use. This primarily targets non-domestic water use and falls short of a key outcome ‘reduced overall demand’ assessed in this policy indicator.
- **The Long-Term Water Strategy for Northern Ireland also considers water demand management** by reducing leakage and introducing measures to reduce demand, rather than by increasing water abstraction, treatment, and transfer, given the associated energy demand. The strategy assesses supply and demand of drinking water and considers a climate change and resilience component. Flood resilience and preparedness for extreme weather events is also included.
- **Water efficiency measures were recommended in the Water Resource and Supply Resilience Plan, although no further information is available on the implementation of these measures.** Four demand management recommendations across Northern Ireland were selected: Targeted non-household water audits of key accounts, schools water audit and retrofit, hotel and hospitals water audit and retrofit, and farm audits. However, there is no clear designation of responsibilities on who is taking these forward and the expected timescale. Projections of how much water could be saved from these retrofits are also not included.
- **Metering can be a useful tool to encourage lower water consumption and best practice by helping customers understand their usage.** Recent analysis found that fitting one million smart water meters in the UK each year for the next 15 years could result in saving at least one billion litres of water a day (1,000 Ml/d) by the mid-2030s, as well as reducing the UK’s current greenhouse gas emissions by 0.5% (2.1MtCO₂e). Subsidising uptake of water meters could help to stimulate greater uptake, although meters must be visible to customers so they can track usage in real time.

(b) Outcome 2: Improved system performance

Partial policies and plans are in place for improvement of system performance in Northern Ireland. Reporting on policies and plans demonstrate that improved system performance is being prioritised by NI Water and the Utility Regulator.* Planning actions consistently include active leakage reduction, among other service improvements. NI Water has annual targets for leakage, determined through the investment mechanism ‘PC21’, in coordination with the Utility Regulator.

Reporting on policies and plans demonstrate that improved system performance is being prioritised by NI Water and the Utility Regulator.

- **Key sectoral plans include monitoring requirements for system performance.** NI Water’s Water Resource Management Plan (WRMP) has embedded system improvement as deliverables through regular monitoring, repair, and use of data analysis to model where leakage is likely to occur.²⁵ NI Water’s Strategy 2021-46 aims to improve resource efficiency and includes a commitment to develop an adaptation plan. A publicly available adaptation plan could help to clarify progress on the risks identified by NI Water, building on their recommendation in the Water Resource and Supply Resilience Plan to utilise latest projections in UKCP18.

* The Utility Regulator has the equivalent role in Northern Ireland to Ofgem in the rest of UK.

- NI Water's 'Our Strategy 2021-2046' recognises the climate emergency as one of six strategic risks for the next 25 years. The strategy sets an overarching ambition to improve resilience for public water supply infrastructure in Northern Ireland and identifies current risks to the system.
- The Water and Sewerage Services (Northern Ireland) Order 2006 sets a legal requirement on NI Water to reduce water leakage in its network. NI Water, the government-owned company responsible for water and sewerage services, is legally required to reduce water leakage in its network. The Utility Regulator, under the current investment period 'PC21', sets annual targets to progress towards reducing, with current aims to achieve a sustainable level of leakage of 150 million litres per day.
- The Utility Regulator's price control for NI water, PC21, sets price limits from 2021-2027 that set efficiency standards. By the end of PC21, NI Water is expected to operate at equivalent level of efficiency to the upper quartile of similar companies in England and Wales. Mandatory water efficiency labelling is required in Northern Ireland, aligned to the progress in the rest of the UK.
- NI Water has targets for leakage reduction, but the acceptable level of leakage is determined entirely on an economic basis and does not identify leakage reduction rates that may be needed to ensure adequate water supplies are maintained despite climate change. Leakage targets are a key mechanism for reducing the amount of water lost through the supply system. Targets for leakage have incremental changes aligned to the 2021-27 investment period.
- The Drought Plan that forms one part of the Water Resource and Supply Resilience Plan relies upon assessment of demand at the onset of any drought event. There is a planning assumption that substantial leakage reductions will help to ensure preparedness for future drought conditions to reach a sustainable level of leakage, which is 150 million litres per day. The Plan also sets out how water supplies can be maintained through peak water demand in events that are more severe than usual service. UKCP18 projections have not currently been used to forecast extreme temperature and drought impacts in the future.

(c) Outcome 3: Increased supply

There are **limited plans and policies** on increasing water supply.

Current plans and policies do not address risks to capacity of public water assets from climate change.

There is strategic prioritisation for increasing supply by the Utility Regulator and NI Water. However, current plans and policies do not address risks to capacity of public water assets from climate change or set out actions to increase supply, such as creating new reservoir capacity or increasing connectivity between regions.

- One of the aims of Northern Ireland's Sustainable Water – Long Term Water Strategy is to improve the resilience of water supply. Impacts on public water supplies are informed by the Water Resource and Supply Resilience Plan and the climate change scenario modelling carried out by NI water to underpin their planning. This includes the Water Resource Management Plan – which contains the legislative requirement for NI Water to forecast supply and demand over at least the statutory minimum of 25 years. NI Water also review climate change impacts in 'sensitive zones' to the 2020s. There is a need to ensure that this planning progress is linked to clear

policies and monitored deliverables for water supply. Northern Ireland Water's sensitive zones review their climate change impacts to 2020s in Northern Ireland.

- **The Interruptions to Supply Strategy by NI Water sets out priorities for reducing supply interruption performance and achieve better service for its customers.** The implementation of the Interruptions to Supply Strategy has supported progress in reducing the number of minutes that a property is affected by water supply interruptions.

(d) Outcome 4: Interdependencies identified and managed

There are **insufficient policies and plans** to identify and manage interdependencies in the water supply sector.

There is an incomplete picture of interdependency risks across the sector and no clear policy to manage this.

- **Assessment of risks from cascading failures in infrastructure systems is not included within the Strategic Environmental Assessment for the Water Resource and Supply Resilience Plan.** While there are some key interdependency areas identified, these are insufficient because infrastructure interdependencies are not considered in high-demand or supply shortage scenarios. No evidence could be found which demonstrates a consideration of infrastructure interdependencies in NI Water's current plans.

(e) Recommendations

Table 5.2 provides a set of targeted recommendations to close key outstanding policy gaps identified within this sector.

Table 5.2

Recommendations - Water supply

Primary responsibility	Recommendation	Date
DAERA	Include a clear outcome and aligned indicators on water supply in the upcoming NICCAP3.	2024
NI Water	Embed latest UK Climate Projections (UKCP18) into all long-term water strategies and project planning.	Ongoing
DfI	Increase investment and research into identifying appropriate indicators for assessment on reduction of demand, system performance and increased supply.	2024-29
DfI, NI Executive	Designate legislative mandate for the Utility Regulator to have a climate resilience remit.	2024
Utility Regulator	Set standards for NI Water and monitor their progress in factoring latest UK Climate Projections (UKCP18) into business planning.	2024
NI Water	Conduct a comprehensive risk assessment to identify climate change impacts on system assets, including on their continued efficiency.	2024
NI Water	Produce an adaptation action plan that considers priority outcomes, such as reduction of demand, improved system performance and increased supply. Forecasted supply and demand should be considered for varying climate projections in UKCP18 going forward.	2024

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Chapter 6

Energy

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Introduction

Table 6.1

Progress summary – Energy

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Reduced vulnerability of energy assets to extreme weather	Insufficient progress	Limited policies and plans	<ul style="list-style-type: none"> There is very limited evidence available on the number of energy assets at risk from extreme weather impacts and the degree of vulnerability in future climate change scenarios. There are no data for other hazards such as overheating, landslides and subsidence. The Department for Infrastructure has identified energy assets at risk of flooding but there is no reporting on the delivery of actions. The National Policy Statement embeds climate resilience into all major infrastructure decisions, but the Utility Regulator does not have a statutory duty on climate resilience. Monitoring data on measures taken to reduce risk of assets and adapt to climate risks is not available. There is also no overarching Government strategy that aims to deliver a climate-resilient energy system.
Outcome 2: System level security of supply	Mixed progress	Partial policies and plans	<ul style="list-style-type: none"> Challenges in ensuring security of supply has refocused efforts to the transitions needed to restructure energy consumption. Better indicators need to be developed to build a resilient Net Zero energy supply system. Operators have energy response arrangements to respond to outages from severe weather events. Generation capacity, flexibility and redundancy is being considered. Key plans do not include sufficient adaptation actions.
Outcome 3: Interdependencies identified and managed	Unable to evaluate	Insufficient policies and plans	<ul style="list-style-type: none"> There is insufficient data to evaluate progress against this outcome. Interdependency risks are not considered within current energy policies and plans.

Relevant risks from CCRA3:
Risks to infrastructure networks (water, energy, transport, ICT) from cascading failures (I1); risks to infrastructure services from river, surface water and groundwater flooding (I2); risks to infrastructure services from coastal flooding and erosion (I3); risks to bridges and pipelines from flooding and erosion (I4); risks to hydroelectric generation from low or high river flows (I6); risks to subterranean and surface infrastructure from subsidence (I7); risks to energy generation from reduced water availability (I9); risks to energy from high and low temperatures, high winds, lightning (I10); risks to offshore infrastructure from storms and high waves (I11); risks and opportunities from summer and winter household energy demand (H6).

Our dependence on a reliable energy system is increasing at pace as we digitalise and decarbonise our economy.

This chapter covers adaptation to climate change for the energy system. This includes the generation of electricity and gas, and the operation of the electricity and gas grid to distribute energy to end users. Access to reliable and plentiful energy is essential for the functioning of the UK's economy and for the wellbeing of its population. Critical services such as banking, health, telecoms, and infrastructure are already dependent on the functioning of the energy system. Continued digitalisation of the economy in coming years will further increase the scale of potential impacts arising from electricity system failures, as will increasing use of electricity for road transportation and household heating.

Energy systems are undergoing a large-scale transformation to reduce and eliminate greenhouse gas emissions.

This requires major investment and turnover of assets and networks which make up the UK's energy system, creating the opportunity to improve resilience to climate change in the energy system at the same time.

Climate change will alter the frequency and intensity of weather hazards in Northern Ireland. UK Climate Projections show an expected rise in annual temperatures of 1.2°C by 2050 in Northern Ireland.*¹ Higher temperatures can result in increased likelihood of intense heatwaves and flooding.

Multiple climate hazards can and do cause large scale outages to the power network and the risk of many of these will increase due to climate change.

Projected risks to the energy system include:

- Higher temperatures in summer and increased intensity of heatwaves, which contribute to energy generation and transmission losses, faults from overheating components and increasing electricity demand for cooling.
- Evidence currently suggests that warming air can influence rainfall patterns – particularly the intensity and timing of short-duration precipitation. This results in increased risks of surface water flooding in winter and can impact energy infrastructure, causing capacity loss from inundation or flood damage. Summer rainfall is likely to decrease, although extreme downpours will be heavier despite the overall drying trend.

While drought is not expected to be a significant climate hazard for Northern Ireland, projections of future water availability suggest there could be reductions in water availability by 2050 in some catchments of Northern Ireland (under a pathway to 2°C global warming at 2100). This would have implications for the siting of any future thermal generation plant. Increased risk of summer drought, impacting supply of water required for cooling, hydropower generation, and hydrogen production.

Wind conditions are increasingly critical to the function of the system, as sources of electricity generation become more weather dependent (Box 6.1). Changes in the frequency and intensity of large-scale wind droughts due to climate change cannot be ruled out based on current evidence.

Snow and ice related incidents are important causes of weather-related power supply disruption. Warming temperatures are expected to decrease the frequency of these events, but they will likely still occur. Changes in some potentially important weather hazards remain uncertain, including wind strength, wind regimes, storminess, and lightning (Box 6.1). These hazards can all potentially cause large scale outages and loss of network capacity and are some of the key system-level hazards. Further evidence is needed to understand changes to these hazards, given the increasing reliance on generation from weather-dependent renewable sources for Net Zero.

Box 6.1

Climate impacts on the energy system

Storms. Recent extreme weather events, such as Storm Dudley and Storm Eunice, demonstrated the possible impacts on the energy supply system and knock-on impacts that can cascade across society (Box 6.3). However, there is not yet clear observational evidence for increased UK storminess or its link to climate change.¹ Trends in storm activity depend on the time-period analysed and can have significant multi-decadal variability.

High wind speeds. Wind turbines are designed to stop operation when wind speeds exceed a certain level, typically around 25 metres per second (around 56 mph), to avoid

* RCP6.0 scenario

mechanical damage from excess stress. Wind speeds consistently above that level can therefore lead to total wind generation dropping, potentially to near zero, within a few hours. There is currently no observational evidence for changes in the occurrence of strong wind gusts in Northern Ireland and limited understanding of possible future changes.

Northern Ireland's electricity system relies on a large share of generation from offshore wind, so the drop in available generation from such events could be significantly greater than the variations the system operator is accustomed to managing today. This drop would require a large amount of replacement generation to be ramped up sufficiently quickly.

Wind droughts. Wind droughts are extended periods of low wind speed conditions. Analysis of strong wind gusts across the UK show increases in gusts over 40 knots up to around 2000, after which there has been a decline.² In 2021, despite UK and parts of Ireland seeing negative trends, wind farms in Northern Ireland observed larger negative deviations.³ CCRA3 assessed the observed seasonal changes in near surface wind speeds (1981-2000) and UK climate projections for wind under 2°C, 3°C and 4°C warming thresholds (UKCP09 regional model, UKCP18 regional model and CMIP5 global model). The analysis concluded that in winter there is a large spread and no clear signal across the three sources of evidence that would imply robust changes in wind energy supply. In other seasons there is a consistent, but small, signal of weaker winds, except in summer where the declines are larger, especially in the UKCP18 results. This possible decrease in average surface wind speeds also have implications for renewable energy generation.

Lightning. Lightning strikes can and do have large-scale impacts on the electricity system. They are also an important cause of wildfires, which can result in widespread disruption, including to the energy sector. However, there is currently conflicting evidence for significant changes in the frequency of lightning strikes over coming decades.

Long-term uncertainty also exists for other hazards, such as sea-level and coastal storm surges. Further research is needed to understand the potential implications of all these hazards on the energy system.

Source: Slingo, J. (2021) *Latest scientific evidence for observed and projected climate change*. In: The third UK Climate Change Risk Assessment Technical Report [Betts, R.A., Haward, A.B. and Pearson, K.V. (eds.)] Prepared for the Climate Change Committee, London.

The energy system is inherently linked to many other sectors. All other infrastructure systems (see Chapter 5 on Water, Chapter 7 on Telecoms and ICT, and Chapter 8 on Transport) depend on energy supply to operate effectively. Failures in energy supply will also impact on buildings and will increasingly impact on transportation as the demand and use of electric vehicles increases over coming years.

All other infrastructure systems and many critical services depend on energy supply to operate effectively.

Policy levers in relation to energy are fully devolved from UK Government, except in the case of nuclear energy. Northern Ireland operates in a single electricity market with the Republic of Ireland in the cross-border Integrated Single Electricity Market (I-SEM), which regulates energy arrangements across the island of Ireland.

Governance for climate resilience in the energy system is complex, with several Government departments & organisations playing a role in ensuring resilience:

- **Civil Contingencies Branch** oversees civil contingencies and risk management for critical infrastructure. Environmental risks are also considered within Northern Ireland's Risk Register, which is maintained by the Civil Contingencies Group.
- **Department of Economy** is responsible for developing and implementing energy policy in Northern Ireland, which also includes promoting renewable energy sources, improving energy efficiency, and ensuring security of supply.

- **Utility Regulator** is the regulator for the energy sector in Northern Ireland. It is responsible for ensuring that energy operators and transmission distributors meet standards. The regulator is also responsible for regulation of the gas network to promote short and long-term interests of consumers. The Utility Regulator has published a range of codes and guidelines that energy companies are required to comply with, including climate resilience and sustainability standards.
- **Single Electricity Market Operator (SEMO)** facilitates the continuous operation and administration of the Single Electricity Market, consisting of the System Operator for Northern Ireland (SONI) and the Republic of Ireland equivalent, EirGrid.
- **Northern Ireland Networks Limited (NIE Networks)** is the electricity asset owner for transmission and distribution infrastructure and Distribution Network Operator (DNO) in Northern Ireland.
- **System Operator for Northern Ireland (SONI Limited)** has license and statutory obligations on ensuring sufficient supply by guaranteeing the stability and security of the electricity system. SONI plays a central role in ensuring that electricity demand and supply in Northern Ireland are balanced at all times.
- **Multiple gas network operators have licenses in Northern Ireland.** The four licensed transmission companies are: Premier Transmission Limited, Belfast Gas Transmission Limited, Gas Networks Limited, and West Transmission Limited. Three distribution companies are: Phoenix Natural Gas Limited, Firms Energy and SGN Natural Gas. Mutual Energy operates gas distribution operations including the Scotland-Northern Ireland pipeline and the Belfast Gas Transmission pipeline.

Coverage of energy-related climate risks and adaptation in the Northern Ireland Climate Change Adaptation Programme (NICCAP) is limited (Box 6.2)

Box 6.2

Energy within Northern Ireland's Adaptation Programme (NICCAP2)

'Infrastructure Services' are identified as a key priority area with one 'outcome objective' on Transport and Network services with no associated indicators on energy resilience:

- IF1: We have Transport and Network Services that are resilience to the impacts of flooding and extreme weather.

There are no indicators in the current adaptation programme that help to monitor adaptation progress in the energy sector. We discuss the indicators associated to the above outcome in relation to flooding and drainage in the chapter on towns and cities (Chapter 9) in this report.

Source: DAERA (2019) *Northern Ireland Climate Change Adaptation Programme 2019-2024*.

Notes: Network services are not clearly defined in the NICCAP, outcomes delivered within the Mid-Term Programme Review in 2022 signal that energy resilience and other infrastructure networks can be covered within the scope of this outcome.

1. Monitoring progress towards a well-adapted energy system

Resilience can be delivered through reduced vulnerability of assets, security of supply and effective management of interdependencies with other systems.

Successful adaptation aims to ensure a reliable power supply in a Net Zero economy, despite climate change. This means that the number of homes and businesses affected by power outages is minimised, and that when outages do occur, their impact and duration is reduced, particularly for critical national infrastructure and essential services such as medical care.

We have identified three key outcomes to deliver a well-adapted energy system (Figure 6.1). A number of policy actions and enabling factors are needed to deliver these outcomes. The key adaptation outcomes that need to be achieved for the energy system to deliver this are:

- **Reduced vulnerability of energy assets to extreme weather.** Increased frequency of extreme weather events poses significant risks to energy assets (power generation plants, electricity and gas transmission and distribution networks). The monitoring of asset-level resilience to floods, overheating of infrastructure and overall conditions are necessary to minimise the impact of climate change on the energy system.
- **System level security of supply.** Weather and climate can impact energy asset performance, and lead to costly disruption, or in severe cases, loss of energy services entirely. Increased reliance on weather-dependent sources of generation necessitates robust system planning to deliver a reliable supply. Increased reliance on electricity supply increases the consequences of power outages.
- **Interdependencies with other systems are known and managed.** Infrastructure services are increasingly dependent on one another. Risks of cascading failures from another service, such as transport, water or digital, also increase the risk of power outages. The energy system also relies on key infrastructure services to operate effectively. These interdependencies need to be accounted for in climate assessments and adaptation actions for all major electricity and gas producers, as well as transmission and distribution system operators.

Governance arrangements for climate resilience in the energy system are complex and not always clear.

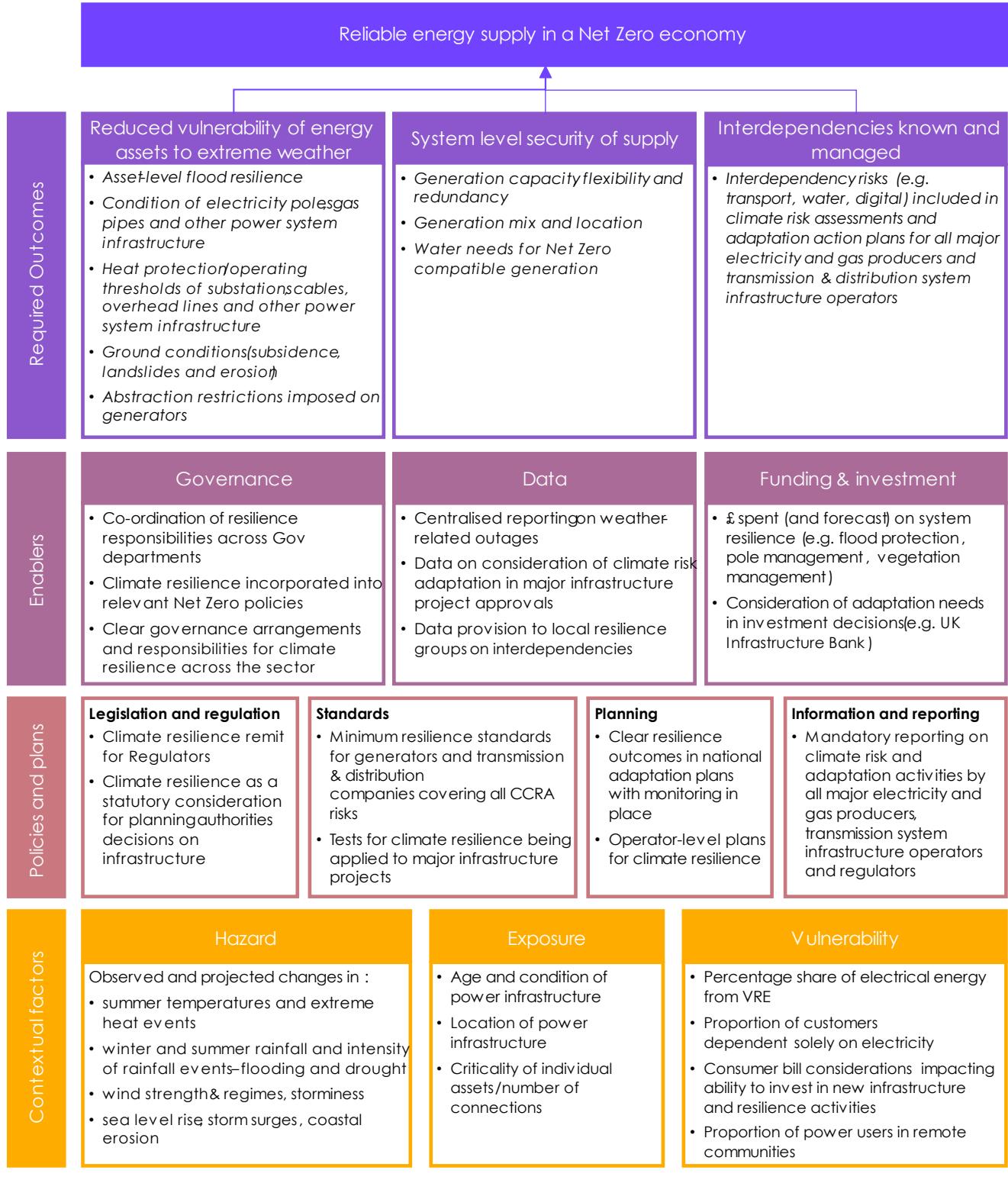
There are several enabling factors that will be needed if the outcomes identified above are to be implemented at appropriate scales:

- **Governance.** Arrangements for governance of climate resilience in the energy system are complex. Many Government departments and organisations have a role in ensuring resilience, though their remits are not always clear. All actors will need to collaborate and communicate more effectively to deliver a resilient, decarbonised energy supply.
- **Data.** National data on weather and climate related impacts on the energy system, and on the extent of adaptation actions being delivered, will enable a better understanding of the extent to which the energy system is climate resilient.
- **Funding and investment.** Climate resilience needs to be formally integrated into investment processes and long-term decisions. This includes in investment for large national-scale infrastructure projects and in company-level investment cycles.

Our monitoring framework highlights policy mechanisms which must be in place to achieve these required outcomes for a well-adapted power supply (Figure 6.1). These fall under the following categories:

- **Legislation and regulation.** National policy must create legislation which enforces sustainable long-term plans for a resilient energy system and provide appropriate frameworks for regulation. Statutory resilience duties are needed for regulators and key system operators. Legislation should also ensure that investment allocation is appropriate to meet adaptation goals.
- **Standards.** A well-adapted energy system will require policy to deliver and extend resilience standards, which deliver an energy system compatible with future climate conditions.
- **Planning.** National adaptation plans must have clear resilience outcomes with monitoring in place. All key operators in the energy system must produce climate change risk assessments and adaptation plans which demonstrate progress in making the energy system more climate resilient.
- **Information and reporting.** Reporting on some aspects of risk and adaptation planning and delivery should be mandatory. This will improve understanding of the national picture of adaptation in the energy system, as well as in other sectors upon which the energy system relies, including transport and telecoms & ICT.

Figure 6.1 Monitoring map for energy



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

This section documents available evidence on progress towards delivery and implementation of each of the climate resilience outcomes identified in the previous section.

(a) Outcome 1: Reduced vulnerability of energy assets to extreme weather

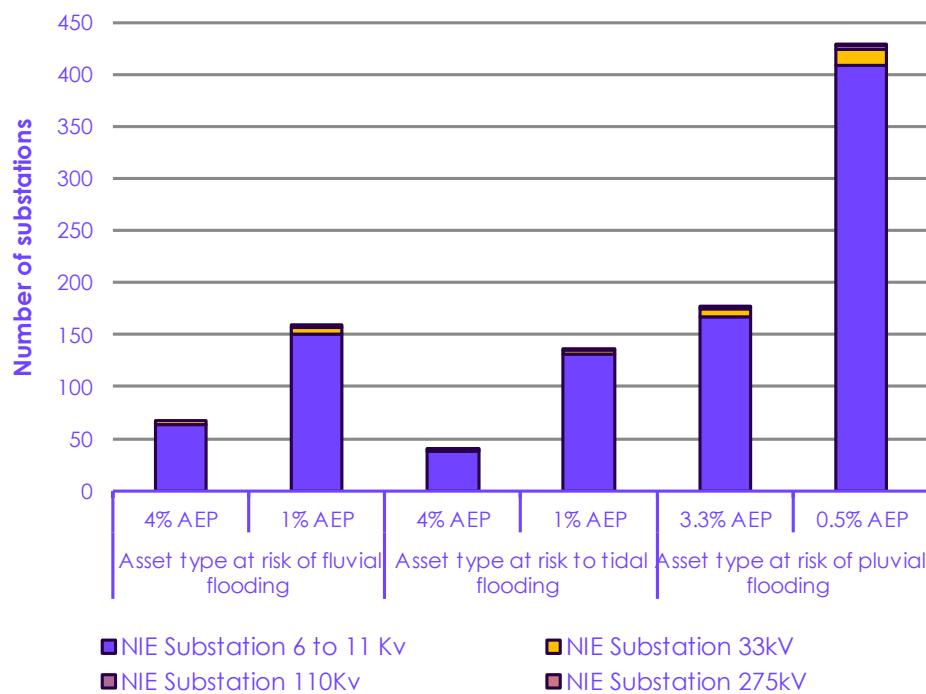
Metrics to monitor extreme weather impacts and degree of vulnerability of assets should be included in reporting.

There is **insufficient progress** towards the delivery and implementation of this outcome. Indicators for the delivery of this outcome are scarcely available. Flood risk to substations is included within the Flood Risk Management Plan. There is no monitoring data available on asset vulnerability. Metrics to monitor extreme weather impacts and degree of vulnerability of assets should be included in reporting. More data are needed to monitor asset level flood resilience, condition of infrastructure, ground conditions and use of abstraction restrictions. Data for vulnerability from some hazards, such as overheating, are not available.

- **Some energy infrastructure assets at risk were identified in the Flood Risk Management Plan (FRMP), but no power stations were identified.**⁴ In total, the Plan identifies that there are 3,233 Northern Ireland Electricity Networks (NIE) substations across the twelve areas of potential significant flood risk.⁵ Of these, the Plan identifies four different types of substations, of which, the smaller NIE Substations for 6 to 11kV have the highest count of assets at flood risk across all types of flooding. There are a total of 3,151 smaller substations for 6 to 11kV, compared to 17 larger 110kV substations and two 275kV substations.⁶ Though there are fewer substations at risk of flooding, there is also a smaller overall number of large substations. Therefore, any high risks of flooding could have considerable impact on the energy supply system. Figure 6.2 shows that the number of substation assets at risk across all types of flooding increases between short-term (1 in 30- or 40-year flood) to medium term (1 in 100- or 200-year flood).
- **Abstraction restrictions imposed on power generators are not available.** Projections of future catchment water availability conclude there could be reductions in by mid-century in some catchments of Northern Ireland, under a pathway to 2°C global warming at 2100.⁷ This would have implications for the siting of any future thermal generation plant.



Figure 6.2 Total electricity substations at risk of pluvial, fluvial, or tidal flooding in four Annual Exceedance Probabilities



Source: CCC analysis; Department for Infrastructure (2021) Second Cycle Northern Ireland Flood Risk Management Plan 2021 – 2027.

Notes: The Annual Exceedance Probability (AEP) is the probability of a natural hazard event, such as flooding, of a particular magnitude, or larger, will occur within a one-year period. For example, 4% AEP (1 in 40 year), 1% AEP (1 in 100 year), 3.3% AEP (1 in 30 year) and 0.5% (1 in 200 year) were selected from larger dataset in the NI Flood Risk Management Plan. NIE refers to Northern Ireland Electricity Network's substations. The dataset does not include any information on electricity power stations. The figures identify number of substations at risk, in the event of a flood, based on the probability of such flooding events.

Box 6.3

Recent weather-related disruption to the electricity system

- Storm Franklin in February 2022: gusts of around 63 – 78 mph causing heavy rainfall and flooding across parts of Northern Ireland. Northern Ireland Electricity (NIE) estimated that at its peak, 10,000 properties were without power.
- Storm Dudley in February 2022: gusts of around 60 mph, which caused power disruption to more than 800 homes across Londonderry and Armagh. NIE reported that there were no major faults across the energy supply network.
- Storm Barra in December 2021: gusts of around 80 mph along with blizzards and heavy rain. 39,000 people lost power in Northern Ireland, Wales, and parts of England.

These events demonstrate the range of hazards and scale of impact that can affect power supply.

Source: BBC (2022) *Storm Franklin hits UK with floods and high winds*; BBC (2022) *Storm Dudley: Power cuts and fallen trees in Northern Ireland*; BBC (2021) *Storm Barra brings strong winds, heavy rain and snow to NI*.

(b) Outcome 2: System level security of supply

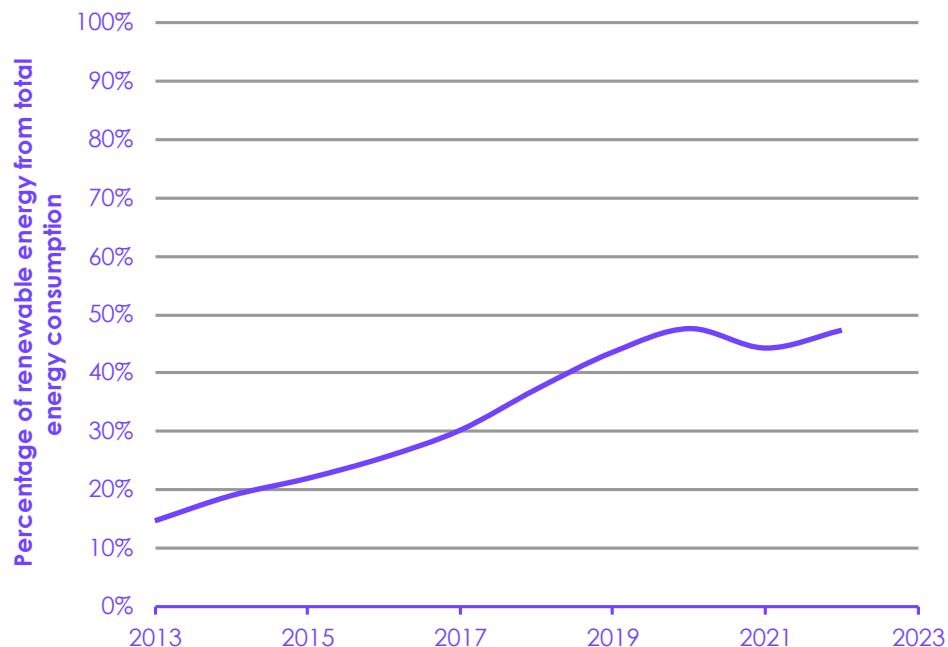
There are some available indicators that show renewable sources of energy are increasingly contributing to the generation mix, in line with the target for 70% of energy consumption to be from renewable sources by 2030.

Despite security of supply being a priority of the Path to Net Zero Strategy, there is **mixed progress** on delivery of measures to achieve this outcome.

Renewable sources are increasingly contributing to Northern Ireland's energy generation mix, in line with the Government aim for at least 70% of electricity consumption to derive from renewable sources by 2030.⁸ Greater reliance on renewable energy also requires due consideration of risks to security of supply during the Net Zero transition. Generation mix scenarios have featured in operator level reporting, but there is limited understanding of sector preparedness to forecasted climate change impacts on security of supply.

- **Renewable sources for energy generation are increasingly contributing to Northern Ireland's energy distribution system.** In 2013, only 14.8% of the total annual average electricity generation came from renewable sources. This increased to 47.3% in 2022. There is a high degree of reliance on renewable wind to support this transition. The gradual transition in the energy sector to renewable energy increases risks to security of supply, and there is an urgent need to assess how climate change risks might impact supply during the transition.

Figure 6.3 Average annual renewable consumption as a percentage of total electricity consumption from 2013 – 2022

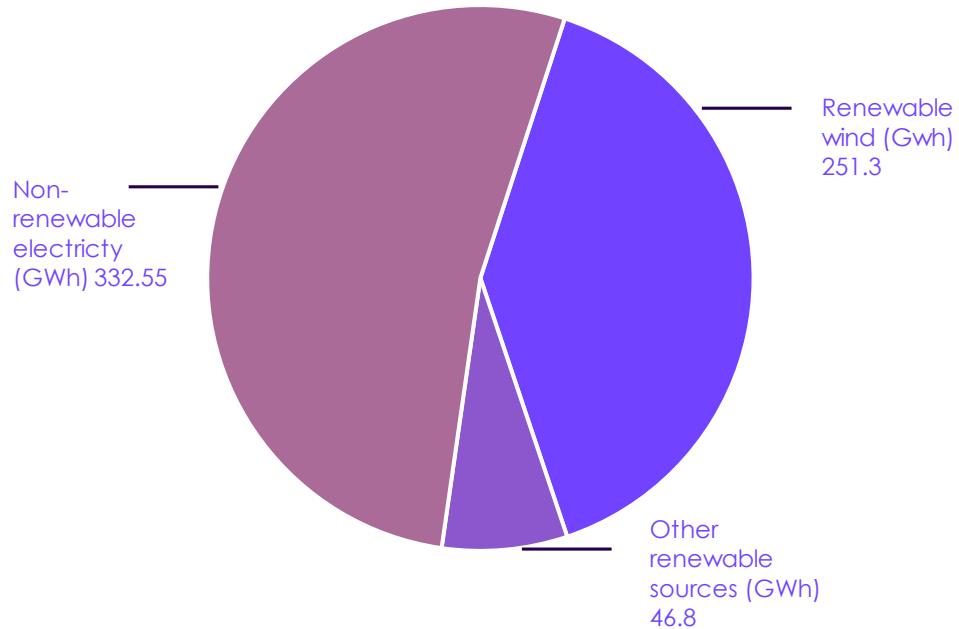


Source: CCC analysis; DfE (2022) *Electricity Consumption and Renewable Generation Statistics*.
Notes: Annual average of monthly electricity consumption from renewable sources were calculated.

- **Generation mix is increasingly reliant on renewable wind energy.** Northern Ireland's energy derived from renewables has consistently been between 40% to 50% from December 2018 till September 2022. The Northern Ireland Statistics and Research Agency (NISRA) identified that in the 12-month period from January 2022 to December 2022, 51.1% of total electricity consumption was generated from renewable sources (Figure 6.3).⁹

Of which, 85.3% was generated from wind. This is an increase of 9.7% from the year before and the second highest proportion on record. Analysis by the CCC on energy supply, published in 2023, shows that a decarbonised system, with a higher degree of weather-dependent generation, can be made both reliable and resilient (see Policy and planning progress (b)).¹⁰

Figure 6.4 Energy generation mix in Northern Ireland for 2022



Source: CCC analysis; DfE (2022) *Electricity Consumption and Renewable Generation Statistics*.

- **There are no large installations for generation of hydropower electricity in Northern Ireland.** Hydropower provided 2% (5,935GWh) of net electricity supply across the UK in 2019.¹¹ However, the majority of large installations are in Scotland and England, with no large hydropower plants in Northern Ireland.

(c) Outcome 3: Interdependencies identified and managed

There is limited data to assess progress of addressing interdependency risks therefore, we are **unable to evaluate** progress for this outcome.

There was no evidence found on climate change risk assessments or adaptation plans being carried out. Sources of interdependency risks are not yet understood.

No climate change risk assessments or adaptation plans could be identified for stakeholders in the energy sector. Resultingly, impacts of failures in other infrastructure areas are also not identified. The importance of interdependencies is mentioned throughout NICCAP2, though no specific actions are included to address cascading risks specifically and there are no monitoring data to evaluate. Mandatory reporting on climate risks and adaptation plans by energy network operators could be a source of this data in future.

(d) Progress on enablers

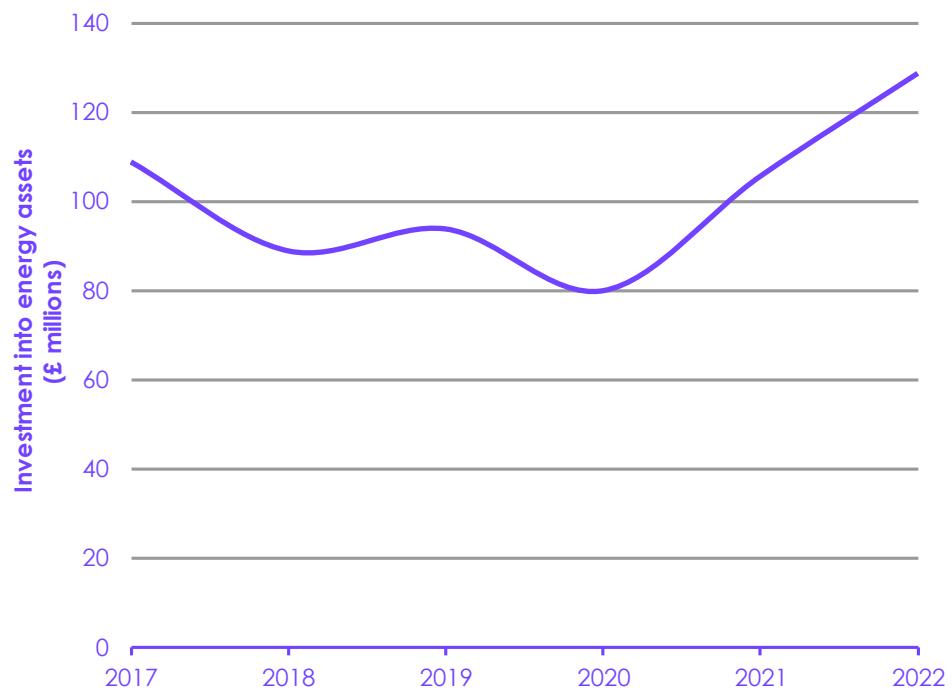
Key enablers to deliver a well-adapted energy system are not yet in place. Climate resilience is being reflected in upcoming regulatory price controls, which represents some progress. However, the resilience of energy assets to risks from climate change has not been considered sufficiently in key Net Zero strategy and lack of data is hampering the ability to monitor progress in adaptation.

Climate resilience is not being reflected in long-term investment decisions and governance arrangements need to be strengthened.

- **The RB7 price controls approach for 2025 – 2031 published by the Utility Regulator on Northern Ireland Electricity networks requires reporting on climate change adaptation.** The RB7 approach require NIE networks to set a plan that identifies impact of climate change on its networks, by assessing risks from extreme weather projected with future climate change. Forthcoming plans require NIE networks to consider risks from higher or lower temperatures, increased wind speeds and increased precipitation on the performance of energy network assets in the long-term in Northern Ireland.
- **The Path to Net Zero Strategy misses an opportunity to integrate climate resilience into decarbonisation policy.** The Northern Ireland Executive's Path to Net Zero strategy is mitigation focused and entirely misses an opportunity to ensure the future energy system is resilient to climate change.¹²
- **The Utility Regulator has statutory responsibility for the Northern Ireland Renewable Obligation (NIRO), but the regulator's statutory remit does not extend to climate resilience.** NIRO is an environmental scheme to encourage use of renewable electricity in Northern Ireland. It is managed by the Utility Regulator and administered by Ofgem under a service agreement. However, the Utility Regulator does not currently have a climate resilience remit within these responsibilities to regulate renewable energy use.
- **The impact of weather-related disruption on the current energy system is not known.** Electricity outages and service interruptions to customers are reported to Northern Ireland Electricity Networks (NIE), however, there is a lack of available data on weather-related outages that can help identify severity of impacts from different climate hazards to Northern Ireland.
- **Data provision to Emergency Preparedness Groups in NI is overseen by the NI Civil Contingencies Policy Branch.** There was no publicly available data and whether these are sufficient in understanding the risks from climate change to the energy sector (see also Chapter 12).
- **The amount spent on some components of building system resilience, such as refurbishing ageing assets has increased.** NIE Networks is required to undertake innovation as a part of its 'Business as usual' activities and demonstrate the benefit of their innovation. Figure 6.5 shows increasing investment into refurbishment and replacement of aged assets to maintain supply and safety of the network. In 2022, NIE Networks invested £128.7 million in the transmission and distribution networks – the majority of which was used for refurbishment and replacement. This is an increased investment from £105.7 million in 2021.¹³ However, the investment into other aspects of maintenance, such as vegetation management to maintain network's resilience to storm conditions and reduce fault rates across overhead lines, is not known. Investment on pole management and flood protection also could not be found.



Figure 6.5 Investment into maintenance of the transmission and distribution network between 2017-2022



Source: CCC analysis; NIE Networks (2022) *Annual Reports and Financial Statements from 2017-2022*.

3. Policy and planning progress

This section assesses progress in policy and planning to deliver the outcomes identified above. Key policy milestones required to deliver a well-adapted energy system in Northern Ireland are legislative and regulatory support to establish climate resilience remits, minimum resilience standards, incorporation of resilience outcomes in planning policies and mandatory reporting on tracking of climate risks and adaptation activities.

(a) Outcome 1: Reduced vulnerability of energy assets to extreme weather

Some key policy milestones for asset level resilience are not in place, such as the climate remit for regulators.

Our assessment finds there are **limited policies and plans** in place to reduce the vulnerability of energy generation and networks assets to extreme weather in Northern Ireland.

The National Policy Statement on Energy embeds climate resilience into major infrastructure decisions, but the Utility Regulator does not have a statutory duty on climate resilience. Network operators report measures taken on asset level flood resilience to the Department for Economy, but there is no quantitative data to support this. Network operators have made good progress in including climate resilience in asset-level planning, but there is no overarching Government strategy to deliver a climate-resilient energy system. The Path to Net Zero Energy Strategy informs the ambition to decarbonise energy supply in Northern Ireland, but there is no discussion of risks to energy infrastructure from climate change.

Positive progress is found in assessing asset vulnerability to floods. The Flood Risk Management Plan identified electricity substations at significant risk from flooding. But site-specific flood risk assessments for larger substations are carried out. There remains a gap in monitoring and reporting data on vulnerability of energy assets from other types of extreme weather in Northern Ireland, such as overheating or subsidence. NICCAP2 also does not have any resilience indicators for energy infrastructure, which should be reflected in future.

- **Key legislation in Northern Ireland contains minimal considerations for monitoring of infrastructure assets.** Most of the responsibility lies with NIE Networks and SONI.
- **Climate resilience is an embedded outcome in the Utility Regulator's approach for the RB7 price control mechanism for 2025 – 2031, however this has not yet been finalised.** Previous price control mechanisms did not specify climate resilience, though good progress has been made by network operators to assess vulnerability of assets and improve resilience to extreme weather. Climate resilience outcomes in the next price control indicate good progress in aligning adaptation actions to Net Zero targets.
- **Condition of power system assets are monitored, but not in relation to climate change risks.** The Electricity Regulations (Northern Ireland) 2007 regulates the supply, transmission, and generation of electricity.¹⁴ Planning applications made under this regulation provide an overview of assets and how these stations are being fuelled or driven, as well as their location. However, the monitoring does not currently extend to climate risk assessments or adaptation plans.

- **There is no available evidence the number of assets at suitable resilience standards in Northern Ireland.** Minimum resilience standards for generators and transmission and distribution companies should be in place and consider risks identified in CCRA. Northern Ireland Electricity (NIE) Networks and Northern Ireland's Gas Network Operators have licenced responsibility to ensure ongoing maintenance of their network assets, which includes consideration of ageing infrastructure, heating protection and operating thresholds, but there are no data on the number of assets reaching these standards.*
- **Network operators have reported to DfE that asset level flood resilience is considered and built into their business continuity planning but there is no quantitative data to accompany reporting.** The following actions listed as outcomes:
 - Exolum Oil considers tidal warnings issued by the Harbour Commissioner. However, no evidence could be found of what actions are being taken upon the issuance of tidal warnings.
 - Puma Oil undertook a quantified risk report and found that their location is not susceptible to flooding.
 - Killroot Power Station confirmed that climate change is captured in its business continuity plan and risk register.
 - Coolkerragh Power Station confirmed that a study undertaken showed the location was susceptible to flooding and follow up actions were taken to address the findings.
- **The Utility Regulator in Northern Ireland has set out a range of codes for transmission and distribution companies, but these codes do not incorporate climate resilience.** For example, the Electricity Distribution Code does not include assessment and management of climate change risks. Electricity distribution companies are not required to develop and implement plans to ensure resilient energy infrastructure. Similarly, the Electricity Transmission Code, and the Gas Transmission and Distribution Code set the same requirement for electricity and gas transmission and distributor companies.
- **Coverage of climate resilience in national plans is limited in scope.** The National Policy Statement on Energy embeds climate resilience into major infrastructure decisions, however, NICCAP2 does not have any resilience outcomes for energy infrastructure. The Flood Risk Management Plan identified electricity substations at significant risk from flooding. For any large substations for transmission and primary distribution in a predicted flooding area, a site-specific flood risk assessment is undertaken to determine the predicted flood depth and subsequent flood defence, or protection required. However, there is currently no overarching plan that addresses the impact from other types of climate risks, such as high temperatures and overheating, on energy assets, which is a key gap.

* Condition 19 of Northern Ireland Electricity Distribution Licence (uregni.gov.uk) requires regular monitoring by NIE Networks in accordance to the Distribution System Security and Planning Standard and Operation of the Distribution system.

- **The Path to Net Zero Energy Strategy informs the ambition to decarbonise energy supply in Northern Ireland, but there is no discussion of risks to energy infrastructure from climate change.** The strategy recognises that additional upfront investment in assets is necessary and would provide ongoing benefits, yet it falls short because the strategy does not adequately embed adaptation.
- **The transmission network operator in Northern Ireland does have plans in place that consider climate resilience.** SONI's 'Transmission Development Plan for Northern Ireland 2021-2030' sets out the planned development that SONI and NIE Networks will collectively carry out across the Northern Ireland electricity transmission system over the 10-year period.¹⁵ This is to prepare and maintain the infrastructure assets to enable an energy transition. Environmental policies were compiled within this plan to ensure SONI gives due regard to existing environmental legislation and best practice.
- **The distribution network operator's 'Networks for Net Zero' does not include adaptation actions for the energy system, though their annual reporting for 2022 signals increased awareness of this gap.** Northern Ireland Electricity Network conducted an audit to consider potential impacts of climate change on their business and financial statements. The audit looked into climate impacts on the energy system and their own risk assessment over physical and transitional risks.
- **Information and reporting on climate resilience activities from energy suppliers is limited.** NIE Networks and SONI Limited are responsible for monitoring and reporting to the Department for Economy on capacity of the energy supply infrastructure. Their monitoring of asset resilience also reflects in the Utility Regulator's price control mechanisms, which budget the improvement of the asset base and deliver adequate supply. However, this information is not being collated by or reported to the Department for Economy.

(b) Outcome 2: System level security of supply

There are **partial policies and plans** in place for this outcome. Adequate emergency response arrangements are in place for responding to outages from severe weather events. Existing plans and programmes across distribution and transmission operators consider generation capacity, flexibility, and redundancy, which may be further developed if the next RB7 price controls include climate resilience reporting. The 'Path to Net Zero Energy' strategy aims to ensure system-level security of supply and has a high-level goal to create a flexible, resilient, and integrated energy system. The sector is making good progress with NIE Networks aligning their planning to the 2080 UK Climate Projections (UKCP18) and taking steps towards preparing energy assets to withstand severe weather conditions.

A decarbonised energy supply will be more weather dependent. This can be reliable and secure but needs suitable planning.

- **All network operators have emergency response plans, which are tested annually.** SONI and Mutual Energy, as system operators for electricity and gas respectively, facilitate these exercises. The Department for Economy is also involved in these annual exercises and feeds into the response plans. The emergency response plans include consideration of network restoration, access to local supplies of energy, support for communities during outages and support to vulnerable customers.

