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25th July 2022

Re: Consultation on Review of the National Adaptation Framework

Our Ref: EPAC-1622

Dear Ms Corcoran,

The Environmental Protection Agency (EPA) welcomes this opportunity to provide input to the Public Consultation on Review of the National Adaptation Framework.

On the 22nd February 2022 the EPA, as a member of the National Adaptation Committee, responded to a request from your Department to provide early stage input to the **Consultation on Review of Draft National Adaptation Framework**

The scope of comments provided in the EPA's response at that time addressed many issues also covered in this Public Consultation as well as broader issues regarding the National Adaptation Framework.

To avoid excessive repetition, I am attaching the EPA's correspondence of February 2022 as an Appendix to this letter to be considered as part of the EPA's response to this Public consultation.

The EPA looks forward to engaging and providing further input to the continued development of the NAF.

Yours sincerely,

Mary Frances Rochford
Programme Manager
Office of Environmental Sustainability

1. Response to key questions for stakeholders

Information sources and climate information

What National information sources do you use to inform yourself about Climate Impacts and Adaptation? Give examples Climate Ireland, others?

- Climate Ireland is in the delivery remit of the EPA. The EPA uses the information sources on Climate Ireland in the delivery of its adaptation activities.

Given that the impacts of climate change are uncertain depending on the degree of warming and other factors, how do you think that this uncertainty can be best managed in National Adaptation policy?

- The NAF should specify that the precautionary principle underpins adaptation decision making, which helps account for scientific uncertainty. To operationally account for uncertainty national policy needs to focus on ranges of impacts rather than focusing on exact figures. For example, to deal with impacts of both increased water in the system and also the probability of increased drought periods infrastructure must be designed to cope with such ranges.
- A National level climate change risk assessment should be undertaken to allow for a better understanding of climate risks. A periodic national level risk assessment should be undertaken, and the results communicated widely.
- The priority climate change hazards will emerge from a carefully designed risk assessment, these cannot be decided without including vulnerability and adaptive capacity assessment in the risk assessment approach to be used.
- There is a need to be cognisant of climate tipping points but in doing so be aware of the uncertainties that exist around such events. Tipping points of potential relevance to Ireland in the medium to long term should be identified under a national level risk assessment.

Are there any significant policy gaps in the current NAF that might be addressed in a new or revised NAF?

- All sectors that are currently or have the potential to be impacted by climate change should be included in the revision to the NAF. These sectors should be identified in the proposed National Climate Change Risk Assessment. Priority sectors for immediate attention should be identified.
- From a general planning perspective, the NAF should consider the hierarchy of adaptation planning from the Framework to sectoral plans to local authority climate action plans. These should reflect how they impact on each other both horizontally and vertically. This approach would provide coherence between national environmental policies and plans, which is a key message in the EPA 2020 State of the Environment Report.
- The planning (land use and marine) policy context is an increasingly important consideration for adaptation, particularly in relation to the location of critical infrastructure (roads, rail, communications, energy). Attention should be placed on the integration of adaptation within the National Marine Spatial Planning Framework (NMSPF) and any subsequent plans; and on the National Planning Framework, which drives strategic planning and development for the country over the next 20 years.

- Health and climate are emerging as important areas for attention and should be reflected in the revision of the NAF. Particular attention should be paid to topics such as air quality, food, wellbeing.
- Water quality and water services policy should be reflected in the plan with linkages to the River Basin Management Plan.
- The integrated nature of the issues associated with the policy areas of Biodiversity and climate change should be included in the revision of the NAF. The National Biodiversity Action Plan and National Peatlands Strategy should be included with attention placed on nature-based solutions to adaptation.
- The national transboundary element of impacts and adaptation should be considered as part of the revision to the NAF. Common areas across the island of Ireland include river basins, catchments and infrastructure (e.g. roads, rail). It would be beneficial for NAF review process to make contact with an ongoing EPA funded research project “Transboundary Climate Risks for Island of Ireland (TCRII)” which is due to be completed in January 2023.
- The NAF should also consider impacts beyond immediate national impacts of climate change. These include, the global impacts of climate change and consequences for Ireland such as global food shortages, food security and migration.

Additional sectors and priorities

This is addressed by the EPA in its previous correspondence (Appendix 1 of this correspondence)

Are there any Sectors that are not included that you believe should be included?