- **Generation capacity, flexibility, and redundancy is being considered.** Key programmes and plans to note are:
 - **NIE's Delivering a Secure, Sustainable Electricity Programme** identified several viable distributed energy resources (DER) in electricity distribution networks that can displace transmission connected generation, prioritising flexibility to respond to changing weather conditions.
 - **SONI has a five-year corporate strategy to embed the need to secure the Net Zero transition without compromising the reliability, resilience, and affordability of the energy infrastructure.** It incorporates consideration of climate impacts to ageing infrastructure, increase in supply and storage of renewable energy, and rising demand.
 - **SONI's annual Winter Outlook sets out the expected electricity demand and capacity margin across the whole of Ireland.** The capacity margin is the excess generation and interconnection available to meet the peak electricity demand.
 - **The annual All-Island Generation Capacity Statement** published by EirGrid and SONI presents information on studies that assess the balance between supply and demand over the subsequent ten years.

(c) Outcome 3: Interdependencies identified and managed

Systemic planning for interdependency risks is needed. Exclusion of this outcome in policies and plans can hinder oversight of risks from failure of other infrastructure systems due to extreme weather that would impact the energy supply network.

There are **insufficient policies and plans** in place to identify and manage interdependency risks of the energy infrastructure in Northern Ireland. The Northern Ireland Executive Office's Civil Contingencies branch maintains a risk register to map interdependencies in failures to critical infrastructure since its establishment in 2021.

However, there is a lack of policy and monitoring of interacting failures and better integration of interdependencies in the risk assessment process and adaptation planning is needed.

- **Interdependency risks are not included in climate risks assessments and adaptation action plans.** All major electricity and gas producers, as well as transmission and distribution system infrastructure operators need to consider the risks of cascading failures from climate change in other infrastructure systems causing disruptions to energy supply. We are unable to assess progress because no evidence was found that producers and operators have identified and managed interdependency risks.
- **Interdependency risks have not been included in current energy policies.** Electricity generators, transmission and distribution companies do work closely with other infrastructure areas, such as water and transport. However, there are no requirements for data sharing and reporting.
- **There are developing plans which may improve public sector reporting to the Government on adaptation actions.** Regulations are being developed under the Climate Change (Northern Ireland) Act 2022, to require public sector reporting on climate risks and progress in adapting to climate change. It is not yet clear whether public bodies with the responsibility for improving resilience of energy supply will be required to report.

- **There are currently no mechanisms for private companies to report to the Government on adaptation actions that are being taken or need to be taken in upcoming years.** Energy in Northern Ireland is uniquely coordinated with Republic of Ireland. While the public body reporting duty provides an opportunity to cover this gap, private companies will be unable to directly feed into this process. Therefore, reporting from key public bodies such as the Utility Regulator will be essential in having an overview of the energy sector's resilience to climate change.

(d) Recommendations

Table 6.3 provides a set of targeted recommendations to close key outstanding policy gaps identified within this sector.

Table 6.3

Recommendations - Energy

Primary responsibility	Recommendation	Date
DAERA	Include actions to embed climate resilience into planning for energy infrastructure in NICCAP3.	2024
DfE	Collate national data on weather-related outages, including the frequency and duration of outage and the number of properties and businesses affected.	Ongoing
DfE	Build upon the interdisciplinary approach undertaken in the development of the Civil Contingencies Branch Risk Register. Build on the interdependency risks mapping and develop strategic planning instruments to track how cascading failures may affect the energy system.	2024-29
Utility Regulator	Set minimum resilience standards covering all key energy system operators and all relevant climate hazards from CCRA3.	2024
DfE, in coordination with NI Executive Office	Mandatory reporting on climate risk and adaptation plans by public bodies that oversee implementation action from all generators, network operators and regulators under the Public Body Reporting Duty. The Public Body Reporting should include specific actions for managing climate change risks in their adaptation plans. Guidance from the Northern Ireland Executive is needed to support this.	2026
DAERA	Include actions to embed climate resilience into planning for energy infrastructure in NICCAP3.	2024

Endnotes

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- ¹⁰ Climate Change Committee (2023) *Delivering a reliable decarbonised power system* Climate Change Committee (2023) *Delivering a reliable decarbonised power system*, accessed on 20 March 2023, <https://www.theccc.org.uk/wp-content/uploads/2023/03/Delivering-a-reliable-decarbonised-power-system.pdf>.
- ¹¹ Climate Change Committee (2021) *UK Climate Risk Independent Assessment (CCRA3) Technical Report on Infrastructure*, accessed on 15 March 2023, <https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA3-Chapter-4-FINAL.pdf>.
- ¹² Department for Economy (2021) *Energy Strategy for Northern Ireland – Path to Net Zero Energy*, accessed on 14 February 2023, <https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-Strategy-for-Northern-Ireland-path-to-netzero.pdf>.
- ¹³ Northern Ireland Electricity Network (2022) *Annual Report & Financial Statements* Twelve months ended 31 December 2022, accessed on 15 March 2023, <https://www.nienetworks.co.uk/documents/annual-reports/nie-networks-2022-annual-report-and-financial-stat.aspx>.

¹⁴ The Electricity (Application for Licences and Extensions of Licenses) (No.2) Regulations (Northern Ireland) 2007.

¹⁵ SONI (2021) *Transmission Development Plan for Northern Ireland 2021-2030*, accessed on 18 March 2023, <https://www.soni.ltd.uk/media/documents/Transmission-Development-Plan-Northern-Ireland-2021-2030.pdf>.



Chapter 7

Telecommunications and ICT

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Introduction

Table 7.1

Progress summary – Telecommunications and ICT networks

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Vulnerability of assets reduced	Unable to evaluate	Mostly Reserved	<ul style="list-style-type: none"> No publicly available data could be found to assess progress of Northern Ireland's telecoms and ICT network resilience to risks from climate change in different warming scenarios. Telecoms and ICT networks are reserved to the UK at policy level, so policy scores are not given to Northern Ireland. In the CCC's UK adaptation progress report (2023), this outcome had limited policies and plans.
Outcome 2: System level resilience	Unable to evaluate	Reserved	<ul style="list-style-type: none"> Digital infrastructure services in Northern Ireland are privately operated and there is no overview of the extent to which climate change risks have been adequately identified and how these risks are being managed within the sector. There is a lack of data to evaluate progress. Telecoms and ICT networks are reserved to the UK at a policy level, so policy scores are not given to Northern Ireland. In the CCC's UK adaptation progress report (2023), this outcome had insufficient policies and plans.
Outcome 3: Interdependencies identified and managed	Unable to evaluate	Mostly reserved	<ul style="list-style-type: none"> There is limited data across the UK, but especially in Northern Ireland, to evaluate progress on this outcome. Telecoms and ICT networks are reserved to the UK at a policy level, so policy scores are not given to Northern Ireland. In the CCC's UK adaptation progress report (2023), this outcome had insufficient policies and plans.

Relevant risks from CCRA3:

Risks to infrastructure networks (water, energy, transport, ICT) from cascading failures (I1); Risks to infrastructure services from river, surface water and groundwater flooding (I2); Risks to infrastructure services from coastal flooding and erosion (I3); Risks to bridges and pipelines from flooding and erosion (I4); Risks to subterranean and surface infrastructure from subsidence (I7); Risks to digital from high and low temperatures, high winds, and lightning (I13).

This chapter covers adaptation to climate change for telecommunications (telecoms) and information communications technology (ICT) network infrastructure. This is infrastructure for the provision of telephone, mobile communications, and internet services, including data centres across Northern Ireland and extensive networks of optical fibres, cables, and masts.

Telecoms and ICT infrastructure will be affected by flooding, increased temperatures and occurrence of heatwave events, storms, and winds. Many of these hazards will increase in frequency and intensity, with greater impact on the provision of telecoms and ICT services than we see today. For others, evidence on future changes and therefore potential impacts on telecoms and ICT infrastructure remains uncertain (Box 7.1).

Many climate hazards are already affecting telecoms and ICT services today and will become more severe and intense.

Box 7.1

Changes in hazard and impacts on telecoms and ICT infrastructure

High summer temperatures, as well as rapid fluctuations in temperature and humidity, pose challenges particularly to data centres, which need to be kept cool to operate.

Data centres are also vulnerable to floods, high winds, wildfire, and droughts as well as loss of supporting power supply.

An increase in the frequency or intensity of storms could increase the risk of wind, ice and snow damage to overhead cables and damage from wind-blown debris. These fixed line services are being replaced by wireless services (4G and 5G) from the nearest fibre node, and direct connection to fibre networks. During periods of severe cold, snow or flooding, telecoms providers can be affected by the denial of access to affected sites, or loss of power. These risks decline as more robust, underground, fibre optic cables parallel or replace aerial cables and wireless links. Fibre and cables are vulnerable to flooding damage where they use bridges to cross rivers.

More intense or longer droughts and heatwaves can affect a range of ICT infrastructure because ground shrinkage can lead to failure of electrical, gas and water pipes, thereby damaging co-sited ICT infrastructure. The Third Climate Change Risk Assessment (CCRA3) concluded that further attention to the climate resilience of this sector and quantitative information on current and future risks under climate change is needed to better assess its vulnerability and exposure to climate change.¹

Source: Jaroszowski, D., Wood, R., and Chapman, L. (2021) Infrastructure. In: *The Third UK Climate Change Risk Assessment Technical Report*. [Betts, R.A., Haward, A.B., Pearson, K.V. (eds)] Prepared for the Climate Change Committee, London.

Exposure to these hazards is influenced by the age, condition and location of telecoms and ICT infrastructure. Continued digitalisation of key functions in society means our dependence on digital infrastructure is growing, and therefore the impacts of climate-related events causing outages are likely to increase over time. The ownership of a large proportion of ICT infrastructure, particularly data centres, base stations, and network connections, is private. For commercial or sensitivity reasons, information on location and connectivity is often not publicly available, meaning it can be difficult to assess vulnerability to extreme events across the system. Remote communities and vulnerable groups such as those who rely on digitally operated health equipment are likely to be more vulnerable to climate risks affecting digital infrastructure. The removal of copper lines, upon which many critical functions are reliant (traffic lights, lifts, communications for healthcare), risks increasing vulnerability when replaced with less climate-resilient alternatives.

Telecommunications is a reserved matter and has not been devolved to the Northern Ireland Executive. There is no designated department responsible for adaptation policy on this area in Northern Ireland.

Regulation of telecommunications and ICT is reserved to the UK Government.² There is no designated department responsible for adaptation policy on this area in Northern Ireland. The UK Government Department for Digital, Culture, Media, and Sport (DCMS) is responsible for Government regulation related to the telecoms and ICT sector in Northern Ireland. Ofcom regulates operations in the sector. Public utilities, such as telecoms, energy supply, waste management and flood risk management are addressed by Local Development Plans by local councils, within the context of the Regional Development Strategy (RDS) and Strategic Planning Policy Statement (SPPS).

The Northern Ireland Climate Change Adaptation Programme (NICCAP2) sets objectives and indicators that relate to infrastructure services (Box 7.2). These objectives also relate to towns and cities and are discussed further in Chapter 9. The telecoms and ICT system is inherently linked to several other systems. All other infrastructure systems depend on telecoms and ICT to operate effectively (see Chapter 5 on water, Chapter 6 on energy and Chapter 8 on transport).

Box 7.2

Telecoms within Northern Ireland's Climate Change Adaptation Programme (NICCAP2)

NICCAP2 identifies 'Infrastructure Services' as a key priority area and one 'outcome objective' on Transport services with associated indicators:

- IF1: We have Transport and Network Services that are resilience to the impacts of flooding and extreme weather.

There are no indicators identified within this adaptation programme that monitor the progress on resilience of telecoms and ICT networks to climate hazards. These indicators have strong linkages to the towns and cities chapter of this report and are discussed further in Chapter 9.

Source: DAERA (2019) Northern Ireland Climate Change Adaptation Programme 2019-2024 (NICCAP2).

1. Monitoring progress towards well-adapted telecoms & ICT

Successful adaptation of telecoms and ICT networks to climate change aims to ensure that reliable telecoms and ICT services are maintained despite the range of present and future extreme weather events. To deliver on this ambition for climate resilient telecoms and ICT networks we have identified key outcomes that need to be achieved (Figure 7.1).

- **Reduced vulnerability of assets to extreme weather.** Telecoms and ICT assets will be exposed to an increased frequency of extreme weather events due to climate change. Assets must be designed and operated to be resilient to the range of climate hazards they will be exposed to over their lifetime, including flooding, overheating of infrastructure and deterioration of asset condition. Monitoring is necessary to identify and minimise the impact of climate change on these systems.
- **System level resilience.** Increased digitalisation means the consequences of network failures due to extreme weather will be greater. Telecoms and ICT systems must be designed to operate in these changing conditions and have plans in place to respond quickly and effectively when outages occur. This includes redundancy in system design and operation, diversity of technologies and contingency plans for weather-related events (see Chapter 12 for community preparedness and response).
- **Interdependencies with other infrastructure services are identified and managed.** Infrastructure services are increasingly dependent on one another. These interdependencies need to be accounted for in climate assessments and adaptation plans for major operators.

A set of enabling factors need to be in place to support the delivery of these outcomes:

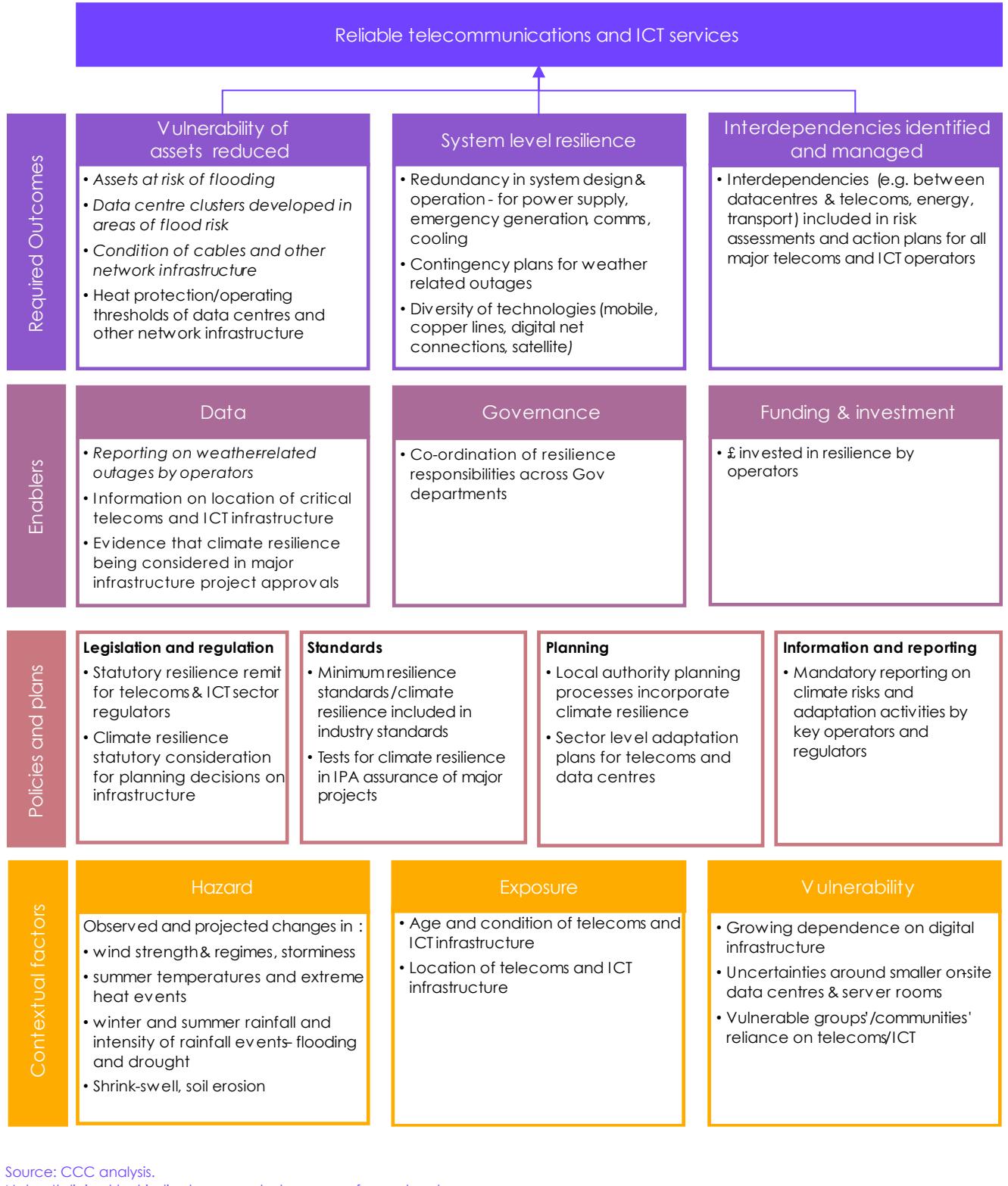
- **Data.** Data on weather and climate related impacts on telecoms and ICT networks, and on the extent of adaptation actions being delivered, will enable a better understanding of how climate resilient the system is.
- **Governance.** Clear, mandated remits for climate resilience and appropriate co-ordination across interdependent sectors are needed, to ensure that the identified outcomes can be delivered, particularly around interdependencies.
- **Funding and investment.** Climate resilience needs to be formally integrated into investment processes and long-term decisions. This includes for large national infrastructure projects and company investment plans.

To put in place the enablers and deliver the outcomes there are several important roles for the Executive:

- **Legislation and regulation.** The Northern Ireland Executive should engage at UK level for legislation that integrates long-term planning to build resilient telecoms and ICT networks and provide appropriate frameworks for regulation. Statutory resilience duties are needed for regulators. Legislation should also ensure that investment allocation is appropriate to meet adaptation goals.

- **Standards.** New minimum resilience standards, or updates to existing industry standards, will be necessary to set expectations for operators and ensure the system continues to operate under a changing climate.
- **Planning.** National adaptation plans must have clear resilience outcomes with monitoring in place and reflect vulnerabilities in Northern Ireland. All key operators must produce climate change risk assessments and adaptation plans which demonstrate progress in making telecoms and ICT networks more climate resilient.
- **Information and reporting.** Reporting on some aspects of risk and adaptation planning and delivery should be mandatory. This will improve understanding of the national picture of sectoral adaptation, as well as in other sectors upon which telecoms and ICT networks depend, including energy and transport.

Figure 7.1 Monitoring map for telecommunications and ICT



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

(a) Outcome 1: Reduced vulnerability of assets

Due to insufficient available data, we are **unable to evaluate** progress for this outcome. There may be relevant adaptation measures being implemented for this outcome, but information is not publicly available.

There may be relevant adaptation measures being implemented for this outcome, but information is not publicly available.

Metrics are needed across Northern Ireland to monitor climate impacts and the sector's adaptation progress.

- **No evidence was found on whether network providers have flood defences compliant with the National Flood Resilience Review requirements.** The Data Centre Incident Reporting Network (DCIRN) does not currently collect quantitative data on climate change related outages to data centres. So far, there has been no publicly reported disruption from data centre outages because of recent extreme weather events.
- **Metrics are needed for measuring adaptation progress.** Indicators that would be useful include:
 - Assets at risk of flooding.
 - Conditions of cables and other network infrastructure.
 - Maximum temperature operating thresholds of system components.

(b) Outcome 2: System level resilience

There are no suitable indicators to assess the progress on system level resilience, which means we are **unable to evaluate** progress for this outcome. There may be relevant adaptation measures being implemented for this outcome, but information is not publicly available.

- **Metrics are needed for measuring adaptation progress.** Indicators that would be useful include:
 - Level of redundancy in system design and operation for power supply, emergency generation, comms, cooling.
 - Extent of contingency plans for weather related outages.
 - Diversity of technologies (mobile, copper lines, digital, satellite).

(c) Outcome 3: Interdependencies identified and managed

There is awareness of sources of interdependency risks at sector level but a lack of information on steps being taken by operators to manage those risks.

We are **unable to evaluate** progress for this outcome, due to insufficient available data on identification of interdependency risks. The most recent UK Adaptation Reporting Power (ARP) reports relating to telecoms and ICT have not specified the geographic coverage in their assessments of risk, therefore it is unclear whether reporting on Northern Ireland has been streamlined into the ARP process.³ In addition, there are no systematic assessments of interdependency risks by operators or set plans on how these risks will be managed across the UK.

Interactions between ICT infrastructure and weather are generally understood, and often reflected within critical infrastructure contingency plans.

However, quantitative projections that assess how climate change will impact the frequency and magnitude of these interruptions are lacking across the sector at a national level. The sector is fully privatised and so this data gap is compounded by a lack of information in the public domain on the location or specification of assets for interests of security and commercial sensitivity.

(d) Progress on enablers

Many key enablers are not in place including indicators to monitor progress or effective governance and investment models for resilience.

Many of the enablers needed to deliver these outcomes are not yet in place. These include:

- **Data.** There is a lack of adaptation indicators for this system. To better understand the impacts of weather-related events, reporting by operators on outages caused by weather and the duration of those outages should be collated at national level. Further work is needed in the sector to develop suitable indicators for assessing adaptation progress.
- **Governance.** Telecoms and ICT is inherently linked to other infrastructure services. There is a need for better co-ordination across government departments with a role in infrastructure resilience. Regular engagement between the Northern Ireland Executive and UK Government, as well as Department for Economy and DCMS is necessary to ensure coverage of risk assessments include Northern Ireland.
- **Funding and investment.** The extent of current investment in resilience and additional investment needs for telecoms and ICT are unknown. We made recommendations in our Adaptation Investment report on identifying and incentivising investment in adaptation more broadly.⁴

3. Policy and planning progress

We have provided an assessment for policies and plans in this area, but not formally scored them as regulation of telecommunications and ICT is reserved to UK Government. Where there are policies or plans within the Northern Ireland Executive's control, we have highlighted these potential opportunities for consideration of climate risks.

Most key policy milestones required across the UK to ensure telecoms and ICT networks are resilient to extreme weather are not yet in place. Policies and plans for this system are assessed together as the key policy milestones are largely the same across the three outcomes.

(a) Legislation and regulation

- **Regulation of telecoms in Northern Ireland is carried out through the Electronic Communications Code (the Code).**⁵ This is the UK-wide legal framework that regulates the relationship between network operators and site providers to ensure rollout and maintenance of physical networks for telecoms and ICT services.
- **Ofcom does not have a statutory duty for climate resilience.** Ofcom's regulatory remit across the UK extends to Northern Ireland. Their general conditions require communications providers to maintain uninterrupted access to emergency organisations "to the greatest extent possible",⁶ with significant fines for failures. Ofcom also has powers to take any measures in response to "anything that compromises the availability, performance or functionality of the network or service".⁷ However, climate change parameters are not explicitly stated.

Ofcom has no statutory duty for climate resilience.

There is very limited consideration of climate resilience in existing industry standards.

Overview of climate risks to Northern Ireland's telecoms and ICT industry is limited.

(i) Scope in Northern Ireland:

- **Several data centre facilities are designated as Critical National Infrastructure in Northern Ireland.** The Civil Contingencies Branch of the Northern Ireland Executive Office maintains a risk register. This includes risks such as utility outages and environmental risks, and the mapping of risks to any critical infrastructure with potential environmental considerations. Forty-six risks are identified and ranked according to urgency, based on likelihood of risk and scale of impact.
- **There was no evidence found on inclusion of specific risks from climate change to digital infrastructure in the civil contingencies risk register.** The register includes environmental hazards to digital infrastructure. Consideration of climate change scenarios and consequent risks is not known because this information is not publicly available.⁸ This data maps risks to NI and can be accessed by Government departments, who can both feed into the identification of climate risks to their sector and integrate identified risks to their adaptation plans.
- **There is no publicly available data on design consideration and operational guidelines to build resilience to physical threats** such as extreme weather, flooding, and lightning. Consideration of climate scenarios, and how these may affect the prevalence or impact of such events, was not reflected in current policies.

(b) Planning and reporting

The UK Government has committed to new standards for resilience by 2030 under the new UK Resilience Framework. This presents an opportunity to ensure that the telecoms and ICT system is resilient to future climate conditions and to include key stakeholders in Northern Ireland to identify and manage risks at the planning stages in all reserved policies.

- **There is limited consideration of climate resilience in existing industry standards.** Even where standards exist, they can be unclear (e.g., Ofcom's flood resilience standards) or may be inadequate (e.g., design standards for cables).⁹
- **There is no visible plan or process by the industry or Northern Ireland and UK Governments with actions to manage long-term climate risks to the sector.** Resilience planning across data centres is managed by individual private operators, who compete on their ability to ensure business continuity for customers, but there is no centralised mechanism to gather such information on preparedness.
- **Tech UK and the Electronic Communications Resilience & Response Group (EC-RRG) reported on their climate risks and adaptation plans in the third round of the ARP.**¹⁰ However, there is not enough information to understand the sector's climate change preparedness across UK. This gap is larger when considering Northern Ireland's telecoms and ICT sector because the data is not representative of operators in Northern Ireland.

(i) Scope within Northern Ireland:

- **There are no specific actions listed within NI's second national adaptation programme (NICCAP2) on improving resilience in telecoms and ICT sector (Box 7.2).** The programme identifies that telecoms and ICT network providers operate independently in this sector, having their own responsibility to identify and monitor climate change adaptation actions and strategies.
- **There are no adaptation actions linked to telecoms and ICT networks within the NI's Strategic Planning Policy Statement (SPPS).** The SPPS sets regional strategic objectives for key policy areas, including telecommunications and other utilities. It includes the aim to ensure that the environmental impacts of telecoms or any other utility development are kept to a minimum.¹¹ It also sets the aim to minimise, as far as possible, undue interference that may be caused to users (for example, mobile phone services, media broadcasting and wireless broadband services) by new telecoms development. While the minimised disruption to services is a prioritised outcome, there is no evidence that climate change risks to telecoms services are being considered.
- **There are no adaptation actions or objectives linked to telecoms and ICT networks within the Regional Development Strategy 2035.**¹² The strategy prioritises investment in infrastructure to increase broadband speeds, improve service to minimise urban/rural divide, increase the usage of broadband and capitalise on direct international connectivity. Each of these objectives will face increasing barriers from climate risks.

- **Participation in the Adaptation Reporting Power is voluntary, and the information reported in the most recent round does not provide sufficient detail.** The geographical coverage of the reporting is unclear on whether Northern Ireland's telecoms and ICT sector is represented. More detail is required on the extent of climate risk and progress in adaptation plans at the operator level. Existing mechanisms, such as the upcoming public sector reporting or the Adaptation Reporting Power, should be utilised. This requires enhanced coordination between the Northern Ireland Executive and Defra to ensure key reserved sectors are adequately represented in reporting.

(c) Recommendations

Table 7.2 provides a set of targeted recommendations to close key policy gaps identified within this sector.

Table 7.2
Recommendations - Telecommunications and ICT

Primary responsibility	Recommendation	Timing
Northern Ireland Executive	Identify a department which is responsible for climate resilience of telecoms and ICT.	2025
DAERA	Ensure that Northern Ireland's next adaptation programme includes consideration of telecoms and ICT networks within its infrastructure objectives and target sectoral resilience building.	2024
DfE	Fund research to identify telecoms and ICT infrastructure assets at risk from extreme weather and understand adaptation progress by private operators in Northern Ireland.	2025 - 2026
Northern Ireland Executive	Engage with UK Government to ensure that Ofcom is given a climate resilience remit across UK, including all devolved administrations.	Ongoing
DfE, DCMS	Department for Economy, in coordination with DCMS, should advocate to set minimum resilience standards for operators in Northern Ireland to streamline the adaptation objectives in highly privatised sectors.	2025
Northern Ireland Executive	Northern Ireland Executive should liaise with UK Government and Defra to include coverage of telecoms and ICT network operators within the Adaptation Reporting Power.	Ongoing

Endnotes

¹ Jaroszweski, D., Wood, R., and Chapman, L. (2021) *Infrastructure*. In: *The Third UK Climate Change Risk Assessment Technical Report*. [Betts, R.A., Haward, A.B., Pearson, K.V. (eds)] Prepared for the Climate Change Committee, London.

² Northern Ireland Act 1998, Sch 3 (29).

³ CCC (2023) *Understanding climate risks to UK infrastructure, Evaluation of the third round of Adaptation Reporting Power – July 2022*, <https://www.theccc.org.uk/wp-content/uploads/2022/07/Understanding-climate-risks-to-UK-infrastructure-Evaluation-of-the-third-round-of-the-Adaptation-Reporting-Power.pdf>.

⁴ CCC (2023) *Investment for a well-adapted UK*, <https://www.theccc.org.uk/publication/investment-for-a-well-adapted-uk/>.

⁵ *The Electronic Communications Code*, Communications Act 2003, Schedule 3(a).

⁶ Article 23, *Universal Service Directive (USD)*, Ofcom's Consumer Policy.

⁷ *Telecommunications (Security) Act 2021*, s 105A(2)(a).

⁸ Northern Ireland Executive (2021) *Building Resilience Together NI Civil Contingencies Framework*, https://www.executiveoffice-ni.gov.uk/sites/default/files/publications/ofmdfm_dev/ni-civil-contingencies-framework.pdf.

⁹ CCC (2023) *Progress in adapting to climate change - 2023 Report to Parliament*, <https://www.theccc.org.uk/publication/progress-in-adapting-to-climate-change-2023-report-to-parliament/>.

¹⁰ CCC (2023) *Understanding climate risks to UK infrastructure, Evaluation of the third round of Adaptation Reporting Power – July 2022*, <https://www.theccc.org.uk/wp-content/uploads/2022/07/Understanding-climate-risks-to-UK-infrastructure-Evaluation-of-the-third-round-of-the-Adaptation-Reporting-Power.pdf>.

¹¹ Department of the Environment (2015) *Strategic Planning Policy Statement for Northern Ireland (SPPS) Planning for Sustainable Development*, <https://www.infrastructure-ni.gov.uk/sites/default/files/publications/infrastructure/SPPS.pdf>.

¹² Department for Regional Development (2010), *Regional Development Strategy (RDS) 2035*, <https://www.infrastructure-ni.gov.uk/sites/default/files/publications/infrastructure/regional-development-strategy-2035.pdf>.



Chapter 8

Transport

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Table 8.1

Progress summary – Transport

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Asset & system level reliability of rail network	Mixed progress	Insufficient policies and plans	<ul style="list-style-type: none"> Some monitoring data of rail infrastructure is available, but there is no reporting available for weather related delays or incidents. The Regional Development Strategy 2035 embeds some considerations of climate risks. There are some adaptation objectives included in the plan, these do not relate to the transportation network. The plan falls short in taking stock of climate change impact on railway assets and how these risks could be better managed.
Outcome 2: Asset & system level reliability of strategic road network	Unable to evaluate	Limited policies and plans	<ul style="list-style-type: none"> Limited monitoring data exists on asset and system level reliability of strategic road network. Department for Infrastructure contributed to the UK Design Manual on Roads and Bridges, which is applicable across Northern Ireland and adopts UKCP18 projections. Plans and policies on the infrastructure network do not include measures to ensure preparedness to climate risks.
Outcome 3: Asset & system level reliability of local roads	Insufficient progress	Insufficient policies and plans	<ul style="list-style-type: none"> Department for Infrastructure's reports suggest that condition of local roads is poor and number of roads at risk of flooding remains high. Many reports do not disaggregate data on strategic and local roads, which means data on local roads is largely not available for assessment. There are no published significant adaptation plans or policies for local roads.
Outcome 4: Asset & system level reliability of airport operations	Unable to evaluate	Mostly reserved	<ul style="list-style-type: none"> Most airport operations are privately managed and policy levers are with Department for Transport and the Civil Aviation Authority. There are no published climate change reports or plans from airports in Northern Ireland on their asset and system level preparedness to climate change risks. The UK policy and plans score for this outcome is partial.
Outcome 5: Asset & system level reliability of port operations	Unable to evaluate	Mostly reserved	<ul style="list-style-type: none"> Port operations are privately managed and policy levers are with Department for Transport. There are no published climate change reports or plans for ports in Northern Ireland on their asset and system level preparedness to climate change risks. The UK policy and plans score for this outcome is limited.
Outcome 6: Interdependencies identified & managed	Unable to evaluate	Insufficient policies and plans	<ul style="list-style-type: none"> There is a lack of evidence that operators are assessing climate risks from interdependencies. No adaptation plans or risk assessments could be identified which consider interdependency risks.

Relevant risks from CCRA3:

Risks to infrastructure networks (water, energy, transport, ICT) from cascading failures (I1); Risks to infrastructure services from river, surface water and groundwater flooding (I2); Risks to infrastructure services from coastal flooding and erosion (I3); Risks to bridges and pipelines from flooding and erosion (I4); Risks to transport networks from slope and embankment failure (I5); Risks to subterranean and surface infrastructure from subsidence (I7); Risks to transport from high and low temperatures, high winds, lightning (I12).

Introduction

This chapter covers adaptation to climate change for transport networks in Northern Ireland. This includes infrastructure networks for strategic and local roads, rail, ports, and airports. Functioning transport networks are necessary for personal mobility and public services, as well as key to corporate supply chains. Weather-related disruption to transport systems can cause significant cascading impacts across society with substantial financial impacts, and weather conditions can also lead to the safety of transport system users being compromised.

Transportation systems will be affected by a range of climate changes:

- Changes in rainfall intensity and frequency can lead to flooding and earthworks failures across road and rail networks.
- More frequent and intense periods of extreme heat events can cause damage and disruption to all transportation systems. For example, risks of rail buckling and failure of overhead power lines on the railways, and risks of asphalt melting impacting the road network and airports.
- Long-term sea level rise and increases in the height of storm surges can affect port operations and damage or disrupt other coastal transport infrastructure.

Exposure of transport networks to these climate hazards is influenced by the age, condition, and location of infrastructure. More critical networks (in terms of traffic volumes or number of areas and services supported) will be more exposed. Changes in population and expected demands for transportation services, in particular around critical networks, will influence the vulnerability of transport networks to climate risks.

Infrastructure services are increasingly linked and dependent upon one another. This is true in the transportation network, for example where the rail and road network are dependent on the electricity and telecommunications systems (for example for signalling and increasingly as a fuel source). This means that any unmitigated risk connected to extreme weather has the potential to result in far-reaching socio-economic consequences. All infrastructure systems are inherently dependent on transport networks. Key societal functions such as healthcare and supply chains rely on transport to function effectively (see Chapter 11 Health and Chapter 13 Business).

Other policy goals will also have an important impact on the exposure of the transport system to climate risks. Transitioning to a Net Zero society will facilitate and necessitate changes in transport mode demand (limiting growth in demand for aviation, shifts to lower-carbon forms of transportation, including active travel) and transportation infrastructure investments currently planned. Approaching future warming scenarios will also increase exposure to some climate hazards, for example - heatwaves causing sagging of overhead lines and electrical outages, and storms causing network damage from fallen trees.

The Department for Infrastructure (DfI) has overall responsibility for transport policy and planning in Northern Ireland. The Department is responsible for roads, including transport and road assets management. DfI also regulates all public transport. The Northern Ireland Transport Holding Company (Translink), a public corporation, is sponsored by DfI to oversee bus and rail services. DfI provides capital grants to Translink for Northern Ireland Railways to maintain and develop the railway infrastructure.

Policies created by DfI are delivered by TransportNI, which is the business unit of the Department and, in effect, the road and public transport authority in Northern Ireland. While local authorities do not have statutory responsibilities for transport policy, they are expected to produce local transport plans that support the delivery of these policies. The Northern Ireland Climate Change Adaptation Programme (NICCAP2) sets objectives and indicators for resilient transport networks (Box 8.1). These objectives also relate to towns and cities and are discussed further in Chapter 9.

Box 8.1

Transport within Northern Ireland's Climate Change Adaptation Programme (NICCAP2)

NICCAP2 identifies 'Infrastructure Services' as a key priority area and one 'outcome objective' on Transport services with associated indicators:

- IF1: We have Transport and Network Services that are resilient to the impacts of flooding and 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.
 - £ spent on structural drainage.

These indicators have strong linkages to the towns and cities chapter of this report and are discussed further in Chapter 9.

Source: DAERA (2019) Northern Ireland Climate Change Adaptation Programme 2019-2024 (NICCAP2).

Aviation and shipping matters are reserved to the UK Government. Airports and ports in Northern Ireland are largely privately owned and operated. Policy responsibility rests with the Department for Transport (DfT) and Civil Aviation Authority (CAA).¹ Reserved components of this policy area include safety regulation, aviation security, competition, consumer protection, air traffic management and international aspects of aviation policy.² The Northern Ireland Executive has devolved powers relating to airports in terms of land use planning and airport surface access issues.³

1. Monitoring progress towards well-adapted transport networks

Within the transport sector, successful adaptation aims to ensure reliable Net Zero transport systems, despite climate change (Figure 8.1).

The key adaptation outcomes that need to be achieved for transport networks to deliver this are:

Net Zero transport systems need to be resilient to climate and weather impacts at asset and system level.

- **Asset and system level reliability of rail network.** Impact of severe weather on rail assets, which result in rail services being minimised. Tracks need to be protected from flooding and able to withstand higher future temperatures (as well as remaining resilient to cold weather). Overhead lines, signalling, bridges, and earthworks need to be maintained and protected from flooding, storm damage and heat impacts.
- **Asset and system level reliability of strategic road network.** Northern Ireland is more dependent on road transport than any other part of the UK, due to an absence of freight trains. The agriculture industry also relies heavily on the road network. Motorways and major roads need to be designed and maintained to withstand increased precipitation and higher risk of flooding. Earthworks and geotechnical assets need to be resilient to temperature changes, including deformation and expansion of concrete and changes to ground shrinkage and earth pressures affecting dependent assets such as structures and drainage.
- **Asset and system level reliability of local roads.** Local authority managed roads face similar pressures to strategic roads, and account for a significant proportion of the road network and of all traffic. Rural roads constitute 77% of the road network in Northern Ireland and over one third of Northern Ireland's population live in rural areas.⁴
- **Asset and system level reliability of airport operations.** The impacts of climate change on UK aviation are expected to be the least significant of all transport modes. Reliance on energy and telecommunications, as well as other transport modes, put airports at increasing risk of cascading failures across infrastructure systems.
- **Asset and system level reliability of port operations.** Current projections for sea level rise in Northern Ireland are between 27 cm and 58 cm by 2080, with larger rises considered possible due to potential marine ice sheet instabilities.⁵ Harbour infrastructure also needs to be resilient to flooding and physical damage. Supporting road and rail networks, crucial to port operations, need to be resilient to a different set of hazards as set out above.
- **Interdependencies identified and managed.** All transport modes rely on energy, telecommunications, and ICT infrastructure to varying degrees. All infrastructure operators need to carry out detailed assessments of their sources of interdependency risks, and work across sectors to manage those risks.

All transport infrastructure operators need to identify and manage their risks arising from dependence on other sectors, such as energy, telecoms and ICT infrastructure.

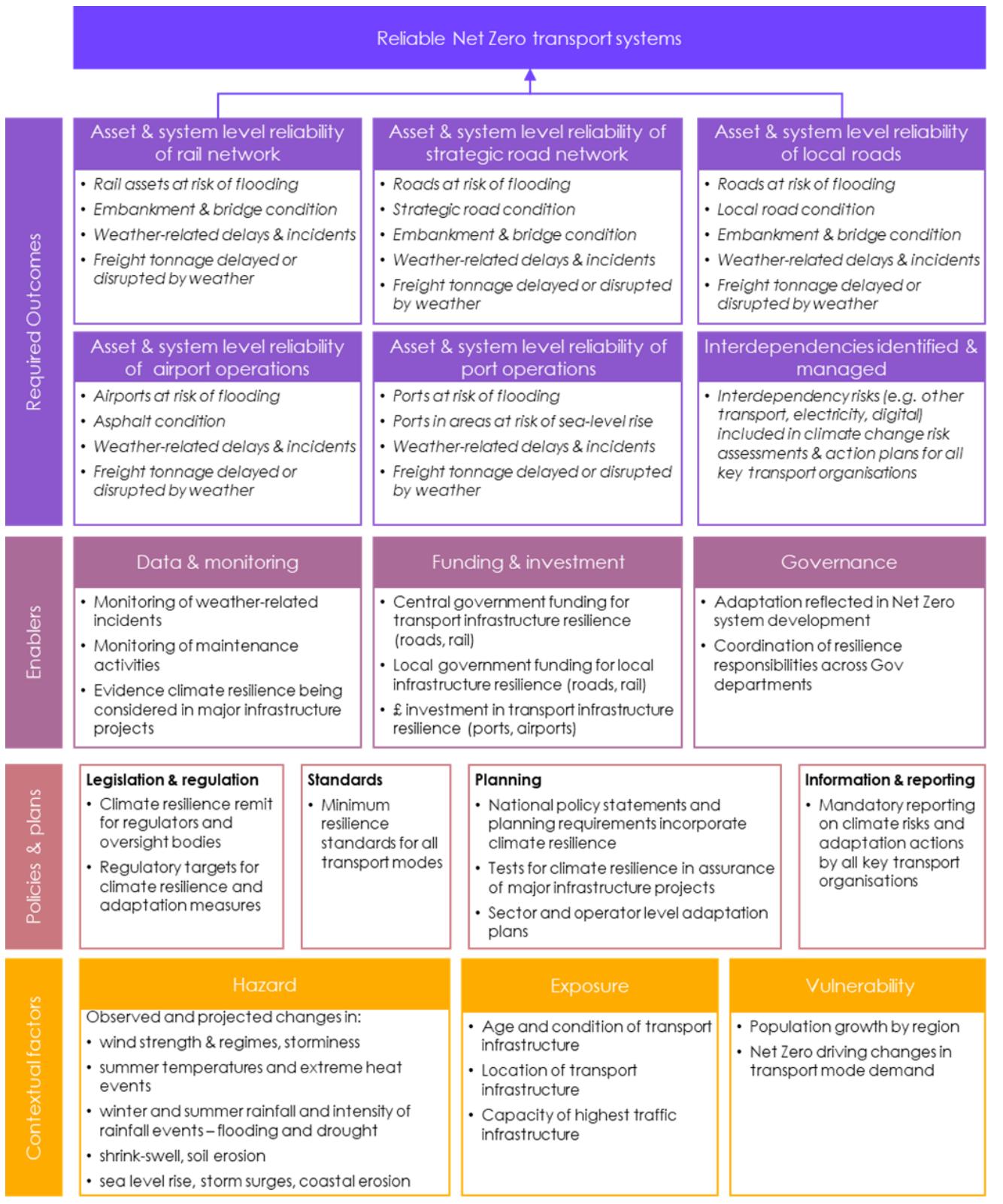
There are several categories of enabling factors that will be needed if the outcomes identified above are to be implemented at appropriate scales. These include:

- **Data and monitoring.** Effective monitoring of weather-related incidents and maintenance activities will improve understanding of the impacts of climate change on transport infrastructure and the actions being taken to manage them.
- **Funding and investment.** Delivering the outcomes identified above will require appropriately sized investment that is well-targeted. Sources of investment in the transport system vary across transport modes, including Central and Local Government funding, user charges and private investment. Regulation can facilitate the investment that is needed to ensure the whole transport system is resilient.
- **Governance.** There are a range of organisations that have responsibility for key aspects related to the climate resilience of the transport system and other interdependent infrastructure systems. System development required to deliver Net Zero makes it even more important that resilience remits are well defined and there is appropriate co-ordination to ensure that the identified outcomes can be delivered, particularly around interdependencies.

Our monitoring framework highlights policy mechanisms which must be in place to achieve these required outcomes for a well-adapted transport system (Figure 8.1). These fall under the following categories:

- **Legislation and regulation.** National policy must create legislation which enforces sustainable long-term plans for resilient transport networks and provide appropriate frameworks for regulation. Planning must span across regions to ensure suitable national scale planning. Legislation should ensure that funding allocation and investment is appropriate to meet adaptation goals.
- **Standards.** Well-adapted transport networks will require policy to deliver and extend resilience standards, which deliver a transport system compatible with future climate conditions.
- **Planning.** National policy and consenting processes for new major infrastructure should incentivise adaptation actions by transport network operators. All key transport operators need robust climate change risk assessments and adaptation plans, which integrate adaptation into long-term planning and investment decisions.
- **Information and reporting.** Reporting on some aspects of risk and adaptation planning and delivery should be mandatory. This will improve understanding of the national picture of adaptation in transport networks, as well as in other sectors upon which the transport system relies, including energy and telecoms & ICT.

Figure 8.1 Monitoring map for transport



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

(a) Outcome 1: Asset and system level reliability of rail network

There is no available data on impact of weather-related disruptions to services in the rail network.

Translink has carried out a risk analysis on cuttings and embankments using available flooding information.

Available indicators for this outcome demonstrate **mixed progress**. There is some progress can be seen in monitoring of rail infrastructure, but there is no reporting available for weather related delays or incidents.

- **Rail assets at risk of flooding remains high.** There are approximately 339 km of railway track in Northern Ireland.⁶ Recent analysis for the third UK Climate Change Risk Assessment (CCRA3) found that 183 km of railway lines are currently at a significant (1:30) risk of surface water flooding. Under a 2°C warming scenario, the length of railway at risk is projected to increase by 64% by the 2050s, and by 84% by the 2080s.⁷ Indicators such as weather-related delay or disruption of rail services are not available.
- **Rail embankment and bridge conditions are being monitored.** Translink has an ongoing programme of repairs to structures following storm damage. There was also a recent effort to that strengthened three bridges and strengthen embankments on the Antrim and Dublin Branch railway lines to futureproof them for climate change impacts. Translink has carried out a risk analysis on cuttings and embankments using available flooding information.⁸ They also track weather forecasts and manage rail assets during heavy rainfall with additional inspections and reduced speeds of trains. Data on embankment and bridge conditions are not available.

(b) Outcome 2: Asset and system level reliability of strategic road network

More datasets are needed to assess reliability of the strategic road network and impacts from extreme weather.

This outcome is scored as **unable to evaluate**. Monitoring data on roads affected by flooding, road conditions and recent level of investments are available, but there is limited timeseries data and progress cannot be assessed. Improved metrics for assessing climate risks and extent of adaptation are needed.

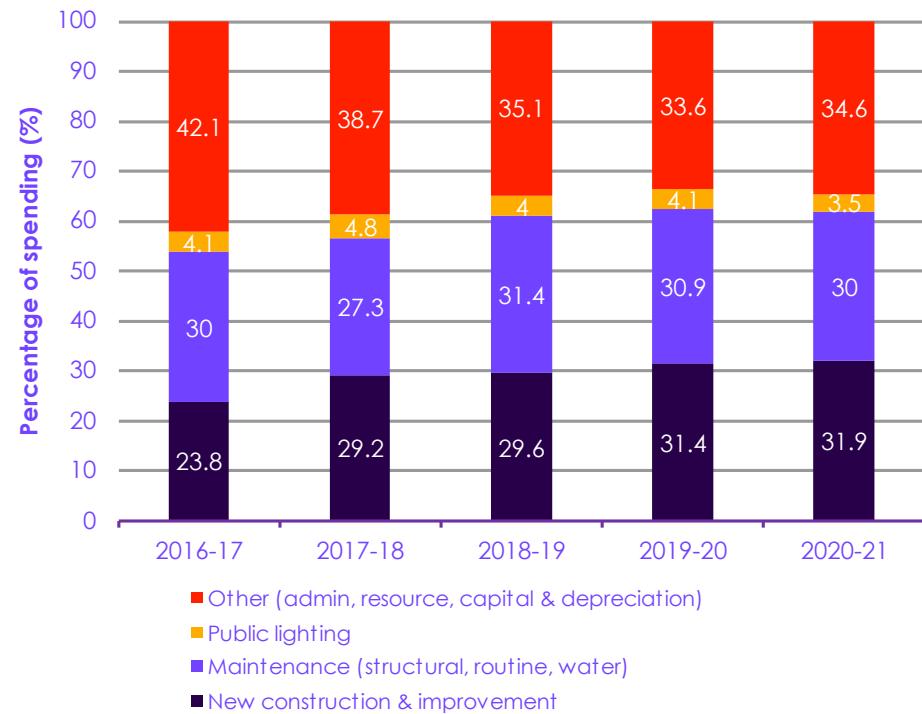
- **Floods are already causing full road closures in Northern Ireland.** There are approximately 2,600 km of strategic roads (motorways and major 'A' roads) in Northern Ireland.⁹ Data from the DfI shows that there were 9961 reports of flooding along roads from 1st August 2017 to 19th October 2021.¹⁰
- **Strategic road condition is improving.** Surveys show the condition of the trunk road network has improved in recent years.^{11,*} Non-trunk 'A' road condition is also improving through DFI prioritisation. However, this has been achieved by diverting budgets away from B, C and U class roads and towards strategic roads.¹² Disaggregated data on road defects for strategic roads is not available. However, data across Northern Ireland for 2019 recorded a total of 102,521 road defects.
- **Strategic road embankment and bridge conditions are not known.** Public expenditure in maintenance of structures and bridges and routine maintenance (Figure 8.2) saw an incremental decrease in 2020-2021 due to reduced budget availability and impact of COVID-19 restrictions.

* Trunk road refers to a main road used for long distance travel.

However, public expenditure for this priority remains consistent (see figure below). Although there are reactive measures to reduce the impact of heat on transport infrastructure, there is no current strategy in Northern Ireland for inspecting bridges or rail tracks for buckling due to heat.

- **Further detailed indicators on reliability are not available.** DfI maintains a record of number of roads that were flooded on an annual basis, however, there is no breakdown on the proportion of these that were strategic or local roads. Weather-related delays and incidents are not being reported. Data on freight tonnage delayed or disrupted due to weather is also unavailable. There is a lack of quantified data on the impact of high and low temperatures, wind, and lightning on road infrastructure.

Figure 8.2 Public expenditure on Northern Ireland roads between 2016-17 to 2020-21



Source: DfI Roads (2021) NI Transport Statistics 2020 – 2021.

Notes: Data covers all roads, no disaggregated information available on strategic and local roads.

(c) Outcome 3: Asset and system level reliability of local roads

Local road condition is poor due to underfunding, according to reports from Department for Infrastructure. There is a need to disaggregate data on impacts of floods on strategic and local roads, as well as monitor impacts from other extreme weather events.

Available indicators on local roads are limited. Those available show **insufficient progress** in addressing the risks to already deteriorated local road conditions.

- **Data on flooding of local roads is not available.** DfI recorded 9,961 reports of flooding along roads from August 2017 to October 2021.¹³ However, this information is not disaggregated local and strategic roads. Rainfall is among the major causes of road deterioration, which is a significant concern in Northern Ireland because limited investment into local roads risks further deterioration in the condition of local roads.

- **Local road condition is poor due to underfunding.** DfI Roads has allocated limited funding¹⁴ to minimize the deterioration of the lower-class roads, relying mostly on surface dressing and patching works which do not add any strength to deteriorating roads against climate hazards. There are severe funding constraints that are hindering progress on adequate progress in the reliability of local roads. In 2015-16, Northern Ireland spending per person on roads was half the spending in 2010-11. In July 2021, the infrastructure minister increased funding for rural roads by 50%, meaning that £15 million was allocated for rural roads.¹⁵

(d) Outcome 4: Asset and system level reliability of airport operations

Metrics need to be identified for assessing the reliability of airport operations in Northern Ireland.

Indicators for assessing progress in this outcome were not available, and it is scored as **unable to evaluate**. The Climate Change Committee's assessment of UK adaptation progress for airports is set out in our 2023 UK Progress Report.¹⁶ Most airport operations are privately managed and policy levers are with Department for Transport and the Civil Aviation Authority. Further work is needed in the sector to develop a set of metrics for measuring adaptation progress within Northern Ireland. Indicators that would be useful include:

- Airports at risk of flooding
- Asphalt condition
- Weather related delays and incidents
- Freight tonnage delayed or disrupted by weather

(e) Outcome 5: Asset and system level reliability of port operations

Metrics need to be identified for assessing the reliability of port operations in Northern Ireland.

Indicators for assessing progress in this outcome were not available, and it is scored as **unable to evaluate**. The Climate Change Committee's assessment of UK adaptation progress for ports is set out in our 2023 UK Progress Report.¹⁷ Port operations are privately managed and policy levers are with Department for Transport. Further work is needed in the sector to develop a set of metrics for measuring adaptation progress in Northern Ireland. Indicators that would be useful include:

- Ports at risk of flooding
- Ports in areas at risk of sea-level rise >50 cm
- Weather related delays and incidents
- Freight tonnage delayed or disrupted by weather

(f) Outcome 6: Interdependencies identified and managed

There is no evidence available on how interdependency risks are identified and managed across infrastructure areas.

Operators should be assessing interdependency risks from cascading failures in other infrastructure areas but there is currently no information on interdependencies. Therefore, we are **unable to evaluate** progress against this outcome.

(g) Progress on enablers

- **Funding and investment.** The Regional Strategic Transport Network plan proposed an investment of £529.4 million for the improvement of strategic roads.¹⁸ By 2015, nine strategic road improvements schemes were completed, and five schemes were under construction. Recent information on road improvements is not reported. Total spending on roads has only incrementally increased in recent years.

3. Policy and planning progress

(a) Outcome 1: Asset and system level reliability of rail network

Minimum resilience standards are not in place for rail operators in Northern Ireland and policies to measure adaptation actions could not be found.

There are **insufficient policies and plans** on asset and system level reliability of the rail network in Northern Ireland. Minimum resilience standards are not in place for rail operators in Northern Ireland and policies to measure adaptation actions could not be found. There is no mandatory reporting on climate risks and adaptation actions by Translink in Northern Ireland.

- **Regulatory targets for climate resilience and adaptation measures are not set in Northern Ireland.** Northern Ireland Railways, one of the companies trading jointly as Translink, are the sole operators. However, it is unclear whether they have a climate resilience remit.
- **Minimum resilience standards are not set for the rail sector.** The UK Government Resilience Framework is only applicable to reserved areas. There is no equivalent framework for Northern Ireland's transport network.
- **The Regional Development Strategy has embedded some consideration of climate risks.** The 'Regional Development Strategy 2035' published in 2012 informs the spatial aspects of the strategies across government. There are some adaptation components included in the plan, but the plan fails to take stock of climate change impact on railway assets and how these risks could be better managed. There is no official plan for assessment and maintenance of railway bridges in Northern Ireland.

(b) Outcome 2: Asset and system level reliability of strategic road network

Improved monitoring of indicators is required to assess progress across the strategic road network.

There are **limited policies and plans** on asset and system level reliability of the strategic road network in Northern Ireland. Some plans on asset and system level reliability are available, however, adequate monitoring is not in place in existing plans to ensure preparedness to climate risks. Despite there being several flood management strategies, they do not include consistent indicators of resilience to flood risk across transport infrastructure.

- **Regulatory targets for climate resilience and adaptation measures are not yet set for strategic roads.**
- **The Department for Infrastructure contributed to the review and update of the UK Design Manual for Roads and Bridges (DMRB) with latest climate change projections from UKCP18.** This is a series of standards and advice notes relating to the design, assessment, and operation of roads in the UK. The standards contained in DMRB apply to all roads which are maintainable by the Department for Infrastructure or are likely to become so, except some Residential Development Roads.
- **Climate resilience and adaptation standards for Infrastructure.** The Northern Ireland Government has also published guidance on climate change adaptation and resilience for infrastructure projects. These standards provide a framework for infrastructure owners and operators to assess the climate risks facing their assets and to develop strategies for building

resilience. There are a range of major infrastructure projects on the strategic road network in Northern Ireland, which these standards will be applicable to.

- **The Strategic Planning Policy Statement includes consideration of climate resilience on new road developments.** The Planning Policy statement sets out the government's policy on flood risk management and climate change adaptation, requiring that all new development should be designed to be resilient to the impacts of climate change. There is no strategy in Northern Ireland to protect roads from softening due to heat in the future. There is no rolling programme of maintenance and inspection of bridges for signs of climate related deterioration from flooding and heat.

(c) Outcome 3: Asset and system level reliability of local roads

Metrics need to be identified to assess progress on building resilience in local roads.

There are **insufficient policies and plans** on asset and system level reliability of the local roads in Northern Ireland.

- **Regulatory targets for climate resilience and adaptation measures are not yet set for local roads.**
- **The Department for Infrastructure contributed to the review and update of the UK Design Manual for Roads and Bridges (DMRB) with latest climate change projections from UKCP18.** The standards contained in DMRB apply to all roads which are maintainable by the Department for Infrastructure or are likely to become maintainable by the Department, except some Residential Development Roads.

(d) Outcome 4: Asset and system level reliability of airport operations

There are no climate change reports or plans available from airports in Northern Ireland on their asset and system level preparedness to climate change risks.

We have provided an assessment for adaptation policies and plans for airports below, but not formally scored them as policy is almost entirely reserved to UK Government.

There are no climate change reports or plans available from airports in Northern Ireland on their asset and system level preparedness to climate change risks. Across the rest of the UK, some evidence is provided by voluntary submissions through the Adaptation Reporting Power (ARP). However, despite major airports being a part of UK reserved policy, airports in Northern Ireland are not currently required to submit a report.

- **No evidence could be found on climate resilience plans for airport operations.**
- **No information is available on the assessment of risks based on current and future climate scenarios.** Airport operators for Northern Ireland have not been invited to report through the Adaptation Reporting Power. Regulations for adaptation reporting in Northern Ireland are under development, though the scope of these is not yet clear.

(e) Outcome 5: Asset and system level reliability of port operations

We have provided an assessment for adaptation policies and plans for ports below, but not formally scored them as policy is almost entirely reserved to UK Government.

There are five major ports in Northern Ireland – Belfast, Larne, Londonderry, Warrenpoint and Coleraine. There are no climate change reports or plans available for ports in Northern Ireland on their asset and system level preparedness to climate change risks.

There are no climate change reports or plans available from ports in Northern Ireland on their asset and system level preparedness to climate change risks.

- **Resilience standards for ports are left to individual operators** and there is limited information available on the extent of planning for climate change impacts.
- **No information is available on the assessment of risks based on current and future climate scenarios.** Port operators for Northern Ireland have not been invited to report through the Adaptation Reporting Power. Regulations for adaptation reporting in Northern Ireland are under development, though the scope of these is not yet clear.

(f) Outcome 6: Interdependencies identified and managed

There are **insufficient policies and plans** for identifying and managing interdependencies in the transport sector.

- **No adaptation plans or risk assessments could be identified that had considered infrastructure interdependencies.**

(g) Recommendations

Table 8.2 provides a set of targeted recommendations to close key policy gaps identified within this sector.

Table 8.2
Recommendations - Transport

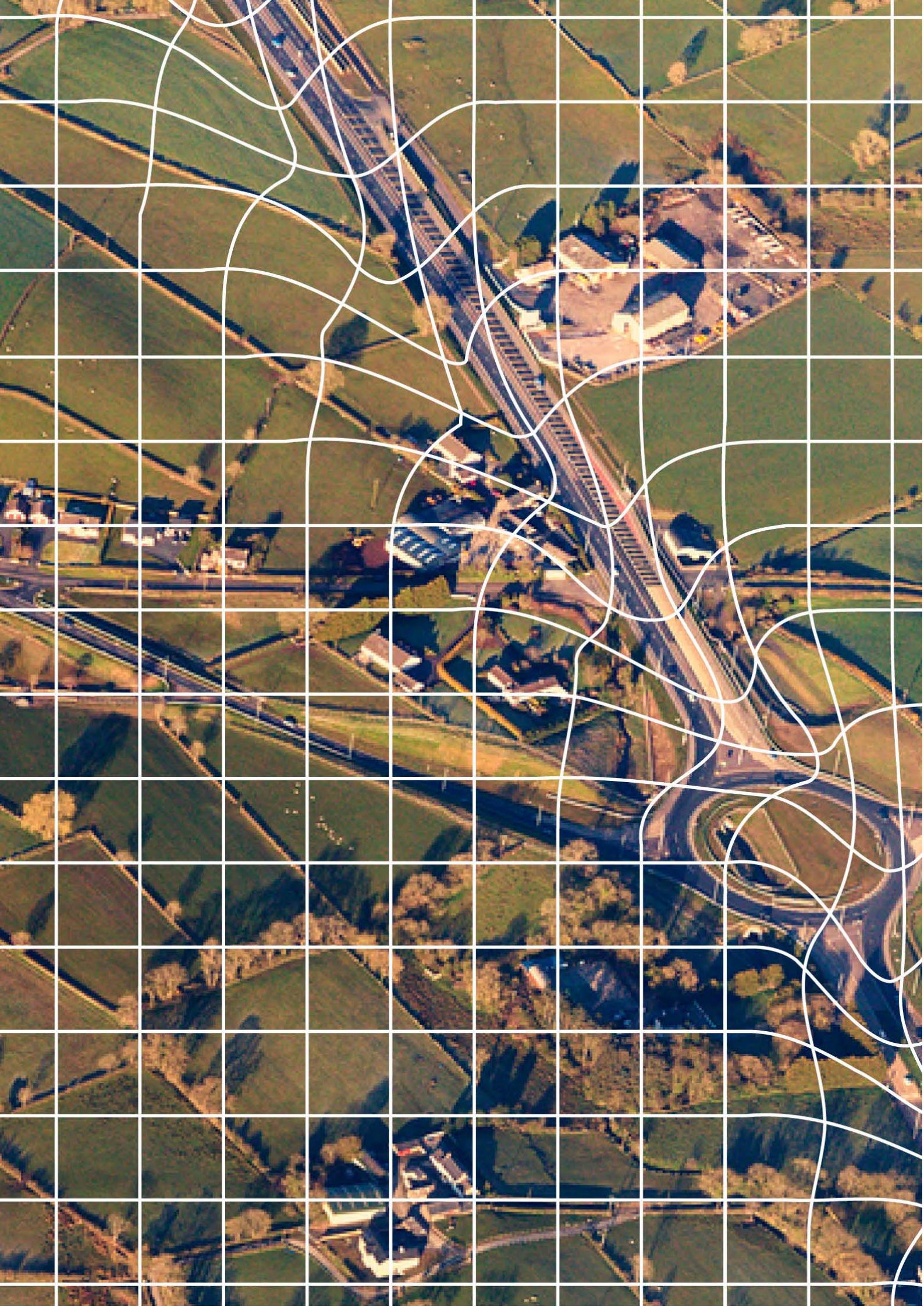
Primary responsibility	Recommendation	Timing
DAERA, DfI	Ensure clear designation of resilience responsibilities and mandates for each division of the transport sector.	2025
DfI, Northern Ireland Executive	Operators should conduct risk assessments that identify current and future climate change risks to services, based on UKCP18 projections, and create adaptation action plans that address the high-risk areas that are identified in the risk assessment.	Ongoing
DfI	Oversee that operators conduct regular monitoring of existing infrastructure and improve maintenance practices. For new infrastructure, climate change adaptation and resilience should be embedded into planning standards and design to avoid costs of retrofitting in future.	Ongoing

DfI, Northern Ireland Executive	Require mandatory reporting of climate risks and adaptation progress by all key transport operators. Existing mechanisms, such as the upcoming public sector reporting or the Adaptation Reporting Power, should be utilised.	2025
DfI	Conduct a comprehensive risk assessment to identify the climate change hazards to major ports and airports. The Northern Ireland Executive should utilise the findings of this risk assessment to advocate for the need to strengthen climate resilience within policy for ports and airports.	2026
Northern Ireland Executive, DfI	Airport and port operators should be required to report through either NI public sector adaptation reporting regulations, or the UK Adaptation Reporting Power.	Ongoing

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- ⁴ DfI (2021) *Northern Ireland Transport Statistics 2020-21*, <https://www.infrastructure-ni.gov.uk/system/files/publications/infrastructure/ni-transport-statistics-2020-2021.pdf>.
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- ¹⁶ CCC (2023) *Progress in adapting to climate change - 2023 Report to Parliament*, <https://www.theccc.org.uk/publication/progress-in-adapting-to-climate-change-2023-report-to-parliament/>.
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Chapter 9

Towns and cities

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Introduction

Table 9.1

Progress summary – Towns and cities

	Delivery and implementation	Policies and plans	Summary
Outcome 1: River and coastal flood risks minimised across catchment	Mixed progress	Partial policies and plans	<ul style="list-style-type: none"> There are indications of positive actions being undertaken, with annual reporting on reductions of properties at flood risk. However, without an overall target figure, it is difficult to say what proportion of risk remains. There are positive developments for policies and plans in this area. Policies are integrating catchment-based approaches with detailed modelling, delivery plans and budgets.
Outcome 2: Surface water and groundwater flooding risks managed	Mixed progress	Limited policies and plans	<ul style="list-style-type: none"> NI Water has made progress removing impermeable surfaces. However, data on uptake of sustainable urban drainage systems remains limited and there are still gaps in evidence. The second cycle Flood Risk Management Plans provide detailed plans for 12 priority locations. However, further development is needed on the modelling of surface water risk.
Outcome 3: Sustainable and long-term coastal management	Unable to evaluate	Insufficient policies and plans	<ul style="list-style-type: none"> Government has commissioned and undertaken a significant amount of coastal risk research, which should be used to develop plans. However, the majority of outputs are not yet available. There is limited evidence for the delivery of sustainable coastal management. There is no legislation on coastal erosion, and long-term coastal management plans do not currently exist.
Outcome 4: Urban heat risks are minimised	Unable to evaluate	Limited policies and plans	<ul style="list-style-type: none"> Monitoring on delivery of adaptation measures, such as green infrastructure is lacking. A number of local council policies and plans now mention urban heat issues, but there is little detail on targets, regulation, and data collection.
Outcome 5: A planning system which prioritises future climate resilience	Unable to evaluate	Limited policies and plans	<ul style="list-style-type: none"> There is little evidence to support assessment of how the planning system in NI is delivering on climate resilience. Planning policies mention the need to account for climate adaptation. However, at present these are not sufficiently strong.
<p>Relevant risks from CCRA3:</p> <p>Risks to health and wellbeing from high temperatures (H1); Risks to people, communities, and buildings from flooding (H3); Risks to viability of coastal communities from sea level rise (H4); (aspects of Risks to infrastructure services from river, surface water and groundwater flooding I2 and Risks to infrastructure services from coastal flooding and erosion I3 are also covered less explicitly in this system).</p>			

People, buildings and land in towns, cities, and smaller settlements will be exposed to more severe and frequent hazards associated with climate change, such as heatwaves, flooding, and erosion.

This chapter covers adaptation actions to climate change at the settlement scale of whole towns, cities, and smaller built settlements. The interventions in this chapter are those delivered at a spatial planning scale, not that of individual properties or assets. Towns and cities well prepared for climate change are protected from flood risks, are designed in ways which minimise the urban heat island effect and the impact of extreme weather. They also have plentiful green, blue and shaded spaces for residents to access.

This allows residents and the local infrastructure and economic activities of the settlement to be minimally impacted by climate and weather extremes.

Around 63% of Northern Ireland's population lives in urban areas.¹ This number is increasing, with a 7% increase in urban population and 36% increase in mixed urban/rural between 2001 and 2020.² As such, towns and cities represent areas where exposure to the risks from climate change is high, due to higher densities of people, buildings, infrastructure, and businesses.

Towns and cities will face several risks from changes in the UK's climate over the coming decades:

- **Heatwaves.** Urban land surfaces, such as pavements and buildings, absorb and retain heat. This means that towns and cities are usually warmer – particularly at night - than surrounding rural areas. This leads to increased risk and potential harmful impacts of overheating during hot temperatures.
- **River, surface water and groundwater flooding.** Increasing flood risk results from more high intensity rainfall events predicted under future climate scenarios. Additionally, even in the absence of climate change induced flooding, there are more people and buildings at risk of flooding due to the development of land on flood plains and the use of more impermeable surfaces (e.g. roads and paving). Increasing risk from groundwater flooding, which occurs when water within the ground rises above the ground level, can result from changes in long-term and short-term rainfall, and water abstraction.*
- **Sea-level rise.** Sea level rise means that coastal towns and settlements are at higher risk of flooding during storms or high tides. Coastal erosion rates are also expected to increase with the greater nearshore water depths which result from sea level rise.

Population growth, particularly in urban areas, exposes more people to climate risks.

Adaptation actions in and around towns, cities and other smaller settlements can reduce the harmful impacts of climate change risks.

Box 9.1

Changes to the climate in Northern Ireland affecting towns and cities

Flooding. Climate change will increase the number of properties at risk of flooding from all sources. The dominant source of flood risk is from rivers, but if current levels of adaptation continue, surface water and coastal risks will increase in their relative contribution to Northern Ireland's flood risk. Groundwater continues to have a limited contribution at national scale, although will be important locally. According to analysis for the third Climate Change Risk Assessment, about 33,000 people in Northern Ireland are currently at significant risk of flooding, including roughly 10,000 from fluvial, 1000 from coastal and 22,000 from surface water flooding. 45,000 properties (about 5%) are currently located within either the 1% Annual Exceedance Probability (AEP) fluvial floodplain or in areas at risk of flooding from a 0.5% AEP surface event with a flood depth greater than 300mm - without any additional climate change.³

Approximately 5,675 people or 2,720 households are at risk of coastal flooding in Northern Ireland. The largest increase in risk in Northern Ireland is related to coastal flooding, which is projected to increase by 550% by 2080s (in a high population scenario and with 4°C global warming at 2100).⁴

Coastal erosion. The most recent mapping of Northern Ireland estimates around 19.5% of the Northern Ireland coastline is eroding. Approximately 32% of the coast is fronted by manmade structures, compared to 44% in England and Wales. 68% is natural land.⁵

* Surface water and groundwater flooding is considered separately from river and coastal flooding because different policies, plans and actors are required for adaptation. However, there are significant overlaps between the different sources of flooding (all sources are covered in the Flood Risk Management Plans and have some of the same climate drivers) and this should be considered in managing the risk.

Heat. Climate change is likely to increase heat-related mortality in Northern Ireland. Projections estimate that heat-related deaths will increase to around 30 - 115 per year by 2050 and 55 - 135 per year by the 2080s assuming no population growth.⁶ These figures do not include heat-related illness and discomfort, which is of particular concern to vulnerable people, or those in certain housing types such as flats or terraced housing. Although heat impacts are not often considered to be a significant issue in Northern Ireland, a recent adaptation survey suggested that most respondents (60%) already have personal experience with discomfort during heatwaves and 32% have personal experience or know someone who experiences serious health impacts from heatwaves.⁷

Key powers over flood and coastal erosion risk management and spatial planning are devolved to the NI Executive with responsibility distributed across the following actors:

- **Department for Infrastructure (DfI)** is the Lead Government Department responsible for flooding (from rivers, surface water, and the sea) and through its Emergency Planning Unit (EPU) it supports the multi-agency response to flooding and wider civil contingencies arrangements. It is also responsible for the upkeep of 26 km of designated coastal flood defences, in addition to approximately 426 km of fluvial defences, 364 km of culverts and 12 control structures. Through the Department's role as a Statutory Consultee in the planning process, advice on planning and flood risk matters is provided to Planning Authorities in line with Planning Policy. Advice is also provided on the drainage/flood risk aspects of the forthcoming Local Development Plans being progressed by local councils.⁸
- **Local councils** are the lead partners for spatial planning and support DfI and other multi agency partners in the co-ordination of a flood emergency response. All eleven councils are currently creating Local Development Plans (LDPs) which, when adopted, will mean they are the decision maker for determining planning applications, and will consider issues relating to flood risk along with other material considerations in their decision-making process. DfI Rivers will continue, in its current role as a Statutory Consultee, to provide advice to Planning Authorities on planning and flood risk matters.
- **NI Water** is the state-owned water company (GOCO) and the only water company in NI. It manages the risk of flooding in relation to stormwater overflow and the wastewater network. NI Water manages some sustainable drainage system (SuDS) approvals and adoption powers relating to sewers for new developments.
- **Department for Agriculture, Environment and Rural Affairs (DAERA).** DAERA has some responsibility for coastal erosion, nature conservation protection and delivery of policies on river basin management plans and integrated catchment management.
- **NI Coastal Forum.** DfI co-chairs the NI Coastal Forum alongside DAERA. The group works with a range of other partners* in acknowledgement of the overlap of coastal erosion, flooding, and management. A Coastal Forum Working Group exists to support to work programme.

There are multiple actors for climate adaptation in towns and cities, which is strongly linked to plans at the local scale.

* Other partners include the seven councils with a coastline and the National Trust.

Box 9.2

What is Northern Ireland's Flood Risk and Planning Policy?

Northern Ireland has four major regulations and strategies relating to flood risk policy and planning.

Flood Risk

- **Water Environment (Floods Directive) Regulations (NI) 2009.** Based on the EU Flood Directive, the regulations require a 3-step cycle of flood Risk assessment, flood mapping and flood risk management planning, which is updated roughly every 6 years. The second cycle flood risk assessment was published in 2018, followed by updates to the Flood Maps (NI), and the publication of the latest Flood Risk Management Plan was in 2021, covering the period 2021-27.

The 2021-27 Flood Risk Management Plan largely (but not exclusively) focuses on 12 Areas of Potential Significant Flood Risk (APSFR)* and sets out detailed catchment-level information, potential impacts, expected damages and avoided damages from planned work. This prioritisation marks a change from the initial 45 areas of priority flood risk identified in the first cycle.

- **Long Term Water Strategy.** 'Sustainable Water - A Long-Term Water Strategy for Northern Ireland (2015-2040)', published in 2016, sets out a vision of a sustainable water sector in Northern Ireland. Two of its four key aims are to manage flood risk and drainage in a sustainable manner; and provide sustainable reliable water and sewerage services that meet customers' needs. The NI Regional Development Strategy 2035 recommendations on flood risk are implemented through the Long-Term Water Strategy flood risk management policies. Through Regional Guidance (RG9/12), the RDS recommends:
 - A precautionary approach to development in flood risk areas using the latest flood risk information.
 - Towns and cities are developed in a manner that avoids the risk where possible.
 - Development incorporates Sustainable Drainage Systems (SuDS).
 - All new urban stormwater drainage systems incorporate measures to manage the flow of waters which exceed design standards to protect vulnerable areas.

Planning

- **Regional Development Strategy (RDS) 2035.** The Regional Development Strategy (RDS) 2035 provides an overarching strategic planning framework. In addition to those listed above, a number of specific measures are highlighted:
 - Employment land should avoid, where possible, areas at risk from flooding (RG 1).
 - The redevelopment of land for urban and rural renaissance should avoid, where possible, areas that are at risk from flooding (RG 7).
 - Housing growth should be managed so that it mitigates the risk of flooding by avoiding those areas known to be at risk (RG 8).
 - A precautionary approach to development in areas of flood risk should be exercised using the latest flood risk information that is available (RG 9).
 - Promoting a sustainable approach by encouraging the greater use of SuDS (RG 12).
- **Strategic Planning Policy Statement (SPPS) 2015.** The SPPS sets out the DfI regional planning policies for development of land in Northern Ireland under the reformed two-tier planning system. The provisions of the SPPS must be 'taken into account' in the preparation of Local Development Plans, and are also material to all decisions on individual planning applications and appeals. Alongside the SPPS, planning policy statement 15 (PPS15) aims to prevent inappropriate development in areas that may be at risk from flooding or where development may increase the risk of flooding elsewhere.

* Areas become APSFR if their Annual Average Damage is more than £1 million.

This chapter relates to spatial planning and excludes risks and policies related to large-scale infrastructure and individual buildings. Community preparedness and response is covered in Chapter 12. However, climate resilience in towns and cities is strongly linked to resilience across several other sectors. Some of the key risks overlap, and delivery of adaptation and response is interdependent. Key interactions include:

Policies and actions for preparing urban developments to climate change are linked with those in other chapters.

- **Power, telecoms and transport infrastructure.** Adaptation actions to reduce risk to infrastructure systems must also protect nearby settlements, and not result in increased risks to surrounding areas. Spatial planning must therefore consider the resilience of infrastructure systems and the additional pressures they may place on an urban environment, such as heat generation and reduction in drainage capacity. These infrastructure systems are also critical for helping towns and cities respond to climate events, enabling warning systems and emergency coordination (see Chapter 12).
- **Water supply.** Water supply infrastructure is linked to drainage and sewage systems. These can increase resilience to flooding when well adapted, but poorly maintained infrastructure can exacerbate climate impacts.
- **Buildings.** Adaptation of individual buildings can contribute to well-adapted towns, cities and smaller settlements. Buildings, and their contents and occupants, will be impacted by urban heat and flooding hazards. Property-level design and adaptation measures can increase the resilience of whole settlements.
- **Nature.** Risks to urban and rural nature, and their capacity to build resilience will impact built-up areas. Nature-based solutions (NbS) can be adopted in adaptation plans to manage climate risks to infrastructure and urban environments. For example, riverine tree planting and green-blue infrastructure (like urban ponds) can increase infiltration of water, facilitate urban cooling and reduce run-off and downstream flooding.”

Adaptation policy in towns and cities must align with other policy goals for reducing emissions, and creating pleasant and efficient spaces, with sufficient housing and infrastructure.

There are several other policy goals for towns and cities which may have co-benefits or trade-offs with climate change adaptation. These include:

- Meeting housing and infrastructure demands.
- Reducing greenhouse gas emissions towards Net Zero.
- Health and wellbeing of communities in quality urban spaces.

Box 9.3

Towns and cities in NICCAP2

NICCAP2 identifies flooding and overheating at a spatial scale as a key priority area, largely within the 'People and Built Environment' outcome objective:

- P1: We have people, homes, buildings, and communities 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 which take account of climate change adaptation considerations in accordance with the provisions of the Strategic Planning Policy Statement (SPPS) and have been adopted post Independent Examination.

The 'Infrastructure' and 'Business and Supply Chain' outcome objectives also have relevant indicators which will now sit within the towns and cities system:

- IF1: We have transport and network services that are resilient to the impacts of flooding and extreme weather'
 - Number of properties removed from the 'Out of Sewer Flooding' Register.
 - Amount spent on structural drainage.
- B1: We have businesses that can adapt to the impacts of climate change & extreme weather.
 - % of non-residential properties at risk of flooding in NI.

Most flooding actions in NICCAP2 take place at the spatial planning scale and not at building level, so they are relevant to this towns and cities chapter. However, as previously explained, there are significant overlaps with Chapter 10 (Buildings).

Source: DAERA (2019) *Northern Ireland Climate Change Adaptation Programme 2019-2024*.

1. Monitoring progress towards well-adapted towns & cities

Well-adapted towns and cities should be prepared for and resilient to the harmful impacts of climate and weather extremes.

Well-adapted towns and cities are places which are adequately equipped for climate and weather extremes, such as flood events and high temperatures. Built environments should be designed in ways which minimise the negative impacts of future climate hazards. While this Chapter is named 'Towns and cities', the climate risks, impacts, and key goals for adaptation are similar for smaller settlements.

In this chapter we propose a monitoring map of the key outcomes, enablers and policy actions that are needed to ensure that fewer buildings, people, and land use are at risk from the harmful impacts of climate risk. This means reducing risk and damages through increasing preparedness and improving people's ability to respond.

We have identified five key outcomes to deliver well-adapted towns and cities. (Figure 9.1). A number of policy actions and enabling factors are needed to deliver these outcomes:

Towns and cities should be prepared for future flooding from rivers, the sea and rainfall events.

- **River and coastal flood risks to people, land and buildings are minimised.** New flood defences will be required to protect settlements from increased river and coastal flood risk. Existing and new flood defences need to be well-maintained to continue to function well. Effective flood risk management requires a catchment-based approach. A combination of upstream (rural) and downstream (urban) interventions allows for better management of overall risk.
- **Surface water and groundwater flood risks to people, land and buildings are minimised.*** This requires effective management of water flows in urban areas, through well-maintained drainage infrastructure – including sewers, drains and sustainable nature-based options. Managing the extent of impermeable surfaces and delivering appropriate property level protection are also key to managing surface water flood risk. Groundwater flood risks can be managed through drainage and pumping, as well as property level protection measures.
- **Areas at risk of coastal erosion are supported in a sustainable coastal transition.** This requires long-term planning which considers the scale of future risk. Some coastal areas will need to be defended by structures. In some areas, coastal defence may not be a sustainable option, and communities should be supported to relocate. The whole coastline should be considered as connected using a combination of approaches, including nature-based solutions. Long-term planning, particularly for coastal erosion, is required to ensure decisions made now are sustainable in the future.
- **Urban heat island risks are minimised.** Urban heat island effects can be minimised through careful urban design. Policies which encourage more shading and water in street design can act to reduce urban outdoor temperatures, as can maximising green spaces and reducing surfaces that absorb heat (such as creating a green or reflective roof).

Policy should ensure coastal settlements are protected from erosion or supported to adapt or relocate where this is not sustainable.

Adaptation to urban heat must be addressed by urban planning.

* Surface water flooding is considered separately from river and coastal flooding because different policies, plans and actors are required for adaptation. However, there are significant overlaps between the different sources of flooding and this should be considered in managing the risk.

Climate resilience should be embedded in policy and decisions which influence the location, spatial layout and design of settlements.

Adaptation in towns and cities will require sufficient funding, clear responsibilities for actors, updated research and buy-in from communities at risk.

- **Climate resilience is fully integrated into, and enforced by, the planning system.** Sufficient legislation, regulation and enforcement is required to ensure that new developments are built in locations and designed in a way that reduces vulnerability to flooding, coastal erosion and urban overheating – now and in the future. Policies should enforce and support sustainable planning decisions for new developments and adaptation retrofitting in existing developments. This will allow more proactive risk management.

Enabling factors that need to be in place to deliver these outcomes are:

- **Funding.** Building and maintaining flood defences and green infrastructure requires sufficient and well-targeted public capital (new investment) and resource (maintenance) funding, including for local authority spending. Additional funding from the private sector is likely to be required to meet the scale of ambition required for well-adapted towns and cities.
- **Governance.** A proactive planning system which considers future climate risks needs to be supported by joined-up risk management plans, which have clear responsibilities for actors. This allows for collaboration across catchments and between urban and rural regions, as well as promoting the data sharing necessary for effective adaptation. Ambition and resource in local authorities and risk management agencies are key enablers for this.
- **Engagement and education.** The public should be well-informed about future climate risks to enable household-level decisions about building in adaptation. Clear risk mapping and communication is required to achieve this. In addition, equitable long-term planning requires local stakeholder engagement. Climate-resilient planning and construction requires workers with technical and practical skills to support activities such as modelling, design and installation.
- **Research.** Further research can enable improved flood risk mapping. This is particularly an issue in relation to groundwater flooding. An improved understanding of risk, vulnerability indicators and the benefits of climate adaptation actions beyond risk reduction (such as health and well-being) will help their incorporation into decision-making and public confidence. In addition, further research could enable more just funding allocation, which considers future risk.
- **Data and monitoring.** More standardised approaches to risk mapping across scales and consistent asset registry is crucial for systems approaches which work across catchments and regions. Good practices of data sharing across sectors, regions and risk management authorities are key to enabling planning. Monitoring changes in risk and the status of adaptation actions, such as the runoff reduction from sustainable urban drainage systems, will enable prioritisation of actions.

Our monitoring framework highlights policy mechanisms which must be in place to achieve these required outcomes for well-adapted towns and cities. These fall under the following categories:

- **Legislation and regulation.** National policy must create legislation which enforces sustainable long-term plans – for flood risk management, coastal erosion risk management and spatial planning. Legislation should include mandatory resilience targets (such as green infrastructure installations or delivery of shoreline management projects) and provide appropriate

frameworks for regulation and delivery. Frameworks should be appropriate for the scale and type of adaptation. Legislation should also ensure that funding allocation is appropriate to meet adaptation goals.

A lack of legislation, regulation, and standards for adaptation actions in current policy is limiting delivery at the scale and urgency required.

- **Standards.** Well-adapted towns and cities will require policy to create resilience standards which reflect planning fit for future climate conditions. This includes standards for buildings in new developments, as well as quality standards for green infrastructure (such as Sustainable Drainage Systems (SuDS)) and Nature-based Solutions (NbS). Quality and maintenance standards are also required for flood and coastal defence infrastructure.
- **Financial instruments.** Policies should incentivise adaptation actions (such as using permeable surfaces or installing green roofs) by actors, including developers, utilities companies, and individual home or business owners. Good upstream land management (often not directly within built-up areas at risk) should be supported.
- **Information and reporting.** National policy must ensure that there are clear responsibilities for key actors which result in joined-up risk management. Reporting on some aspects of risk and adaptation planning and delivery should be mandatory. This will improve understanding of the national picture of adaptation in settlements – resulting in improved future modelling and risk assessment - to be used for funding prioritisation and community engagement.

Progress towards well-adapted towns and cities will be affected by contextual factors (Box 9.4).

Box 9.4

Contextual factors

Contextual factors outside of policy control may influence the risk level and need for adaptation in different towns and cities. Aspects of these changes to hazard, exposure and vulnerability factors may be useful to track:

Hazard. Sea level rise, in combination with increased storm surge intensity and frequency, will increase the likelihood of coastal flooding. Monitoring of sea levels and tipping points which might have high impacts on flooding – such as sea temperature – are key to understanding this hazard. Evidence currently suggests that warming air will influence rainfall patterns – particularly the intensity and timing of short-duration precipitation – and therefore flooding hazard intensity. Extreme temperatures are likely to be hotter in urban areas, due to the urban heat island effect. Tracking urban temperatures may help to prioritise risk management measures in heatwaves, such as alerts to the public. The interacting impacts of different types of flooding, such as heavy rainfall combined with high tides, and the risks associated with overheating and drought, such as reduced permeability, should be monitored and modelled.

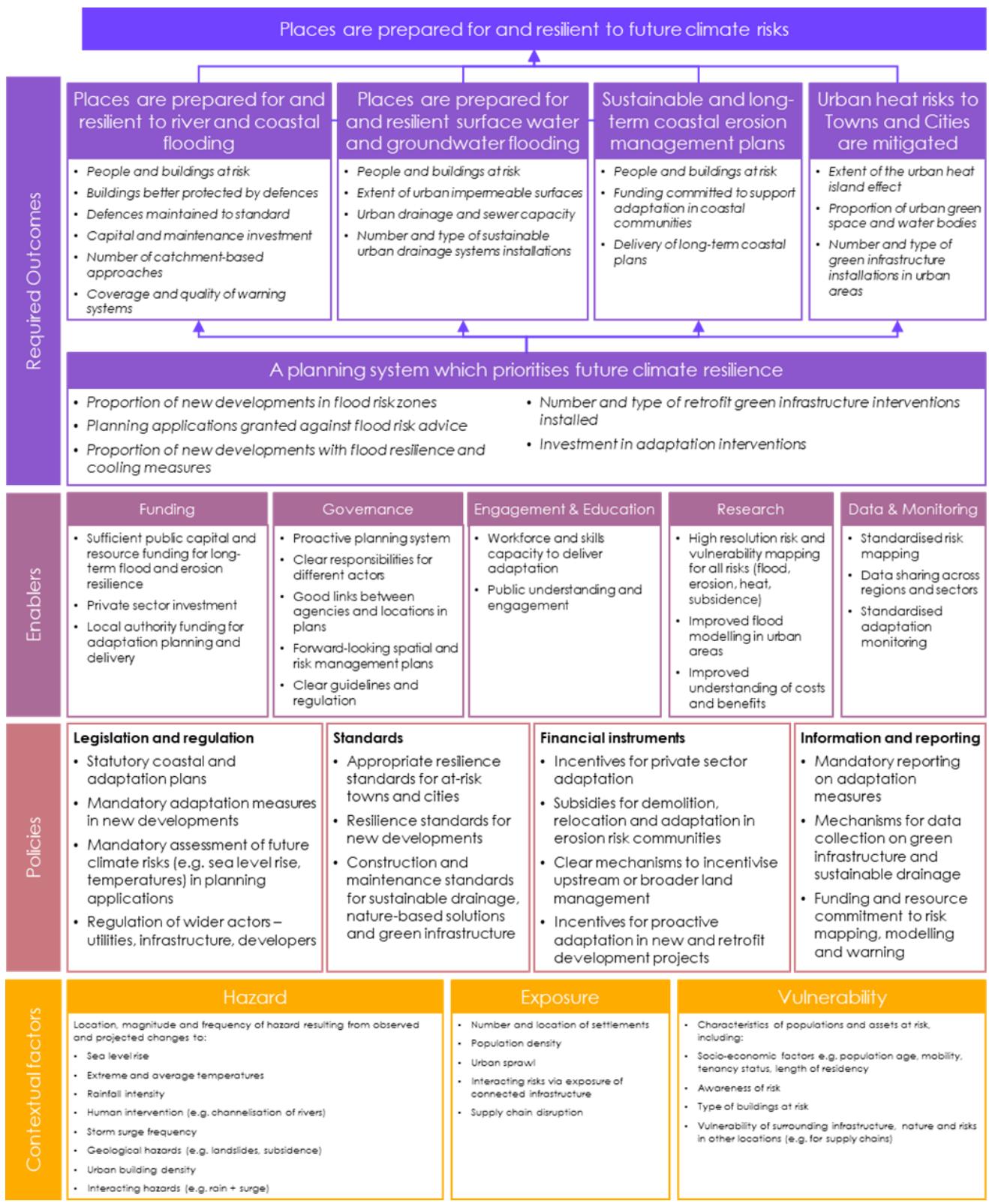
Exposure. Flood modelling indicates that under a low population growth scenario and 2°C warming, with the current level of adaptation, around 32,000 people and 15,500 residential properties are at significant risk from surface water, coastal and fluvial flooding by the 2080s. Under a high population scenario, this rises to 58,200 people and 28,400 residential properties. On top of more people living in high-risk areas, increasing urban development raises exposure to surface water flooding through reduction in permeable surface areas. Modelling suggests a 45% increase in exposed population and 77% increase in total expected annual damages from surface water flooding alone in Northern Ireland by 2080 under this high population scenario.¹⁰

Vulnerability. The demographic characteristics of the population at risk in urban areas may influence their ability to respond to hazard events. For example, the age demographic or social vulnerability of the population living in coastal communities or

areas of high flood risk. These factors may impact ability to respond to and recover from flooding, even under well-adapted policies and plans.

Source: CCC (2021) Evidence for the third UK Climate Change Risk Assessment (CCRA3); Sayers and Partners (2020) *Third UK Climate Change Risk Assessment (CCRA3): Future Flood Risk Analysis*.

Figure 9.1 Monitoring map for towns and cities



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

This section documents available evidence on progress towards delivery and implementation of each of the climate resilience outcomes identified in the previous section.

(a) Outcome 1: River and coastal flood risk minimised across catchments

Indicators show positive progress in providing data on properties removed from flood risk, but an overall target figure would help assess the scale of action.

The score for this outcome is **mixed progress**. There are indications of positive actions being undertaken in this area, and annual reporting on reductions of properties at flood risk is positive. However, without an overall target figure for properties removed from flood risk, it is difficult to say what proportion of risk remains, and there is limited data on changes to risk exposure or damages over time. Northern Ireland is also not currently covered by a flood warning service.

To have more confidence that progress is being made towards this outcome, evidence is required which shows decreasing exposure of people and buildings to significant current and future flood risk as a proportion of a total target; shows how many non-coastal defences are in good condition; and demonstrates that proposed catchment-based approaches are moving from planning to implementation across the region.

- **People and residential buildings are at significant risk of flooding from rivers and the sea.**
 - **Buildings.** The Northern Ireland Flood Risk Assessment (NIFRA) 2018 estimates that just over 25,000 or approximately 3% of the 861,000 properties in Northern Ireland are located within the 1 in 100-year (1% AEP) fluvial floodplain or 1 in 200 year (0.5% AEP) coastal floodplain.¹¹ Approximately 1 in 18 properties are at flood risk from rivers and the sea in Northern Ireland, compared to 1 in 6 in England and Wales, and 1 in 22 in Scotland.¹² Analysis from NIFRA estimates that on average, 1,665 (1344 residential) buildings are currently impacted by fluvial flooding every year, and 150 (69 residential) by coastal flooding. With climate change, these metrics are projected to rise to 5,296 buildings impacted by river flooding and 2,823 by coastal flooding on average every year.¹³ The available data provides a snapshot of the current risk, but there is no available evidence on how the number of buildings in the fluvial and coastal floodplain is changing over time.
 - **Population.** Analysis in the NI Flood Risk Assessment stated that around 3,532 people are at risk from river (fluvial) and coastal flooding across all 45 flood risk areas identified in the 2011 NI Flood Risk Assessment.¹⁴ Figures in the Climate Change Risk Assessment (CCRA3) are much higher, suggesting that about 10,000 people in Northern Ireland are currently at significant risk of flooding from rivers (fluvial) and 1,000 from coastal flooding.*¹⁵ There is limited data to assess how this number, and its spatial distribution is changing, but projections suggest that under a 2°C scenario (with low population growth) coastal risk for

People and residential buildings are at significant risk of flooding from rivers and the sea.

* A 1 in 75-year risk (1.3% Annual Exceedance Probability (AEP)) or greater

people could rise by 89% by the 2080s, while people at risk from fluvial flooding could decline by 22%.¹⁶

Annual average damages from flooding are over £1million for 12 locations in NI.

– **Damages.** Direct expected annual damages from fluvial and coastal flooding across Northern Ireland for residential properties are currently around £21.3 million.¹⁷ However, significant floods in the last decade have exceeded this projection. For example, the August 2017 floods in Foyle and Faughan resulted in clean-up costs of around £30 million and impacted 400 properties.^{18,19} 12 Areas of Potential Significant Flood Risk (APSFR) were identified as priority locations within the second NI Flood Risk Management Plan. These areas were designated in places where the Annual Average Damage value of flooding from all sources was greater than £1 million. Annual average damages for fluvial flooding across the 12 APSFR is over £14 million and nearly £7 million for coastal flooding. For each area, the Department for Infrastructure also estimates the present value (avoided damages) of the risk management programme by flood type. For example, resilience and protection projects are estimated to avoid almost £140 million of fluvial flood damages and £187 million of tidal flood damages in Belfast.²⁰

More properties will be at risk in the coming decades, particularly on the coast.

- **There will be an increase of properties at risk in the coming decades.** The Northern Ireland Flood Risk Assessment estimates that an additional 14,800 properties (or 39%) will be at risk by the 2080s, accounting for climate change and a medium probability flood risk.^{21,*†} Evidence from the Third Climate Change Risk Assessment (CCRA3) suggests that coastal flooding will become a larger risk. For example, projections suggest a 160% increase in residential properties at significant coastal flood risk by 2080 under a low population growth scenario where global average temperatures rise by 2°C, versus a 2% increase in residential properties at significant risk of river (fluvial) flooding under the same scenario.²²
- **Coastal defences are in good condition, but there is less evidence for the condition of other flood defences.** All 26 km of sea walls in Northern Ireland are in ‘very good’ to ‘fair’ condition.²³ These are inspected every 6 months and judged to the standards of England’s Environment Agency asset inspections. In total, there are about 60 flood and sea defence systems across Northern Ireland which offer protection to major towns and large areas of agricultural land.²⁴ Time-series data for flood defence condition are not available, so we are unable to fully evaluate the maintenance of existing defences. Target and actual investment in maintenance is not published, although annual watercourse maintenance expenditure is estimated at £12 million.²⁵
- **Investment in flood risk management has been consistent over recent years but is not set to increase in the future.** Total capital expenditure on flood and coastal erosion risk management in 2021/22 was around £24 million.²⁶ This is the same as 2015/16, but is around a 20% increase on figures from 2010/11 (£20.7 million).²⁷ Costs associated with DfI Rivers Capital Works Programme for flood alleviation schemes are greatest at the beginning of the cycle. Figure 9.2 shows that for the period 2021 and 2027, the plan

* Climate change scenarios in NIFRA are currently based on UKCP09 Climate Projections.

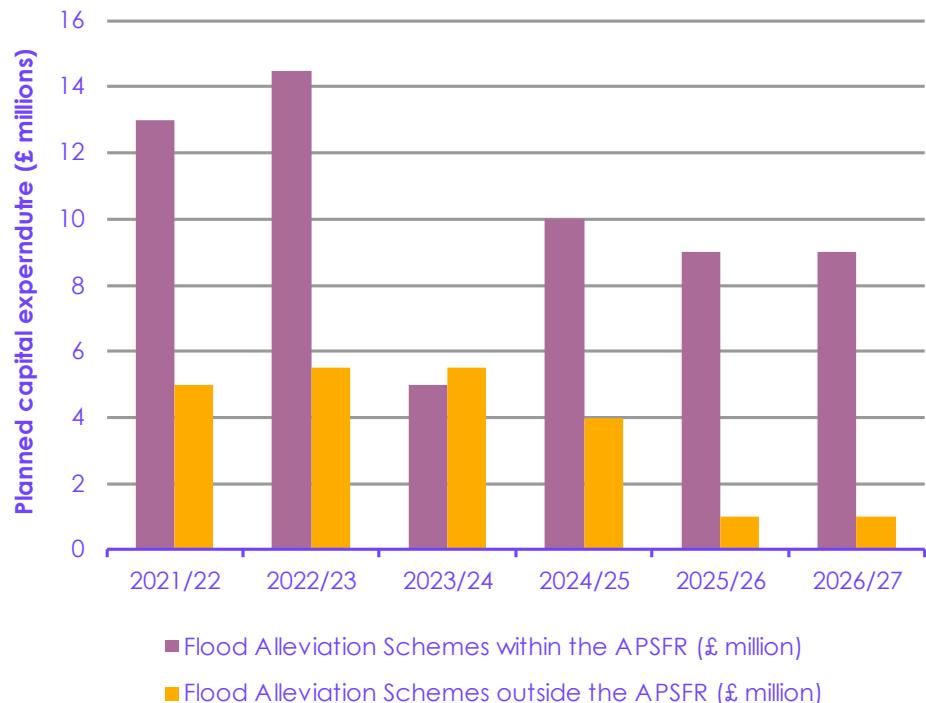
† Medium probability is defined in NIFRA 2018 as a 0.5% AEP of surface water flooding, 1% AEP of fluvial flooding and 0.5% AEP of tidal flooding.

allocates £60.5 million in Flood Alleviation funding for APSFR schemes and £22 million²⁸ for other areas.

Government is investing in a variety of flood alleviation projects across NI up to 2027.

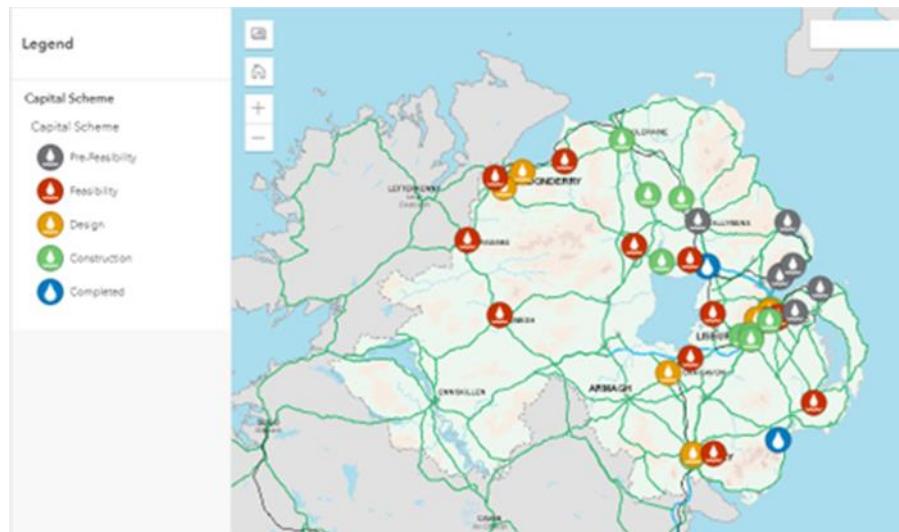
- **New flood defence projects are currently under construction or at design phase.** DfI Rivers has 17 Flood Alleviation projects currently listed between completion and pre-feasibility studies (Figure 9.3). Of those 17, two are completed, with nine under construction].²⁹ These projects include the £18 million Belfast Tidal Flood Alleviation scheme (Box 9.5) and the Portadown (fluvial) Flood Alleviation scheme, which is currently at design stage, with estimated construction costs of £28 million.³⁰ These projects are at early stages and unable to be evaluated at this stage.
- **Northern Ireland is not currently covered by a flood forecasting and warning system.** Development of this service would constitute positive progress and play an important role in minimising river and coastal flood risk.