What specific areas or Sectors that should be given increased emphasis?

- There are a number of new and existing sectors and priorities that require attention. These include coastal zones and cultural and heritage assets, cost of adaptation, development of national level resilience scenarios and greater linkage between mitigation and adaptation.
- Special emphasis should be given to the coastal and marine environment, biodiversity, water quality and resources and the costing of adaptation are particularly important.
- The UK approach should be examined when considering other mechanisms to deliver adaptation in areas where stand alone sectoral plans may not be the best model for delivery. The UK has taken a thematic approach to its decision-making framework and examination of its potential in Ireland is merited. It should be noted that if sectors are grouped along common thematic lines a designated clear lead with responsibility for delivery and driving implementation of actions is needed.

Alignment and integration

How do we best integrate Sectoral and Local Adaptation Policy into the NAF?

- To better understand how both sectoral and local policy could be best integrated into the NAF an analysis needs to be conducted to understand how the objectives from the current NAF were implemented through these plans and in particular how they influenced each other in their design and delivery. This should also focus on the challenges to policy implementation, which should then be addressed through the revised Framework.

How can National Adaptation Policy more effectively integrate and align mitigation policy to result in increased co-benefits?

- There is a need to better link mitigation and adaptation strategies within the NAF. International best practice is evolving to consider both mitigation and adaptation together. Leaders in this area include countries, such as, Denmark, Sweden and the Netherlands. The NAF review process should incorporate an assessment of policy evolution in these countries to understand this process to inform the new Framework.
- The understanding and operationalisation of the links between the mitigation and adaptation is important and will become clearer with the development of the Local Authority Climate Action Plans. How the linkages are made between these two policy areas should be monitored and lessons learned applied to sectoral plans.

How can we better integrate the concept of “just resilience” into National Adaptation Policy?

- An underlying set of principles for the NAF should include the concept of just resilience. The concept of just resilience relates to i) how different groups of society are affected by climate change impacts, ii) how benefits and burdens of adaptation responses are distributed across different groups and how different groups. At an operational level this means understanding social vulnerability to climate change impacts and identifying and assessing and selecting adaptation options that take account of the social elements of adaptation.
- Just resilience can be better integrated into the NAF process through the proposed national level risk assessment. The current definition of risk assessment as proposed by the IPCC accounts for vulnerability (including social vulnerability), which should allow Ireland to understand who is most vulnerable to climate change, where they are located and their resilience to such change. The outcomes of such as assessment then allows just resilience to be understood and addressed
- The European Environment Agency Technical report 2021/2 Overview of Knowledge and Practice for Just Resilience provides a useful summary of Just Resilience and its integration into policy across Europe.

Adaptation research and knowledge gaps

Can you identify gaps in Climate Adaptation knowledge that could be addressed by new or additional research?

- The EPA ‘s 5 Year Assessment will provide a comprehensive overview of the state of play and research gaps for climate change adaptation in Ireland. The findings of Volume 3-Being Prepared for Ireland’s Climate Future should be used to inform the further development of the NAF.
- In addition to Volume 3 of the 5YA, Volume 1 (Science: Ireland in a changing world) should also be relevant to the NAF review.
- There is a need to develop national observation, analytical and research infrastructure in respect to climate change.
- The NAF review should assess current capacity/infrastructure and outline how the gaps identified will be addressed. The review should start with the conclusions and recommendations of the Status of Ireland’s Climate 2021.

- Further research needs to be undertaken in relation to compound hazard events, where hazards occurring simultaneously or concurrently can create or exacerbate hazardous conditions, e.g. saturated soils prior to a heavy rainfall event.
- There is a requirement for research focussing on the co-benefits of adaptation actions and any potential negative impacts. This is needed to assist with planning of adaptation actions and to inform further risk assessments to take into account the impacts of these actions. Details of past and ongoing EPA climate adaptation relevant research are provided in the EPA's previous submission (Appendix 1).

Climate Services/Climate Information

- The proposed development of a National Framework on Climate Services should provide a coherent approach to climate services in Ireland. The approach will allow for better co-ordination at the national level such that the services being provided are fit for purpose, authoritative, reliable and understandable.

The EPA has indicated its willingness to work with Met Éireann to develop and enhance Ireland's existing climate information portal, Climate Ireland. The NAF should reflect the ongoing and evolving nature of climate services and the central role of Climate Ireland in such service development and provision.

The Met Eireann funded TRANSLATE project is highly relevant to the NAF as it will produce standardised climate projections as well as working with some sectors to pilot climate services related to risk assessments.

Data sharing is crucial to risk assessments and has frequently been a barrier taking up a large amount of resources to overcome. Stronger leadership at the national level in relation to ensuring organisations are able to easily share their datasets would be should be a priority.

- The Improved alignment of work programmes across agencies and stakeholders to create strategic awareness of partners goals/ timelines for delivery of mutually relevant products would be beneficial

General

Are there priority climate hazards in the existing NAF that need to receive greater attention.

- For Ireland there is a recognised shortage of some climate hazards data, at a general level more information is required on spatially specific sea level rise, and more is also needed on droughts and periods of low precipitation. These and other priority hazards will be identified through the National Climate Change Risk Assessment.
- The EPA is a member of the Coastal Change Technical working group, chaired by the Office of Public Works. The working group feeds into the high level Inter-Departmental Group on Managing Coastal Change. The technical working group is currently tasked with compiling data inventory of all datasets relevant to the management of hazards and risks at the coast associated with coastal erosion, accretion, tidal inundation and coastal flooding arising from coastal erosion and in particular those increasing hazards and risk associated with the impacts of climate change, e.g. future sea level rise and/or increased storm frequency. Both the Inter-Departmental group and the Technical working group may be able to provide further input.

Do you have any other suggestions for an improved National Adaptation Framework?

- An analysis should be conducted on evolving NAF's across Northern Europe member States. A number of countries are now in their 3rd and 4th iteration of their adaptation planning and it would be useful to understand how they are evolving and changing. In addition, an analysis of the success and failures of the existing NAF should be conducted with a view to developing an evolved NAF.
- The monitoring and evaluation of national adaptation strategies is ongoing at the level of the UNFCCC and under the EU Energy and Governance Directive. Central to any reporting is the use of appropriate indicators. Ireland has yet to identify a national set of adaptation indicators that are applicable to all sectors and cover all aspects of adaptation.
- In response to CAP 2021 the EPA Climate Ireland work programme 2022 includes the development of indicators for a pilot sector. The project will address adaptation reporting. The objective is to consider international best practice and also EU and international reporting requirements. Such indicators could provide the basis of any future national level adaptation reporting.



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22nd February 2022

Re: Consultation on Review of Draft National Adaptation Framework

Dear Ms Corcoran,

The Environmental Protection Agency (EPA) welcomes this opportunity to provide input into the Review of the National Adaptation Framework 2022 at this early stage.

Policy

The EPA's State of the Environment Report (SoER) published in 2020 identified the need for an overarching national environmental policy position that integrates and delivers across multiple related strategies, plans and programmes. This recognises that environmental issues and challenges such as climate change, air quality, water quality and biodiversity cannot be looked at in isolation as they are complex, interconnected and need to be tackled in an integrated way. An overarching environmental policy position for Ireland should articulate our ambition to protect Ireland's environment in the short, medium and long-term and our commitment to live up to the image of a Clean Green Island. A new national adaptation framework should seek to address the challenge of policy and sectoral integration in its preparation and implementation.¹

The SoER also highlighted that in Ireland's changing climate, 'mitigation and adaptation action that is planned, coordinated and prioritised is required to build the resilience of society and the economy in the face of current and projected climate change impacts'.

Implementation

While substantial progress has been made in the area of climate adaptation in Ireland in terms of the development of the scientific basis, policy and plan making; challenges remain at the national level.

Implementation of adaptation plans has not been strong. The Climate Change Advisory Council Annual Review 2021 reported that it 'found little evidence of the necessary adaptation in some Departments, as shown in the Council's 'Adaptation Scorecard'.

¹ [State of the Environment | Environmental Protection Agency \(epa.ie\)](#)

The new National Adaptation Framework should support effective and timely implementation of current and future adaptations plans which will need good governance and oversight supported by the availability of information and knowledge systems.

Challenges

The EPA is in the process of developing a strategic approach to its role in supporting and informing Climate Adaptation governance system, policy, planning and implementation in Ireland.