Figure 9.2 Estimated costs of flood alleviation schemes with the Second Cycle Flood Risk Management Plan (2021-2027)



Source: Department for Infrastructure (2022). *Second cycle Northern Ireland Flood Risk Management Plan 2021-2027*. Table 6-12, page 273.

Figure 9.3 New Flood Alleviation Schemes in Northern Ireland



Source: Department for Infrastructure (2022) *Flood Alleviation Scheme Explorer*.

Box 9.5

Belfast Tidal Flood Alleviation Scheme

The Belfast Tidal Flood Alleviation Scheme is an £18 million programme, delivering a scheme of works that will provide a long-term approach to tidal flood risk management for Belfast. The scheme involves implementing a mix of temporary and long-term flood defences over 8.5 km from Belfast Lough to Stranmillis Weir - the extent of tidal influence on the River Lagan. The main works commenced in July 2022 and construction is partially complete, with work ongoing at Belfast Harbour.

It is estimated that there are currently over 1,500 buildings (1,103 residential and 430 non-residential) within the city at risk of flooding from a significant tidal event.³¹ Climate change induced sea level rise results in increases to these figures to over 3,400 by 2065 and over 7,900 by 2115.³² Total housing stock in Belfast in 2022 (including apartments) was 160,400.*³³

The design standard adopted for the project ensures the first intervention is designed to the 1 in 200-year 2080 estimated sea level, but also must incorporate potential for adaptability for a second intervention raising the design standard to the estimated 2117 sea levels. The estimated 'present value' for direct flood damages avoided is valued at approximately £168 million.^{†³⁴}

Source: Department for Communities (2022) *Northern Ireland Housing Statistics*; DfI Rivers (2023); DfI (2023)
Notes: Unpublished data provided on request.

There are several unavailable indicators for this outcome which would improve our ability to assess delivery and implementation:

- Consistent time series data of people and buildings moving into or out of flood risk.

* Number of buildings at flood risk does not directly map to housing stock statistics because the number of apartments included in the building estimates is unknown.

† Projects typically have a range of 'options' for how they are delivered. This is the figure for the DfI 'preferred option'.

- More centralised monitoring of flood risk management data on the characteristics and monitoring of delivery and maintenance of flood risk management projects.
- More information on implementation of natural flood management measures and catchment approaches.

(b) Outcome 2: Surface water and groundwater flood risks are managed

The score for delivery and implementation of this outcome is **mixed progress**. The committee recognises that there is positive work being undertaken in this area. NI Water has made progress removing impermeable surfaces and reducing out-of-sewer flood risk, which is welcomed. However, data is required on the proportion of overall impermeable area and how many properties are on the out-of-sewer flood risk register. Without these it will be hard to understand if current scale and pace of progress is sufficient. Data on Sustainable Drainage Systems (SuDS) uptake also remains limited, and so more work is required to demonstrate effective management of surface water flood risks.

Evidence should show a decrease in the number of people and buildings at risk from surface water and groundwater flooding.

To have confidence that progress is being made towards managing surface and groundwater flood risks, evidence is required which shows there is a decreasing number of people and buildings exposed to surface water and groundwater flooding. This requires management of impermeable surfaces, urban sewer and drainage networks and delivery of sustainable drainage systems.

- **People and buildings are at significant and increasing risk of surface water flooding.** The surface water flood map for Northern Ireland indicates that around 20,000 (2.4%) of properties are situated in an area shown to be at risk of flooding from a significant rainfall event.*³⁵ The Third Climate Change Risk Assessment found that 22,400 people and 9,000 residential buildings are currently at significant risk from surface water flooding.[†] Risk of surface water flooding is likely to increase in the future. Under a 2°C warming scenario, with current adaptation and low population growth, the number of people at significant risk rises by around 4% and residential buildings at significant risk by around 22% by the 2080s.³⁶
- **Predicted annual average damages from surface water flooding are the largest of any flood type.** In the second cycle NI Flood Risk Management Plan (2021-27), annual average damage from surface water flooding across the 12 Areas of Potential Significant Flood Risk is around £45 million. High-level assessments of avoided damages associated with works in the plan suggest a ‘present value’ of over £1.3 billion, including over £500 million in Belfast alone.³⁷
- **NI Water is beating its target on removing impermeable areas, although it is not clear that impermeable areas are decreasing overall.** NI Water is piloting stormwater separation projects, which means removing combined sewer networks and replacing these with separate storm and foul sewer networks. Over the 2015-21 period, the total impermeable area removed was around 296,000 m². This is exceeded the NI Water target of 30,000 m² per year (150,000 m² total) set for the 2015-21 period.³⁸

Surface water flooding is a significant risk for NI.

NI Water is removing impermeable surfaces and taking steps to reduce the number properties at flood risk, but a better understanding of scale would help to assess progress.

* Risk of flooding to a depth greater than 300mm from a 1 in 200yr (0.5% AEP) rainfall event.

[†] A 1 in 75-year risk (1.3% Annual Exceedance Probability (AEP)) or greater.

However, there is limited data on the total amount of impermeable area which exists or has been newly installed within that period, which makes it difficult to assess whether this constitutes an overall reduction in impermeable surfaces.

- **The number of properties on the internal sewer flood risk register is decreasing, but the proportion of total at-risk properties is not available.** ‘Internal’ flooding is defined as flooding which enters a building or passes below a suspended floor. NI Water is running several projects to remove properties at risk. For example, an ongoing NI Water project on Ravenhill Avenue will remove 11 properties from the internal flooding register, through upgrading and replacing 2 km of sewers to reduce out-of-sewer flooding and removing almost 9 hectares of impermeable area from the combined sewer network.³⁹ NI Water proposes to use similar interventions remove a total of 57 properties from the internal at-risk flooding register by the end of 2027.⁴⁰ This is consistent from the previous 2015-21 period, where projects removed 52 properties, missing the target of 62.⁴¹ It is not clear how many properties in total are on the register for out-of-sewer flooding.
- **Uptake of Sustainable Drainage Systems (SuDS) is beginning to increase but lacks monitoring data.** The NICCAP2 indicator on sewer adoption agreements shows that of 1,025 sewer adoption agreements approved by NI Water since April 2019, 61% were approved with SuDS,* with 31% of the total agreements adopted with SuDS to date.⁴² Sites which have ‘adopted’ means the developer has completed the construction of the sewers to the agreed design and has applied to have them taken into the ownership of Northern Ireland Water. These sewers and SuDS are now owned and maintained by Northern Ireland Water, although there is no available data for the proportion of these sewers which meet maintenance standards. There is no national-scale centralised or standardised database of SuDS installations. Furthermore, there has been limited implementation of some SuDS actions for new developments in the Long-Term Water Strategy (see policy and planning section). The current uptake of sustainable drainage solutions for new development within Northern Ireland is estimated to be below 5%.⁴³
- **Investment in ‘structural drainage’ appears to be increasing but is not well defined.** This NICCAP2 indicator was not clearly defined in the NI Climate Change Adaptation Programme, as it could refer to a range of interventions. The 2021-27 Flood Risk Management Plan details an annual budget of £3.5 million (total £21 million)⁴⁴ for structural drainage upgrades to road drainage systems, with the aim of reducing susceptibility to surface water flooding. It is not clear how this has changed since previous budgets. Spend on underground services, such as inspection and repair of culverts, increased from around £864,000 in 2021/22 to more than £1 million in 2022/23, representing a commitment to manage surface water flood risk via multiple interventions.⁴⁵
- **The number of properties protected annually through Long-Term Water Strategy projects has decreased.** Since the strategy was introduced in 2016, to 2021, 623 properties were protected by drainage and flood alleviation schemes funded by Dfl Rivers (Table 9.2).⁴⁶

Millions in investments are being directed towards drainage and flood alleviation projects

* Sites which have been approved means the developer has agreed a design with NI Water for the sewers. They have taken out an agreement and bond for the future adoption of the sewers and are to construct the sewers to the agreed specification, including any SUDS systems that NI Water has approved.

However, the annual number of properties protected, and the annual spending on schemes has decreased since 2018/19 (Figure 9.2).

Table 9.2

Drainage and flood alleviation expenditure/ properties protected by year

Year	2017/18	2018/19	2019/20	2020/21
Total spend (£ millions)	7	6.7	6.3	6.1
Properties protected	204	245	91	83

Source: DfI (2021) Annual Reports on Sustainable Water (Long Term Water Strategy).

Unavailable indicators, which would help to inform our understanding of this outcome include:

- **The storage capacity of urban drainage systems.** There is no available database on the indicative capacity of drains and sewers, and how this is changing over time, despite progress in reducing out-of-sewer flooding. Capacity and the risks to drainage networks should be monitored.
- **The number and characteristics of SuDS installations.** There is no centralised or standardised database of SuDS installations (both new and retrofit). An asset registry of the location, type and maintenance condition would be useful for tracking progress in implementation.
- **The number of buildings at risk of groundwater flooding.** Groundwater flooding occurs when water within the ground (in rock or soil) rises above ground level. The level of the water can change due to long-term and short-term rainfall and water abstraction. There is a lack of monitoring of the incidence of groundwater flooding and its impacts, as well as research to help us understand adaptation options. The risk level and hazards associated with groundwater flooding remain poorly understood and mapped.

Indicators for this outcome could be improved by further contextual information (e.g. proportion of total buildings or defences at risk) and time series information. Developing these datasets to include these measures would result in more complete analysis of progress towards this outcome.

(c) Outcome 3: Long-term and sustainable coastal erosion management plans

Delivery and implementation towards this outcome is scored as **unable to evaluate**, due to a lack of indicators and data. There is currently no nationally defined approach or consistent tracking of coastal erosion risk management in Northern Ireland.

There is no defined approach to coastal erosion risk management in Northern Ireland.

To evaluate progress towards this outcome, indicators should suggest that the number of people and buildings at risk of erosion is balanced by investment in coastal defence projects and community support. Progress in adaptation to coastal erosion is difficult to assess because there may be some areas where

adaptation at site is not sustainable or possible in the long-term. Indicators should reflect a broader approach to resilience.

- **There is some high-level baseline data on coastal erosion risk but many new and updated datasets are not yet published.** A report in 2018 concluded that the data available was insufficient for effective management of the NI coast.⁴⁷ Following publication of this report, the Northern Ireland Coastal Forum (led by central government) was reconvened, and a work programme was developed to implement the recommendations for a baseline and gap analysis study. The coastal team in Department for Agriculture, Environment and Rural Affairs (DAERA) are working to make much of the information publicly available in the coming years, but it was not published in time for this assessment.
- **There are no timeseries data on the number of people and buildings at risk of coastal erosion.** The 2018 Coastal Erosion Risk Management Report for Northern Ireland estimates that 32% of the coast is fronted by manmade structures and 68% is natural. It is estimated that 19.5% of the Northern Ireland coastline is currently at risk of erosion.⁴⁸
- **Preliminary baseline maps suggests that the risk of coastal erosion is high but there are limited data on delivering adaptation actions to manage this risk.** The high-level preliminary risk assessment in 2019 found that around 21% of the coastline is at high risk of coastal erosion, and a further 60% is at moderate risk. This corresponds to high vulnerability in physical assets at the coast – particularly in the north-east.⁴⁹
- **We lack some key data for tracking the number of properties and land lost to coastal erosion.** While there are recent examples of local monitoring initiatives (such as recent aerial and LiDAR mapping after storms), there remains no consistent national picture. This data would provide useful context for tracking national-scale risk assessment and targeting funding. Furthermore, we lack evidence for the delivery of projects to manage coastal erosion and progress in adapting to coastal change as a whole, which requires a suite of long-term resilience actions beyond defence or realignment.

(d) Outcome 4: Urban heat risks are mitigated

This outcome is scored as **unable to evaluate**, due to a lack of indicators. Overall, data are lacking to evaluate adaptation to urban heat risks in Northern Ireland. While there are some limited datasets, trackable data on green and blue infrastructure assets in urban areas is not yet gathered centrally. There are some projects aiming to address this but there is a need to improve monitoring to enable progress in delivery to be assessed.

Urban heat risks are not being centrally managed in NI.

To evaluate progress towards adapting to urban heat island risks, we require evidence that green and blue space in urban areas is increasing and that measures, such as green roofs and urban trees, are being installed.

- **Local Government is taking a lead on urban heat risk and needs support from Departments.** Several councils in NI are now undertaking work to increase green infrastructure in urban areas. In Belfast, the Green and Blue Infrastructure Plan states that the city has a wide variety of green spaces, ranging from expansive areas of natural and semi-natural land in the Belfast Hills and along the Lagan Valley, nearly 900 ha of city parks, significant areas of informal amenity grassland and around 2,000 street trees.⁵⁰

The city has undertaken a 'Million Trees' project which proposes to plant one million trees in the city and region by 2035, with 63,000 planted already.⁵¹ While the cooling impact of these adaptation actions is uncertain, recent evidence suggests that increasing tree coverage by 30% can cool cities by around 0.4°C, suggesting that this is as an appropriate outcome-level target.⁵²

- **Access to natural space in urban areas is comparable with Great Britain.**

43% of households in Northern Ireland have accessible natural space within 400 metres. This can provide important cooling benefits as well improvements to air quality and mental and physical health. Accessible natural space is defined as areas greater than two hectares and off-road trails and paths. In urban areas, 50% of households have accessible natural space within 400 metres.⁵³ This is broadly in line with Great Britain where the percentage of people living within five minutes of a public park or playing fields is 52%.^{54,*}

Box 9.6

Belfast Heat Vulnerability Index

The Met Office, in partnership with Belfast City Council and Climate Northern Ireland, created a Heat Vulnerability Index (HVI) for Belfast.⁵⁵ The HVI uses 8 metrics on hazard exposure (3), sensitivity (3) and adaptive capacity (2) to provide a relative, numerical score for the 60 electoral wards, which can be used to determine which parts of the city are at greater risk to extreme heat than others.

Hazard exposure metrics

- Hot days (above 25°C) and warm nights (above 15°C) in summer: High day and night temperatures prevent the body from cooling down and can cause heat-related health conditions and mortality.
- The proportion of the housing stock that are apartments or terraced housing: Upper floors in apartments and end terraces are at greater risk from overheating, because they are less able to regulate air flow.
- Population density (the number of people per square kilometre): Densely populated areas expose more people to the heat hazard.

Sensitivity metrics

- Proportion of the population aged 65+: Older people are more susceptible to developing heat-related illnesses.
- The proportion of Belfast's vulnerable assets within an electoral ward: Schools, hospitals, care homes and residential homes are at greater risk of overheating due to building design. Residents also tend to be more vulnerable.
- Proportion of the population with a long-term health condition (respiratory or chronic): Those with underlying health conditions are more susceptible to developing heat related illnesses.

Adaptive capacity metrics

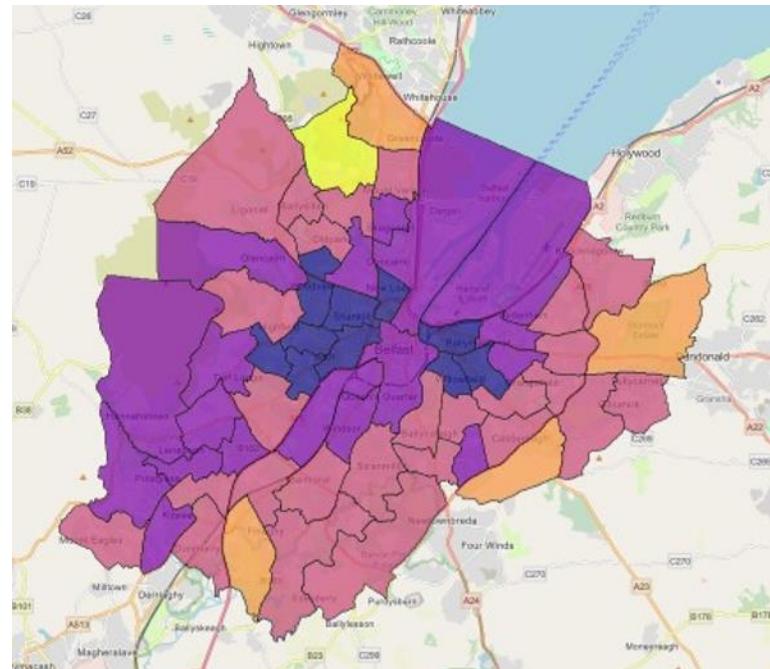
- Level of deprivation: High levels of deprivation may prevent people adapting, for example, by purchasing cooling equipment or travelling to cooler spaces.
- Proportion of publicly accessible green space: Green space acts to cool its surroundings and can offer residents an area of respite.

Results showed that under a high emissions scenario, Belfast will see substantial increases in days above 25°C (1.9 days per year for 1981-99 baseline to more than 23 per year by 2061-79). Warm nights above 15°C will also increase (2.1 days per year for 1981-99 baseline to more than 31 per year by 2061-79).

* Although the study did not differentiate between public and private land, meaning real-world access is less certain.

The map suggests that under a 2°C warming scenario, the electoral ward of Ardoyne in inner Belfast could be at high risk. 12 other electoral wards, such as New Lodge and Woodstock would be considered medium-high risk. Under a higher emissions scenario, the number of electoral wards at high or medium-high risk increases to 29 (11 and 18 respectively), around half of the total in the City.

Figure B9.6 Heat Vulnerability Index (HVI)



Source: Met Office (2022) *Urban Heat Risk In Belfast*.

Source: Met Office (2022) *Urban Heat Risk In Belfast*.

Unavailable indicators, which would help to inform our understanding of this outcome include:

- **Urban heat island (UHI) effect for other urban regions.** There will be increasing trend in urban and rural daytime and night-time temperatures under future climate projections. Urban and rural temperatures should be monitored consistently.
- **Green and blue infrastructure.** The 'Future of Urban Green Spaces in NI' is looking at urban green space in population centres over 5,000 people.⁵⁶ The project will collate information on the extent and use of current greenspace, before co-creating a vision and action plan to 2030. The outputs will be available by the next assessment. Monitoring should include data collection on green infrastructure types and size. Departments could also make use of local government, academic and NGO datasets to fill gaps in knowledge. To this end, Ordnance Survey (NI) data must be made more accessible for a wider range of users and applications than is currently the case.

Some projects are developing to fill the current gap in information.

(e) Outcome 5: A planning system which prioritises future climate resilience

Limited data is available to assess how the NI planning system is prioritising climate resilience.

This outcome is scored as **unable to evaluate**, as there is limited data to understand how many planning applications are requested 'by exception' to develop on floodplains, or how many of those developments are constructed. Where developers are required to submit drainage assessments for new developments, there is limited evaluation of these. This means we cannot evaluate the extent and quality of the flood alleviation measures which are eventually built. Local Development Plans (LDPs) are currently under development across all NI councils. At the time of writing, only the Fermanagh and Omagh District Council Plan Strategy has been formally adopted, and although the Committee understands that several others are imminent, they may still be subject to modification.

This outcome is required to ensure that new developments and changes to existing developments are designed to be resilient to future climate risks. Evidence is required to suggest fewer new developments are being built in areas at flood risk, and that new and existing developments are being planned with green and blue spaces and green infrastructure. This outcome overlaps with outcomes in the Buildings chapter (Chapter 10), which require evidence that adaptation measures are fitted into new buildings. Aspects of this outcome, such as sustainable drainage and green space, are also covered within Outcomes three and four of this chapter.

- **It is unclear to what extent Local Development Plans will properly embed climate change adaptation considerations.** All 11 councils in NI are required to develop a local development plan under the Planning Act (Northern Ireland) 2011 and The Planning (Local Development Plan) Regulations (Northern Ireland) 2015. In the mid-programme review of NICCAP2, nine of 11 councils stated specifically that adaptation was being accounted for within the Local Development plan.⁵⁷ Although it is too early to assess the quality of implementation in most of these policies, the plans will provide an important source of information for future assessments. For example, the draft Plan Strategy for Belfast City Council proposes monitoring data on 'Quantity of development permitted in undeveloped areas of flood risk' with an associated target and trigger threshold for review. Similar proposals are made for the number of planning permissions that secure Green and Blue Infrastructure improvements or SuDS, with targets and minimum thresholds.⁵⁸

Local Development Plans could deliver additional data from annual monitoring of indicators.

There are several unavailable indicators for this outcome, which could enable better tracking of progress. These include:

- **There are no data on the number of exceptions made for development** within the 1 in 100-year fluvial flood plain or the 1 in 200-year coastal flood plain. It would also be useful to understand this as a proportion of total planning applications which request an exception.
- **Furthermore, the number of planning applications approved against flood authority advice is not known.** This dataset does not currently exist, but it would be useful if gathered by DfI and local councils.
- **There is no centralised or national-scale data on the number of new developments built with flood resilience (e.g. SuDS) and cooling measures (e.g. shaded areas).** While individual local authorities may track their

investment in blue-green infrastructure for built-up areas, there is no centralised information to evaluate progress at the national scale.

(f) Progress on enablers

To achieve these five outcomes for well-adapted towns and cities, multiple enabling factors must be in place. To evaluate progress in enabling factors, indicators are required which show: sufficient funding and investment, an increasing workforce with the required skills, investment and improvement in data and monitoring, and an increasing public and stakeholder understanding and acceptance of adaptation. Indicators for the enablers show some progress towards achieving the outcomes for well adapted towns & cities.

- **It is too early to assess whether local and city plans are setting ambitious targets.** Target-setting can be an important element of green infrastructure implementation for cities. Belfast was included in a review of green infrastructure target setting in 18 UK cities, which found that only 28% set out a clear approach for monitoring and tracking green infrastructure within which Belfast was not one of the cities with a clear tracking plan.⁵⁹
- **There are some examples of non-government stakeholders delivering local adaptation.** In Northern Ireland, the National Trust manages 22% of the coast, 75% of which falls under a conservation designation. Schemes have included the first sea defence abandonment in Northern Ireland at Anne's Point in Strangford Lough and enhancing wetland plants and wetland area to protect Mount Stewart.⁶⁰
- **There has been substantial research undertaken on managing long-term coastal risk since NICCAP2.** This has included the Northern Ireland 3D Coastal Survey which will provide a high-resolution baseline, covering the full extent of the coast, as well as LiDAR surveys to quantify the extent of storm damage. DfI have contributed to the UK-wide project - 'Coastal Flood Boundary Conditions for the UK Mainland and Islands' which will include updating of coastal extreme boundary conditions for the NI coastline. There are further examples of local projects which investigate shoreline change, such as the INTERREG VA MarPAMM project, which focuses on Murlough special area of conservation.
- **There appears to be no published data on national or regional monitoring of the public's engagement.** To date, some information has been made available, but there is little data available to track the extent of its use to date. For example, there has been some limited use of social media within the Regional Community Resilience Group (RCRG) to advise the public on risk to some climate impacts through community resilience guidance, social media and a seasonal newsletter. The main government website, NI Direct, has extensive information on flooding, contact information for emergency services and guides on what support or finance may be available. NI Business Info is a government funded site and the main source of information for businesses on a wide range of issues. It has a user guide on adapting businesses to climate change, including information on preparing for flooding.
- **Evidence suggests that some of the public are willing to pay for flood risk reduction.** A recent survey of nearly 1000 people found that in Northern Ireland, between 71% and 81% of people were in favour of spending public money now to prepare the UK for the impacts of climate change, including building flood defences.⁶¹

A range of actors deliver projects on the coastline in NI.

Much of this chapter is defined by a need for better monitoring and publication of data.

- **There are no available indicators to track the number of trained workers and skills.** Indicators tracking workforce and skills for climate resilience (e.g. digital planning, flood risk management) within Local Authorities would help to inform the future role of this enabler on progress. In addition, tracking the availability and funding for guidance and training, such as the Construction Industry Research and Information Association (CIRIA) SuDS manual, is important.

3. Policy and planning progress

This section documents key policy developments relevant to each of the climate resilience outcomes identified within our monitoring map and the extent to which the key policy and planning milestones are in place.

(a) Outcome 1: Towns and cities are prepared for and resilient to flooding from rivers and the sea

This outcome is scored as having **partial policies and plans**. Some of the key policy milestones to minimise risk of harmful impacts from river and coastal flooding on towns and cities are in place. Evidence for their effective delivery is not yet fully available. Policies and plans could be supported through the development of long-term coastal management plans and clear targets for flood risk reduction.

Some of the key policy milestones for minimising river and coastal flooding are in place in NI.

- **Legislation and regulation plans are in place, but there are some gaps in the allocation of long-term funding.** The second cycle Flood Risk Management Plan for NI was published in December 2021 in accordance with regulations. A review of the first cycle showed progress which included the establishment of seven Local Community Resilience Groups, three Coastal Emergency Response Plans and five Flood Alleviation Projects being completed within the lifetime of the plan.⁶² The second cycle has increased ambition, with a series of regional measures under the headings of Prevention, Protections and Preparedness, as well as a detailed set of actions for each of the 12 priority Areas of Potential Significant Flood Risk (APSFR). The action plan for each area has a responsible owner, description, and timescale for delivery and the plan considers future climate risk. Progress will be monitored annually which will be important for future assessments. In addition to including recommendations from this report, the department should seek to ensure that it engages with the development of NICCAP3. There are some concerns about budgetary constraints which may affect the delivery of these plans, due partly to the current political impasse and partly to historic underfunding issues associated with budget setting and regional tax subsidies.
- **Catchment-based approaches are increasingly being embedded within policies and plans but should be more ambitious.** Catchment-based approaches are embedded within the second Flood Risk Management Plan 2021-27, with 12 Areas of Potential Significant Flood Risk (APSFR), which look at risk across whole regional areas, forming the core detail of the plan. However, to date they do not formally interact with the DAERA River Basin Management Plans, which is an area requiring further progress. There are no ambitious targets for natural flood management to be integrated into these plans. There is no requirement to collect data on these schemes at the local and national scale.
- **Coastal flood risk is not fully covered by legislation.** The Northern Ireland Coastal Flood Response Plan was developed in 2017 by the Flooding and Severe Weather Working Group of the three NI Emergency Preparedness Groups (EPGs). Its aim is to provide a pre-planned response to warnings of coastal flooding and to outline the graduated incident and co-ordinated inter-agency response to a potential or actual tidal flooding event affecting NI. The Plan remains a living document to incorporate any changes to the area and to ensure it is up to date.⁶³

In the absence of any coastal legislation, the NI Coastal Forum will play an important role in driving ambition to reduce flood risk from coastal impacts. A work programme has been agreed and the forum is currently developing an action plan.

- **Overall resilience standards for flooding would improve plans and policies.** There is no clear target-based monitoring of the resilience standards of existing flood defences and the number of properties at risk of flooding.
- **There are some policies and plans to improve information and reporting.** The new DfI flood alleviation storymap is useful for monitoring the scheduled and completed works in Northern Ireland.⁶⁴ This could be expanded over time and shared more widely from key pages on the DfI website.
- **Substantial plans for asset management are still to be delivered.** The new DfI Asset Management Plan was not published in time for this assessment. Final recommendations could include improved data sharing and monitoring for maintenance and work on each asset, reassessing systems of flood defences to ensure all defences have the same standard of protection (SOP), and flood modelling for every DfI asset.

(b) Outcome 2: Towns and cities are prepared for and resilient to flooding from surface water and groundwater

This outcome is scored as having **limited policies and plans** in place to reduce risk and prepare communities for flooding from surface water and groundwater. Additional policy milestones are required to define responsibility for and promote uptake of sustainable drainage systems (SuDS) and offer a consistent approach on reduction of impermeable surface areas.

Policies to address surface water flood risk are limited overall, despite positive plans in some areas.

- **There is some good progress on strategy, which incorporates surface water flooding into risk management plans.** The second cycle Flood Risk Management Plan (2021-27) was published in December 2021 and built on the first cycle plan by including surface water (pluvial) flooding in the prioritisation of the twelve Areas of Potential Significant Flood Risk (APSFR) which form the core part of the plan. Pluvial flooding is modelled for every one of the 12 plans, including catchment-level information for each, in addition to potential impacts, expected damages and avoided damages from planned work. For the period April 2021 – March 2027, NI Water will also be conducting Enhanced Drainage Area Plans (DAPs) in each of the APSFR. These Enhanced DAPs extend modelling to include the NI Water storm sewers in addition to all combined and foul sewers, which may help to identify drainage improvement schemes.
- **Sustainable drainage systems are not mandatory nor are there clear guidelines and regulations.** ‘Sustainable Water - A Long-Term Water Strategy for Northern Ireland (2015-2040)’ led to the creation of the Stormwater Management Group (SMG), which was set up to provide a solution to issues in the planning system including approval and adoption/maintenance of landscaped SuDS. SMG is currently looking at the proposals for SuDS and considering how SuDS in developments might be approved and maintained. SuDS are not yet mandatory as they are in England, and will not be mandatory in any Local Development Plan given the limited requirements within the current NI Strategic Planning Policy Statement (SPPS). A subgroup of the Stormwater Management Group in DfI is continuing to identify and work through issues and risks with developers

when implementing landscaped SuDS, but no clear regulations are yet in place.

- **However, there are some plans for managing capacity of urban drainage.** The Long-Term Water Strategy has numerous actions relating to surface water flood risk. Examples include: avoiding connection of surface water drainage systems (e.g. from roads, housing developments, and car parks) to the combined sewer system; creation of a register of at-risk properties to internal and external sewer flooding; and consideration of a strategy for retrofitting SuDS measures such as rainwater recycling and green roofs and permeable paving into existing properties. Since annual reporting on this plan is not accompanied by an updated action plan, it is hard to assess demonstrable progress on many of these actions.
- **There are positive plans for reporting against the Long-Term Water Strategy.** Reporting takes place on an annual basis, and the reports are made publicly available. However, in addition to that report, it would be useful to have an updated delivery plan to help assess progress against each action.
- **Belfast has a long-term, integrated surface water risk plan.** The £1.4 billion, 12-year Living With Water Plan for Belfast is an example of catchment approaches being embedded within policy. Delivery is now underway through the development of the nine Catchment Delivery Plans (CDPs) that make up the Living with Water Plan. Each CDP will include an integrated programme of drainage and wastewater management projects for a catchment area. These combine investment in wastewater and drainage infrastructure with a range of catchment management measures to help manage surface water generated from rainfall in a more natural way. This should help reduce the risk of flooding in urban areas and pollution to watercourses and the sea.
- **There are some plans for managing the risk of flooding from reservoirs but these are not yet regulated.** The Reservoirs Act (Northern Ireland) 2015 provides for the regulation of reservoir safety in Northern Ireland. The Act will introduce a proportionate regulatory framework for the management and maintenance of controlled reservoirs in order to protect from the risk of flooding due an uncontrolled release of water from reservoir failure. Secondary legislation in the form of commencement orders and associated regulations still need to be made to introduce the reservoir safety regime envisaged in the Reservoirs Act (NI) 2015. Work to take forward the regulations on reservoir safety cannot currently progress as it requires approval by the NI Assembly.
- **Options for financing and funding surface water flood management infrastructure are lacking.** There remain limited incentives and business models for the private sector and homeowners to install sustainable urban drainage systems.
- **Improvements to mapping and modelling of surface water flooding are needed.** The second Flood Risk Management Plan (2021-27) states that the surface water maps within Flood Maps (NI) are not currently suitable for decision making in regard to capital investment on infrastructure for the purposes of flood alleviation.
- **There are plans to assess the drainage capacity of sewers.** NI Water is currently producing a Climate Plan which is due in 2023, and will assess

Plans and policies must be monitored and reported on with greater clarity.

The Living With Water Programme is a 12-year programme of work, integrating catchment-based approaches.

Surface Water modelling needs further improvement and development.

capacity, pressures, and risks to its network. When published this should provide an up-to-date assessment of drainage capacity for the 16,000km of sewers it operates.

(c) Outcome 3: Sustainable long-term coastal management

This outcome is scored as having **insufficient policies and plans**. Unlike other parts of the UK, Northern Ireland has not yet experienced large-scale coastal erosion events, and therefore, coastal erosion has not been considered a major issue. Northern Ireland has both a legislative and policy void and, until 2019, had a lack of systematic data collection on the occurrence of coastal erosion. Despite progress being made on a programme of research and work on short-term resilience measures, key policy milestones to support long-term coastal management are still not in place.

Coastal plans and policies are lacking in NI.

- **There is no clear coastal legislation in Northern Ireland.** The Coast Protection Act 1949 does not extend to Northern Ireland and there is no legislation in place in Northern Ireland to specifically address the issue of coastal erosion or assign responsibility for it. This means there is a lack of leadership on coastal erosion risk management and no coordinated strategy to consider and address coastal erosion in NI. No department has the overall responsibility for the management of risk associated with coastal erosion. Following publication of the Baseline Study and Gap Analysis of Coastal Erosion Risk Management in Northern Ireland report in 2018, the Northern Ireland Coastal Forum was reconvened. Featuring key statutory agencies such as DfI and DAERA, a work programme and action plan was developed that would implement the recommendations of the report. The action plan was not made available for this assessment.
- **There is no clear vision for managing the risk of coastal erosion in policies and plans.** Shoreline Management Plans (SMPs) do not exist in Northern Ireland, which is unusual amongst other UK and EU jurisdictions. While coastal flood defences are managed and maintained by government, there are no available data on how many people and buildings are at risk from coastal erosion, and policy has yet to realistically address the future risk. Furthermore, there are no subsidies or schemes to support coastal communities in relocation, demolition, and adaptation.
- **There has been significant investment in developing information on coastal erosion and risk management.** Much of this information, such as the NI 3D Coastal Mapping study, is likely to be publicly available for consideration in the next CCC assessment. The NI study will provide a high-resolution baseline, covering the full extent of the NI coast. The survey is now complete and has been fully validated by the UK Hydrographic Office. DAERA Marine & Fisheries Division are working with ESRI Ireland and Digital Services Division in DAERA to develop a map viewer which will make this data readily available for stakeholders to view and download. On behalf of DAERA, Geological Survey NI (GSNI) has produced a bedrock coastal geology dataset from 200 m inland to the 10 m contour line offshore for the entire coastline of Northern Ireland. This will be used for a full assessment of coastal vulnerability to erosion around Northern Ireland. This will be undertaken by 2024 to assist planners and developers in assessing risk. This will be carried out in conjunction with the NI Coastal Forum working group.⁶⁵

Research is underway to fill some information gaps on coastal risk and change.

- **There has been some monitoring of coastal change after storms, which should be continued to track change.** Following the recent storm events in February 2022 which resulted in extensive coastal erosion along the north coast, a LiDAR survey was completed in March 2022 to access the extent of change since the NI 3D Coastal Survey in 2021. This post-storm LiDAR survey will quantify the extent of storm damage along soft sedimentary coastlines and provide valuable information on the impacts of extreme storm events at the coast. In October 2022, a further LiDAR survey was flown off the same coastal area to quantify how the beach system has recovered over the summer period. Repeated surveys along the soft sedimentary coastlines will provide insight to the impacts of extreme storm events which are associated with climate change. DAERA plans to repeat topographic LiDAR surveys every three years and nearshore LiDAR surveys every five. However, this is dependent on budget availability.

(d) Outcome 4: Urban heat risks are minimised

This outcome is scored as **limited policies and plans**. There are few plans in place to minimise urban heat island impacts and a lack of national-scale ambition. There are promising plans at a local level to increase urban greening in some locations, but there remains a gap for a joined-up regional strategy for managing urban heat.

Further work is needed to provide clear direction on minimising urban heat risks in NI.

- **Regional Policies are low on detail and clear direction for where or how to minimise urban heat risk.** The Regional Development Strategy 2035 highlights the need to make adequate provision for green and blue infrastructure in cities, neighbourhoods, and new developments.* The NI Strategic Planning Policy Statement (SPPS) notes that the planning system should help to adapt to climate change by shaping new and existing developments in ways that positively build community resilience to problems such as extreme heat or flood risk. It also states that trees and other green infrastructure provide important ecosystem services that reduce the effects of flooding and the urban heat island effect.
- **Local Government is taking a lead on urban heat risk policy and needs support from government departments.** The draft Belfast Local Development Plan states that the city's open spaces and green areas are vitally important to the function and environmental quality of the city for health, recreation, wildlife, amenity value, air quality, urban cooling, and flood alleviation. Local councils across NI have undertaken projects and developed plans on green and blue infrastructure, such as the 'Million Trees' project in Belfast which proposes to plant one million trees in the city and region by 2035.
- **There are no national-level resilience standards for adapting to urban heat risks.** This includes existing urban areas and in new developments. Furthermore, there are no accompanying standards for building fabric (see Chapter 10) and urban surfaces to minimise urban overheating, or standards for monitoring urban heat risk.
- **There is potential to encourage green infrastructure uptake through subsidies and incentives.** Some urban cooling adaptation, such as green roofs, can be installed by individuals, businesses, or communities.

* Green infrastructure such as parks, green spaces and street trees; blue infrastructure such as ponds, streams and lakes (RDS 2035, Strategic Guidance RG11, 'Natural Environment').

- **Data collection on urban heat impacts and adaptation uptake is not sufficiently included within current plans.** Centralised monitoring and reporting of green infrastructure within urban areas would improve the ability to track and understand the effect on heat risks – as well as possible trade-offs, such as increasing drought risks from more trees.
- **There is some positive policy progress at a regional level, such as the introduction of heat alerts and coordination with wildfire policies.** Met Office Heat Alerts were introduced to Northern Ireland in 2021 and coincided with record breaking temperatures of over 31°C.⁶⁶ Work on high quality wildfire prevention so far as it relates to urban planning will also become increasingly important, and work is already underway in NI to develop and coordinate this work through DAERA Wildfire forum.

(e) Outcome 5: A Planning system which places climate-resilience at the centre

This outcome is scored as **limited policies and plans**. While adaptation is mentioned, neither the Regional Development Strategy 2035 nor Strategic Planning Policy Statement are sufficiently strong in their language to ensure climate action is embedded in delivery of Local Development Plans. At the local level, inconsistency and barriers to adaptation remain.

Language in strategic planning policies is often not sufficiently strong to embed climate resilience in delivery.

- **Policy and guidance on resilience in the NI planning system are inconsistent.** Current regional planning policy, within the Strategic Planning Policy Statement (SPPS) and Flood Risk Planning Policy Statement (PPS15), is based on the present day 1 in 100-year fluvial and the 1 in 200-year present day coastal floodplains. DfI now provides planning authorities with updated Climate Change flood mapping guidance based on a 2080s epoch, to add to what is written in policy.
- **Technical Flood Risk Guidance in relation to Allowances for Climate Change in Northern Ireland is out of date.** The 2019 Guidance included information on allowances for Climate Change in Development Planning & Management and in Flood Risk Management. However, this information is still based on UKCP09 information and in some cases may now not be fit for purpose. DfI is considering a further review of the guidance. In doing so, it could also consider how the guidance could better link with planning decisions.
- **DfI has been involved in extensive consultation with local councils in the development of their Local Development Plans (LDPs).** In preparing LDPs, councils must ‘take account’ of the Regional Development Strategy 2035, the Sustainable Development Strategy for Northern Ireland, the SPPS and any other policies or guidance advice issued by DfI. Once adopted, LDPs will be given primacy in the determination of planning applications unless material considerations indicate otherwise. It is anticipated, but not certain, that new LDPs will provide appropriate floodplain definitions to enable the presumption against development in both present day and future flood mapped areas.
- **Local plans have the potential to embed climate adaptation in planning guidance.** The LDP for Fermanagh & Omagh includes policies for SuDS, exception tests for developments in the floodplain, and open space in new developments.⁶⁷ DfI has provided consultation responses to several draft Plan Strategy documents to date, highlighting the need to ‘take account of’ the climate objectives of the Regional Development Strategy and SPPS.

Local Development Plans will be a powerful tool for shaping places in NI.

However, given the importance and power of the local development plans, this language in the SPPS could be strengthened to ensure climate adaptation and mitigation are demonstrable requirements. This extends to issues such as surface water flooding or requirements for mandatory SuDS. The existing wording is not legally defined which means there is little clarity for decision-makers at all levels, for developers, and for the Planning Appeals Commission (PAC) (the arbiter of the Independent Examination process for the LDPs).

Uptake of SuDS would be increased with clear standards and an agreed process for maintenance and approval.

- **Consistent standards for adaptation interventions are not yet in place.** Approval and responsibility for sustainable drainage systems remains inconsistent in Northern Ireland. DfI Stormwater Management Group is currently looking at the proposals for SuDS and considering how SuDS in developments might be approved and maintained. Action is needed to standardise design, planning and adoption processes. There are currently no overall statutory target standards for the quality and continued maintenance of adaptation interventions.
- **Incentives for developers to install green infrastructure and plan for future climates lack ambition.** There is limited financial incentive for developers to include sustainable urban drainage and green design. Policy and plans have not yet fully addressed how the maintenance of adaptation actions which might be included in the LDPs (such as water tanks and storage ponds) will be funded.
- **There is limited information and reporting on adaptation in planning and new developments.** Public consultation on public body reporting regulations is due in 2023 and could include mandatory reporting for local councils. Fermanagh and Omagh District Council's new LDP Plan Strategy and Belfast City Council's draft Plan Strategy each include a number of metrics which they plan to monitor to show adaptation outcomes. Belfast's draft plan strategy also details specific policies on adaptation, flood risk and green and blue infrastructure. Practical information on the extent to which these are being delivered is not yet available. Fermanagh and Omagh's District Council Plan Strategy is the only one published to date.
- **There is no strategy for data sharing across key actors and local councils.** Developers, planners, and agencies installing adaptation designs, may be invited to report under the NI Public Body Reporting regulations. Data sharing is important to measuring progress, and further work on hosting a database is required.

(f) Recommendations

We provide a set of recommendations for targeted actions to help put in place critical outstanding policy milestones (Table 9.3).

Table 9.3

Recommendations – Towns and cities

Primary responsibility	Recommendation	Timing
DfI	Language in the Strategic Planning Policy Statement (SPPS) and Regional Development Strategy 2035 should be strengthened. The requirement that LDPs 'take account of' climate change adaptation, flood risk and related matters, should become a mandatory requirement where planning authorities require flood risk assessments in areas at risk from all flood types (using floodplain definitions from the latest DfI guidance), as well as other climate-related risks such as erosion, overheating and wildfires, where relevant.	2024
Local Councils	Councils should review and monitor local development plans to embed climate decisions and require designs to integrate the latest flood plain definitions from DfI guidance.	2024
DfI	Government should review the 2019 guidance for flood risk allowances and consider how it can better link with planning decisions.	2024
DfI	Provide information and training on adaptation to council committees and planning appeals committees on how the Local Development Plans need to deliver on climate adaptation.	From 2023
DfI, Local Councils	Work with councils to develop a baseline on planning applications which are by exception on the flood plain, and how many such applications are received.	From 2023
DfI	Government should set long-term targets for the number of people and buildings at high to very low risk for all sources of flooding (sea, river, surface water and groundwater).	2025
DfI	SuDS interventions must become mandatory. Government should move promptly to create a clear SuDS approval process and ensure that SuDS in new developments and retrofits are well-regulated, maintained and monitored. It should also set out mechanisms for funding installation and maintenance of SuDS and green infrastructure.	2023
DAERA, DfI, DfC, Local Councils	Introduce an urban greenspace target to ensure towns and cities are better adapted to more flooding and heatwaves.	2025
DAERA, DfI	Government should build on the good work of commissioning new coastal data and commit to long-term management for coastal areas, such as through statutory shoreline management plans.	2024
DfI, DAERA	Work with local authorities and other risk management agencies to set in place and fund guidance and tracking for the installation and maintenance of green infrastructure, nature-based solutions and flood risk adaptation measures.	2024

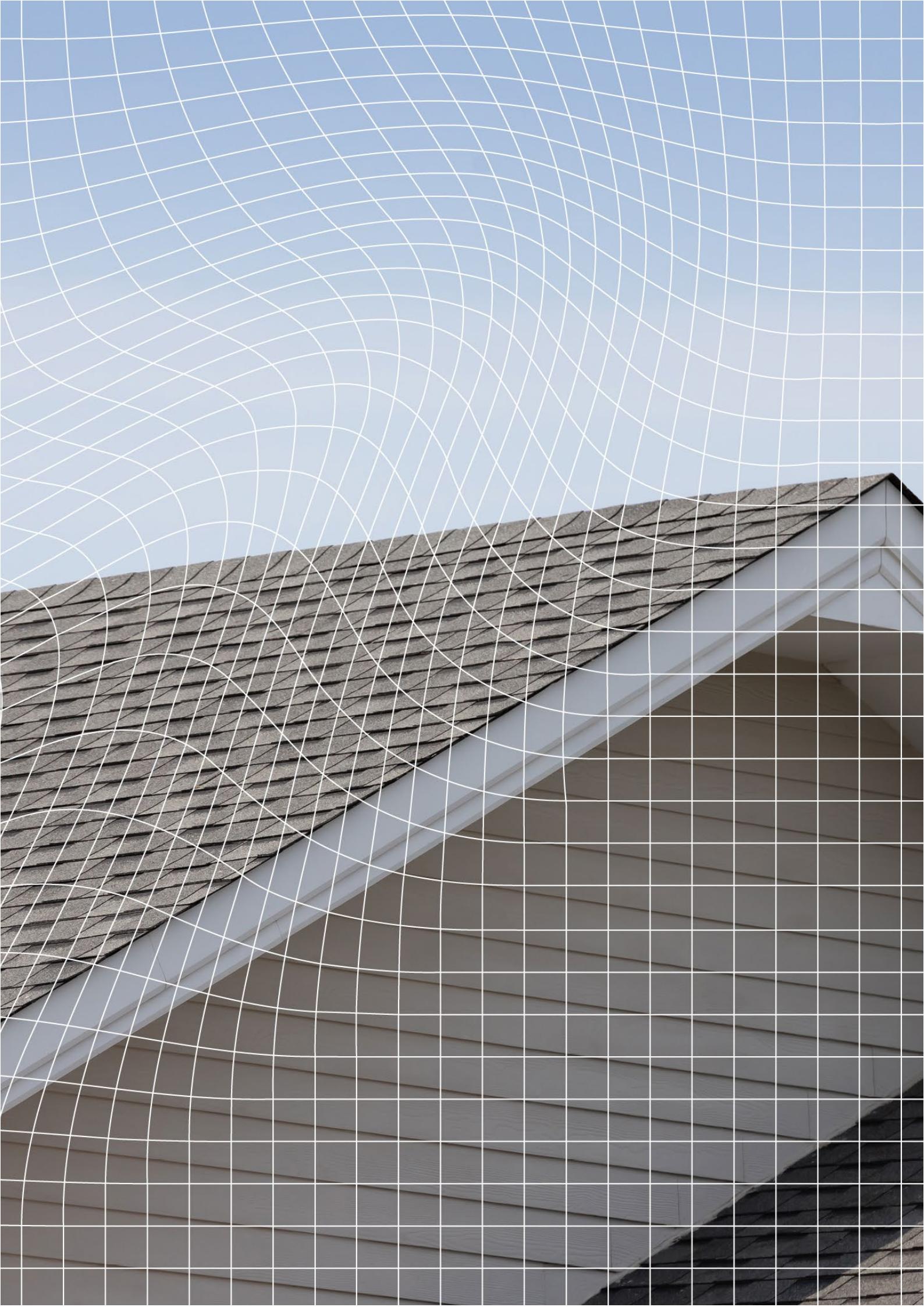
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Chapter 10

Buildings

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Introduction

Table 10.1

Progress summary – Buildings

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Buildings do not overheat	Unable to evaluate	Insufficient Policies and Plans	<ul style="list-style-type: none"> Data to assess progress on prevention of building overheating in Northern Ireland is virtually non-existent. An update to the Northern Ireland Building Regulations, to provide a new Part O overheating assessment, is being considered for Northern Ireland. Otherwise, there is almost no existing or planned work to further develop an information baseline or strategy on overheating for residential or non-residential buildings.
Outcome 2: Buildings are prepared for flooding	Unable to evaluate	Limited Policies and Plans	<ul style="list-style-type: none"> Despite some data from two government schemes on Homeowner Flood Protection and Emergency Financial Assistance, there is limited data to understand how well buildings across NI are prepared for flooding. There is minimal tracking of property flood resilience measures in the building stock. There is some policy in place to support the uptake and installation of property flood resilience, which is positive progress. However, if government focuses solely on these existing grant schemes, it will run the risk of providing only short-term, reactive support for a limited number of properties.
Outcome 3: Buildings resilient to other climate risks	Not scored		<ul style="list-style-type: none"> Further research is required to understand both the extent that these risks will change in future climate scenarios, and the most appropriate policy response.

Relevant risks from CCRA3:
Risks to health and wellbeing from high temperatures (H1); Risks to people, communities and buildings from flooding (H3); Risks to building fabric (H5); Risks and opportunities from summer and winter household energy demand (H6); Risks to health and social care delivery (H12); Risks to education and prison services (H13).

This chapter assesses progress in adapting the building stock in Northern Ireland to a changing climate. Buildings should be healthy and comfortable places to spend time in all year round. This means warm in winter, cool in summer and resilient to climate hazards such as flooding. The building stock includes residential and non-residential buildings, such as commercial buildings (offices and factories) and public buildings (schools, prisons and hospitals).*

Changes to the Northern Ireland climate will increase the severity of several important weather hazards that impact on buildings and their occupants (Box 10.1).

* In this progress report, the building chapter does not include adaptation of hospitals and care settings which are covered in the Health Chapter (Chapter 11). Commercial buildings and the impacts to workers are largely captured in the Business Chapter (Chapter 13).

Climate change will increase severity of hazards such as rainfall and heat.

Box 10.1

Climate hazards for buildings

Buildings in Northern Ireland will need to be resilient to a range of different climate hazards which are already changing.

- Northern Ireland temperatures are increasing, leading to warmer winters and summers. Higher summer temperatures and more intense heatwaves will increase the risk of overheating in residential and non-residential buildings. This can lead to health problems for people in buildings, particularly those who are vulnerable or have existing health conditions (such as heart and respiratory conditions). It may also lead to an increase in heat-related deaths.
- Overheating in buildings also leads to impacts on productivity directly (e.g. working from home) and indirectly (e.g. through poor sleep). Projections estimate that heat related deaths in Northern Ireland could increase to around 30-115 per year by 2050, and 55-135 per year by the 2080s, assuming no population growth.¹
- High intensity rainfall events can result in surface water and river flooding. More frequent and intense flooding events will increase the number of properties at risk of flooding. In addition, sea level rise will increase the risk of flooding for buildings in coastal communities. In Northern Ireland, the number of buildings at risk of coastal flooding is likely to increase significantly under future climate change.² Flooding can destroy or damage contents within the building and can also undermine a building's structural integrity.
- Changes in other hazards that can affect buildings and building fabric, such as driving rain and storminess, remain less certain. These hazards can have a significant impact on buildings.
- Extreme cold and snow events will become less likely throughout the century but will still occur. The burden of ill-health from cold will remain significant. This means buildings must be constructed and retrofitted to meet a wider range of extremes.

Source: Kovats, S. and Brisley, R. (2021) *Health, communities and the built environment*. In: The Third UK Climate Change Risk Assessment Technical Report.

Vulnerability to these changes will differ depending on building type.

Risks from climate change in the buildings system depend on the type of building (e.g. single aspect, mid-high-rise flats are more likely to overheat than houses), tenure and occupancy, location of new and existing buildings, vulnerability of their occupants (such as age, underlying health conditions) and severity of the changes in hazards. Socioeconomic factors, such as income levels or mobility of building occupants, also have a significant impact on risk levels in the buildings system.

Ensuring that buildings across the country are safe and comfortable in periods of weather extremes will have benefits across society. Buildings that don't overheat will reduce the health burden of high summertime temperatures and will have benefits for economic productivity. Property-level flood protection will have a significant social and economic benefit due to the level of disruption flooding causes.*

For new and existing buildings, the key policy areas of planning, building regulations and property-level flood protection are devolved to the Northern Ireland Executive. The following departments have responsibility for different aspects of the building stock:

* Property level flood protection, whilst critical, will not by itself offer sufficient protection from flooding hazards. Property level actions will need to be integrated with wider 'settlement' scale flood defences, covered in the Towns and cities chapter (Chapter 9).

- **Department for Communities** has a remit for housing policy (including oversight of the Housing Executive), Private Tenancies Legislation and the legislation which underpins local government.
- **The Housing Executive** is the Public Housing Authority in Northern Ireland, the largest social housing provider (with responsibility for around 85,000 properties)³ and the Home Energy Conservation Authority. It also carries out the Housing Condition Survey.
- **Department of Finance** has responsibility for Building regulations in Northern Ireland (which is delivered through local government), Energy Performance Certificates, and an estate management and property information service for government departments and the public sector.
- **Departments for Economy, Education, Justice and Health** hold a variety of remits for other types of buildings, such as business premises, schools, prisons and hospitals respectively.

Efforts to adapt buildings to climate change has strong overlaps with other chapters:

The efforts to adapt buildings to climate change have strong overlaps with adaptation actions in other chapters.

- **Towns and cities.** Urban design strongly influences the climate risks faced by buildings and their occupants.
 - Urban areas (such as large towns and cities) can be significantly warmer than surrounding countryside, particularly overnight, meaning the indoor air temperatures are also higher.⁴ Water, trees and green space can reduce this urban heat island effect by providing shade, reducing heat absorption by urban surfaces and providing sources of evaporation. Building these measures into urban areas is known as 'green infrastructure'.
 - Green infrastructure can also make urban areas less susceptible to surface water flooding by improving water storage and drainage. Other sustainable urban drainage schemes, such as permeable paving, also help to reduce flooding at a settlement scale – although building-level protection may also be required.
 - Large-scale defences from river and sea flooding tend to be planned and implemented at the settlement scale and are designed to protect whole neighbourhoods.
- **Health.** Overheating in buildings can result in increased deaths and increases in the prevalence and severity of some health conditions.
 - Given the large fraction of time people spend indoors (particularly overnight) the overheating experienced in buildings is a large contributor to the overall health impacts of increasing temperatures.
 - Some buildings are also critical to the operation of the health and social care system (e.g. hospitals and care homes) – with overheating in these buildings often impacting on particularly vulnerable people or causing stress to the operation of the health system.
- **Water.** In Northern Ireland the average person uses about 145 litres⁵ per day, which is roughly in line with the UK average. Typical business premises, on average, use 50 litres per person per day.⁶

A key action to increase resilience to future drought extremes is reducing water demand within buildings. This means more water efficient appliances installed within buildings.

- **Business.** Climate change impacts, such as extreme heat or weather-related travel disruption, can make it difficult for staff to conduct their roles. Without adaptation measures, there is a risk of productivity losses.
- **Community preparedness and response.** This chapter covers ensuring local heritage, including different types of heritage buildings, is conserved under a changing climate. Recent mapping of hazards found a high increase in exposure to overheating and humidity, relatively low levels of coastal risk and insufficient data to understand exposure to precipitation.⁷

Decarbonisation policy and building safety are two important goals for buildings in addition to adaptation.

There are two additional policy goals for buildings relevant to adaptation efforts:

- **Decarbonisation.** Policy to reduce emissions from buildings focusses on reducing energy demand in buildings through energy efficiency and replacing fossil fuel fired heating systems with low-carbon ones. The decarbonisation of the building stock should be done alongside a consideration for overheating and indoor air quality risk.
- **Building safety.** A key policy objective for buildings relates to building safety. This means, in the context of this chapter, ensuring that buildings do not overheat, have good levels of indoor air quality, meet fire safety standards, and do not have indoor moisture problems such as mould and damp.

Box 10.2

Buildings in NICCAP2

NICCAP2 identifies homes and buildings as a key priority area included within the 'People and Built Environment' outcome objective:

- P1: We have people, homes, buildings and communities resilient to the impacts of flooding & extremes of weather.
 - % of properties at risk of flooding in NI.

The Business and Supply Chain outcome objective also has a relevant indicator:

- B1: We have businesses that can adapt to the impacts of climate change & extreme weather.
 - % of non-residential properties at risk of flooding in NI.

NICCAP2 highlights the risks to buildings from climate change, including from hazards such as extreme heat and flooding. There is only one specific action listed in the mid-programme review to address overheating, namely the consideration of new building regulations. Most flooding actions in NICCAP2 take place at the spatial planning scale and not at building level, but an action to implement the second cycle Flood Risk Management Plan (2021-27) would include funding for continuation of the Homeowner Flood Protection Grant Scheme, which offers subsidised property flood resilience for homes in NI.

Other NICCAP2 flooding indicators, in both the people and built environment and Infrastructure outcome objectives, are more closely related to the towns and cities chapter (Chapter 9) in this report and their indicators are discussed further there.

Source: DAERA (2019) Northern Ireland Climate Change Adaptation Programme 2019-2024 (NICCAP2).

1. Monitoring progress towards a well-adapted building stock

In this chapter we propose a monitoring map (Figure 10.1) of the key outcomes, enablers and policy actions needed to ensure that Northern Ireland's buildings are fit for now and the future, including being resilient to future climate extremes.

Buildings should not overheat during heatwaves, should be prepared for flooding and should be resilient to other climate risks.

We have identified three key outcomes to ensure that buildings are resilient to a future climate (Figure 10.1). A number of policy actions and enabling factors are needed to deliver these outcomes:

- **Buildings do not overheat during heatwaves.** This requires that new buildings are built to meet a robust standard on overheating and existing buildings that are vulnerable to overheating are retrofitted with (primarily passive) cooling and insulation measures where necessary. Beyond the properties of the building, residents and occupants of buildings should understand how to best manage the internal temperature and take appropriate actions during heatwaves.
- **Buildings are prepared for flooding.** New and existing buildings, in areas of flood risk, should have the necessary property-level flood resilience (PFR) and resistance measures installed.
 - Flood-resistant construction, such as flood doors or air brick covers, can prevent water entering buildings up to depths of around 0.6 metres.⁸
 - Flood resilience measures look to minimise damage when a building is flooded. This includes use of resilient building material and raising socket-outlets. These measures increase preparedness to flood events, minimise the damages if flooding was to occur and increase the ability of occupants to recover quickly after flooding.
- **Buildings are resilient to other climate risks.** Beyond overheating and flooding, additional direct and indirect risks to buildings will likely increase over time.
 - These include subsidence due to drought and dry soil, or structural damage due to high winds. At present, little is known about how climate will affect these risks.⁹ Further research is required to understand the extent that these risks will change in future climate scenarios, the household costs for damage associated with these climate hazards and the most appropriate policy response.
 - Modelled estimates show that climate change is likely to reduce the burden of cold-related mortality (connected to cold buildings), however the overall burden remains high, even to the end of the century, and population aging is likely to offset some of the benefits from warmer winters for cold-related mortality. Policies to improve energy efficiency and reduce winter fuel poverty are therefore still required.

Enabling factors that need to be in place to deliver these outcomes are wide-ranging.

Enabling factors that need to be in place to deliver these outcomes are wide-ranging, from ensuring private funding and investment in buildings retrofit, to education and awareness about climate risk and adaptation strategies:

- **Governance.** Ensuring policies for building decarbonisation include climate adaptation is a key priority, especially given the risk of increased energy efficiency standards potentially exacerbating the risk of overheating and poor indoor air quality. There is also a need for enforcement of the planning system to ensure that any building in areas of flood risk considers appropriate property-level resilience measures. The planning system can help ensure that development at future risk is constructed and designed with adaptation measures, as discussed in Chapter 9 (towns and cities).
- **Funding and investment.** Most of the investment in adaptation measures for the building stock will be private. Low-cost finance, which enables households and businesses to install adaptation measures, is needed. Finance can be accessed through instruments such as green mortgages, property-linked finance and flood insurance.
- **Education and awareness.** High levels of awareness of climate risks and adaptation actions amongst the public would ensure that people know how to prepare buildings for, and behave during, extreme weather events. In particular, occupiers and residents of buildings need to know how to operate and manage building temperatures.
- **Research.** Additional research on heat thresholds, overheating, adaptation options and how to retrofit buildings to achieve co-benefits across energy efficiency, thermal comfort, air quality and ventilation would help target action and better understand co-benefits and trade-offs.
- **Data and monitoring.** There is currently a lack of large-scale monitoring of overheating incidences and flood risk across the building stock. Without monitoring, people may be unaware that there is a risk that they should be mitigating.
- **Skills and construction.** The construction and engineering industry are key actors enabling PFR and widespread understanding and skills in this industry are key. Professional standards are important to this. For example, the PFR Code of Practice was developed in a collaborative project by the Construction Industry Research and Information Association (CIRIA), and the Chartered Institute of Water and Environmental Management (CIWEM) is involved with PFR industry training. There is also a need for building control officers to have the skills to check regulations are being met.

Enabling factors have not been assessed later in this chapter, due to lack of available evidence.

We identify a number of policy milestones that would be required to help deliver the climate resilience outcomes and put in place the set of wider enabling factors:

Building regulations and the planning system are the Government's key levers for ensuring that new buildings are built to a high standard and have limited overheating and flooding risks.

- **Legislation and regulation.** Building regulations and the planning system are the Government's key levers for ensuring that new buildings are built to a high standard and have limited overheating risks (including under both current and future climate conditions). Regulations and policy to help adapt existing buildings are also needed.
 - Currently, a series of tests must be carried out by planning authorities before new buildings are developed in areas at flood risk. If building goes ahead, risk should be mitigated through new or improved flood defence infrastructure and property-level resilience measures. The extent of PFR required and the installation of these measures (in both

new and retrofit buildings) should be regulated to ensure maintenance and quality, with building-level surveying and recording a regulated part of the installation process.

- Property flood resilience projects should continue to be funded through flood risk management policy. This should be targeted at the most effective measures and locations. Projects should follow a proactive approach, focusing on installing measures before flooding occurs, to complement post-event grants.

Financial mechanisms should be in place to support building-level adaptation investment.

Access to affordable insurance is required for quick and effective recovery from flooding events.

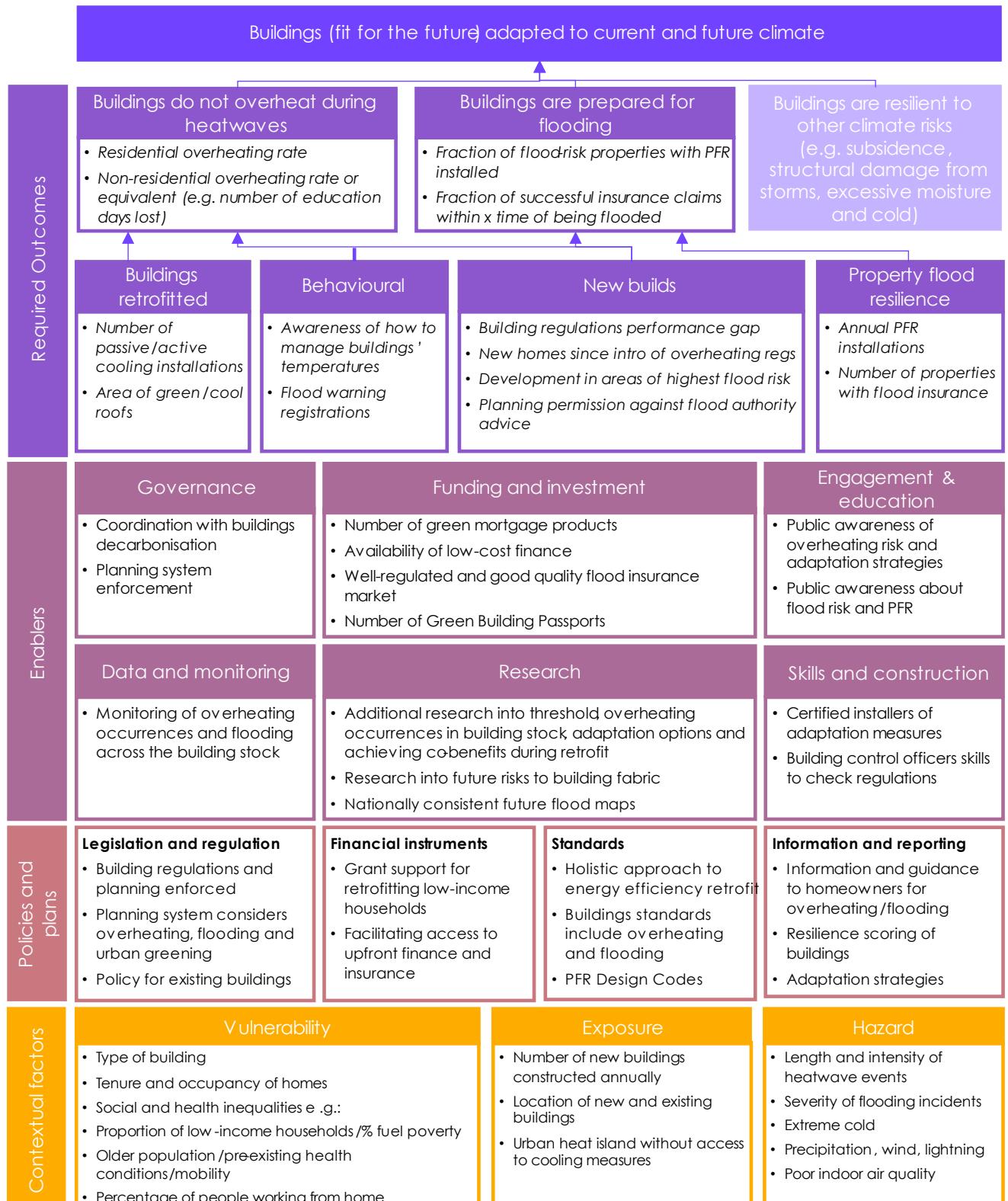
Information and guidance to homeowners and building occupiers for overheating and flood risk is key to enable them to use buildings effectively and reduce risks.

Contextual factors can influence vulnerability to climate hazards, and ability to respond to them.

- **Financial instruments.** Mitigation packages for adapting to overheating risks can come with a high cost, although there are also several low-regret, low-cost options. Financial mechanisms should be in place to support building-level adaptation investment for any buildings; this is particularly important for vulnerable private households. The biggest role for public funding is expected to be supporting reduced overheating risk as a co-benefit of investment in greenhouse gas emissions reductions through energy efficiency improvements to buildings. Finance mechanisms should consider socioeconomic and vulnerability characteristics of building stock and building occupants in the allocation of post-event grants.
- **Standards.** There are standards for buildings health and safety (such as Housing Fitness Standard) that should include consideration of overheating. Standards for new and retrofit PFR are key to ensuring a good quality market and installation industry. Standards should consider resilience as well as resistance measures to ensure new buildings are capable of dealing with being flooded should resistance measures fail.
- **Information and reporting.** Information and guidance to homeowners and building occupiers for overheating and flood risk is key to enable them to use buildings effectively and reduce risks.
 - Homeowners should be able to check their flood risk and access information about how to prepare their homes for flooding and other climate risks. This could be via mechanisms similar to EPCs.
 - Organisations should produce adaptation strategies, planning for at least 2°C global temperature rise, outlining actions to be taken and improving knowledge.
 - Engagement must be carried out at the local level to trigger behavioural change at the household or building level.

Contextual factors have a significant impact on adaptation outcomes in the buildings and how they are distributed across society. Factors such as building type and location, age, income level, or even social networks can influence vulnerability to climate hazards and ability to respond to them (Box 10.3).

Figure 10.1 Monitoring map for buildings



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

Box 10.3

Contextual factors

Contextual factors in buildings – relating to hazard, exposure and vulnerability - have a significant impact on the outcomes and how they are distributed across society. This box presents available data and evidence regarding some important factors for the UK or Northern Ireland.

Type of building. Flats often represent the type of building most at risk of overheating compared to other types of buildings. People living in modern, urban flats often have high levels of glazing with little shading, limited natural ventilation, are single aspect and many have no easy access to outdoor green space. Multi-tenement flats can also be hard to alter given that the agreement of all households is needed to make changes. There is also the difficulty in attributing costs and benefits of measures to each flat. The number of households living in a flat, maisonette or apartment has risen markedly over the decade. As of 2021 in NI, 77,300 households lived in a flat, maisonette or apartment (10% of all households), compared to 62,600 households (8.9%) in 2011 – an overall increase of around 23.5%.¹⁰

Other types of buildings, such as schools, prisons, care homes and hospitals are occupied by people that may be more vulnerable to climate risks.

Tenure and occupancy. Tenure is important for considering barriers and incentives to climate change adaptation and mitigation measures. A person in rented accommodation is more likely to be in fuel poverty, which may mean they have limited resources for measures such as energy efficiency and property-level adaptation. A person living alone, especially if they are vulnerable, may also be at greater risk of climate impacts. In NI since 2011 there has been a decrease in the proportion of households owning their accommodation (65.2% in 2021 compared to 67.5% in 2011). In that same period there has been an increase in renting (32.5% in 2021, up from 30% in 2011) 2.1% of which is in the private rented sector.¹¹ In 2021 nearly a third of people in NI lived in a single-person household (30.52%).¹²

Proportion of people working from home. In 2021, 153,500 people in NI over the age of 16 (18.9% of those in work, excluding full-time students) indicated that they worked mainly at or from home.¹³ Increases in proportion of people working from home may further increase exposure to high temperatures during the daytime. One consequence of a shift to people working from home would be a greater impact of summertime overheating on productivity.

Income and vulnerability. Income levels are one means of assessing the adaptive capacity of a population to respond to climate hazards such as heatwaves or flooding. People with lower incomes or households in fuel poverty may find it more difficult to adapt their houses. Studies have shown that there are many regions in the UK which have high levels of exposure to climate risks, and where income-levels are below average.^{14,15} In Northern Ireland, the most recent official fuel poverty rate is 22%, although this is based on Housing Conditions Survey data from 2016.¹⁶

Other social and health inequalities. The UK population is increasing and getting older, increasing the demand for housing. As well as age, underlying health conditions and mobility can impact a person's risk level. These are discussed in more detail in the health chapter (Chapter 11).

2. Delivery and implementation progress

This section documents available evidence on progress towards delivery and implementation of each of the climate resilience outcomes identified in the previous section.

(a) Outcome 1: Buildings do not overheat during heatwaves

There is a lack of data to assess progress on ensuring buildings do not overheat.

This outcome is scored as **unable to evaluate**, due to a lack of direct or proxy data to assess how overheating is affecting the building stock. Modelling data suggests that buildings in NI would fail criteria for overheating under future climate scenarios, while some survey data suggests that people in Northern Ireland are already being affected by heat.

- **Data for residential overheating is sparse or not available:** There is no regular data collection to monitor overheating rates in residential buildings, nor is there data on the amount of passive cooling measures installed. One-off studies provide an indication of the proportion of buildings in the UK which are overheating, but we are unable to assess whether this proportion is changing over time and do not have specific data for Northern Ireland.
 - Recent research carried out by Arup for the CCC provided further modelled evidence that a large proportion (55%) of the residential building stock in the UK is currently overheating, although this was based on the CIBSE TM59 criteria for bedrooms which is difficult to pass. The proportion overheating was estimated to rise to 90% in a 2°C scenario and 100% with 4°C of warming. Northern Ireland was modelled alongside the Midlands and Wales, and for this area under 2°C of global warming, 100% of buildings failed the criteria on night-time overheating in bedrooms (see Figure 10.2).¹⁷
- **Data on non-residential overheating is not available:** There is no available evidence of any programme of work being undertaken in NI to periodically measure overheating in non-residential buildings, such as schools or prisons.
- **People in NI are already being affected by heat.** Although heat impacts are not often considered to be a significant issue in Northern Ireland, a recent adaptation survey suggested that most respondents (60%) have personal experience with discomfort during heatwaves and 32% have personal experience or knew someone who experiences serious health impacts from heatwaves.¹⁸

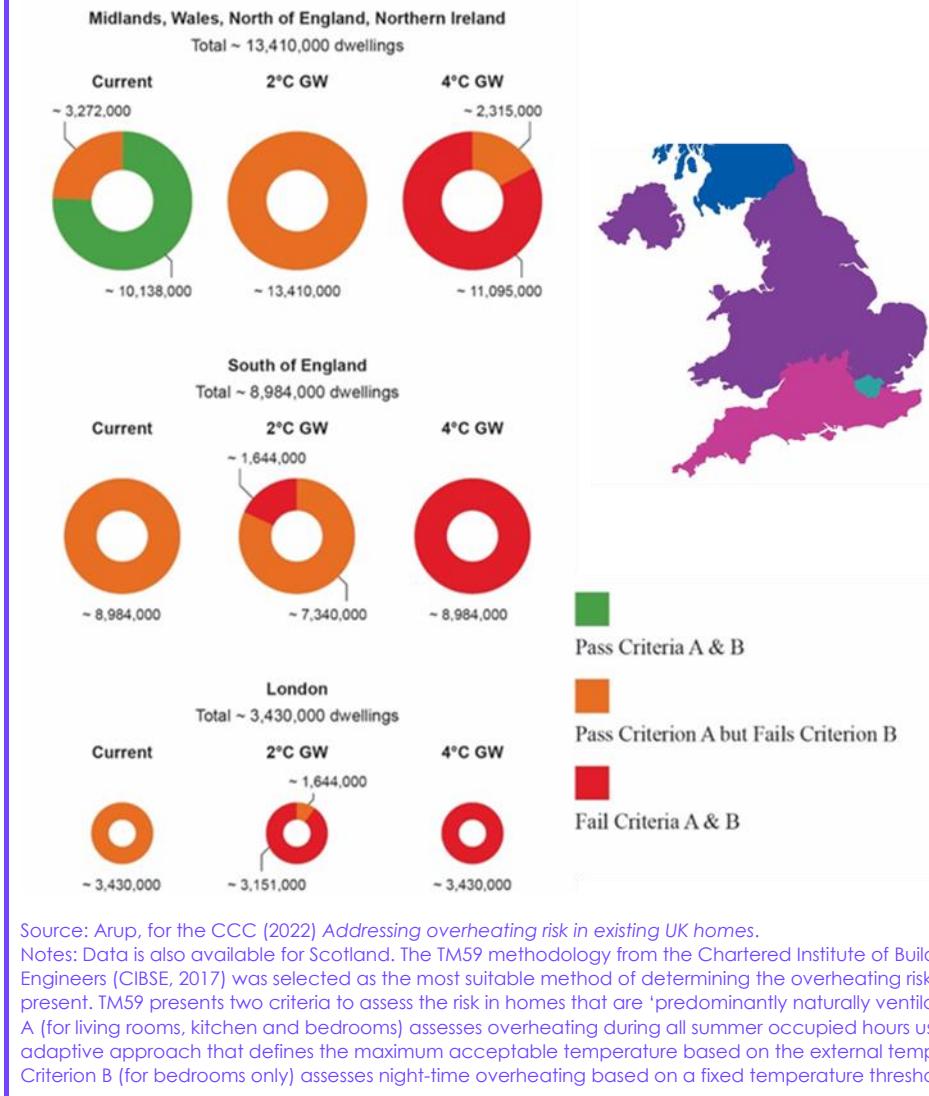
People in NI are already being affected by heat.

Other indicators are currently unavailable. These include:

- Annual number of cooling measures installed in homes.
- Area of green roofs.
- Awareness amongst the public about how to manage internal temperatures.
- Rollout of active cooling. This indicator would serve two purposes. In addition to the benefit of knowing the number of buildings with cooling

installed, tracking the rollout of active cooling would help estimate the potential future power demand for air conditioning in summer.

Figure 10.2 Overheating risk across existing homes in England and Northern Ireland according to CIBSE TM59 criteria



(b) Outcome 2: Buildings are prepared for flooding

There is limited data to assess progress on how well the building stock is prepared for flooding.

This outcome is scored as **unable to evaluate**. To evaluate progress in this outcome, evidence is required that buildings are being fitted with property-level flood resilience measures and more building occupants are able to recover from flooding. There is limited data to assess progress on ensuring buildings are prepared for flooding. Despite some information on the delivery of the Department for Infrastructure (DfI) Homeowner Flood Protection Grant Scheme, there is a lack of accessible data on installation of property level flood resilience measures (PFR).

The projected impacts of flooding for buildings in Northern Ireland are serious. Direct expected annual damages from flooding in Northern Ireland for residential properties are currently around £21.3 million.¹⁹ Non-residential buildings face impacts as well, for example, the third UK Climate Change Risk Assessment

(CCRA3) found that 439 schools are currently at flood risk in Northern Ireland without any additional climate change.²⁰

A significant proportion of buildings in NI are at risk of flooding without any additional climate change.

- **The total number of buildings at current risk of flooding in Northern is around 45,000, this is due to increase in the future.** This is comprised of some 34,300 residential and 10,800 non-residential properties.²¹ Analysis from NIFRA estimates that on average, 1,700 (1,300 residential) buildings are currently impacted by fluvial flooding every year, and 150 (69 residential) by coastal flooding. With climate change, these metrics are projected to rise to 5,300 buildings impacted by river flooding and 2,800 by coastal flooding on average every year.²² Further data are required to understand the proportion of properties at flood risk as a total of all buildings.
- **More than 100 properties have received funding to install property-level flood protection from the Department for Infrastructure since 2020.** The Homeowner Flood Protection Grant Scheme (HFGPS) entitles homeowners to get 90% funding of flood protection measures up to a value of £10,000.²³ The 2021-2027 Flood Risk Management plan sets the proposed annual budget for this scheme at £250,000.²⁴ To the end of April 2020, 219 applications were received and of those, 123 have been assessed as suitable and approved.²⁵ Work on more than 100 of these homes has been completed as of March 2023.²⁶ However, the data lack context. There are no available data on the extent and type of measures installed or the level of flood risk of the properties who have received funding.
- **The government provides some financial assistance for post-flooding recovery and repairs.** Data on the Scheme of Emergency Financial Assistance (SEFA) shows that over 1,000 homes have received support since 2015. A £1,000 payment has been provided to 1,046 homes in Northern Ireland which met SEFA criteria after a flood²⁷ (Figure 10.3) in order to make homes liveable again as soon as possible. However, the total value of the SEFA payments has decreased steadily since 2020/21. Further data are required to assess whether this decline is related to fewer applications for support and whether the number of payments cover a sufficient proportion of homes impacted by flooding.
- **The rate of contents insurance is the highest in the UK, but we do not know how this links to vulnerability to flooding.** Northern Ireland is the best performing region in the UK for people having buildings contents insurance cover, with 18% of homes not having cover.²⁸ This is compared to a UK-wide figure of 15% of UK adults who do not have buildings or contents insurance, which rises to 22% of those living in high social flood risk areas.²⁹ However, there was no more detailed comparable data available on the flood risk of the homeowners who have insurance in Northern Ireland.
- **More households at risk of flooding can access multiple insurance quotes.** The proportion of at-risk households in the UK with recent flood claims (in the last 5 years) able to obtain more than 10 different quotes for insurance has steadily increased since the introduction of Flood Re (Box 10.4), from 1% in early 2016 to a high of 98% in November 2021, declining to 93% in June 2022, where it has remained steady since (Figure 10.4).³⁰

Further information is required to better understand the insurance situation in NI.

Box 10.4

Flood Re and flood insurance accessibility

- Flood Re is a reinsurance company. It allows other insurance companies to insure themselves against losses because of flooding. This means that people who own and live in properties at flood risk areas are more able to access affordable home insurance.
- Flood Re was established by UK Government legislation in 2016 to replace previous agreements between government and insurance companies to provide flood insurance coverage to domestic properties at risk of flooding. It is a not-for-profit, publicly accountable fund. The set-up costs were covered by the insurance industry, and the pool of money to cover claims comes from a charged fee for each policy which is passed to Flood Re and an additional £180 million annual Levy from all home insurers in the UK.
- Customers do not deal directly with Flood Re – their insurer will place the flood risk part of their policy with Flood Re when it rises above a certain level. The insurer is then charged a fixed sum based on council tax bands. When a customer makes a claim, the insurer can then recover the costs of the claim and repair works from Flood Re.
- Most homes in high flood risk areas are eligible, although properties built after January 2009 and flats in leasehold blocks containing four or more homes are not. Businesses are not covered. Flood Re can cover contents insurance for tenants if the property qualifies. Flood Re had around 3,800 policy counts in Northern Ireland in 2022; an increase of over 1,000 since 2019.

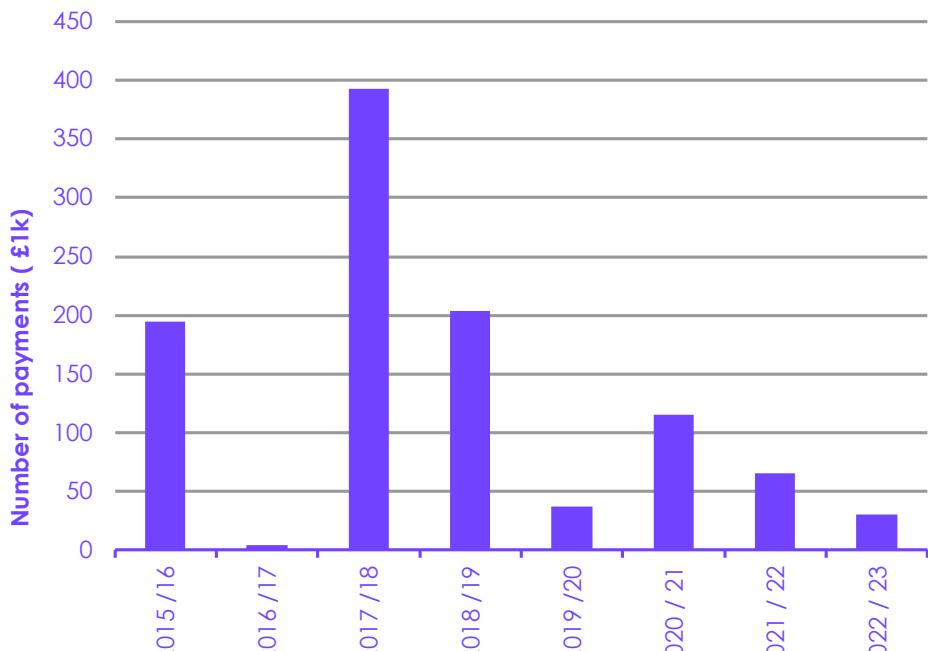
Source: ABI (2023) *Flood RE Explained*³¹; Flood Re (2023)³²

There are missing data required to understand the progress in adapting buildings to flood risk. There is no baseline data for the number of homes with preparedness and resilience measures. Unavailable indicators for this outcome include:

Some indicators are unavailable, such as the number of homes with flood resilience measures in place.

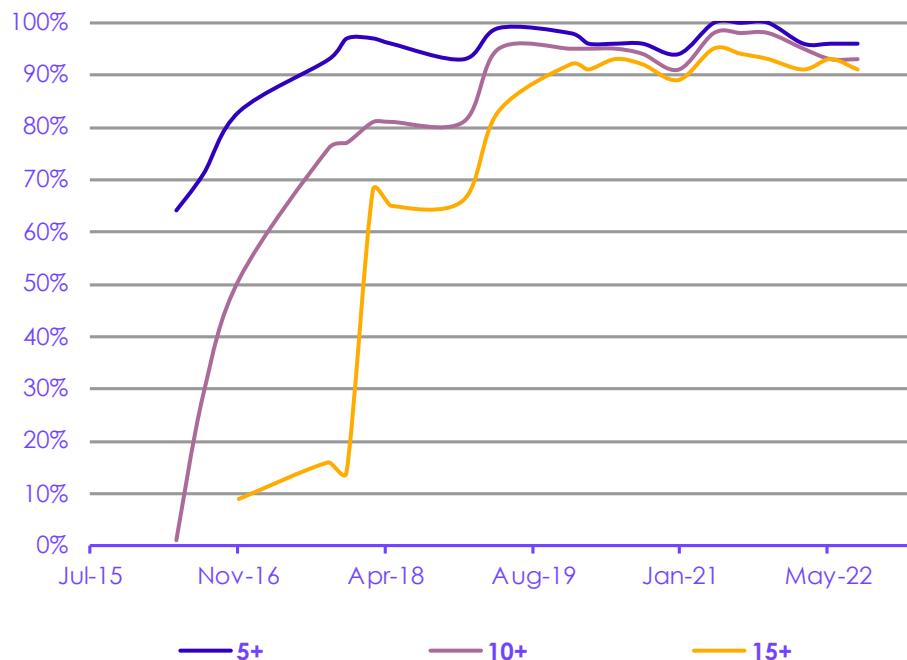
- **There appears to be no consistent central data collection on the number of PFR installations and their contribution to reducing damages from flooding.** There are currently no government plans to collect this information. Property-level measures may be installed by a range of different actors, including NI Water, local government projects and individual building owners. This makes centralised data collection and tracking difficult, but data could be created through monitoring of grant schemes.
- **A more detailed breakdown of insurance cover was not available.** While it is positive that NI has a comparatively high rate of contents cover, there is not clear data for building cover, a more detailed evaluation of the situation for the remaining 18% of uninsured homes,³³ or any information on the number of successful claims after flooding.

Figure 10.3 Scheme of Emergency Financial Assistance (SEFA) payments 2016-2023



Source: Department for Communities (2023) Data provided on request.

Figure 10.4 Proportion of households with recent flood claims able to obtain multiple insurance quotes



Source: Flood Re (2023) Data provided on request.

Notes: Prices fell throughout 2022, which appears to be a direct result of the General Insurance Pricing Practices reforms by the FCA, which means companies have to offer the same price to everyone.

(c) Outcome 3: Buildings resilient to other climate risks

Further research is required to understand how risks to building fabric will vary over time and to form a policy response.

In addition to overheating and flooding, there are other risks to both new and existing buildings in the UK. Climate hazards which can damage building fabric include subsidence caused by drought and dry soil, excessive moisture due to flooding and heavy rain, and structural damage due to high winds. The impact of climate change on these specific hazards is not currently well understood. As a result, we do not yet have indicators to assess progress against this outcome.

Further research is required to understand how risks to building fabric will vary over time, and to form a policy response. Given the lack of a clear outcome, and uncertainty on an appropriate adaptation response to the risks, this outcome is not scored. However, the third UK Climate Change Risk Assessment summary for Northern Ireland stated that despite the uncertainty, "there is high confidence that current building regulations are inadequate for addressing moisture and damp in buildings."³⁴

3. Policy and planning progress

This section documents key policy developments relevant to each of the climate resilience outcomes identified within our monitoring map and the extent to which the key policy and planning milestones are in place.

(a) Outcome 1: Buildings do not overheat during heatwaves

This outcome is scored as having **insufficient policies and plans** to ensure that buildings do not overheat during heatwaves.

Current policies and plans are insufficient to ensure that buildings do not overheat during heatwaves.

- **Policy and guidance to prevent overheating in NI buildings is insufficient.** An update to the Northern Ireland Building Regulations, to provide a new Part O overheating assessment, is being considered for Northern Ireland. This follows the inclusion of 'Part O' into Building Regulations for England in 2021, which the Committee noted was a significant step forward for ensuring that new-build residential buildings are resilient to summertime overheating. As well as application to new-build dwellings and residential buildings, measures in NI could go further to include refurbishment, alterations, extensions and conversion.
 - The Department for Communities' draft Housing Supply Strategy includes an action in Outcome 5 to 'Protect and optimise existing supply, across all tenures, with consideration to retrofit, adaptive reuse and climate resilience',³⁵ which is positive. However, the final strategy remains unpublished, awaiting Executive approval.
 - There remains no policy in place to incentivise adaptation in the existing building stock, and the UK Green Building Council states that 80% of those that will exist in 2050 are already built.³⁶
 - The Buildings Safety Regulator remit, established in England in 2022 under the Buildings Safety Act, does not currently apply in Northern Ireland.
- **Existing financial instruments could be better utilised for adaptation.** On behalf of the Utility Regulator in Northern Ireland, the Energy Saving Trust is the Programme Administrator of the Northern Ireland Sustainable Energy Programme (NISEP). This is an £8 million fund,³⁷ collected from both domestic and commercial electricity customers through a public service obligation (PSO). The fund has not focused on adaptation to date, although improved ventilation to reduce overheating and increased moisture in buildings should be considered alongside energy efficiency schemes. Schemes like NISEP must consider the implications of a warmer future climate when making interventions and could consider research to monitor overheating in homes through smart meters.
- **The NI Housing Fitness Standard does not account for climate risks.** Northern Ireland uses a process called the Housing Fitness Standard to define a minimum benchmark for human habitation. It does not include a minimum level of insulation or energy efficiency. The Fitness Standard is in NI Housing legislation (Schedule 5 of the Housing (NI) Order 1992).

It is important to embed adaptation considerations into energy efficiency schemes.

Current NI housing standards do not consider overheating.

- The former Minister stated her commitment to reviewing the Standard. There is limited consequence to not meeting the Standard, especially in the owner-occupied sector (there is in the private-rented sector, where failure to meet fitness standard can result in a statutory Fitness Notice imposing a duty to improve, and the imposition of rent control).
- The Decent Homes standard is an English social housing standard which relates to asset management of homes. It has no standing in Northern Ireland, although many social landlords measure themselves against it. The UK Government is currently reviewing the Decent Homes Standard (DHS) which might therefore result in some modifications to social housing in NI, but this remains unclear.

Opportunities exist to make information on building overheating available for future assessments.

- **Some information and reporting on building overheating is in development.** The UK Government has commissioned research at a UK level to better understand overheating in residential buildings, through the CS-NOW (Climate services for a Net Zero resilient world) research programme, but overall the extent of work and available data on overheating in all building types in NI remains at a very low level.
 - **Public Body Reporting.** Some additional information may also be gathered in coming years through the forthcoming Public Body Reporting regulations under the Climate Change Act (NI) 2022. Housing providers beyond the Housing Executive should be encouraged to report, whether reporting becomes mandatory or not.
 - **Housing Condition Survey.** Additional climate adaptation questions are being considered for inclusion within the Housing Condition Survey, according to Department for Communities. There is ongoing discussion as to whether this should be integrated into the survey or done as a standalone survey. Regardless of the method, there is a need for a more consistent and regular flow of data than currently exists.
 - **A proposed 'One-Stop Shop'** energy advice service underwent public consultation until January 2023, but neither adaptation support nor information on resilience considerations in energy efficiency and home retrofit are included in the proposal.
- **Housing Executive Climate Adaptation Plan.** The Housing Executive (HE) is developing its first internal Climate Change Adaptation Plan, which should be used by all parts of the HE to provide information on, and to guide actions in response to climate change impacts. This work will compliment other strategies being developed within the HE to reduce the impact of the Climate Emergency, and the work of other public bodies. Key aims of the project include:
 - Develop a multi-year Climate Adaptation Plan, with dedicated resource and staff ownership for delivery, which reduces exposure to climate risk;
 - HE staff build climate change and adaptation knowledge, leading to decision making through a climate lens;
 - Identify areas for further priority work on data gaps and reduction of risk levels for vulnerable communities in social housing;

The Housing Executive (HE) is developing its first internal Climate Change Adaptation Plan.

- Ensure NIHE is ready for reporting on adaptation actions and can share best practice with the public sector.

(b) Outcome 2: Buildings are prepared for flooding

Limited policies and plans exist to ensure that buildings in NI are prepared for flooding.

This outcome is scored as having **limited policies and plans** in place to ensure that buildings are prepared for flooding. Some positive progress has been made in Northern Ireland to increase uptake in property-level flood resilience (PFR) measures, through the DfI Homeowner Flood Protection Grant Scheme (HFPGS) and the Scheme of Emergency Financial Assistance (SEFA), which provide financial support repair and prepare homes. However, policies lack monitoring and evaluation, and could be higher in ambition to improve overall flood resilience. Furthermore, there are no clear plans which focus on improving enabling factors, such as investing in workers and skills and public engagement.

- **Some financial instruments are in place for PFR in Northern Ireland.** Two schemes (the DfI Homeowner Flood Protection Grant Scheme and the Flood RE ‘Build Back Better’ scheme) are currently available to support homeowners in flood risk areas to install PFR.
 - The ‘Build Back Better’ scheme is specifically for properties after experiencing flooding.
 - The Homeowner Flood Protection Grant Scheme (HFPGS) is a Northern Ireland-specific initiative run by Department for Infrastructure (DfI) which began in 2016. It is designed to encourage the owners of residential properties that have flooded before and/or are located within known flood prone areas, to modify their properties to make them more resistant to flooding. The scheme has so far made interventions for a small number of the total properties at risk, and according to eligibility criteria for the scheme, installations are mainly for properties which have flooded, in areas with no viable flood alleviation scheme or where no flood alleviation scheme is planned in the next 5 years.
 - The scheme applies to properties in coastal areas affected by flooding from the sea as well as floodwaters from rivers, surface water and sewerage systems. Qualifying homeowners can get 90% funding of flood protection measures up to a value of £10,000. The additional 10% of the cost and any extra cost above £10,000 is funded by the homeowner themselves.³⁸
 - Although the HFPGS is positive, particularly vulnerable households may still struggle to afford the 10% share of costs.
 - Further incentives for PFR installation for homeowners and new build developers are required to ensure the wider building stock is sufficiently protected.
- **There are currently no legislation or funding mechanism to incentivise PFR in schools, prisons or non-residential buildings.**
- **The Scheme of Emergency Financial Assistance (SEFA) is positive but should be accompanied by longer-term resilience building.** SEFA is an emergency payment of £1,000 to householders as practical assistance to those who have suffered severe inconvenience from flooding to help make homes habitable as quickly as possible (if a household is deemed to fit criteria).³⁹

The Homeowner Flood Protection Grant Scheme has been active since 2016.

Current support is short-term, and only available for residential properties.

The scheme enables the Department for Communities to reimburse the councils for expenditure incurred as a result of immediate action following a flooding incident.

- **There is no clear legislation or subsidies to install preparedness measures in properties before they flood.** While the Homeowner Protection Grant Scheme can enable some homeowners in areas of flood risk to install PFR, current policies lack clear legislation for installing PFR in new buildings and for retrofitting PFR in at-risk properties before they flood.
- **There is limited policy or standards on PFR design in NI.** Design codes and standards for PFR in new buildings can help to ensure that PFR installations are of high quality. There are no standard resilience levels for the extent or quality of post-event PFR retrofits, and no legislation which enforces standards or regulates PFR in building design. Options for benchmark guidance exist in the form of the CIRIA PFR Code of Practice and BSI Kitemark standard PAS1188.
- **There is some work on engagement and education of household-level flood risk and adaptation, but more is required.** A recent report suggested that only 14% of UK adults know what to do to prepare for a flood and 19% said they knew where to access information about what to do before, during and after a flood.⁴⁰ It is worth noting that this report had a small sample size of nine NI focus group participants, so it is unclear how well this represents the situation in NI, where awareness work has been undertaken in over 40 of the most at-risk communities by the Regional Community Resilience Group.
- **Public body reporting regulations may provide an opportunity for regular published information from local authorities, which could include the uptake of property-level resilience.** Local authorities could report on the uptake and outcome (e.g. installation) of property-level schemes such as SEFA. This would be undertaken through regulations under the Climate Change Act (NI) 2022 which should be out for public consultation in Spring 2023.

(c) Outcome 3: Buildings resilient to other climate risks

Given the uncertainty related to the climate risks to building fabric, regarding how the risks will vary over time and what an appropriate adaptation response should be, a policy score for this outcome is not included in this assessment. However, policy for reducing the impact of cold, damp homes and those affected by subsidence or storm damage will be required.

The energy price crisis has highlighted the poor levels of energy efficiency across the UK's building stock. The Government response has primarily focused on financial support to offset the impact of rising energy bills during a cost-of-living crisis. There has been less focus on improving the fabric efficiency of buildings. The Government urgently needs to develop a coherent set of policies to drive and guide efficiency improvements in buildings. These policies should articulate a unified approach to building retrofits which ensures that both adaptation and mitigation goals are met, while minimising costs and disruption to building owners.

(d) Recommendations

We provide a set of recommendations for targeted actions to help put in place critical outstanding policy milestones (Table 10.2).

Table 10.2 Recommendations - Buildings		
Primary responsibility	Recommendation	Timing
DfC, DoF, DoH, DfE, DoJ, DE	Develop a centralised overheating baseline in residential (homeowner, social and private rented sector) and other buildings (care homes, prisons and schools), making use of empirical studies of overheating and other innovative ways to monitor temperatures in buildings (e.g. smart data).	2026
DoF	In bringing forward any future Part O overheating regulations, ensure that they apply to new-build dwellings and residential buildings as well as refurbishment, alterations, extensions and conversion for existing dwellings and residential buildings. This should include a robust programme of post-occupancy evaluations.	From 2023
Utility Regulator, NI Executive, Local Councils	Demonstrate considerations of future overheating and ventilation needs in energy efficiency schemes, for example the NI Sustainable Energy Programme (NISEP).	From 2023
DfC	Ensure adaptation is embedded in development of building-related policy and projects from 2023 onwards, including Climate Action Plans, the final Housing Supply Strategy and NIHE housing construction pilots.	2023
DfC	Update the housing fitness standard to include actions on climate risks such as overheating and flood.	2026
Dfl	Create a framework for data collection and monitoring of property flood resilience installations.	2024
DfC, Dfl, DAERA	Make finance available to install proactive adaptation measures for overheating and flood resilience. This should be via grant schemes or green finance for private owners, with public funding targeted at low-income or vulnerable households, alongside energy efficiency retrofit.	2024
Dfl	Consider property-level flood resilience as part of any future actions on an approvals process for sustainable drainage, flood warnings and risk modelling.	From 2023
DfC	Collate peer-reviewed and grey literature on climate risks to building fabric and develop a programme of work to support asset owners to better understand and deal with issues.	2026

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Chapter 11

Health

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Introduction

Table 11.1

Progress summary – Health

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Population health protected from impacts of climate change	Unable to evaluate	Insufficient policies and plans	<ul style="list-style-type: none"> Baseline indicators are too scarce to measure progress for this assessment on either outcome. Aside from some collaboration on UK-level vector disease surveillance, one-off guidance and some interaction with the NI Severe weather plan, the Department of Health does not appear to be proactively and strategically planning for climate change impacts in either outcome. Issues such as clear direction for the HSC Trusts and Public Health Agency pre-date the disruption of the pandemic. The potential for a Health Sustainability Strategy and work on submissions to Climate Action Plans under the new Climate Change Act (NI) 2022, present an opportunity for Department of Health to make progress.
Outcome 2: Population health protected from impacts of climate change	Unable to evaluate	Insufficient policies and plans	

Relevant risks from CCRA3:
H1 Risks to health and wellbeing from high temperatures; H2 Opportunities for health and wellbeing from higher temperatures; H3 Risks to people, communities and buildings from flooding; H7 Risks to health and wellbeing from changes in air quality; H8 Risks to health from vector-borne diseases; H12 Risks to health and social care delivery.

This chapter covers the need for adaptation to ensure that the effects of climate change on population health are minimised. To be well-adapted to climate change, the population should be healthy under current and future climate scenarios, and the health and social care system should continue to operate during extreme weather events.

Population health, both physical and mental, may be affected by a range of climate hazards:

Extreme heat will increase risk of heat-related mortality and create stress on the functioning of the health and social care system.

- Increased frequency and intensity of extreme heat will increase exposure to heat stress and increase risks of heat-related mortality (death) and morbidity (disease and illness). Projections estimate that heat related deaths in Northern Ireland could increase to around 30-115 per year by 2050, and 55-135 per year by the 2080s, assuming no population growth.¹ Periods of extreme heat can also create significant stress on the functioning of the health and social care system.
- Warmer temperatures may lead to changing suitability for vectors of infectious diseases and increasing the potential exposure of people. Projected changes in UK climate indicate that climate suitability for ticks and mosquitoes will increase in the UK.²
- Decreased frequency and intensity of cold weather will help to reduce the mortality and morbidity impacts of cold weather to some extent. However, an aging population will offset this somewhat. In the UK, cold related deaths per year are projected to remain around three times higher than those related to heat by the end of the century.³
- Other hazards such as flooding can also result in mortality, morbidity and impacts on mental health.

Risks to people's health from climate change are not only affected by the severity of the changes in hazards, but also by vulnerability and exposure.

- There may also be some benefits to physical and mental health from spending more time outdoors.

The risks to people's health from climate change are not only affected by the severity of the changes in hazards but also by vulnerability and exposure, such as socio-economic factors leading to health inequalities, equitable access to green and blue space, and levels of existing resilience.

Within this chapter, both population health and healthcare delivery are devolved to the NI Executive. The following organisations are responsible for different aspects of the health system:

The Department of Health will be key to driving climate adaptation across the Health and Social Care sector, and beyond.

- The Department of Health (DoH) is named in relation to health impacts in the NI Climate Change Adaptation Programme (NICCAP2). It now has an additional duty under the Climate Change (NI) Act 2022 (CCA) to exercise its own functions in a manner that is consistent with the objectives of the CCA, and provide resilience to the impacts of climate change. DoH has a duty to contribute to both NICCAP and CCA covering its three main areas of responsibility:
 - Health and Social Care, including policy and legislation for hospitals, family practitioner services and community health and personal social services.
 - Public Health, which covers policy, legislation and administrative action to promote and protect the health and well-being of the population.
 - Public Safety, which covers policy and legislation for fire and rescue services.
- The Public Health Agency (PHA) has a mandate to protect and improve health and social wellbeing and reduce health inequalities through strong partnerships with individuals, communities and other key public, private and voluntary organisations.
- The operation of secondary care provision (main hospitals and community health and personal social services) is undertaken by five geographic Health and Social Care (HSC) Trusts. The Northern Ireland Ambulance Service (NIAS) is the sixth HSC Trust. The HSC Trusts function with a high degree of autonomy regarding operational matters, however DoH is responsible for setting the overall strategic direction for the provision of health services in NI.

It is worth noting that unlike other areas of the UK, there is no equivalent to an 'NHS England' body which operates between the Department of Health and Health and Social Care Trusts. Local Authorities have no equivalent remit on health as is the case in Great Britain. Northern Ireland has an integrated Health and Social Care (HSC) system that is delivered by the HSC Trusts and family practitioner services, and is supported by a number of other Departmental ALBs, all of which are accountable directly to DoH.

The healthcare system in the UK has been under increasing pressures. These pressures may affect the ability of health agencies to make progress in other areas of work including climate change.

There are strong overlaps between health and other chapters, especially buildings.

The impacts of climate change to health will be somewhat determined by how well the built environment is adapted to the future climate. There are therefore strong overlaps with the Buildings chapter (Chapter 10). There are also other important overlapping areas in other Chapters:

- **Food.** Continued food security and safety from climate-sensitive food-borne diseases under future climate.
- **Towns and cities.** Urban design, new developments, planning and reducing the urban heat island effect.
- **Communities.** At local levels, communities are prepared for and can respond to climate shocks helping to minimise knock-on impacts on public health.
- **Business.** Productivity losses due to the impacts from overheating on workers, both arising directly in the workplace and indirectly from disrupted sleep.

Box 11.1

Health in NICCAP2

NICCAP2 identifies people and communities as a key priority area included within the People and Built Environment Outcome objective:

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

NICCAP2 highlights the risks to population health and health and social care from climate change, including from hazards such as extreme heat and flooding, but aside from one action on a Climate and Health Information Platform, there are no specific actions listed in the programme to address climate hazards.

None of the three indicators listed in the P1 objective relate directly to population health or Health and Social care resilience. Instead, they are more closely related to the towns and cities (Chapter 9) in this report and their indicators are discussed further in those chapters.

Source: DAERA (2019) *Northern Ireland Climate Change Adaptation Programme 2019-2024 (NICCAP2)*.

1. Monitoring progress towards a well-adapted health system

Being well-adapted to climate change means that the direct impacts of changes in Northern Ireland's climate on people's health are minimised and that health system delivery is not disrupted by weather extremes.

We have identified three key outcomes to achieve a healthy population under current and future climate (Figure 11.1). A number of policy actions and enabling factors are needed to deliver these outcomes:

The impact of climate change on population health should be minimised and potential benefits realised.

- **Protect population health from the impacts of climate change and utilise potential benefits.** The impact of summertime overheating and flood events on mortality and morbidity, including mental health impacts, should be limited.
 - Surveillance mechanisms should be properly implemented to understand any changes in the prevalence of infectious diseases that may become more widespread or established due to changes in the climate.
 - Ambient and indoor air quality levels should be improved by any actions taken to reduce greenhouse gas emissions. Actions to decarbonise and improve air quality should be aligned with adaptation objectives.
 - Climate change should be included in local risk registers.
 - Explicit attention should also be given to address inequalities in health that would help reduce the burden of climate change on the population and ensure that health co-benefits of adaptation actions across other sectors (such as adapting the built environment) are maximised.
 - As well as adapting to the potential adverse effects of a warming climate, policy should also encourage increased use of outdoor greenspaces during warm weather which can have a positive impact on population health.
- **Quality and accessible health and social care delivery during extreme weather.** Health and social care delivery must be able to continue during extreme weather events. Primary and secondary care facilities, social care and other health settings will need to be adapted to ensure they do not overheat during heatwaves, are at significant flood risk, or vulnerable to climate-related failures of dependent infrastructure systems.

Inequalities in health that would help reduce the burden of climate change should be addressed.

The health system should be able to provide quality accessible healthcare during and after extreme weather.

Enabling factors that need to be in place to deliver these outcomes are wide ranging, from ensuring agency coordination, providing funding and investment in buildings, to training, education and awareness about climate risks and adaptation strategies.

- **Governance.** Appropriate cross-sectoral governance arrangements between different health and social care agencies is essential to adapt to risks. Clear coordination and leadership on public health responses to extreme weather events and adaptation is required.

- **Funding and investment.** Protected public and private funding must be in place to adapt health and care settings, as well as funding for nationwide vector and disease surveillance and provision of local greenspace.
 - Adaptation options focusing on health and social care organisations can offer a targeted approach for reducing heat-related mortality in vulnerable groups.
 - Low-regret options include better forecasting of events, better information and monitoring of risks, enhanced risk preparedness and enhanced risk response. These should be actioned alongside a wider set of adaptation actions for reducing heat exposure in buildings in general and the urban environment.
- **Engagement and education.** Awareness levels amongst the general population, health and social care staff, and workers across local government organisations is essential.
 - Among clinicians and healthcare staff, educational needs vary depending on impact. Education and engagement should cover risks to health, the costs and benefits of adaptation and opportunities (e.g. from spending more time outside in nature). This can be achieved through training, risk communication, education and guidance provision.
- **Research.** A better understanding of costs, benefits and effectiveness of interventions to reduce overheating in health and social care facilities would help to target action. There is also a need for better understanding of the interactions between heat and air pollution, and extreme events on vector breeding and disease transmission.
- **Data and monitoring.** Regular monitoring of overheating, flooding incidences and air quality levels in health and social care settings is needed, which could be built into pre-existing reporting requirements. In addition, continued and widened monitoring of those vectors and infectious disease prevalence impacted by climate change is required.
- **Skills.** Public health professionals and staff able to plan for and respond to extreme weather events.

Enabling factors have not been assessed later in this chapter, due to lack of available evidence.

We have identified the following roles for policy as key to help deliver the identified outcomes and help put in place enabling factors.

- **Funding and investment.** Public funding of vectors and vector-borne diseases is needed to ensure knowledge of this risk remains up to date. Long term and protected funding at sufficient levels is required to adapt hospitals, care homes and other healthcare buildings to the impacts of climate change.
- **Legislation, regulation and standards.** Building regulations and standards for healthcare buildings that address overheating risk would ensure that new and refurbished buildings do not overheat. The readiness of health and care providers to manage overheating and other extreme weather should be regularly inspected by the sector regulator.

Enabling factors that need to be in place to deliver outcomes are wide ranging

Funding, regulations, standards, adaptation planning, and guidance are some of the policy milestones required.

- **Information and reporting.** Adaptation plans for all Health and Social Care Trusts, and care home providers should be required.
 - An integrated and coordinated plan that takes account of future climate change impacts of health from pathogens would also be beneficial.
 - The Government should ensure that the public, health workers and local authorities have appropriate guidance on heat avoidance, spending time outdoors safely, flood risks and tick safety, as well as integrating both long term and emergency planning.
 - Guidance should be available on how to ensure that overheating and air quality risks are considered alongside energy efficiency installations.

Health risks will continue to be distributed inequitably with vulnerable populations and regions differentially affected, unless these are considered across all policies to improve resilience to climate change.

The risks to people's health from climate change are also affected by vulnerability and exposure such as through socio-economic factors leading to health inequalities, the location of healthcare buildings, equitable access to greenspace and levels of existing resilience (Box 11.2). Health risks will continue to be distributed inequitably with vulnerable populations and regions differentially affected unless these are considered across all policies to improve resilience to climate change.

Box 11.2

Contextual factors

Contextual factors in health relating to hazard, exposure and vulnerability have a significant impact on the outcomes and how they are distributed across society. This box presents data and evidence regarding some of the important factors affecting vulnerability.

Poor quality housing particularly impacts the health of people and can exacerbate health inequality (see Chapter 10).

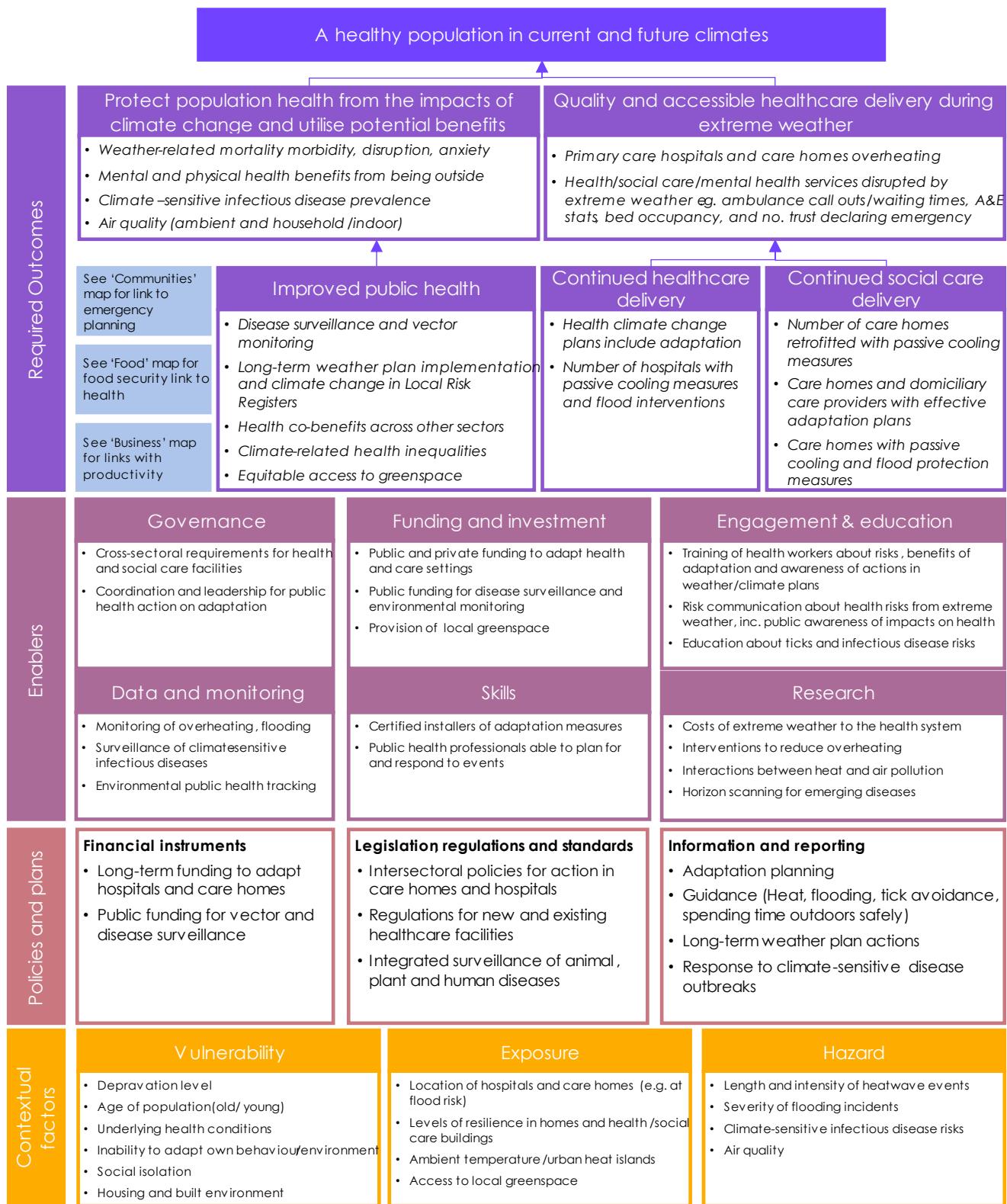
Ageing population. It is widely agreed that the over 65 population is most vulnerable to health impacts from heat. The ONS' population projections show that the proportion of the UK population aged over 65 is estimated to grow faster than other age groups out to 2100.⁴

Underlying health conditions. People with cardiovascular and respiratory conditions have a higher risk of adverse health outcomes, including to extreme heat and cold. In 2021/22, around 465,500 patients in NI were registered as having a cardiovascular condition, (Hypertension was the largest proportion at around 140 per 1,000 GP patients) and around 167,700 were registered with a respiratory condition (asthma was the largest proportion, with 63 per 1000 GP patients).⁵

Deprivation level. Northern Ireland has higher levels of multiple deprivation than the rest of the UK, with locations of high relative deprivation in urban areas of Belfast, Derry City and Strabane.⁶ This is linked to health inequalities, for example, the rate of hospital admissions for respiratory conditions in the most deprived areas in NI is more than double that of the least deprived areas, for all ages.⁷ Areas of higher deprivation in the UK can also have less access to high quality green and blue space, contributing to differing disease burdens and life expectancy.⁸

* Up to 75 years.

Figure 11.1 Monitoring map for health



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

This section documents available evidence on progress towards delivery and implementation of each of the climate resilience outcomes identified in the previous section.

(a) Outcome 1: Protect population health from the impacts of climate change and utilise potential benefits

The score for this outcome is **unable to evaluate**. There is limited baseline data available to assess progress towards ensuring good population health under current and future climate.

- **People in Northern Ireland are already being affected by heat.** A 2022 survey of climate change perception in Northern Ireland showed that despite heatwaves being rated a less serious risk than cold or flooding, most respondents (60%) have personal experience with discomfort during heatwaves and 32% have personal experience or know someone who experiences serious health impacts from heatwaves.⁹
- **Mortality data is not publicly available for both cold and heat.** The Winter Mortality Index (WMI) shows that in Northern Ireland, deaths in the winter months vary significantly. For example, mortality was 4.4% higher than in the adjacent non-winter months for the period 2021/22, 21.4% in 2020/21, and 11.4% for the period 2019/20.¹⁰ On average, cold events will become less frequent, while heat impacts will become more frequent and intense in coming years, however cold related deaths will remain significant and greater than heat-related deaths. There is no equivalent dataset for heat-related mortality, which means that a comprehensive baseline is not available for this indicator.
- **Access to natural space in urban areas is comparable with Great Britain.** 43 per cent of households in Northern Ireland have accessible natural space within 400 metres. This can provide important benefits including urban cooling in heatwaves, as well improvements to air quality and mental and physical health. Accessible natural space is defined as areas greater than two hectares and off-road trails and paths. In urban areas, 50% of households have accessible natural space within 400 metres.¹¹ This is broadly in line with Great Britain where the percentage of people living near a public park or playing fields is 52%.^{12*}

Data to assess progress on protecting population health from climate change impacts is largely unavailable.

Unavailable indicators for this outcome include:

- **Regular monitoring of the health effects of increased extremes.** This would include impacts on those working outdoors in more frequent and intense heat, as well as mental health impacts, which to date have only been covered in one-off reporting, despite evidence of short- and long-term mental health impacts for people who had experienced flooding, as well as household disruption and reduced social cohesion.
- **Infectious disease prevalence.** There is limited information available on changes in rates of vector borne diseases related to climate change in

* Although the study did not differentiate between public and private land, meaning real-world access is less certain.

Northern Ireland. This is also an important area for cross border collaboration with the Republic of Ireland.

- **Indoor air quality.** The Committee is not aware of any long-term programme of monitoring for indoor air quality in NI.

(b) Outcome 2: Quality and accessible healthcare delivery during extreme weather

The score for this outcome is **unable to evaluate**. There is almost no baseline data on which to assess NI progress towards achieving continued health and social care delivery during extreme weather events.

It has not been possible to assess progress on ensuring delivery of health and social care during extreme weather.

- **Data on overheating in primary care, hospitals and care homes is not available.** There is a lack of data on overheating across all hospitals, care homes GP surgeries and other healthcare buildings in Northern Ireland.
- **Disruption to health and social care services by heatwaves or flooding is unknown.** There is no evidence to indicate the extent to which health and social care services have been disrupted by heatwaves or flooding. This could include information on A&E statistics, hospital admissions, or ambulance callouts at times of weather extremes.

Further unavailable indicators include:

- **Health and social care facilities with passive cooling measures,* adaptation plans, heat management plans or flood protection measures.**

* CCRA3 notes that "there is some evidence that care homes and hospitals are already being affected by overheating, with some care homes installing air conditioning." Information on overheating in hospitals and care homes is not yet collected and held centrally.

3. Policy and planning progress

This section documents key policy developments relevant to each of the climate resilience outcomes identified within our monitoring map and the extent to which the key policy and planning milestones are in place.

(a) Outcome 1: Population health protected from impacts of climate change

This outcome is scored as having **insufficient policies and plans**. Key policy milestones required to ensure that population health is protected from impacts of climate change are not in place, including a clear adaptation policy and operational direction for key agencies. At the time of writing, environmental issues in the Department of Health have also been put on a formal policy pause due to Covid-19.

Weather extremes are accounted for in a regional severe weather plan, but other key policies on climate and population health are not in place.

- **A clear strategy for climate and population health does not exist in Northern Ireland.** Through work to develop NI's first Climate Action Plan under the Climate Change Act (NI) 2022, Department of Health (DoH) received feedback from arm's length bodies that a specific Health Sustainability Strategy would help them prioritise health specific actions. The Public Health Agency and the HSC Trusts have no clear direction from Department of Health in NI to take more action on climate issues. This is a key gap to be addressed, either as a standalone adaptation plan, or integrated into development of a health sustainability strategy.
 - There has been limited epidemiological analysis of the health impacts of hot weather in NI. There is currently no heatwave plan, but heat is included in the regional severe weather plan.
- **The Public Health Agency (PHA) and DAERA collaborate with the UK Health Security Agency (UKHSA) on disease surveillance.** This work is delivered through the Human Animal Infections and Risk Surveillance (HAIRS) programme. Surveillance of vector borne diseases is undertaken by UKHSA (Travel associated disease and International Health Regulations department) to which NI contributes. There is a range of surveillance data on infectious diseases on the PHA website, although many do not relate to climate change. Datasets specific to Northern Ireland for a range of diseases are limited and often difficult to access.
 - **Financial instruments to support surveillance systems are mostly in place at a UK level.** The UK Government directly funds surveillance of vectors and vector-borne disease. PHA undertakes some surveillance in NI and feeds into some UK-wide datasets. There are benefits of further action, with many low regret options and cost-effective options for monitoring and surveillance systems.
 - **The Republic of Ireland has a Climate Change Adaptation Plan for the Health Sector.** This plan includes actions related to vector borne diseases in the context of climate. There is no equivalent integrated and coordinated plan in NI that takes account of future climate change impacts of health from pathogens and changes to weather patterns.

- **Data is available on air pollution exposure in NI.** The Administrative Data Research Centre Northern Ireland (ADRC NI) and Queen's University Belfast run an online air pollution dashboard that allows the public to input a postcode for anywhere in Northern Ireland to see levels of air pollution in their area. The dashboard also lets the public view how levels of air pollution have changed over time and whether they exceed the new WHO guideline threshold levels, above which pollution leads to ill health.
- **The Met Office has developed a Heat Vulnerability Index for Belfast.** This project focused on the co-development of urban climate service on vulnerability to urban heat. The Met Office, in partnership with Belfast City Council and Climate Northern Ireland, created a Heat Vulnerability Index (HVI) for Belfast. The HVI uses eight metrics to provide a relative, numerical score for the 60 electoral wards, which can be used to determine which parts of the city are at greater risk to extreme heat than others.
 - Sensitivity Metrics used included the proportion of the population aged 65+, vulnerable assets and population with a long-term health condition, as well as considering levels of deprivation and accessible greenspace.
 - Results showed that under a High emissions scenario, Belfast will see substantial increases in days above 25°C (1.9 days per year for 1981-1999 baseline to more than 23 per year by 2061-2079). Warm nights above 15°C will also increase (2.1 days per year for 1981-1999 baseline to more than 31 per year by 2061-2079). The map suggests that under a 2°C warming scenario, the electoral ward of Ardoyne in inner Belfast could be at high risk. 12 other electoral wards, such as New Lodge and Woodstock would be considered medium-high risk. Under a higher emissions scenario, the number of wards at high or medium-high risk increases to 29 (11 and 18 respectively) which is around half of the total electoral wards in the city.¹³

Non-departmental organisations are taking a lead on developing tools and resources on climate and population health

- **The voluntary sector is taking a lead in developing baseline information on population health.** Belfast is home to around 18%¹⁴ of the NI population. Belfast Healthy Cities (BHC) is a charity based in the city which recently coordinated creation of a City Health Profile. The report provides data and analysis from a range of sources according to the '6P' framework of the World Health Organization (WHO) European Healthy Cities Network Phase VII (2019-2025): People; Place; Participation; Prosperity; Peace and Planet.¹⁵
 - **Greening the City.** BHC is also leading development of the Greening the City Programme in Belfast. Underpinning the overarching goal of the greening the city programme are four strategic objectives around inclusive green environments, encouraging the greening of public spaces, increasing collaboration and engagement in design of green spaces, and promoting interventions to reduce health inequalities.¹⁶

(b) Outcome 2: Quality and accessible healthcare delivery during extreme weather

This outcome is scored as having **insufficient policies and plans**. Key policy milestones are not in place to ensure quality and accessible healthcare delivery during extreme weather.

- **A strategy on adaptation is vital for delivery of Health and Social care in NI.** Data gaps and a lack of clear policy drivers indicate that an adaptation

plan is needed to progress work across the Health and Social care system. Environmental issues should be removed from a formal policy pause as soon as possible. The Department of Health has an opportunity to build on renewed interest from officers through involvement in Climate Action Plan development under the Climate Change Act (NI) 2022. Clear direction is needed on increased coordination and capacity between DoH and other agencies such as the HSC Trusts.

The Committee believes that current policies and plans within the health and social care sector are insufficient.

- **There are no regulations for avoiding overheating in new or refurbished healthcare buildings.** The only overheating policy across Health and Social care relates to Care homes, which have guidance that ‘the temperature in areas occupied or used by residents should be between 19°C - 22°C’.¹⁷
- **Extreme weather considerations in local risk registers.** As part of the multi-agency approach in NI, a severe weather plan has been developed with input from all agencies. This includes an outline of the actions of each responding agency in the preparation for and during a severe weather event, and which considers all weather types including rain, thunderstorms, ice/snow and heat. However, it is unclear what assessments exist within the Health and Social care system.
- **Financial instruments for adapting Health and Social Care premises do not exist in NI.** Long-term funding to adapt hospitals, care homes and other healthcare buildings to the impacts of overheating and flooding is not currently available from Government.
- **There have been some limited developments on information and reporting in NI.** The Department of Health features Heatwave advice for healthcare professionals on its website.¹⁸ In most other areas there is minimal guidance for healthcare workers about the health impacts of climate change, so that they can respond appropriately during extreme events. Adaptation planning can be a particular challenge for social care sites as care providers are usually smaller and more dispersed than NHS trusts. There is also no guidance available to ensure that overheating and air quality risks are considered alongside energy efficiency installations.
- **Reporting of instances of overheating in health and social care (HSC) settings in Northern Ireland is ad-hoc.** Currently the reporting of instances of overheating in HSC settings in Northern Ireland is through the reporting systems of each local organisation. Depending on severity and risk to service delivery, the local organisation may escalate the issue to DoH for information and regional action.
- **Department of Health (DoH) requested a risk assessment with colleagues in Health and Social Care (HSC) Trusts** during the pandemic, as part of an initial evidence gathering exercise. It is likely that the HSC Trusts will soon have to report on climate risks and risk management as part of the new Public Body Reporting requirement under the Climate Change Act (NI) 2022.
- **An online climate change and health information exchange platform was developed for health practitioners.** The Climate Northern Ireland Health and Wellbeing Platform was launched in September 2019 to meet a request from Health stakeholders for easier access to climate and health information relevant to NI. Due to COVID-19, access to

information from health partners was disrupted, and interest of the primary audience in the health sector was seen to be greatly reduced, so update of the platform was put on hiatus in April 2020. As of September 2022, membership had grown to 90 members,¹⁹ from a wide range of public, private, academic and voluntary bodies. A review of the long-term plans for this platform is due in 2023.

(c) Recommendations

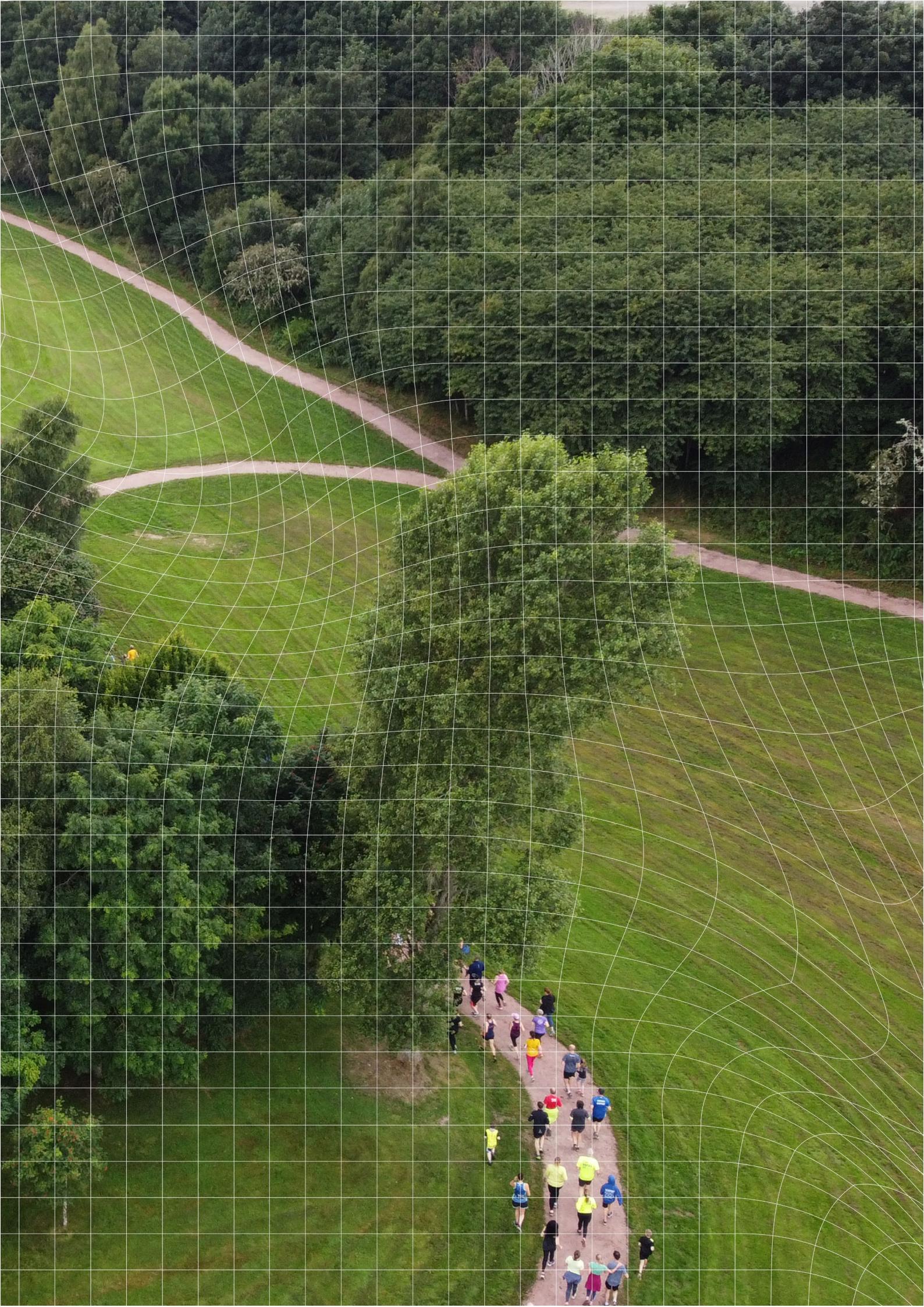
We provide a set of recommendations for targeted actions to help put in place critical outstanding policy milestones (Table 11.2).

Table 11.2
Recommendations - Health

Primary responsibility	Recommendation	Timing
DoH	Develop an NI Health Adaptation Plan as a standalone or part of a wider health sustainability strategy, which establishes a baseline for priority climate adaptation indicators and risks for both population health and the Health and Social care. This should use a cross sectoral approach to include collaboration with wider structures e.g. community planning, emergency response, housing and health adaptation plans in ROI.	2025
DoH	DoH should provide clear strategic direction on coordination roles, ownership, training, resources and required deliverables for climate adaptation actions to arm's length bodies and agencies including Public Health Agency and HSC Trusts.	2025
DoH, DoF	Consider the need for long-term, protected funding to adapt hospitals, care homes and other healthcare buildings to the impacts of climate change.	From 2023
DoH	Undertake a regular health vulnerability and adaptation assessment across the department and with arm's length bodies and agencies, including gathering information about impacts on health and social care which are caused by weather extremes.	2025
DoH	Work with other departments to collate research into the risk of overheating occurring in various building types which could allow adaptation actions to be planned for buildings most susceptible to overheating occurring in the future.	2024
DoH	Work with relevant health partners in Republic of Ireland to support transboundary collaboration and knowledge exchange between public health professionals and policymakers on the island of Ireland.	2023

Endnotes

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- ⁹ Steentjes, K., McCamley, M., Berman, J., & Pidgeon, N. (2022). RESIL RISK Northern Ireland: Public perceptions of climate risks and adaptation in Northern Ireland. Cardiff: Cardiff University <https://orca.cardiff.ac.uk/id/eprint/150146/1/RESIL%20RISK%20Northern%20Ireland%20report%20.pdf>
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- ¹⁴ NISRA (2021) Census 2021. <https://www.nisra.gov.uk/publications/census-2021-infographics>
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- ¹⁷ DoH (2011) Residential Care Homes Minimum Standards. <https://www.health-ni.gov.uk/sites/default/files/publications/dhssps/care-standards-residential-care-homes.pdf>
- ¹⁸ DoH (2018) *Information Leaflets on caring for patients before and during a heatwave.* <https://www.health-ni.gov.uk/publications/information-leaflets-caring-patients-and-during-heatwave>
- ¹⁹ DAERA (2022) *Northern Ireland Climate Change Adaptation Programme 2019 - 2024 Mid Programme Progress Review 2022*



Chapter 12

Community preparedness and response

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Introduction

Table 12.1

Progress summary – Community preparedness and response

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Communities are prepared for climate shocks	Insufficient progress	Limited policies and plans	<ul style="list-style-type: none"> Although positive steps are being taken on resilience planning, progress is not well monitored. Indicators which could exist for this outcome include data which show that preparedness or perceptions of preparedness are increasing. Civil contingencies structures are extensive, and over 40 communities are now involved with the Regional Community Resilience Group. However, most council adaptation plans are not yet published, and there is no regional flood warning system.
Outcome 2: Communities can respond to climate shocks	Unable to evaluate	Partial policies and plans	<ul style="list-style-type: none"> There are no data for recovery time from extreme weather events, or year on year comparative data for damage from extreme weather events. Current civil contingencies structures cover many of the key areas required for a robust response to climate shocks. Co-ordination with the UK Resilience Framework on issues such as training and standards will be important.
Outcome 3: Cultural heritage is conserved	Unable to evaluate	Limited policies and plans	<ul style="list-style-type: none"> Most available data on cultural heritage risk from climate comes from high-level modelling in the Department for Infrastructure (DfI) Flood Risk Management Plan. More detailed data are likely available but are either not centrally gathered or not accessible. Risk assessment guidance has been published and evidence gathering work is being undertaken, but the lack of an overall strategy on climate and cultural heritage means some key issues are not being addressed. Forthcoming Public body reporting duties might provide some additional information.

Relevant risks from CCRA3:
H1 Risks to health and wellbeing from high temperatures; H2 Opportunity for health and wellbeing from warmer summers and winters; H3 Risks to people, communities and buildings from flooding; H4 Risks to viability of coastal communities from sea level rise; H11 Risks to cultural heritage; N18 Risks and opportunities from climate change to landscape character.

This chapter covers community-level awareness, planning and response to weather and climate impacts. It also considers the protection of cultural heritage (which is run by local and national organisations) from the effects of climate change. Local communities and services will be impacted by all climate hazards, including extreme heat, flooding, storms and sea-level rise.

Figure 12.1 Climate change hazards affecting people and the built environment



	Communities and settlements	Buildings	Health and social care system	Population health
Heatwaves	Heatwaves, urban heat island, air pollution	Overheating	Overheating risks to patients, social care, occupational risks, energy use	Heatwave risks to population, mortality, injury etc.
Floods	Flooded communities, resilience, relocation, blight/economic effects	Flood damage, damp, mould	Flood risks to NHS assets, service disruption	Flood impact on mental health, deaths and injuries
Drought	Risk to water supply, drought	Subsidence	Service disruption	Water supply failure, risks to public health
Cold	Risks from extreme weather	Damp homes, cold homes	Service disruption	Cold risks to mortality and morbidity

Source: Climate Change Committee (2017) *Climate Change Risk Assessment 2017*.

Community-level adaptation is fully devolved and, in many cases, relies on local government. Guidance and standards may be provided from national government but planning and actions typically take place at the local council level, often in collaboration with other local actors.

Emergency preparedness and response work is driven by the UK Civil Contingencies Act 2004, despite being devolved to the NI Executive.

The UK Civil Contingencies Act (2004) is the legislative basis for the UK's resilience frameworks, setting out the arrangements for emergency preparedness and civil protection, including the roles and responsibilities for local responders.

Responsibility for community-level adaptation in Northern Ireland is spread across a series of regional and local structures including:

- **Civil Contingency Group (NI) (The Executive Office)** oversee work to prepare, respond and recover from civil emergencies at a sub-regional to national scale. This team are not risk owners, but rather communicate with other departments on issues of business continuity and emergency response plans.
- **Department for Infrastructure (DfI)** is the Lead Government Department responsible for flooding (from rivers, surface water and the sea) and through its Emergency Planning Unit (EPU) it supports the multi-agency response to flooding and wider civil contingencies arrangements.
- **Emergency Preparedness Groups (EPGs)** are equivalent to local resilience forums in England. The three Regional EPGs in NI, as well the Regional Community Resilience Group (RCRG), are overseen by the Northern Ireland Emergency Preparedness Group (NIEPG). RCRG is jointly chaired by the Department for Infrastructure (DfI) and local government, and includes members from the emergency services, Met Office, education, health, transport, drainage and the voluntary sector.

A range of national and sub-national actors are involved in emergency preparedness and response.

Community preparedness and response links to several other chapters.

Community preparedness and response links to several other chapters, with some of the most direct links with Health, Towns & Cities, Buildings, Transport and Business. This is particularly important when considering the quality of planning and decision-making in relation to its effect on community resilience (Box 12.2). Risks to cultural heritage are also included in Chapter 2 (Nature) and Chapter 10 (Buildings).

Box 12.1

Community preparedness and response in NICCAP2

NICCAP2 identifies communities as a key priority area included within the 'People and Built Environment' outcome objective:

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

Northern Ireland is the only jurisdiction in the UK which has integrated a chapter on 'Civil Society and Local Government' into its National Adaptation Planning process. This should be built upon, as it recognises the important role that collaboration with local and non-government actors has in climate adaptation.

While there is no statutory requirement for local councils in Northern Ireland to develop an adaptation plan, SOLACE (Local Government Chief Executive Forum) agreed an ambition for all 11 local councils to develop a full adaptation plan by 2024. This is to be achieved in partnership with Climate Northern Ireland and NI Local Government Association, using the 'NI Adapts' online planning toolkit which was developed by Climate Northern Ireland. To date, nine of 11 councils are using the cycle for adaptation planning. Derry City and Strabane were the first and, at the time of writing, the only council to finish and publish their plan.

Source: DAERA (2019) *Northern Ireland Climate Change Adaptation Programme 2019-2024 (NICCAP2)*

1. Monitoring progress towards well-adapted communities

Well-adapted communities are those that are adequately prepared for climate and weather extremes and can respond to weather and climate emergencies when they do occur to minimise their impacts. Maintaining thriving communities also requires conservation of key cultural heritage under future climate change conditions.

We have identified three key outcomes to deliver community-level adaptation. (Figure 12.2). A number of policy actions and enabling factors are needed to deliver these outcomes:

We have identified three adaptation outcomes for community preparedness and response.

- **Communities are prepared for climate shocks.** Preparing for climate shocks requires good adaptation planning at local authority level, in co-ordination with other actors in the event of extreme weather. The potential for increased frequency and intensity of extreme weather events should be factored into relevant local plans.
- **Communities can respond to climate shocks.** Responding to climate shocks when they occur requires strong local-level co-ordination during an extreme weather event to minimise damage and provide ongoing support for recovery after the event. Targeted recovery support may be required for vulnerable communities, and the mental health impacts of suffering damages should also be considered.
- **Cultural heritage is conserved.** Protecting cultural heritage requires an understanding of climate risks and a plan for the most appropriate way to conserve different types of heritage, such as archaeological sites, buildings and structures, historic landscapes, wrecks, museum collections and archives and their associated communities. We must also consider intangible heritage such as folklore, traditional language, knowledge and practices. Heritage conservation is the process of maintaining and managing change in a way that sustains and, in some cases, enhances the significance of a heritage asset.¹ Given the threat faced by cultural heritage from the impacts of climate change, it may not always be possible to conserve in every situation.

Enabling factors that need to be in place to deliver these outcomes will include:

Targeted support for vulnerable communities will be needed at local-level to support them in preparing for and recovering from extreme weather events.

- **Funding and investment.** Targeted support will be needed at the local-level to support communities which are particularly vulnerable to climate risks. This includes assistance in preparing for, and recovery from, extreme weather events. Psychosocial support will also be needed in the recovery from events such as flooding. Funding for adaptation should be ring-fenced at local-level; irregular funding cycles and mechanisms prevent authorities from blending funding streams into coherent projects that can deliver wider benefits for health and nature.
- **Engagement and education.** The public should be well-informed about future climate risks to enable household-level decisions about building in adaptation. Clear risk mapping and communication is required to achieve this. Equitable long-term planning also requires local stakeholder engagement. An understanding of skills in managing climate risks will be needed at local authority level. Targeted engagement and long-term

relationship building with communities at risk from different hazards is needed to increase the effectiveness of early warning systems.

- **Research.** Further research is needed to understand the local impacts of climate change. This includes social vulnerability mapping to different hazards in order to better understand the distributional effects of climate change. Research is also needed on the effectiveness of different types of behaviour change for adaptation.
- **Data and monitoring.** Data are needed on local-level adaptation actions and discussions which may already be happening. Data sharing on climate risks between organisations and early warning systems for climate hazards will also be important for local action. For conserving local cultural heritage, community-led heritage asset surveys can provide useful data on heritage assets and their potential exposure to climate change.
- **Governance.** Local authorities have an important role to play in national adaptation efforts. Their roles and responsibilities should be clearly defined to reduce duplication and encourage bottom-up action towards national adaptation programmes. Local public services and institutions can be stress-tested for climate impacts, including responding to cascading climate impacts. Local resilience groups should facilitate strong relationships between incident responders to ensure co-ordinated responses to extreme weather events.

Our monitoring framework highlights policy mechanisms which must be in place to achieve these required outcomes for well-adapted Towns and Cities. These fall under the following categories:

- **Legislation and regulation.** National legislation should enable local preparedness and response to extreme weather events, with clear roles and responsibilities for responder organisations. Regulations should also support protection and appropriate conservation of heritage assets.
- **Standards.** National resilience standards should support best practice among responder organisations, and national guidance should be provided on local community response to extreme weather events. Building standards for heritage assets should support the appropriate restoration or management of heritage assets affected by climate change.
- **Financial instruments.** Sufficient and stable funding is required for local resilience groups (e.g. Regional Community Resilience Group) to ensure long-term planning, relationship building and preparedness. Funding should also be provided to support vulnerable groups implementing local or household adaptation measures.
- **Information and reporting.** Local authorities should be required to report on local adaptation actions, including adaptation actions relating to cultural heritage. Similarly, organisations responsible for heritage should be required to report. Responder organisations should be required to report on their activities to provide accountability, and community risk registers should include consideration of vulnerable groups. Public engagement and deliberation are critical for adaptation actions, particularly for irreversible and contentious adaptation policies, such as managed retreat from low-lying coastal settlements (see Box 12.2).

Local authorities have an important role to play in community preparedness and response efforts.

Local authorities and organisations responsible for heritage should be required to report on their adaptation actions.

Community preparedness and response is included as the focus of a standalone chapter for the first time in this report. The Committee expects this chapter and its monitoring map to continue to develop as further evidence becomes available of climate impacts and the effectiveness of adaptation action at local-level across the UK.

Box 12.2

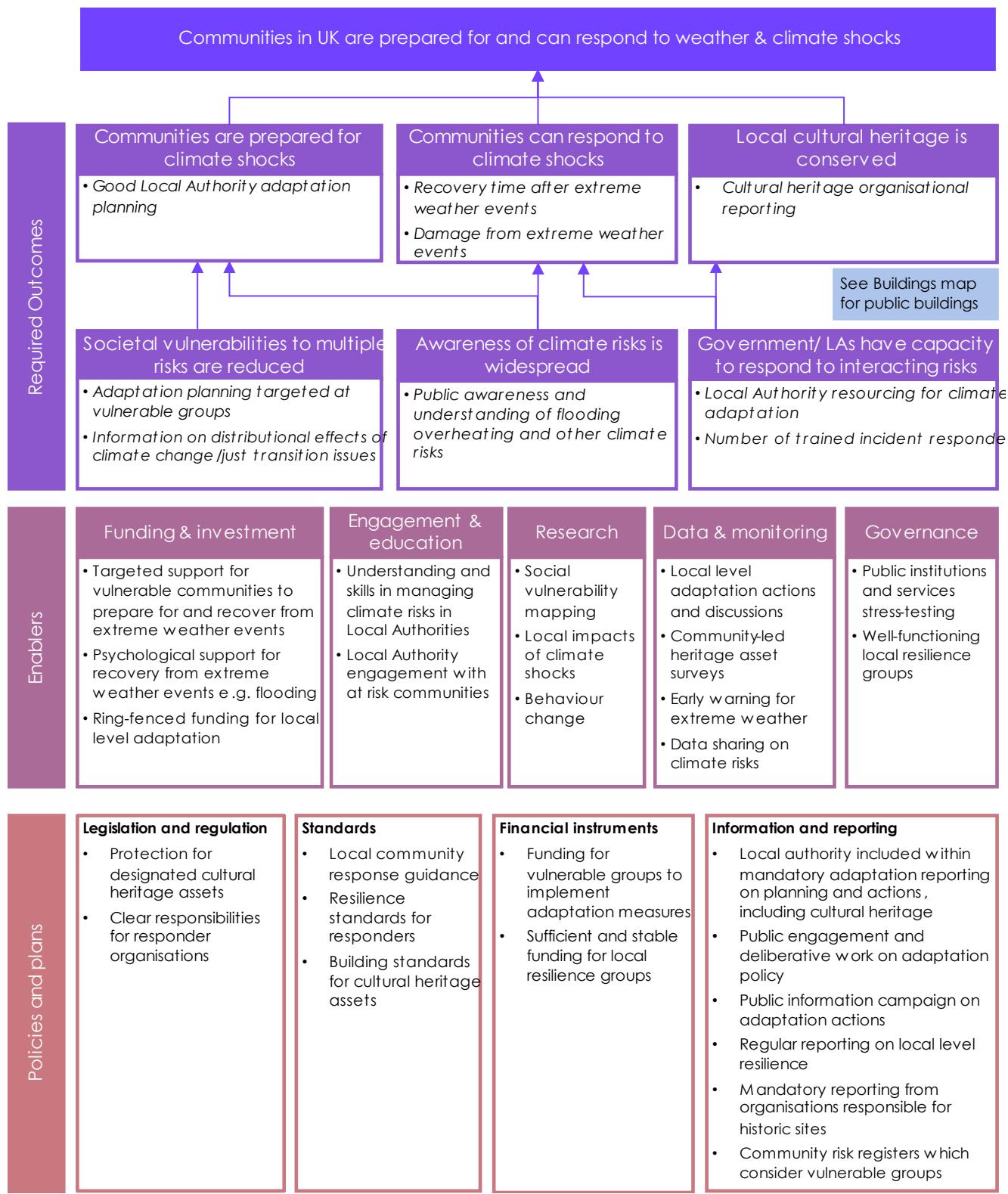
Community engagement and deliberation in adaptation planning

In recent years there has been growing interest in engaging communities to be part of climate change planning and strategy, for example, through the Climate Assembly UK in 2020 and citizens' juries facilitated by local councils. Community engagement and deliberation around climate change is equally important for adaptation:

- Adaptation interventions should be tailored to the specifics of their local geographical and social context to be effective in reducing risks for the most vulnerable. This means that extensive consultation and co-design are necessary through the policy design, implementation, and evaluation phases.
- It is important that individuals and groups who could be negatively impacted by climate change impacts and adaptation actions are adequately included in this process.
- For irreversible and contentious adaptation policies, such as managed retreat from low-lying coastal settlements, this process will need to be extensive and highly transparent. It must also allow sufficient time for a thorough public deliberation on the options and their likely costs and benefits, as well as the costs and impacts expected without adaptation.

Source: CCC (2022) *The Just Transition and Climate Change Adaptation*; University of Lancaster (2022) *The role of deliberative public engagement in climate policy development*.

Figure 12.2 Monitoring map for community preparedness & response



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

This section documents available evidence on progress towards delivery and implementation of each of the outcomes identified in the previous section.

(a) Outcome 1: Communities are prepared for climate shocks

Despite some positive progress on both preparedness and adaptation planning, there is has not been enough focus on monitoring to date.

This outcome is scored as **insufficient progress**, although the Committee recognises that positive steps are being taken. For example, awareness of climate impacts is quite high, local authority adaptation planning is limited (but improving), and every council district is covered by a severe weather plan and one of three regional Emergency Planning Groups (EPG). Conversely, while the work of the Regional Community Resilience Group (RCRG) is positive, it does not currently appear to be well monitored, and there is no regional flood warning system in place in Northern Ireland. An increased focus on indicators of preparedness or perceptions of preparedness would be beneficial.

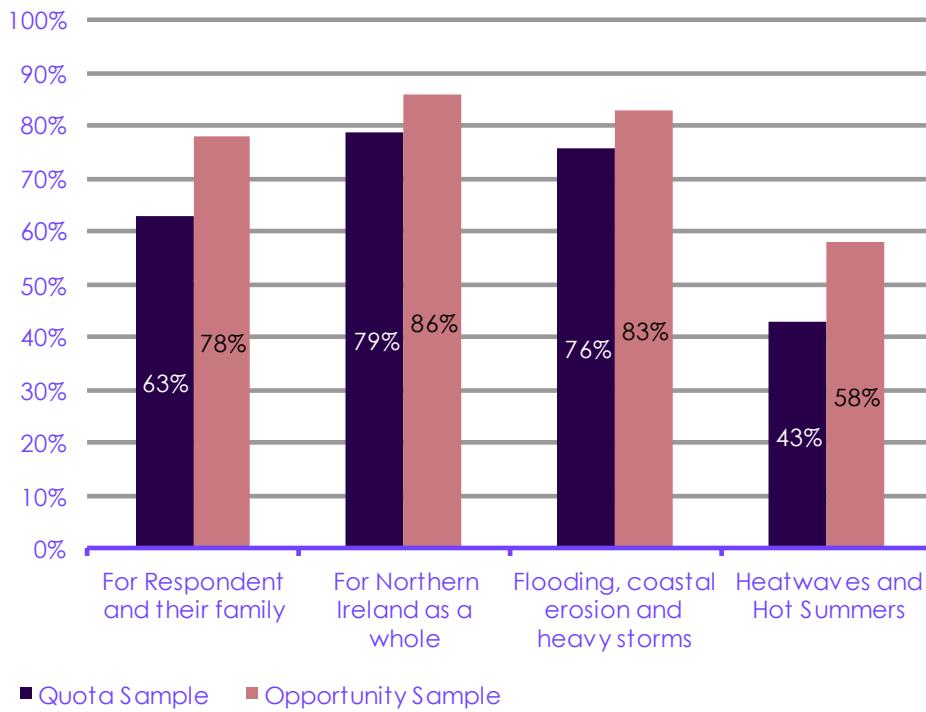
- **Local authority adaptation planning is still under development in NI.** Derry City and Strabane District Council published the first climate change adaptation plan for any NI council and remains the only completed plan to date. Of the remaining ten councils in NI, eight are using the NI Adapts Online Planning toolkit,* with a target of developing their first council adaptation plan by 2024. In the most recent Climate UK 'Local Authority Scorecards' assessment, results showed that planning for mitigation and adaptation in NI scores very low (an average of 3.8 out of 18 compared to an average score of 8.1 for District Councils in Great Britain).² There are no data to date on adaptation planning targeting vulnerable groups.
- **Regional Community Resilience Groups exist across NI but there is limited monitoring.** There are over 40 community resilience groups³ established in NI, normally as a response to flooding or severe weather events. The RCRG has been developed to provide a consistent approach to community engagement activities with the initial support to each group generally consisting of four or five meetings which include guidance and the provision of resources. Each RCRG community receives an annual check-in to ensure contact details are up to date and raise issues of concern. However, across all RCRG communities there are no recent monitoring data on changes to actual or perceived preparedness, which is an area for further work.
- **Awareness or concern about climate change risk is quite high in NI.** An NI-wide survey of nearly 1000 people in 2022 (Figure 12.3) found that climate change impacts for NI are perceived as either 'fairly' or 'very' serious for respondents and their families (63% - 78%) and for NI as a whole (79% - 86%). Flooding, coastal erosion and heavy storms were the climate change impacts most people classified as 'fairly' or 'very' serious threats to Northern Ireland (76-83%). Roughly half of respondents classified heatwaves and hot summers as 'fairly' or 'very' serious risks (43% - 58%).⁴
- **Coverage of weather warning systems is different to the rest of the UK.** Each member of the RCRG communities have provided contact details so that they can be advised by text or email when a Met Office weather warning

* NI Adapts is a five-step adaptation planning toolkit: <https://www.niadapts.org.uk>.

has been issued. These messages, which relate to all weather types, are currently issued to over 400 recipients.⁵ However, there is currently no regional flood warning system as there is in Great Britain.

- Met Office and Emergency Planning teams do collect information on distributional effects of climate change, but this information is often not shared publicly.

Figure 12.3 Percentage of NI public which perceives climate change as 'fairly' or 'very' serious



Source: Steentjes, K. et al. (2022). RESIL RISK Northern Ireland: Public perceptions of climate risks and adaptation in Northern Ireland.

Notes: There were two different response groups in the RESILRISK survey, which were reported separately. This gives a higher and lower percentage range for each question (shown above in darker and lighter colour) rather than a single percentage. In the figure above, the darker column represents the 'quota' sample, which was an attempt to gain a regionally representative group of respondents in terms of age, race, gender etc. The lighter column represents the 'opportunity' sample which responded through a call through existing climate and social media networks.

(b) Outcome 2: Communities can respond to climate shocks

There are extensive emergency response structures in place in Northern Ireland.

This outcome is scored as **unable to evaluate** due to limited data, especially at a community-level resilience. There are no data for year-on-year comparative damage or recovery time from extreme weather events.

- **Every council area in Northern Ireland has an emergency planning officer.** All 11 councils are split into three Emergency Planning Group (EPG) districts, each with its own severe weather plan. Councils all have an emergency planning officer (EPO), who co-ordinates responses and interacts with the wider civil contingencies structure. Belfast City Council appears to be the only council which currently has a full-time officer for climate adaptation.

- **Data on real-world damage and impacts from weather extremes are often not available.** The second cycle NI flood risk management plan details annual average damages for each of the 12 Areas of Potential Significant Flood Risk (APSFR). Each of these APSFRs were designated a priority because their Annual Average Damages were estimated to meet a threshold of £1 million or above. The Plan also suggests that significant numbers of community assets are at risk which communities would struggle without. For example, in Newry, seven of eight GP surgeries and Newry fire station are considered at risk to a 1-in-100-year river flooding event (1% AEP) in current climate conditions.⁶

Data on year-to-year comparative damage does not appear to be routinely gathered or is not accessible.

- Direct expected annual damages from flooding in Northern Ireland for residential properties are currently around £21.3 million.⁷ Significant floods have occurred in the last decade in Northern Ireland, including the August 2017 flood of the Foyle and Faughan River Catchments which caused 400 properties to flood. The clean-up costs of this flooding event were estimated to exceed £30 million.⁸ Holistic figures such as this are often not available, other than through specific post-event reviews such as the 2018 North West Flooding Review.⁹ On that occasion flooding had been so severe that, in accordance with Civil Contingency protocols, a Review was required to identify lessons learned and consider measures to potentially mitigate the impact of any future flooding. This Review was led jointly by the Department for Infrastructure (DfI), The Executive Office (TEO) and Derry City and Strabane District Council (DCSDC). Overall, it found that emergency response had largely been timely and effective but acknowledged areas for improvement including increased support for communities and farms, increased council funding, changes to flood monitoring and mapping and improvements on roles, responsibilities, training and the flood incident line.
- Overall, there is limited real-world data on actual damages from flood events, and a particular absence of data on the impact of heat events. This is important because a recent survey showed that 60% of people in NI have personal experience with discomfort during heatwaves already, and 32% have personal experience or know someone who experiences serious health impacts from heatwaves.¹⁰

Some government schemes are in place to support those affected by flooding, but more information is needed to assess progress.

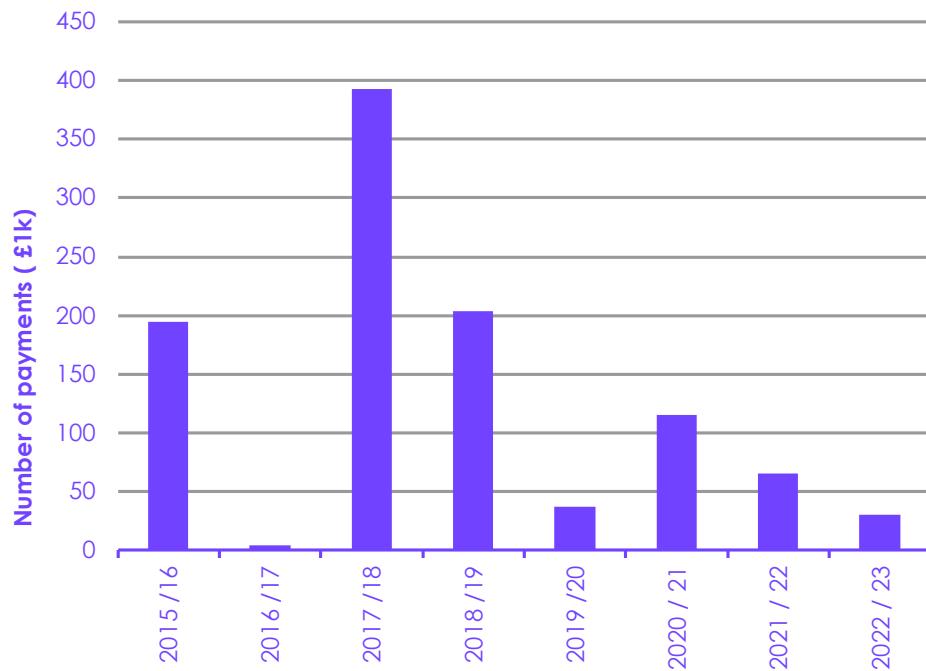
- **The government provides some financial assistance for post-flooding recovery and repairs.** Data on the Scheme of Emergency Financial Assistance (SEFA) shows that over 1000 homes have received support since 2015. A £1000 payment has been provided to 1046 homes¹¹ in Northern Ireland which met SEFA criteria after a flood (Figure 12.4) in order to make homes liveable again as soon as possible. However, the total value of the SEFA payments has decreased steadily since 2020/21. Further data are required to assess whether this decline is related to fewer applications for support and whether the number of payments cover a sufficient proportion of homes impacted by flooding.

Indicators which are not yet available include:

- Monitoring of extreme weather impacts on emergency response.
- Number of responses undertaken by each Emergency Preparedness Group (EPG).

- Number of trained incident responders.*
- Commercial impact of flooding, such as average business days and school days lost due to flooding, and commercial insurance claims.

Figure 12.4 Scheme of Emergency Financial Assistance (SEFA) payments 2016-2023



Source: Department for Communities (2023) Data provided on request.

(c) Outcome 3: Local cultural heritage is conserved

We are unable to assess progress on conservation of cultural heritage to the impacts of climate change in NI.

This outcome is scored as **unable to evaluate** due to a lack of available data. Information on risks to cultural heritage in NI does not appear to be publicly available, other than high-level flood modelling done for the second cycle Flood Risk Management Plan (2021-2027). A range of research programmes are listed for cultural heritage in NICCAP2, but data from these were not available for this assessment.

- **A small percentage of heritage has been designated as 'at risk' due to a range of factors, but climate risk is not yet well understood.** In 2018 HED received reports on 1340 assets owned or leased by Central Government and its arm's length bodies in Northern Ireland. The vast majority of the estate is not considered to be at risk of loss, with 15 historic buildings (2.3% of the government's listed historic buildings or 1.12% of the totality of the government's historic estate)¹² reported as being on the 'Heritage at Risk' NI register. This register is wider than just climate change risk and also covers issues such as vacancy and fire damage.
 - There are 762 buildings¹³ across the whole of Northern Ireland listed on the 'Heritage at Risk' register (8% of listed buildings).¹⁴

* Using the Environment Agency (England) definition of those required to respond to most incidents – mainly roles which are available and operational 24 hrs, rather than specialists with technical skills or geographical responsibility.

There is no climate change assessment or monitoring for these buildings, but according to Department for Communities a listed buildings condition survey is underway at the time of writing. The Listed Building Condition Survey is, for the first time, capturing a building's condition and its associated climate risk. The survey will report if there are significant climate risks and provide a baseline which can be used for comparison. The intention is to undertake future surveys at intervals of five years.

The second cycle NI Flood Risk Management Plan provides some high-level modelling to understand flood risk to cultural heritage in NI, but more local and asset data is required.

- **High level modelling shows that cultural heritage is at flood risk in NI.** The most recent Flood Risk Management Plan for NI undertook high-level modelling for surface water (pluvial), river (fluvial) and tidal flood risk to 3007 Built Heritage sites across the 12 priority Areas of Potential Significant Flood Risk (APSFR). Of the 3007 sites, 2475 were listed buildings. The analysis found that 120 of those listed buildings were at risk from river flooding, 92 from coastal flooding and 113 from surface water flooding.*¹⁵
 - NICCAP2 featured an action on production of an MSc thesis on the impacts of climate change on UNESCO-designated sites in Northern Ireland. It found that while the adaptive capacity to extreme temperature and increased precipitation is moderate to high, for sea-level rise and storm surges it is low in all cases. Recommendations were provided to carry out further research including a full Climate Vulnerability Index (CVI) assessment for the Giant's Causeway.

(d) Progress on enablers

Indicators for the enablers are either limited or do not currently exist.

- **There has been limited mapping of social vulnerability to climate risks in NI.** Community Planning and emergency planning structures undertake work to identify groups which might be most affected by extreme weather impacts, but there are few examples of where mapping has taken place to connect social vulnerability to climate risk since the GB-based Climate Just tool does not cover NI.
 - Perhaps the first attempt to undertake mapping of this kind is the Met Office Heat Vulnerability Index (HVI) for Belfast. Developed in partnership with Belfast City Council and Climate Northern Ireland, the HVI attempts to consider factors such as deprivation or chronic illness in a climate analysis. Results showed that under a high emissions scenario, Belfast will see substantial increases in the number of days above 25°C (1.9 days per year for 1981-1999 baseline to more than 23 per year by 2061-2079). Warm nights above 15°C will also increase (2.1 days per year for 1981-1999 baseline to more than 31 per year by 2061-2079). The map suggests that under a 2°C warming scenario, the electoral ward of Ardoyne in inner Belfast could be at high risk. 12 other electoral wards, such as New Lodge and Woodstock would be considered medium-high risk. Under a higher emissions scenario, the number of wards at high or medium-high risk increases to 29 (11 and 18 respectively) which is around half of the total electoral wards in the city.¹⁶

Half of the electoral wards in Belfast would be at high and medium-high risk of heat vulnerability in a 4°C world.

* Analysis compiled using the same AEP definitions as are used in the NI Flood Maps - River: 1% annual exceedance probability (AEP) or greater in any year, Sea: 0.5% AEP, Surface water: 0.5% AEP.

- **Impacts of climate shocks should be measured by local councils.** There is no consistent record of climate shocks requiring council response, or the time and cost associated with that response.

3. Policy and planning progress

This section documents key policy developments relevant to each of the climate resilience outcomes identified within our monitoring map and the extent to which the key policy and planning milestones are in place.

(a) Outcome 1: Communities are prepared for climate shocks

The NI Civil Contingencies Framework sets out arrangements for preparing for an emergency.

The score for this outcome is **limited policies and plans**. Policy and planning for emergency preparedness in NI is quite well advanced, but adaptation planning is largely still in development. The piloting of Community Risk Registers and development of good quality council adaptation plans may lead to an improved score if implemented, as well as increased public engagement and support for vulnerable groups. Public body reporting should also be in place by the end of 2023 to increase information sharing and reporting on climate adaptation.

Box 12.3

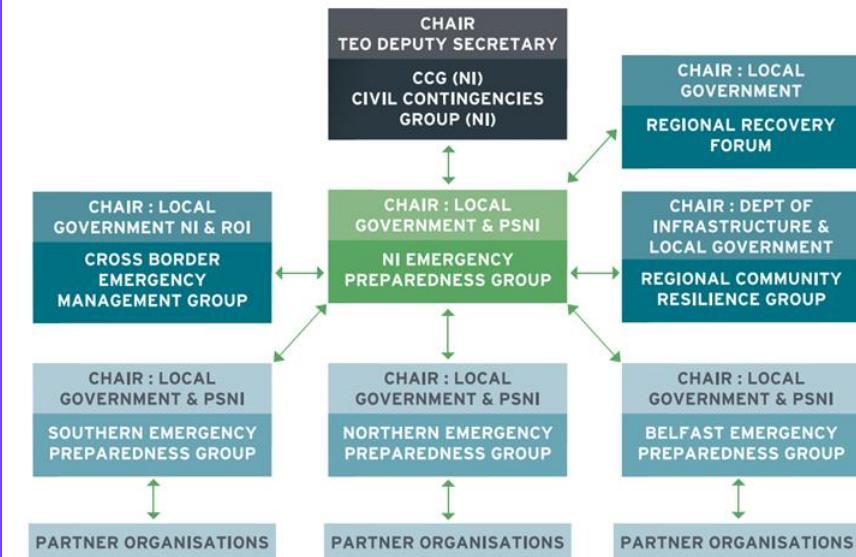
Civil Contingencies Framework in NI

Emergency planning and response is devolved in Northern Ireland, but the UK Civil Contingencies Act is the key legislative driver for this work.

NI Civil Contingencies Framework (2021). The purpose of the framework is to set out the devolved Northern Ireland arrangements for effective emergency management, identifying the processes involved in preparing for, responding to and recovering from an emergency. It provides generic guidance for all types of emergencies and is complementary to the UK Civil Contingencies Act of 2004, drawing upon best practice from across Northern Ireland, the UK, Republic of Ireland (ROI) and global experiences. This framework brought existing protocols and guidance together under one umbrella.

The Framework provides guidance on thresholds for escalation, as well as procedures at a national, regional and local-level. Among other deliverables, it led to the creation of the first NI Regional Risk Register in 2022.

Figure B12.3 NI Local Resilience Structures



Source: TEO (2021) *Building Resilience Together: NI Civil Contingencies Framework 2021*.¹⁷

- **Plans and policy on civil contingencies and local resilience are well advanced.** All NI Departments are engaged in the cross-cutting Civil Contingencies Group, and now have access to the new NI Civil Contingencies Risk Register (released 2022) and interdependency mapping.
 - At a community-level, the Regional Community Resilience Group (RCRG) co-ordinates over 40 community resilience groups. Support includes an annual check-in to get in touch and keep contacts up to date, regular weather warnings, information on topics such as insurance, and a seasonal newsletter. There is also a range of guidance and resources available, including a Community Resilience in Urban Areas (CRUA)¹⁸ toolkit, which was developed by the Red Cross.
- **Pilots of community risk registers will feature public engagement and deliberative work.** A pilot is underway through the RCRG to develop the first two community risk registers in NI, based in Derry City and Strabane District Council and Mid and East Antrim Borough Council. These will consider climate impacts and align with the recent review of the Civil Contingencies Act which recommended that community risk registers include consideration of particularly vulnerable groups.
- **Adaptation planning and reporting is still under development in NI.** The majority of local councils, and the Housing Executive, are using the 'NI Adapts' Online Planning toolkit with a target of developing their first plans by 2024. The recent review of the Civil Society and Local Government Chapter in NICCAP2 features information on the progress of adaptation planning to date, and also an update on the work of RCRG.
 - Under the new Public Body Reporting regulations in the Climate Change Act (NI) 2022, it could become mandatory for local councils to submit reports on the current and projected effects of climate change on their organisation; including their proposals for adapting to climate change in the region and community; and progress made towards implementation. Derry City and Strabane District Council and Belfast City Council also produce annual submissions to Carbon Disclosure Project (CDP) which monitors business and local government mitigation and adaptation actions in regions across the globe.
- **Public information on preparedness is improving.** To date there has been some limited use of social media for risk and advice by groups including RCRG. The main government website, NI Direct, has extensive information on how to prepare for flooding. NI Business Info is a government-funded site and the main source of information for businesses on a wide range of issues. It has a user guide on adapting businesses to climate change, including information on preparing for flooding.
- **Financial instruments for local adaptation do not exist in NI.** There are currently no specific Government funds supporting uptake of adaptation measures by vulnerable groups. The most recent NI Flood Risk Management Plan (2021-27) set out an annual estimated cost of £75,000 incurred by both DfI and other organisations for 'preparedness' associated with community resilience.¹⁹

Work to develop adaptation plans is underway at a local council level, despite not having a statutory requirement to do so.

Government websites offer information on how to prepare for flooding

- **Anecdotal evidence suggests that engagement in the community and voluntary sector has changed after the COVID-19 pandemic.** Stakeholders suggested that the demographic and nature of volunteering is changing in NI, and that many volunteers have not returned. This makes resourcing for local action even more important, to sustain and enhance current action.

(b) Outcome 2: Communities can respond to climate shocks

The score for this outcome is **partial policies and plans**. Some of the key policy and planning milestones are in place through the Civil Contingencies structures and NI Civil Contingencies Framework, particularly around response procedures, and efforts to ensure consideration of vulnerable groups. Northern Ireland responders will have a role engaging with some actions in the new UK Government Resilience Framework, despite many being reserved matters.

Emergency response structures in NI are well-developed and cross-cutting.

- **Every council area in Northern Ireland is covered by a severe weather plan and has an emergency planning officer.** The 11 NI councils are split between the three Emergency Planning Group (EPG) districts. As part of the multi-agency approach a severe weather plan has been developed with input from all agencies and includes an outline of the actions of each responding agency in the preparation for and during a severe weather event, and which considers all weather types including rain, thunderstorms, ice/snow and heat. All 11 councils in NI have an emergency planning officer (EPO) but Belfast is currently the only council which has a full-time officer for climate adaptation. Each EPG has three standing committees; a humanitarian assistance working group, a flooding and severe weather working group and a general purposes working group, which all provide regular updates to the relevant EPG. These are part of the overall governance arrangements for Civil Contingencies in NI, which also include community resilience partners and a cross-border forum with the Republic of Ireland.
- **Resilience standards for responders will be developed across the UK.** National Resilience Standards review will be led by the UK Government, but in consultation with the devolved administrations where appropriate. NI regional team has attended training at the emergency planning college, for example on reservoir flooding. The UK Resilience Framework sets out a series of other training and mock exercise programmes, some of which will be available to NI responders.
 - Devolved administrations should be involved in providing information for an annual resilience report to Parliament from 2025. These reports should include resilience to all climate risks, not just flooding, which may impact local communities.
- **Local community response guidance is available.** The Community resilience in Urban Areas (CRUA) project information is made available through the Red Cross and Regional Community Resilience Group (RCRG). The toolkit includes a Community Resilience guide and a guide to psychosocial support during flooding.²⁰
 - The main government website, NI Direct, has extensive information on what to do after flooding, including the Flood Incident Line, contact information for emergency services and guides on what support or finance may be available. NI Business Info is a government-funded site and the main source of information for businesses on a wide range of

issues. It has information on what businesses can do if they have been flooded.

(c) Outcome 3: Local cultural heritage is conserved

The score for this outcome is **limited policies and plans**, to reflect the somewhat fragmented policy landscape. Policy on protecting heritage assets has developed in a piecemeal fashion, with several different designation regimes that identify different categories of heritage asset. Designation types include world heritage sites, scheduled monuments, listed buildings, registered parks and gardens, conservation areas, and locally listed buildings and sites. However, the Committee recognises that Department for Communities has some plans to address risk on the government historic estate and that guidance is being developed to support asset owners. Further action is needed to create a regional plan and to collate and publish climate impact and risk assessment information which could be used to assess progress.

Box 12.4

Cultural Heritage Policy Context in NI

Cultural Heritage is a devolved matter in Northern Ireland, but it has a complex policy context.

Legislative requirements. These acts and orders are primary legislation or statutory law in Northern Ireland. Under the Planning Act (NI) 2011, each district council must also prepare its own Local Development Plan (LDP) which will include important considerations in dealing with planning applications and guiding decision making at local government level.

- Protection of Wrecks Act 1973
- Historic Monuments and Archaeological Objects (NI) Order 1995
- Marine and Coastal Access Act 2009
- Planning Act (NI) 2011
- Marine Act (NI) 2013

Key strategic policy documents.

- The Regional Development Strategy 2035 includes the explicit objective to: 'Protect and enhance the environment for its own sake' [RDS aims, 2.10] and 'Conserve, protect, and where possible, enhance our built heritage and our natural environment' [RG11] adding that, 'The environment, both in terms of natural and built heritage, is one of Northern Ireland's most important assets. Effective care of the environment provides very real benefits in terms of improving health and wellbeing, promoting economic development'
- The Strategic Planning Policy Statement 2015 includes the following Regional Strategic Objectives for archaeology and the built heritage:
 - 'Secure the protection, conservation and, where possible, the enhancement of our built and archaeological heritage;
 - Promote the sustainable development and environmental stewardship with regard to our built and archaeological heritage; and
 - Deliver the economic and community benefit through conservation that facilitates productive use of our built heritage assets and opportunities for investment, whilst safeguarding their historic or architectural integrity'

Source: Department for Communities (2023) *Conservation Principles: Guidance for the sustainable management of the historic environment in Northern Ireland*.²¹

- **Limited climate plans are in place for the government historic estate, but a cohesive strategy for reducing climate impacts on cultural heritage across NI appears to be missing.** Historic Environment Division (HED) in the Department for Communities is developing actions on Climate Change and the historic environment. Government Departments and arm's length bodies are required to report against the 12-point Protocol for Care of the Government Historic Environment, which requires that reports are submitted to the Assembly on a two-year cycle. Point 12 of the Protocol is to 'ensure that the historic environment is included in climate change action plans.' The most recent 2021 report was not yet published at the time of writing.
 - HED collaborated with the National Trust in the production of climate change adaptation guidance, a Climate Change Hazard Tool, and in development of a site-specific monitoring framework that might be applied to State Care Monuments. The first phase of this work has led to development of a case study which can guide and inform the stewards of heritage assets (such as government departments responsible for heritage assets, or charitable trusts with such roles) on how, when and whether to adapt their management and conservation planning for sites and assets in their care.
 - HED has a climate change risk assessment tool for historic building owners, and has engaged with District Councils through the Community Planning process to advise them on the cultural heritage and are working with a number of councils as they produce plans to develop their heritage, including steps to consider the future impacts of climate change.
- **Initiatives are in development which could enhance information and reporting on climate impacts to cultural heritage.** Under the new Public Body Reporting regulations in the Climate Change Act (NI) 2022, organisations responsible for historic sites could be invited to submit reports on the current and projected effects of climate change on their organisation; their proposals for adapting to climate change; and progress made towards their implementation.
 - A Historic Environment Stakeholder Group is now being developed by HED and Northern Ireland Environment Link, to bring the heritage sector together to shape a vision and activity supporting delivery of DfC priorities.
- **Conservation principles exist for cultural heritage assets in NI.** HED released Conservation Principles Guidance in January 2023. The document sets out a conservation-led framework to inform decision-making. The document recognises the importance of climate related challenges, and the importance of adaptation and mitigation. DfC is encouraging asset owners, developers and local and central government decision-makers to refer to the Principles, which it says are in line with The British Standard 7913: 2013 Guide to the Conservation of Historic Buildings.

(d) Recommendations

Based on the assessment of policy and planning progress, we have identified recommendations to close key policy gaps for community preparedness and response (Table 12.2).

Table 12.2

Recommendations – Community preparedness and response

Primary responsibility	Recommendation	Timing
DfI	Develop a Flood Forecasting and Warning Service for NI.	2027
RCRG, DfI, Local Councils	Conduct a regular survey of public perceptions of risk, resilience and preparedness to better understand requirements for support and identify what interventions should be prioritised, particularly with Regional Community Resilience Groups.	2025
Local Councils	Impacts of local shocks due to weather extremes (including financial impacts) should be measured by local councils and reported as part of Public Body Reporting Duties. These reports should include details on preparedness and also subsequent adaptation initiatives undertaken at a community-level in response to the shocks.	2023
Local Councils	Senior leaders to provide resource and support officers to meet the SOLACE ambition in NICCAP2 of every council having a published adaptation plan by 2024.	2024
DAERA	Include community engagement activities (such as citizens assemblies) under NICCAP3, to put fairness at the centre of efforts to implement a vision for a well-adapted UK. This engagement programme should focus on exploring issues of fairness in some of the most challenging aspects of adaptation (e.g. coastal retreat) and in the provision of public funding for adaptation	2024
Met Office, DfI	Met Office Civil Contingencies Team should publish annual NI-specific briefings on weather impacts and, where possible, response.	2023
DfI, DAERA, DoH	Build on the good work of the DfI Flood Alleviation Storymap / Explorer to develop a publicly available database for local-scale flood risk, coastal erosion and (where possible) overheating risk. This should be easy to understand, so it can be used for community resilience and awareness initiatives.	2025
DfC	Co-develop a climate plan for with the wider cultural heritage sector in NI, which brings together a range of policies and principles and builds on existing good work. This plan should include adaptation actions for identifying and adapting to climate change impacts on the Government estate and beyond, the creation of a condition baseline for future monitoring of the rate of climate change impacts, and actions to promote and assess the use of adaptation guidance among wider cultural heritage owners.	2027
DfC	Cultural Heritage Owners and Arm's Length Bodies to report on adaptation actions and risk assessment under forthcoming Public Body Reporting regulations.	From 2023

Endnotes

- ¹ Historic England. *Heritage Conservation Defined*, <https://historicengland.org.uk/advice/hpg/generalintro/heritage-conservation-defined/>
- ² Climate Emergency UK (2021) Council Climate Scorecards. <https://councilclimatescorecards.uk>
- ³ DfI (2023) Data provided on request.
- ⁴ Steentjes, K., McCamley, M., Berman, J., & Pidgeon, N. (2022). RESIL RISK Northern Ireland: Public perceptions of climate risks and adaptation in Northern Ireland. Cardiff: Cardiff University <https://orca.cardiff.ac.uk/id/eprint/150146/1/RESIL%20RISK%20Northern%20Ireland%20report%20.pdf>
- ⁵ DfI (2023) Data provided on request.
- ⁶ DfI (2022) Second Cycle Northern Ireland Flood Risk Management Plan 2021-2027. <https://www.infrastructure-ni.gov.uk/sites/default/files/publications/infrastructure/second-cycle-ni-flood-risk-management-plan-may-2022.pdf>
- ⁷ CCC (2021) Evidence for the third UK Climate Change Risk Assessment (CCRA3): Northern Ireland Summary. <https://www.ukclimaterisk.org/wp-content/uploads/2021/06/CCRA-Evidence-Report-Northern-Ireland-Summary-Final.pdf>
- ⁸ Ibid
- ⁹ DfI (2018) North West Flooding Review. <https://www.infrastructure-ni.gov.uk/sites/default/files/publications/infrastructure/north-west-flooding-review-2018.pdf>
- ¹⁰ Steentjes, K., McCamley, M., Berman, J., & Pidgeon, N. (2022). RESIL RISK Northern Ireland: Public perceptions of climate risks and adaptation in Northern Ireland. Cardiff: Cardiff University <https://orca.cardiff.ac.uk/id/eprint/150146/1/RESIL%20RISK%20Northern%20Ireland%20report%20.pdf>
- ¹¹ DfC (2023) Data provided on request through DfI.
- ¹² DfC (2018) Protocol for the Care of the Government Historic Estate: Biennial Report 2015-17 <https://www.communities-ni.gov.uk/sites/default/files/publications/communities/hed-protocol-report.pdf> p78
- ¹³ UAHS (2023) Built Heritage Risk. <https://www.ulsterarchitecturalheritage.org.uk/built-heritage-risk/>
- ¹⁴ DfC (2023) Heritage Risk. <https://www.communities-ni.gov.uk/articles/heritage-risk>
- ¹⁵ CCC Analysis on DfI (2022) Second Cycle Northern Ireland Flood Risk Management Plan 2021-2027.
- ¹⁶ Met Office (2022) Urban Heat Risk in Belfast. <https://storymaps.arcgis.com/stories/d7e3520fbf0e4b23ae06eb665288d2ca>
- ¹⁷ TEO (2021) Building Resilience Together: NI Civil Contingencies Framework. https://www.executiveoffice-ni.gov.uk/sites/default/files/publications/ofmdfm_dev/ni-civil-contingencies-framework.pdf.pdf
- ¹⁸ British Red Cross (2022) Community Resilience in Urban Areas. <https://www.redcross.org.uk/about-us/what-we-do/we-speak-up-for-change/community-resilience-in-urban-areas-manual>
- ¹⁹ DfI (2022) Second Cycle Northern Ireland Flood Risk Management Plan 2021-2027. <https://www.infrastructure-ni.gov.uk/sites/default/files/publications/infrastructure/second-cycle-ni-flood-risk-management-plan-may-2022.pdf>

²⁰ British Red Cross (2022) *Community Resilience in Urban Areas*.

<https://www.redcross.org.uk/about-us/what-we-do/we-speak-up-for-change/community-resilience-in-urban-areas-manual>

²¹ DfC (2023) *Conservation Principles: Guidance for the sustainable management of the historic environment in Northern Ireland*



Chapter 13

Business

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Introduction

Table 13.1

Progress summary – Business

	Delivery and implementation	Policies and plans	Summary
Outcome 1: Public and private adaptation measures are implemented to minimise risks to business sites	Unable to evaluate	Limited policies and plans	<ul style="list-style-type: none"> • Lack of up-to-date consolidated information on flood risks and water consumption data for businesses. • Policy plans are in place that target flood risk reduction, but there are some gaps in the allocation of long-term funding. • There is no current water reduction target in place for businesses. • Published 'Adapt your business to climate change' guidance in 2019.
Outcome 2: Businesses have access to capital and insurance including for adaptation	Unable to evaluate	Limited policies and plans	<ul style="list-style-type: none"> • Lack of available data on business use of finance for adaptation action. • Support packages are available, but small in scale and focus on grant funding rather than building the full suite of finance options needed to implement business adaptation.
Outcome 3: Productivity losses due to physical climate risks are minimised	Unable to evaluate	Insufficient policies and plans	<ul style="list-style-type: none"> • Only a limited number of studies have considered the impacts of higher temperatures on productivity in the UK, and there is no regional breakdown. • Data for non-residential overheating is sparse or not available. • Provisions for worker access to work during bad weather is left to individual employer policies and there is no maximum work premise temperature set. • Insufficient policies and plans exist to ensure that buildings do not overheat during heatwaves.
Outcome 4: Supply chain risks are identified and managed	Unable to evaluate	Insufficient policies and plans	<ul style="list-style-type: none"> • Lack of assessment of climate risk exposure of Northern Irish supply chains. • Public tenders must assess social value. But currently adaptation is not included as a criteria. • There is some advisory and financial support for supply chain risk management but not for climate risks yet.
Outcome 5: Risks and actions are disclosed and managed by businesses	Mixed progress	Limited policies and plans	<ul style="list-style-type: none"> • There is increasing participation in voluntary reporting exercises, but focus is on broad environmental management and lacks specific consideration of adaptation. • UK-wide reporting schemes are driving climate-risk reporting by large Northern Irish businesses (e.g. Task Force on Climate-Related Financial Disclosures, UK Green Finance taxonomy). • But small and medium-sized enterprises (SMEs) are outside many of these schemes currently.

Relevant risks from CCRA3:

B1 Risks to business from flooding; B2 Risks to businesses and infrastructure from coastal change; B3 Risks to businesses from water scarcity; B5 Risks to business from reduced employee productivity due to infrastructure disruption and higher temperatures in working environments; B6 Risks to business from disruption to supply chains and distribution networks; B7 Opportunities for business from changes in demand for goods and services.

This chapter covers adaptation to climate change by businesses. The focus is on assessing the Northern Ireland (NI) government's contribution in supporting businesses to adapt to climate change. Business sites, activities and supply chains can be directly disrupted by flooding and storms; coastal change due to erosion; risks of reduced water availability; and higher temperatures in working environments. Businesses are also indirectly exposed to the full range of weather and climate risks (both domestically and internationally) through infrastructure failure and shocks to the prices of key commodities. Some business sectors also have opportunities from a changing climate. Warmer summers may lead to possible opportunities for increased tourism, improved growing conditions for agriculture (for particular products such as wine) and opportunities to provide goods and services to meet a growing need for adaptation across the economy.

Physical climate risks and their impact on businesses in Northern Ireland are highly interdependent, with a range of cross-cutting aspects.

Physical climate risks and their impact on businesses in Northern Ireland are highly interdependent, with a range of cross-cutting aspects. The other chapters within this report where these linkages are most pronounced include:

- **Nature and working lands and seas** (Chapters 2 and 3): Changes in the natural environment impact natural capital, particularly in agriculture and fisheries as business sectors.
- **Infrastructure** (Chapters 5 – 8): Most business functions depend on reliable infrastructure, with disruptions posing a key risk for site operations, access to markets, supply chain and distribution networks, and employee productivity.
- **Buildings** (Chapter 10): Overheating of buildings poses risks to employee well-being and productivity, and the state of the built environment and adaptation responses depend on business action, including investment and construction procedures.
- **Finance** (Chapter 14): Global exposure of UK financial sector through international transactions.

The most recent climate change risk assessment for Northern Ireland found that climate risks are already having a growing impact on businesses.

The most recent climate change risk assessment for Northern Ireland found that climate risks are already having a growing impact on businesses (Box 13.1). It also highlighted that the greatest climate change risks to businesses in Northern Ireland 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 networks and service deliveries.¹

Box 13.1

Climate hazards and opportunities to businesses in Northern Ireland

CCRA3 identified a number of key climate risks for business in Northern Ireland, along with potential opportunities to be realised in the agricultural sector.

- Flooding and coastal change risk to businesses is a medium risk now, is expected to rise to high risk in the future for Northern Ireland.
 - In the future, the expected annual damages for non-residential properties in Northern Ireland are to increase by 22% by 2050 and 33% by 2080 given present day levels under a +2°C by 2100 scenario
 - Northern Ireland faces increasing risks from coastal erosion (c.19.5% of the coast is at risk of erosion) and marine flooding.
- Water scarcity risks require further investigation due to significant gaps in analysis with the magnitude of risk being low now, but medium to potentially high in the future.

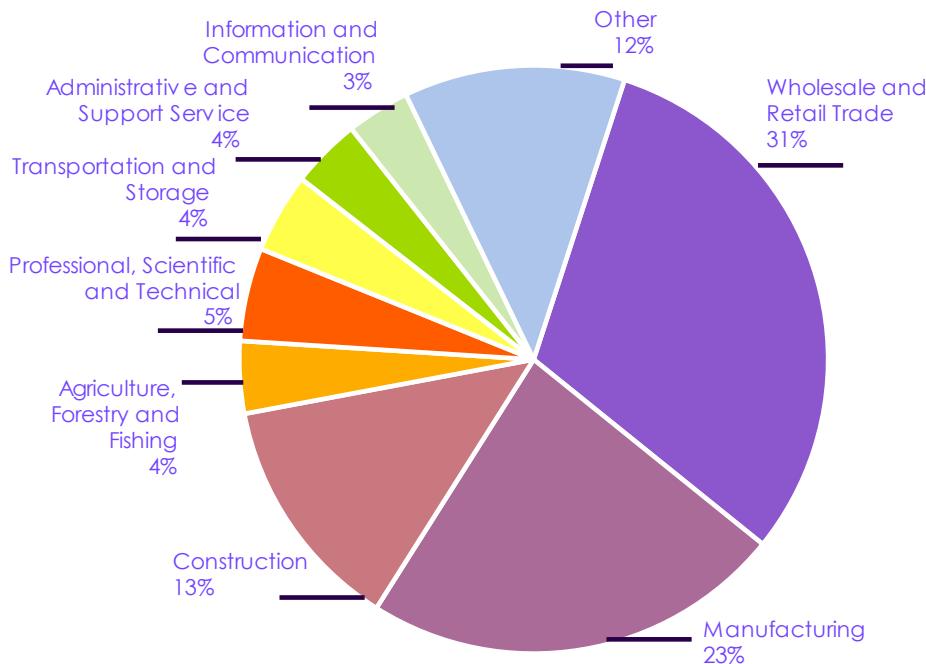
- Increased likelihood of wetter winters and hotter, drier, summers impacts probability scenarios of consecutive bad farming seasons and compounded effects on crop growth also increase likelihood of losses in crop production.
- Recent evidence shows that many Northern Ireland farms have diversified, expanding business into other crops they do not currently grow and using land for business activities beyond traditional farming, this is an area where more opportunities may be realised.

Source: Climate Northern Ireland (2021) Evidence for the third UK Climate Change Risk Assessment (CCRA3) Summary for Northern Ireland.

Compared to the UK overall, Northern Ireland has a greater proportion of turnover from small and medium-sized enterprises (SMEs).

At the start of 2022, there were 128,000 private sector businesses in Northern Ireland.² Figure 13.1 shows the key industry sectors by turnover with wholesale and retail trade and manufacturing driving the majority of turnover. Compared to the UK overall, Northern Ireland has a greater proportion of turnover from small and medium-sized enterprises (SMEs) at 63%, compared to 51% for the UK as a whole.³

Figure 13.1 Northern Ireland private sector turnover



Source: BEIS (2022) Business population estimates for the UK and regions 2022.
Note: Financial and Insurance Activities are not included in data set.

Relevant policy in this area is largely devolved, with Northern Ireland having responsibility for supporting domestic businesses, innovation and contributing to economic growth. Key departments include Department for the Economy (DfE); Department for Infrastructure (DfI) and Department of Agriculture, Environment and Rural Affairs (DAERA). However, macro-economic policy and certain corporate reporting schemes are largely controlled by the UK government. International trade is a reserved matter.

The second Northern Ireland Climate Change Adaptation Programme (NICCAP2) identified indicators and actions to achieve the objective of businesses that can adapt to impacts of climate change and extreme weather (Box 13.2).

Box 13.2

Businesses in NICCAP2

- Objective B1: We have businesses that can adapt to impacts of Climate Change & extreme weather.

Indicator(s):

- Number of non-residential properties at risk of flooding

Actions:

- Publish the Water Resource and Supply Resilience Plan
- DfE liaise with the Oil, Gas and Electricity Industries to promote and encourage thinking on climate change issues
- Invest NI, through the nibusinessinfo.co.uk platform, will maintain and develop 'Adapt your business to climate change' guidance

Source: DAERA (2019) *Northern Ireland Climate Change Adaptation Programme 2019-2024*.

1. Monitoring progress towards a well-adapted business sector

Building on the actions and objectives set out in NICCAP2 (Box 13.2), we lay out the further key goals and outcomes needed for a well-adapted business sector.

For businesses, successful adaptation to climate change means that a reliable supply of goods and services, and a thriving economy, is maintained despite climate change; and that, where they exist, the economic opportunities of climate change are realised. Adaptation also limits the extent of damages, losses and disruption to business sites, production processes and the workforce.

While often used in conjunction with ‘resilience’ within the business community, the focus of this chapter is specifically on responding to physical climate risks, and not broader actions to deliver a low-carbon economy that is resilient to changing markets or regulations.

We have identified key outcomes to deliver a well-adapted business sector. A number of policy actions and enabling factors are needed to deliver these outcomes (Figure 13.2). The key adaptation outcomes that need to be achieved for Northern Irish businesses to deliver these goals are:

- **Public and private adaptation measures are implemented to minimise risks to business sites.** Physical climate impacts, such as extreme weather events, pose a risk to business sites and operations. Climate impacts on resource availability, such as water, can also impact organisations' ability to deliver goods and services. Adaptation to these will require adaptation actions from business themselves (such as preventing workplaces from overheating) as well as wider public adaptation.
- **Businesses have access to capital and insurance including for adaptation.** Businesses will need capital to take adaptation actions and insurance to insulate them from climate shocks – access to these markets, at reasonable cost, is therefore a key element of climate resilience for all business sectors.
- **Productivity losses due to physical climate risks are minimised.** Climate change impacts, such as extreme heat or weather-related travel disruption, can make it difficult for staff to conduct their roles. Without adaptation measures, there is a risk of resulting productivity losses, ultimately impacting on business output and profitability.
- **Supply chain risks are identified and managed.** Businesses in Northern Ireland rely on well-functioning supply chains, both domestically and internationally, to deliver goods and services. The majority of external goods come from Great Britain, but Northern Ireland also relies on links with Ireland, China and USA.⁴ There are a multitude of risks to supply chains from climate change, such as transport disruption and loss of produce.*
- **Risks and actions are disclosed and managed by businesses.** Businesses will need to undertake robust climate risk assessments to identify the necessary adaptation actions they will have to take. Government coordination with businesses to create a transparent information disclosure regime can in turn

* Trade policy is reserved to UK Government.

drive possible incentives for those businesses that are taking effective action (for example from customers and investors).

Businesses of all sizes will need to adapt to climate change.

Businesses of all sizes will need to adapt to climate change. Both large business and SMEs have an important role to play in delivering adaptation across the wider economy as well as adapting themselves to ensure a reliable supply of goods and services. It is in the interests of businesses of all sizes to adapt to climate change to both manage risks but also to realise potential new opportunities. However, the policies and enablers to support businesses of varying sizes are different.

Enabling factors that need to be in place to deliver these outcomes are wide-ranging and include:

- **Governance.** Companies need to embed climate change risks and adaptation into their internal risk governance strategies. This includes development of climate-sensitive business continuity plans, integration of adaptation into climate-related mandatory reporting structures, assigning Board-level responsibility for climate adaptation and establishing responsible investment policies.
- **Engagement and education** will be needed to embed climate adaptation skills within companies. Establishing capacity for risk assessment and scenario analysis helps companies identify key risk areas and potential effective actions. Developing the skills needed to raise finance successfully for adaptation is important, along with dedicated engagement with suppliers on climate adaptation. For SMEs, there should be good access to adaptation guidance and tools.
- **Funding and investment** are needed to deliver adaptation interventions, for example through adaptation-linked financial products. Insurance products designed for adaptation can catalyse adaptation action. Government funding for pilots and support for development of new markets is a powerful enabler.
- **Data and monitoring** are essential to enable robust risk assessment, tracking of effective actions, data on adaptation intervention costs and benefits, and understanding of interdependencies. Building greater evidence to quantify and monetise benefits of adaptation action can enable investment.
- **Research** will be needed to drive innovation in future-ready goods and services, business processes and supply chains, along with identifying any opportunities from climate change.

Key policy milestones to deliver a well-adapted business sector for Northern Ireland will be a mixture of devolved and reserved.

Key policy milestones to deliver a well-adapted business sector for Northern Ireland (NI) will be a mixture of devolved and reserved. For our assessment we focus on policy levers in the control of Northern Ireland but consider reserved policy where relevant for adaptation implementation.

- **Legislation and regulation.**
 - **Northern Ireland scope.** Government procurement rules that give weight to adaptation plans for suppliers can establish high standards and provide incentives to develop climate resilient products and services along with setting water reduction targets for businesses.

- **UK wide.** Mandatory disclosure of business risks and adaptation responses by large companies, along with green finance taxonomies that cover adaptation can drive transparency and enable effective decision-making. Setting a water reduction target for businesses to drive water efficiency is needed to address water availability risks. Large businesses operating in Northern Ireland will be influenced by major UK-wide reporting initiatives, like the Taskforce on Climate-related Financial Disclosures (TCFD).

- **Information and reporting.**

- **Northern Ireland scope.** Climate Change Act (Northern Ireland) 2022 has a provision for climate change reporting by public bodies. Other policy levers include data and assessment support for climate-related scenario analyses and reporting. Larger businesses often have greater organisational capacity for undertaking climate risk analysis and developing adaptation actions in response, though government still has an enabling role in determining consistent standards, scenarios and data provision. Smaller businesses have less capacity to assess their risks, devise responses and recover after extreme weather events. They require clear central resources, where they can access the information they need to make business continuity plans for extreme weather and changes in the climate.

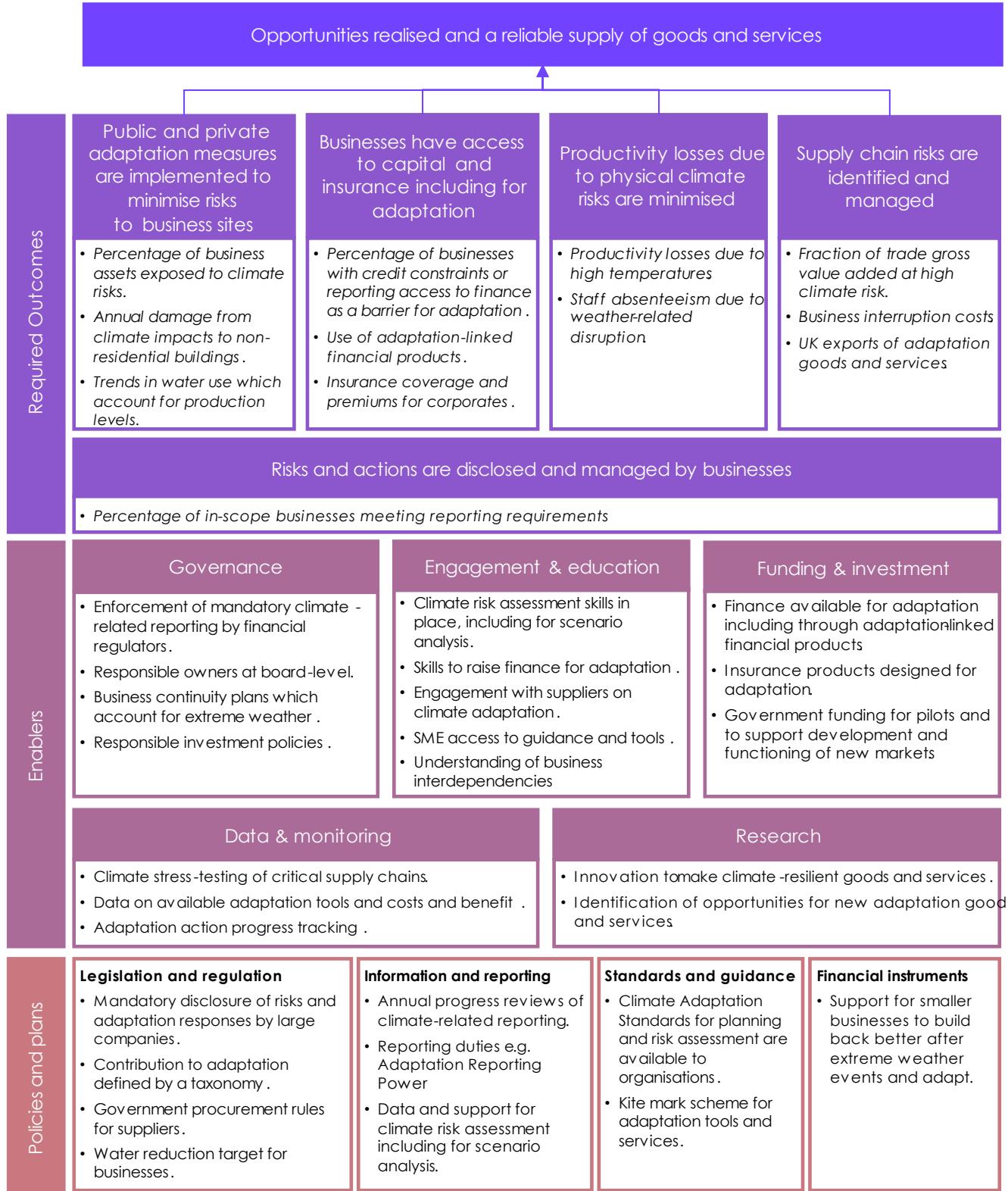
- **Standards.**

- **Northern Ireland scope.** Consistent standards for adaptation planning, tools and services relevant to business context in Northern Ireland.
- **UK wide.** UK-wide standard setting institutions establish consistent standards for adaptation goods and services, for example through a Kite mark scheme.

- **Financial instruments.**

- **Northern Ireland scope.** The impact of extreme weather events can be damaging for businesses, and additional grants and subsidies can reduce the time for which they are unable to trade, the likelihood of them closing down and economic and social consequences.

Figure 13.2 Monitoring map for business



2. Delivery and implementation progress

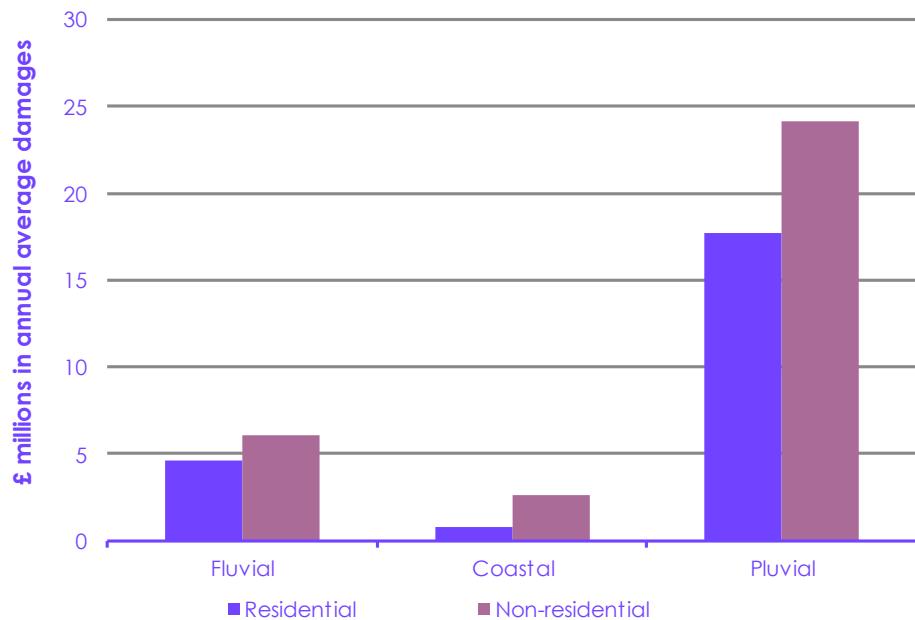
(a) Outcome 1: Public and private adaptation measures are implemented to minimise risks to business sites

It was **not possible to evaluate** this outcome. There is a lack of recent non-domestic water consumption data, and there is limited time-series data on changes in business flood risk and damages.

Measurement of flood damage is not gathered in reality, only predictive models.

- **Data collected under NICCAP2 identify 10,786 non-residential properties at risk of fluvial/tidal/surface water flooding in 2018.⁵** Further data are required to understand the proportion of these properties at flood risk as a total of all buildings.
- **There is a predicted increase of non-households at risk of flooding due to climate change.** Analysis from NIFRA estimates that the projected effects of climate change on flood risk show an increase of over 8,500 residential and 2,200 non-residential properties at risk from combined sources of flooding by 2080.⁶ The North Eastern river basin district (RBD) is predicted to be impacted more than the other RBDs by climate change.
- **The expected direct annual damages for non-residential properties in Northern Ireland (NI) at present is £42 million, comprising of 6% of total UK damages.⁷** The greatest damages are expected to be from pluvial (surface water) flooding (Figure 13.3).

Figure 13.3 Property economic damages in NI flood risk areas



Source: NIFRA (2018)

Notes: Annual average damages is the average economic damages per year that would occur at a defined location from flooding when considered over a very long period of time. Residential includes intangible damages which take into account the stress or inconvenience of moving elsewhere whilst a home is repaired after a flood event.

- **Non-household water demand has fallen, but only in part due to water efficiency measures and there is a lack of recent data.** Non-household water demand has fallen by 41% over the period 2002/03 to 2014/15, but only in part due to water efficiency measures. Another contributor has been the number of business closures and particularly large drops following the economic recession.⁸
- **Uptake of automatic metering is increasing, and monitoring of metering data is also improving.** NI Water has installed over 5,000 Automatic Meter Reading (AMR) Meters as of October 2021, aiming for improved system performance, and increasing the accuracy of billing.⁹
- **There is limited evidence of the impacts of coastal erosion on Northern Irish businesses.** There is evidence that sea level rise could lead to a loss of coastal business locations and the infrastructure they rely on for access, power and communications. However due to a lack of baseline evidence on coastal structure and coastal processes, it is difficult to assess the change over time.¹⁰

(b) Outcome 2: Businesses have access to capital and insurance including for adaptation

It was **not possible to evaluate** this outcome due to a lack of consolidated and large-scale collected information.

- **Northern Ireland specific estimates of adaptation investment gaps are missing.** Recent CCC research highlights the multiple barriers that currently limit investment into building climate resilience from beyond the public sector. These include market, information, bankability, policy, regulatory and behavioural barriers that can prevent business access to capital and insurance for adaptation.¹¹
- **Gathering information on insurance coverage and premiums for businesses relating to climate-risks would help tracking.** The 2011 study by NISRA on 'Northern Ireland Access to Finance 2007 and 2010'¹² could be repeated with additional information gathered for climate change adaptation action.

(c) Outcome 3: Productivity losses due to physical climate risks are minimised

It was **not possible to evaluate** this outcome due to lack of quantified and comparable data. Only a limited number of studies have considered the impacts of higher temperatures on productivity in the UK, and there is no regional breakdown. There is therefore considerable uncertainty about the magnitude of impacts and the degree of the risk to Northern Ireland both now and in the future.

- **Data for residential and non-residential overheating is sparse or not available.** There is no available evidence of any programme of work being undertaken in Northern Ireland to periodically measure overheating in non-residential buildings. As there is a shift to increasing numbers of people working from home, this may increase the exposure of much of the population to high temperatures during the daytime. Prior to 2020 less than 4% of workers in Northern Ireland worked mainly from home. Since the COVID-19 pandemic, 41% of workers in Northern Ireland were working from home and, by April 2021, more than 30% of UK businesses were reporting

Uptake of automatic metering is increasing, and monitoring of metering data is also improving.

Gathering information on insurance coverage and premiums for businesses relating to climate-risks would help tracking.

Data for residential and non-residential overheating is sparse or not available.

that some or all of their employees were still working remotely.¹³ Exposure to heat in homes will increase if some businesses and workers choose to adopt this style of working on a permanent basis¹⁴, but data for residential and non-residential overheating is sparse or not available (See Chapter 10 Buildings).

(d) Outcome 4: Supply chain risks are identified and managed

It was **not possible to evaluate** this outcome due to a lack of assessment of climate risk exposure of Northern Irish supply chains.

- **No major analyses of exposure of major import sectors to climate risks.** In 2020, Northern Ireland purchases from Great Britain (GB) were £13.2 billion compared to £7.1 billion of imports from outside the UK. The major sectors were machinery and transport; food and live animals; and manufactured goods but there is a lack of information on how these imports may be affected by climate change. Republic of Ireland remains Northern Ireland's single largest import market.¹⁵
- **Maritime trade routes are particularly vulnerable to climate change, especially important for Northern Ireland's supply chains.** For example, in 2019, 18.5 million tonnes of sea freight crossed the Irish sea between Great Britain to Northern Ireland, representing 50% of the total sea freight across. 52% of that freight stayed in Northern Ireland, while the rest was forwarded on to other destinations.¹⁶ Maritime trade routes are particularly vulnerable to climate change due to dependence on overseas maritime infrastructure and the future viability of maritime routes.¹⁷
- **In 2021, Republic of Ireland was both the largest export and import market for Northern Ireland for food and live animals.**¹⁸ Northern Ireland's agri-food sector is closely integrated with that of the Republic of Ireland, and agricultural produce crosses the border frequently. Agricultural produce frequently crosses the border during the production process, and supply chains are highly integrated both at the inter-firm and intra-firm level. Many companies operate premises on both sides of the border or rely on suppliers from the other side of the border as part of their supply chains.¹⁹ See Chapter 4 for more information on food supply chains.

(e) Outcome 5: Risks and actions are disclosed and managed by businesses

Indicators for this outcome demonstrate **mixed** progress.

- **UK-wide reporting schemes are stimulating climate-risk reporting by large businesses.** For example, large Northern Irish businesses can align with the UK-wide Task Force on Climate-related Financial Disclosures (TCFD) reporting scheme, which currently would cover c.80 businesses with over 500 employees.²⁰
- **There are some voluntary environmental disclosures in place for SMEs, but climate risks are not yet a strong focus.** Business in the Community Northern Ireland (BITC NI) have conducted a NI Environmental Benchmarking Survey since 1998 that provides some reporting on smaller businesses. It is a free, annual, online, environmental management self-disclosure exercise. Questions cover risk identification and certain governance factors, such as board-level responsibilities, that are key steps for delivering adaptation.²¹

There are some voluntary environmental disclosures in place for SMEs, but climate risks are not yet a strong focus.

The number of business reporting is still low (100 in 2022) compared to number of Northern Irish businesses with between 50-250 employees (965).^{22,23}

(f) Progress on enablers

Indicators relating to enabling factors demonstrate some positive progress towards the outcomes, with good progress particularly in actions to increase business education and engagement on adaptation.

- **Engagement and education.**
 - **There are a number of established business education organisations and platforms that deliver some climate adaptation training and guidance.**
 - The Invest Northern Ireland nibusinessinfo.co.uk website is engaged in the ongoing maintenance and development of online advice and guidance to communicate climate adaptation and mitigation messages and highlight associated support. The monthly newsletter is issued to over 10,500 customers, which is a good reach considering there are 128,170 private businesses in Northern Ireland.^{24,25}
 - BITC NI is another key organisation providing education on climate adaptation to businesses. Set up in 1989, their current members employ more than 40% of the working population in Northern Ireland.²⁶ They offer accredited Climate Literacy training – that covers risks and challenges that climate change will present.
 - Climate education sessions have also been provided by Northern Ireland Chamber of Commerce and Industry covering climate risks and impacts.
- **Research.** The Department for Economy has outlined a new strategy ("A 10X Economy") to drive innovation across Northern Ireland, with a key focus on climate change and developing future-ready goods and services.²⁷ Whilst adaptation is not explicitly targeted in the strategy, there is an opportunity to connect the identified Agri-Tech cluster with further research into potential opportunities from a changing climate for this sector.
- **Governance.** Whilst monitoring of coverage of business continuity plans is not in place, NI Business Info do provide information about how to create a business continuity plan.²⁸ But whilst it does also provide further information about certain types of risks to consider when conducting a risk assessment, it only briefly mentions 'environmental risks'.
- **Data and monitoring.** More progress is needed to establish the data and monitoring needed, such as tracking businesses adaptation actions and impacts, along with available data on adaptation costs and benefits. The Northern Ireland Statistics and Research Agency (NISRA) developed 'UK Regions Imports and Exports of Goods by Country and World Region' prototype is a good tool for information access about Northern Ireland's supply chain and profile of goods imported and exported.

There are a number of established business education organisations and platforms that deliver some climate adaptation training and guidance.

- **Funding and investment.** There are a lack of comprehensive data to assess this, but stakeholder engagement during this assessment raised accessing finance for adaptation as a challenge for businesses.

3. Policy and planning progress

Progress has been made against actions in NICCAP2 (see DAERA Mid-Programme Progress Review 2022).²⁹ The following section builds on this and investigates potential areas for further progress to deliver a well-adapted business sector in Northern Ireland (NI).

(a) Outcome 1: Public and private adaptation measures are implemented to minimise risks to business sites

The policy score for this outcome is **limited**.

- **Legislation and regulation.**

- **Legislation and regulation plans are in place to prepare towns and cities for flooding from rivers and seas, but there are some gaps in the allocation of long-term funding.** The second cycle Flood Risk Management Plan considers an objective to “Reduce economic costs on business caused by the disruption to essential infrastructure and services”.³⁰ There are some concerns about budgetary constraints which may affect the delivery of these plans. (See Chapter 9 Towns and Cities for more information).

There is no current water reduction target in place for businesses.

- There is no current water reduction target in place for businesses. NI Water continues to implement the Water Resource and Supply Resilience Plan (WRSRP) and has started to work on the next WRSRP which is due to be published in 2023.³¹ Water efficiency measures were recommended in the Water Resource and Supply Resilience Plan. Four demand management recommendations across Northern Ireland were selected: Targeted non-household water audits of key accounts, schools water audit and retrofit, hotel and hospitals water audit and retrofit, and farm audits.³² There is also the Northern Ireland Environment Agency (NIEA) plan to review all water abstraction licenses in coming years, but the timeline for this is unknown and it could take ten years before all assessments are complete.³³

- **Information and reporting.**

- **There is climate information accessible on key Northern Irish business platforms.** Invest NI published dedicated guidance for “Adapt your business to climate change” which covers topics such as extreme weather disruption, staff and supplier disruption, and information on climate change risk insurance.³⁴ BITC NI also have a case-studies section to draw together best practice examples from businesses in Northern Ireland. It is lacking on specific adaptation actions currently.

(b) Outcome 2: Businesses have access to capital and insurance including for adaptation

The policy score for this outcome is **limited**. Some financial support packages are available, but small in scale and focus on grant funding rather than building the full suite of finance options needed to implement business adaptation.

- **Financial instruments.**

- **There are some business grants available to implement water saving measures.** Invest NI resource efficiency grant fund provides investment support of up to £50,000 to invest in energy saving equipment that will reduce the consumption of water, raw materials or waste production.³⁵
- Strategic commitments have been made to provide flood insurance to certain small businesses, but there are unclear implementation timeframes. The 'Sustainable Water - A Long-Term Water Strategy for Northern Ireland (2015-2040)' sets out objectives ensure affordable flood insurance continues to be available to businesses. For example, the Executive endorsed extending the Home Owners Flood Protection grant scheme to small businesses, including farms, in the original strategy but no further information was found in subsequent reports.³⁶ A publicly available updated delivery plan, in addition to the annual reports, could help clarify progress.

- **Legislation and regulation.**

- **New national strategies for the economy do not target adaptation.** The Department for Economy has outlined a new strategy ("A 10X Economy") to drive innovation across Northern Ireland, with a key focus on climate change and developing future-ready goods and services.³⁷ Adaptation is not explicitly targeted in the strategy currently.

(c) Outcome 3: Productivity losses due to physical climate risks are minimised

The key policy milestones required for this outcome are not in place. The policy score for this outcome is **insufficient**.

Insufficient policies and plans exist to ensure that buildings do not overheat during heatwaves.

- **There is currently no maximum work premise temperature.** Employers must ensure that work premises are properly ventilated, with clean and fresh air and that temperatures are kept at a comfortable level. Whilst a minimum of 13°C is set, there is currently no maximum limit.³⁸ Further, there are insufficient policies and plans exist to ensure that buildings do not overheat during heatwaves. See Chapter 10 Buildings for further information.
- Provisions for worker access to work during bad weather is left to individual employer policies.³⁹

(d) Outcome 4: Supply chain risks are identified and managed

The key policy milestones required for this outcome are not in place. The policy score for this outcome is **insufficient**.

- **Information and reporting.**

- **Climate risk assessments for key ports in Northern Ireland are needed.** Five commercial ports (Belfast, Larne, Londonderry, Warrenpoint and Coleraine) are critical for Northern Ireland businesses through handling the majority of external trade and also for tourism businesses.⁴⁰ Whilst

ports are a reserved matter, research could be conducted to identify potential climate hazards at these key locations.

- **There is a lack of supply-chain support for climate risks.** Invest NI provides advisory and some financial support for supply chain risk management, but this currently covers disruptions caused by the COVID-19 pandemic, EU Exit and current global environment, rather than specifically to climate risks.⁴¹

- **Legislation and regulation.**

Public tenders must include a minimum of 10% of the total award criteria to social value.

- **There is an opportunity to build on the public tender social value criteria to include adaptation.** From 1 June 2022 public tenders must include a minimum of 10% of the total award criteria to social value.* The focus is on ‘delivering zero carbon’ and the resilient supply-chain section is focused on labour rights and responsibility along supply-chains.⁴² Currently adaptation is not included as a criteria, but progress on social value and Net Zero provides a useful precedent to which adaptation could be added.
- **There is dedicated work for food supply chains risks, but not currently focused on climate hazards.** In September 2021, the Northern Ireland Food Strategy Framework went out for public consultation, proposing a new food systems approach. The framework lays out six priorities, one of which is ‘Building and maintaining appropriate Emergency Contingency plans across the supply chain’, which was added in the wake of the COVID-19 pandemic and associated challenges in supply chains. See Chapter 4 for more information on food supply chains.

(e) Outcome 5: Risks and actions are disclosed and managed by businesses

The policy score for this outcome is **limited**.

- **Legislation and regulation.**

- **SMEs are currently not covered by major disclosure schemes.** Application of TCFD will apply to Northern Irish businesses which will help to drive understanding and management of climate risks. However, SMEs are currently out of scope of these reporting schemes which limits impact for Northern Ireland.

- **Information and reporting.**

- **Some actions are underway to build business capability for understanding and managing climate risks.** BITC NI provide advisory workshops to support businesses that cover climate risk assessment and adaptation actions. DfE and DEARA sit on the steering group of BITC NI along with a number of other organisations.⁴³

* Social value here means the social, economic and environmental benefits of the public procurement process.

(f) Recommendations

Based on the assessment of policy and planning progress, we have identified recommendations to close key policy gaps, both for direct implementation in Northern Ireland and also key areas to engage at a UK level on (Table 13.2).

Table 13.2
Recommendations

Primary responsibility	Recommendation	Timing
DfE	Integrate climate change adaptation into targets and objectives of the '10X Economy' strategy.	2023
DfE, Invest NI	Develop more adaptation dedicated resources. Find good case studies and establish business champion programmes to provide clear examples and practical actions.	2024
Health and Safety Executive for Northern Ireland	Consult with businesses on setting a maximum working temperature.	2024
DAERA	Align Climate Change Act (Northern Ireland) 2022 and the next (third) Northern Ireland Climate Change Adaptation Programme (NICCAP3) objectives to give businesses a clear roadmap and direction.	2024
Invest NI, DfE	Provide financial support for smaller businesses to build back better after extreme weather events.	2024
DfE	Carry out stress testing exercises to understand the resilience of essential goods supply chains.	2024
NI Water	Conduct targeted non-household water audits, as outlined in NI Water's Water Resource and Supply Resilience Plan 2020.	2024
DoF	Add adaptation criteria into social procurement policy.	2024
DfE	Engage with UK Government to strengthen adaptation reporting requirements across the UK Sustainability Disclosure Requirements.	2023

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Chapter 14

Finance

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Introduction

Table 14.1

Progress summary - Finance

	Delivery and implementation	Policies and plans	Summary
Outcome 1: All financial institutions incorporate physical risks into financial decision-making	Unable to evaluate	Mostly reserved	<ul style="list-style-type: none"> There is a lack of available quantitative assessments of level of assets at high-risk from climate change managed by Northern Irish financial institutions. In the CCC's UK adaptation progress report (2023) this outcome score is limited policies and plans. There is progress to embed adaptation in financial regulators' activity, although it is still nascent. There is a lack of reliable indicators on how risk information is used in financial decisions.
Outcome 2: UK financial services are a global leader in adaptation	Unable to evaluate	Mostly reserved	<ul style="list-style-type: none"> Whilst financial services are regulated at a UK-level, the growing financial service technology sector in Northern Ireland could present an opportunity to become a leader in adaptation. In the CCC's UK adaptation progress report (2023) this outcome score is insufficient policies and plans. There is a lack of consolidated information on size of the market for adaptation goods and services. General plans for seizing opportunities in Green Finance Strategy, but taxonomy for adaptation still under development.
Outcome 3: No viable adaptation project fails for lack of finance	Unable to evaluate	Limited policies and plans	<ul style="list-style-type: none"> Lack of aggregate estimates of the costs of adaptation for Northern Ireland and reliable estimates of potential remaining adaptation financing gaps. There is some financial support for implementing adaptation measures, though mainly focused on households. There are some programs in place to support businesses to adapt and realise opportunities, but as they are high-level strategies it is not yet clear how much dedicated focus will be given for adaptation compared to mitigation.
Outcome 4: Risks and actions are disclosed and managed by financial institutions	Mixed progress	Mostly reserved	<ul style="list-style-type: none"> The four 'pillar' banks operating in Northern Ireland are reporting in line with Task Force on Climate-related Financial Disclosures (TCFD) guidelines. There is a lack of information on the consideration of climate risks by smaller insurance providers in Northern Ireland. In the CCC's UK adaptation progress report (2023) this outcome score is limited policies and plans. While work has progressed on Net Zero transition plans, it is only just beginning on adaptation plans and adaptation plan-related disclosures. There is a lack of agreed methodology for measuring the positive or negative contribution an investment portfolio is making or has made to adaptation outcomes.

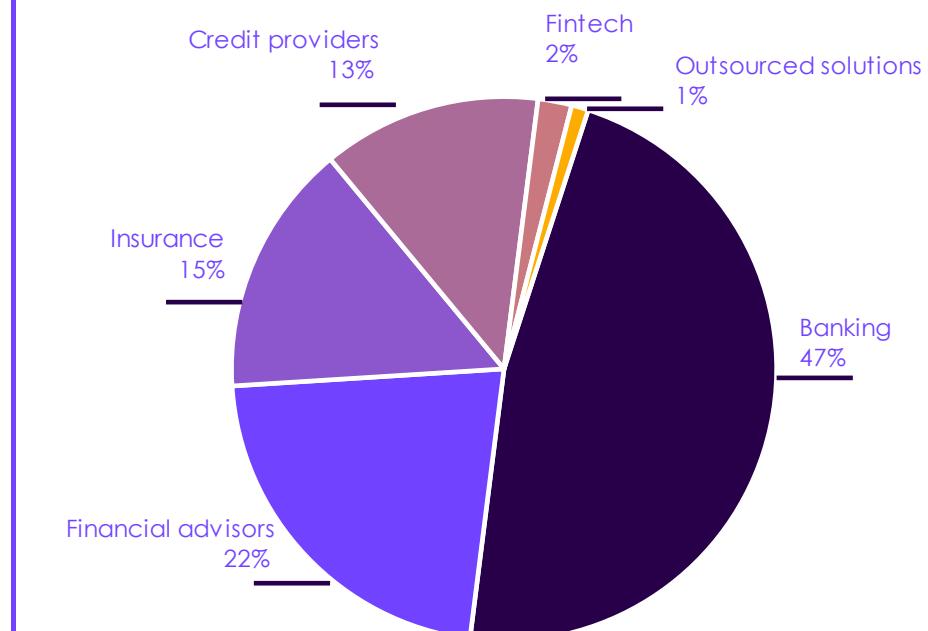
Relevant risks from CCRA3:

B4: Risks to finance, investment and insurance including access to capital for businesses. ID8: Risks to the UK financial sector from climate change risks overseas.

The financial system is a highly connected network of financial institutions – such as insurance companies, stock exchanges, and investment banks – that work together to exchange and transfer capital from one place to another. Through the financial system, investors receive capital to fund projects and receive a return on their investments.

There are approximately 24,000 people employed in financial services in Northern Ireland (NI). In 2019, the sector contributed £2.4 billion to the economy, roughly 5% of Northern Ireland's GDP.¹ The key sub sectors are Banking, Insurance, Fintech, Credit Providers, Outsourced Solutions and Financial Advisors, with banking the biggest sub-sector for employment and by business locations in Northern Ireland (Figure 14.1).² The insurance industry in Northern Ireland is comprised of a number of indigenous, Great Britain-based and internationally-owned providers and a large number of insurance brokers.

Figure 14.1 Breakdown of financial service activity in Northern Ireland by number of business locations



Source: Department for the Economy (2021) *Mapping the Northern Ireland Financial Services Sector*.

The UK single market for financial services means NI financial services firms follow the same legal and regulatory system as the rest of the UK.

Financial services firms in Northern Ireland follow the same legal and regulatory system as the rest of the UK. The Bank of England is responsible for maintaining overall financial stability by monitoring and responding to risks including climate change. Other important roles are served by the regulatory bodies: the Financial Conduct Authority (regulates financial services firms and financial markets in the UK to ensure fair outcomes for consumers); the Financial Reporting Council (regulates auditors, accountants and actuaries, and set the UK's Corporate Governance and Stewardship Codes); the Prudential Regulation Authority (regulates and supervises financial services firms) and The Pensions Regulator (regulates workplace pension schemes). The Department for Communities hold responsibility for administrating the state pension along with policy and legislation on private pensions in Northern Ireland.

The functioning and stability of this system needs to be maintained despite climate shocks (Box 14.1). These physical climate risks impact across the different risk categories that financial institutions face (such as credit risk, liability risk, and operational risk), and ultimately macro-financial risks.³ Additionally, the financial system needs to enable households, infrastructure providers and businesses to adapt to climate change by facilitating access to financial products and services. Significant investment will be needed over the next decade in several key areas to adapt to physical climate risks in the UK across flood protection, public water systems, housing, nature restoration, and infrastructure.

Box 14.1

Climate change hazards and the Northern Irish financial system

- There is a risk that access to finance, investment, insurance, and capital for businesses are negatively impacted by climate change through decline in availability and affordability of insurance, a reduction in the value of assets and investment and increased credit risks and cost of capital. Across Northern Ireland this is currently a medium risk but has the potential to rise to high magnitude in future.
- This interplay between financial flows and physical climate risks can impact financial stability. Although these climate risks are currently low to moderate, they are expected to increase under any future warming scenario given the scale of physical damages expected to impact assets, products, and services both in Northern Ireland, the UK and internationally.

Source: Climate Change Committee (2021) *Evidence for the third UK Climate Change Risk Assessment (CCRA3) Summary for Northern Ireland*.

The second Northern Ireland Climate Change Adaptation Programme (NICCAP2) identified indicators and actions across five key priority areas. Finance is a cross-cutting area, but there were no specific actions or indicators identified within NICCAP2 that monitor progress on the resilience of the financial system in Northern Ireland to climate change. (Box 14.2).

There are no indicators identified within NICCAP2 that monitor the progress on the resilience of the NI financial system to climate hazards.

Box 14.2

Finance within NICCAP2

- NICCAP2 did not include risks to the financial system from climate change.
- There are no indicators identified within NICCAP2 that monitor the progress on resilience of the financial system in Northern Ireland to climate hazards.
- Finance is a cross-cutting area.

Source: DAERA (2019) *Northern Ireland Climate Change Adaptation Programme 2019-2024*.

1. Monitoring progress towards a well-adapted financial system

Successful adaptation means ensuring that the functioning of the UK's and Northern Ireland's (NI) financial system remains stable despite climate change and enables adaptation in the real economy. Building a well-adapted financial system is also necessary for the provision of capital for effective adaptation and to secure availability and affordability of insurance over time.

The focus of this report is on the management of physical climate risks, rather than responses to broader sets of risks, such as transition risks. Whilst these often go hand-in-hand, this assessment is focused on actions taken in response to physical climate hazards.

The financial system is included as a standalone chapter for the first time in this report. The Committee expects this chapter and its monitoring map to continue to develop as further evidence becomes available.

We have identified key outcomes to deliver a well-adapted finance system. A number of policy actions and enabling factors are needed to deliver these outcomes (Figure 14.2).

To deliver a well-adapted financial system, several required outcomes need to be achieved.

To deliver a well-adapted financial system, we identify several required outcomes that need to be achieved:

- **All financial institutions incorporate physical risks into financial decision-making.** Understanding and integrating into decision-making the potential physical risks can help to steer capital towards activities that are adapted to a changing climate, as well as avoid investment in activities that increase climate risks - maladaptation.
- **UK financial services are a global leader in adaptation.** The UK has one of the largest financial sectors globally that could be mobilised to deliver high quality adaptation financial services and products to enable wide-spread action in the UK and abroad.
- **No viable adaptation project fails for lack of finance.*** Increasing the UK's climate resilience requires investment at many scales. Lack of available and appropriately priced finance can limit the projects which go ahead. Financial institutions' contribution to providing insurance, lending and investment is key to enable implementation of adaptation measures by businesses and households.
- **Risks and actions are disclosed and managed by financial institutions.** Undertaking robust climate risk assessments enables financial institutions to identify the necessary adaptation actions. Creating a transparent information disclosure regime can provide a foundation that creates accountability and drives effective adaptation action, particularly by investors.

Enabling factors that need to be in place to deliver these outcomes are wide-ranging and include a mixture of action at both UK-level and at devolved level.

* We use the term 'viable' to mean adaptation projects with benefits exceeding costs.

- **Governance** measures such as assigning institutionally responsible owners and internal committees to oversee climate risks and establishing ways to verify adaptation plans in place are needed.
 - **UK level action** to embed consideration of climate-related risks into financial conduct, macroprudential, microprudential, and monetary policy decision-making. Enforcement of high quality climate-related reporting by financial regulators is needed.
- **Engagement and education** to build skills across financial institutions in risk assessment scenario analysis, awareness of adaptation by corporates and households, how to successfully raise finance for adaptation and awareness of insurance options. This can be supported by an increased availability of modelling tools to assess physical risks.
- **Funding and investment** such as adaptation-linked financial products or government funding for pilots and supporting new markets.
 - **UK level action** to develop financial instruments that monetise adaptation and insurance products designed for adaptation.
- **Data and monitoring** covering corporate assets and monitoring of financial flows to adaptation, and establishing ways to verify adaptation plans, quantify effectiveness of adaptation and its return on investment.
- **Research** to support development of mechanisms to direct finance towards adaptation and identify opportunities for new adaptation goods and services.

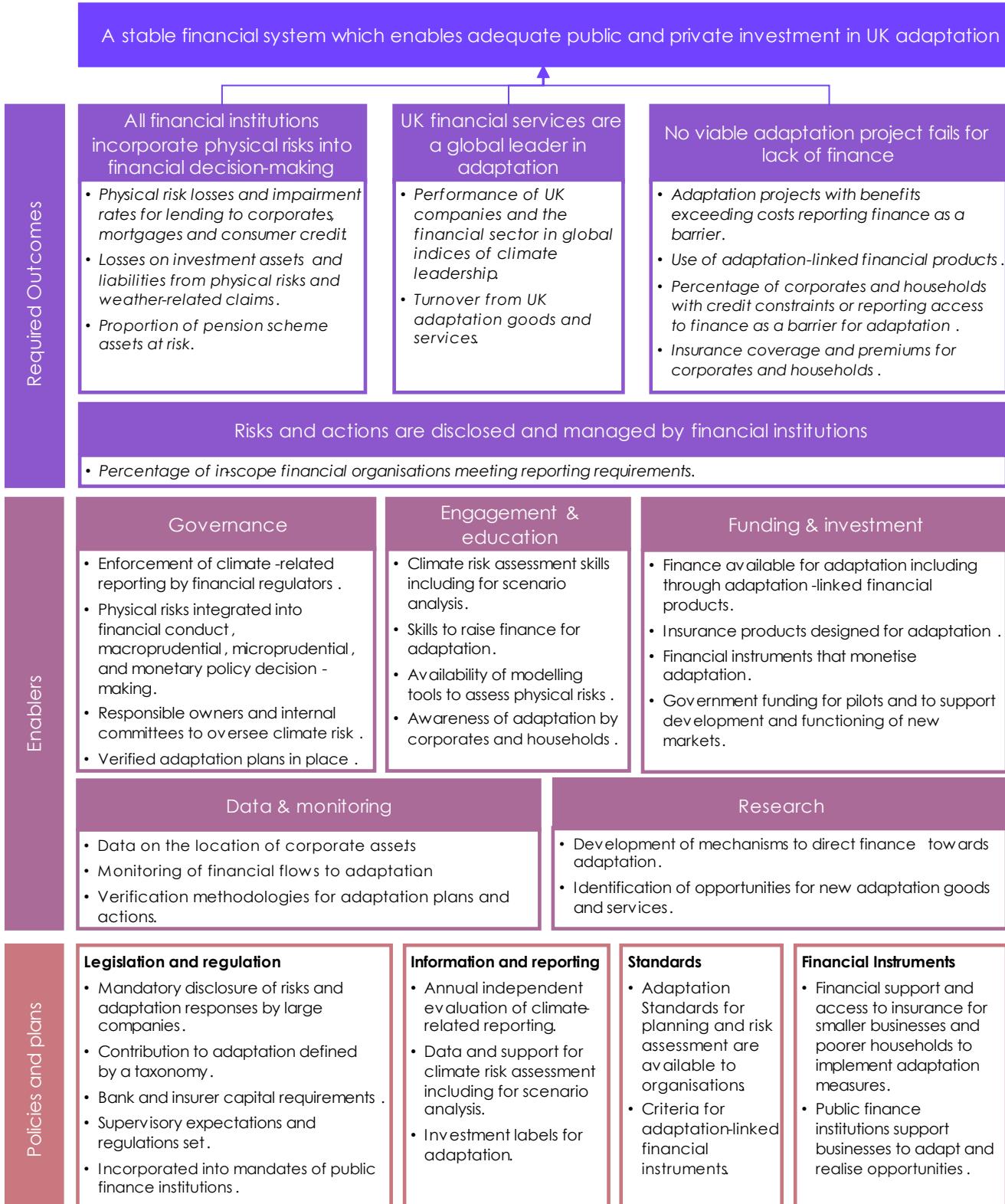
Key policy milestones will be a mixture of devolved and reserved powers.

To increase the prevalence of the enabling factors and deliver the identified outcomes consistent with a well-adapted financial system, we have identified a number of key policy milestones that are required. These will be a mixture of devolved and reserved. For our assessment we focus on policy levers in the control of Northern Ireland but consider reserved policy where relevant for adaptation implementation.

- **Legislation and regulation.**
 - **UK wide.** Adaptation needs to be incorporated into the mandates of public finance institutions with supervisory expectations and regulations set, including over bank and insurer capital requirements. This should be supported by a sustainable finance taxonomy that considers adaptation and a mandatory disclosure regime of climate risks and adaptation responses.
- **Information and reporting.**
 - **Northern Ireland scope.** Annual progress reviews of climate-related reporting could contribute to high levels of transparency and identification of areas for action. A robust data ecosystem is needed for climate risk assessments.
 - **UK wide.** Creating investment labels for adaptation financial products.
- **Standards.**

- **Northern Ireland scope.** Consistent standards and criteria for adaptation planning and risk assessments.
 - **UK wide.** Develop standardised adaptation-linked financial instruments.
- **Financial instruments.**
 - **Northern Ireland scope.** Funding provided for adaptation directly from national or local government or its agencies. This could be in the form of funding for ongoing operational expenditures or capital funding (e.g. grants) for upfront investment. This could also include targeted financial support and access to insurance for smaller businesses and poorer households to implement adaptation measures and also to realise opportunities, such as reduced insurance or mortgage premiums.
 - **UK wide.** UK public finance institutions providing funding that supports adaptation action.

Figure 14.2 Monitoring map for finance



Source: CCC analysis.

Notes: Italicised text indicates suggested measures for each outcome.

2. Delivery and implementation progress

(a) Outcome 1: All financial institutions incorporate physical risks into financial decision-making

A lack of available information makes progress on this outcome **unable to evaluate**. There is no available quantitative assessment of level of assets at high-risk from climate change.

There are indications of local government pension funds beginning to consider climate risks.

- **There are indications of local government pension funds beginning to consider climate risks.** The Northern Ireland Local Government Officers' Superannuation Committee (NILGOSC) administer the Local Government Pension Scheme (LGPS) in Northern Ireland. It is a non-departmental public body, sponsored by the Department for Communities. The value of the Fund as at 31 March 2022 was £10.2 billion.⁴ NILGOSC climate-related disclosures and climate risk statement state that climate risks and opportunities are taken into account at a strategic asset allocation level with specific advice sought from the Investment Advisor.^{5,6}

(b) Outcome 2: UK financial services are a global leader in adaptation

A lack of available information makes progress on this outcome **unable to evaluate**.

The growing financial service technology sector in Northern Ireland could present an opportunity to become a leader in adaptation.

- **The growing financial service technology sector in Northern Ireland could present an opportunity to become a leader in adaptation.** Recent developments in the Northern Ireland (NI) financial services sector point towards potential in this space, with Belfast reported as a top city for Financial Services technology inward investment projects.⁷

(c) Outcome 3: No viable adaptation project fails for lack of finance

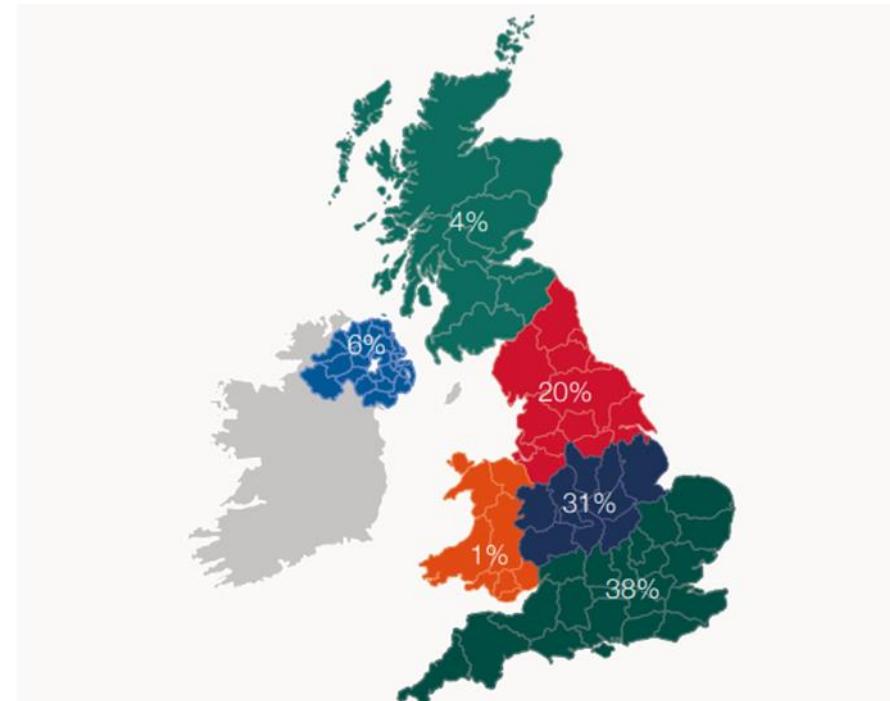
Progress on this outcome is **not possible to evaluate** due to lack of aggregate estimates of the costs of adaptation for Northern Ireland and reliable estimates of potential remaining adaptation financing gaps.

There is a lack of aggregate estimates of the costs of adaptation for Northern Ireland and reliable estimates of potential remaining adaptation financing gaps.

- Information on the proportion of households or businesses reporting access to finance as a barrier for adaptation, or the level of insurance coverage and premiums for businesses and households is not currently available.
- **Some information is available on role of UK Public Finance Institutions in supporting Northern Irish businesses, but it is not clear how this is directed toward adaptation.** The British Business Bank is launching a £70 million investment fund to support the growth of small and medium-sized businesses in Northern Ireland in autumn 2023.⁸ However, it is unclear how adaptation actions may be considered within this fund.
 - 6% of companies benefitting from UK Export Finance (UKEF) trade finance or insurance in 2020-21 were located in Northern Ireland (Figure 14.3). The proportion of these that were part of the allocation for clean growth projects is not available. Eligibility for this additional

direct lending capacity is based upon the use of proceeds criteria and core indicators of the ICMA Green Bond Principles and supports a broad range of sectors including, amongst others, renewables, water management, clean transport, green buildings, climate adaptation, energy efficiency and pollution prevention and control.⁹

Figure 14.3 Proportion of companies benefiting from UKEF trade finance or insurance by region in 2020-21



Source: UK Export Finance (2021) Annual Report and Accounts 2020-21.

(d) Outcome 4: Risks and actions are disclosed and managed by financial institutions

There is **mixed progress** for this outcome.

- **Large banks in Northern Ireland are reporting on their climate risk.** Large Financial Conduct Authority (FCA)-regulated activity (e.g. banks, insurance companies and other financial service companies) are required to align with TCFD reporting. For the four 'pillar' banks active in Northern Ireland, each parent entity (Bank of Ireland, Danske Bank, Allied Irish Bank and Ulster Bank) made recent disclosures covering climate risk management.
- **Financial institutions, including insurers and pension funds, active in Northern Ireland are covered by the UK's Sustainable Disclosure Requirements.** Insurers with large employment in NI included Allstate, Liberty, AXA and Zurich.¹⁰ Yet TCFD and other reporting schemes are currently weak on adaptation disclosures and data regarding actions taken. There is a need for more guidance and comparable reporting schemes that focus on adaptation action, rather than solely risk disclosure.

(e) Progress on enablers

Available information on enablers highlights key action needed across adaptation monitoring and tracking, along with integrating adaptation into upcoming key economic strategies.

- **Engagement and education.** Business in the Community NI (BITC NI) provide education on climate adaptation to businesses, including financial services organisations. They offer accredited training that covers risks and challenges that climate change will present.
- **Data and monitoring.** More progress is needed to establish the data and monitoring needed, such as location of corporate assets and monitoring of financial flows into adaptation action. Financial disclosures need to move beyond physical risk identification and focus more on adaptation actions taken.
- **Research.** The Department for the Economy (DfE) has outlined a new strategy ("A 10X Economy") to drive innovation across Northern Ireland, with a key focus on climate change and developing future-ready goods and services.¹¹ Whilst adaptation is not explicitly targeted within the strategy, there is an opportunity to connect the identified Agri-Tech cluster with further research into potential opportunities from a changing climate for this sector.

3. Policy and planning progress

Key policy milestones for this outcome are largely outside of the Government of Northern Ireland's (NI) direct control. For those that are within the Executive's power related to Outcome 3 'No viable adaptation project fails or lack of finance', the policy score is **limited**.

(a) Financial instruments

(i) Scope for Northern Ireland

Some financial instruments are in place for Property Flood Resilience in Northern Ireland.

- **Some financial instruments are in place for Property Flood Resilience in Northern Ireland.** Two schemes (the Department for Infrastructure's Homeowner Flood Protection Grant Scheme and the Flood RE 'Build Back Better' scheme) are currently available to support homeowners to install property flood resilience (PFR) measures after experiencing flooding. In Northern Ireland, homeowners can apply to the Homeowner Flood Protection Grant for up to £10,000. This is for owners of residential properties that have flooded before and/or are located within known flood prone areas to make their properties more resistant to flooding.¹² See Chapter 9 towns and cities and Chapter 10 buildings for more information.
- **Invest NI provide financial support for companies to increase their efficiency around water use,** among other resources, but otherwise don't have specific adaptation investment targets/objectives.
- **Lack of specific funding streams or programmes for climate adaptation in the '10X Economy' strategy.**
 - The Department for the Economy's (DfE) '10X Economy' policy implementation includes a sustainability objective but it is currently only focused on renewable energy.
 - Invest NI is the delivery arm for much of DfE's '10X Economy' vision through supporting regional business development. It includes the high-level goal of identifying new market opportunities and ensuring companies are supported in competing for these, but there are no specific streams or programmes for climate adaptation. An updated Invest NI action plan that is collectively developed between DfE, Invest NI and key stakeholders is anticipated to be published in the summer 2023.¹³
 - **The draft Green Growth Strategy for Northern Ireland is progress to tie together climate mitigation and adaptation in growth objectives.** Part of this includes a statutory Green Growth test so climate action, the environment, including its natural capital assets and green jobs, are considered in the appraisal of all policies, programmes, and projects for which there are public funding implications.¹⁴

(ii) UK wide

- **Northern Ireland is in scope of UK Public Finance institutions, but the extent to which adaptation is integrated into their mandate is currently low.** The British Business Bank is launching a £70 million investment fund to support the growth of small and medium-sized businesses in Northern Ireland in autumn 2023.¹⁵ It is unclear how adaptation actions may be considered within this fund. The UK Infrastructure bank offers financing to local and mayoral authorities and can support nature-based solution projects that could deliver mitigation and adaptation.¹⁶ However, the only project supported for Northern Ireland so far is a private-sector roll out of ultra-fast broadband.

(b) Legislation and regulation

Northern Ireland is in scope of UK Public Financial institutions, but the extent to which adaptation is integrated into their mandate is currently low.

- **Northern Irish financial institutions must comply with UK financial regulations, but these are currently not strong on adaptation.** Several policy updates are relevant for adaptation in Northern Ireland, such as risk disclosures and definition and enforcement of sustainable finance taxonomies. Box 14.3 gives more information on recent UK-level policy developments.

Box 14.3

Recent UK-level policy developments

- In 2021 the UK Government announced new Sustainability Disclosure Requirements (SDR) and an accompanying Roadmap to Sustainable Investing.¹⁷ SDR is made up of several different parts which cover adaptation.
- The Green Technical Advisory Group published advice to UK Government on the development of the UK Green Taxonomy in October 2022. A Land Use, Nature and Adapted Systems Advisory Group has now been established to advise on the design and implementation of an enhanced set of adaptation Technical Screening Criteria.
- October 2021: Regulations requiring trustees of occupational pension schemes with more than £5 billion in net relevant assets as well as all authorized master trust schemes and authorized collective money purchase schemes to make TCFD-aligned disclosures enter into force. Occupational pension schemes with more than £1 billion in net relevant assets are subject to the regulations as of 1 October 2022.
- December 2021: FCA extends application of climate-related disclosures effective from 1 January 2022 to the largest asset management firms (those with over £50 billion in assets under management) and largest asset owner firms (those with assets over £25 billion), and from 1 January 2023 for smaller firms.
- It is good progress that financial regulators were invited to participate in the Adaptation Reporting Power (ARP), but it remains voluntary. Three (FCA, PRA and TPR) reported in 2022.¹⁸
- Flood Re was established by UK Government legislation in 2016 to replace previous agreements between government and insurance companies to provide flood insurance coverage to domestic properties at risk of flooding. It is a not-for-profit, publicly accountable fund. The set-up costs were covered by the insurance industry, and the pool of money to cover claims comes from a charge for each policy which is passed to Flood Re and an additional annual levy from all home insurers in the UK.

Source: CCC (2023) *Progress in adapting to climate change – 2023 Report to Parliament*.

(c) Information and reporting

- **Data access challenges to support climate risk assessments are present.** Barriers exist for financial institutions to access climate mitigation and adaptation data. For example, bulk access is prevented to the EPC rating database in Northern Ireland, which is not the case in England and Wales.
- **Progress reviews of climate-related reporting are not widely conducted centrally** and focus mainly on mitigation. Examples include financial services' voluntary participation in BITC NI survey. See Chapter 13 Business for more information.

(d) Recommendations

Based on the assessment of policy and planning progress, we have identified recommendations to close key policy gaps for the finance system, both for direct implementation in Northern Ireland and for engagement at a UK level (Table 14.2).

Table 14.2

Recommendations - Finance

Primary responsibility	Recommendation	Date
DAERA	Include finance more centrally in the next (third) Northern Ireland Climate Change Adaptation Programme (NICCAP3 and engage with financial institutions in its development.	2024
DfE	Embed climate adaptation into '10x Economy' strategy and objectives.	2024
Invest NI	Build skills and capacity in the financial services market in Northern Ireland for delivery of adaptation analysis and products.	2024
DfE	Engage with UK public financial institutions (such as the UK Infrastructure Bank, British Business Bank, UK Export Finance, and British International Investment) to create adaptation finance strategies, setting out how they will independently and collectively ensure that no viable UK climate adaptation project fails for lack of finance or insurance.	2023
DfE	Engage with UK Government to strengthen adaptation reporting requirements across the Sustainability Disclosure Requirements.	2023

Endnotes

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- ⁴ Northern Ireland Local Government Officers' Superannuation Committee (2022) *2022 NILGOSC Climate-related Disclosures Report*, <https://nilgosc.org.uk/wp-content/uploads/2022/12/2022-NILGOSC-Climate-related-Disclosures-Report-FINAL.pdf>.
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- ⁶ Northern Ireland Local Government Officers' Superannuation Committee (2022) *2022 NILGOSC Climate-related Disclosures Report*, <https://nilgosc.org.uk/wp-content/uploads/2022/12/2022-NILGOSC-Climate-related-Disclosures-Report-FINAL.pdf>.
- ⁷ Invest NI (n.d.) *Financial Services*, <https://www.investni.com/international-business/our-sectors/financial-services>.
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- ¹⁰ Department for the Economy Northern Ireland. (2021). *Mapping Northern Ireland's Financial Services Sector*. <https://www.economy-ni.gov.uk/articles/mapping-nis-financial-services-sector>.
- ¹¹ Department for the Economy Northern Ireland (2020) *10X Economy NI: A Decade of Innovation*, <https://www.economy-ni.gov.uk/sites/default/files/publications/economy/10x-economy-ni-decade-innovation.pdf>.
- ¹² Northern Ireland Department for Infrastructure (n.d.) *Homeowner Flood Protection*, <https://www.infrastructure-ni.gov.uk/articles/homeowner-flood-protection#:~:text=The%20Homeowner%20Flood%20Protection%20Grant,them%20more%20resistant%20to%20flooding>.
- ¹³ Department for the Economy (2023) *Departmental response to the Independent Review of Invest NI*, <https://www.economy-ni.gov.uk/news/departmental-response-independent-review-invest-ni>.
- ¹⁴ Department of Agriculture, Environment and Rural Affairs (2021.) *Green Growth: Northern Ireland's Path to Sustainable Development*, <https://www.daera-ni.gov.uk/sites/default/files/consultations/daera/Green%20Growth%20Brochure%20V8.pdf>.

- ¹⁵ British Business Bank (n.d.) *Investment Fund for Northern Ireland (IFNI)*, <https://www.british-business-bank.co.uk/nations-and-regions-investment-funds/investment-fund-for-northern-ireland-ifni/>.
- ¹⁶ UK Infrastructure Bank (n.d.) *Local Authority Lending*, <https://www.ukib.org.uk/where-we-invest/local-authority-lending>.
- ¹⁷ HM Treasury (2021) *Greening Finance: A Roadmap to Sustainable Investing*, <https://www.gov.uk/government/publications/greening-finance-a-roadmap-to-sustainable-investing>.
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