Stakeholder engagement undertaken as part of this work has identified a need to improve coordination between stakeholders to deliver robust implementation of climate adaptation in Ireland. Current barriers to its achievement include:

- *Disunity of purpose:* There is an absence of a unifying vision for a climate adaptive and resilient Ireland. The lack of a common language for resilience was seen as a challenge for this policy area.
- *Abundance of data:* A common observation is the sheer amount of data being generated by providers and how this is translated into usable knowledge.
- *Lack of implementation and progress reporting:* The consultation found there existed a lack of effective oversight, monitoring and evaluation at all levels, obstructing reporting on climate adaptation progress. The situation is further weakened due to deficiencies in risk assessment, probability analysis, and urgency-scoring to support decision-making.
- *A need for stronger policy on adaptation:* The urgency on implementation is weakened by the sense that while mitigation and adaptation planning is statutory, the same rigour is not applied to implementation.
- *Fragmented working:* There is a sense among stakeholders that there is a lack of a coordinating mechanism in the climate adaptation action space. As a result, many agencies and interests are moving ahead with individual projects that may be difficult to integrate with system-level needs.

EPA and adaptation

Climate Ireland is Ireland's Climate Information Platform, a central source of scientific and technical data, information and tools; supports for adaptation planning and policy development and implementation; and capacity building in organisations in relation to climate adaptation. The platform is a service provided through the Climate Ireland web portal (www.climateireland.ie) that came within the remit of the EPA in 2021.

In addition to Climate Ireland, the EPA has current and potential roles for the EPA across all functional stages of Climate Adaptation from collecting, interpreting and providing data, collating and coordinating research, synthesising knowledge for specific subsets of users e.g., policymakers, providing decision-making support to unserved or underserved users, providing monitoring and evaluation and progress reporting.

The EPA is committed to the long-term hosting and development of this national climate information platform, in support of the delivery of the National Adaptation Framework and the EPA's role in its implementation.

The EPA would welcome the opportunity to discuss the outcome of our recent work on our role in climate adaptation in Ireland in the context of this review of the National Adaptation Framework.

Consultation Feedback

The EPA is pleased to provide its initial comments at this early stage in this process and looks forward to engaging and providing further input as part of the public consultation process in due course.

The EPA's response to the draft scoping document is set out in the attached document which provides 1) a general comment; and 2) responses to the questions posed in the consultation document.

Yours Sincerely,



Mary Frances Rochford
Programme Manager

1. General Comments

Scope of activities

The scope of activities proposed for consideration in the National Adaptation Framework (NAF) should account of both the sectoral and regional dimensions of adaptation. In the 2018 NAF, sectors were grouped together under cross cutting thematic areas to provide coherence across sectors facing similar climatic issues such as flood risk. This is a useful framework and could be developed further in the revision of the NAF.

While sectoral adaptation is well covered in the document, more attention should be given to the regional and local basis for the activities emerging from the Framework. The role of adaptation at the local level has been strengthened in the 2021 amendment to the Climate Act and this development should be accounted for in the revised NAF. Stronger focus should be given to improve the co-ordination of activities at the sectoral and regional level.

The scoping document should provide a wider context for the forthcoming revision of the NAF beyond the science and policy developments since 2018. Attention should also be given to developments in the following areas since 2018: 1) implementation of adaptation across sectors and local authorities; 2) integration of mitigation and adaptation; 3) local level responses to adaptation; 4) behavioural and social change; and 4) the financial aspects of climate change adaptation.

Climate Change Impacts in the Irish Context

Since the publication of the 2018 NAF, a substantial number of key climate change impact reports have been published for Ireland. The material within Climate Change Impacts in the Irish Context section of the scoping document is outdated and should be updated prior to the public consultation.

'The Status of Ireland's Climate' (2021) report funded by EPA, Marine Institute and Met Eireann provides a comprehensive overview of key impacts across the full set of essential climate variables for Ireland. The Report shows that Ireland's climate is changing in line with regional and global trends and these changes are projected to continue and increase over the coming decades. Adaptation action that is planned, coordinated and prioritised is required to build the resilience of society and the economy to current and projected climate change impacts.

This section should also consider the findings of other relevant EPA funded climate change research which can be found at <https://www.epa.ie/publications/research/climate-change/> Appendix 1 for further details of research reports published in period 2018-2021 that are relevant to climate adaptation. Details of ongoing research that may be of assistance can be found in Appendix 2.

The NAF review should include consideration of the wider national research landscape for climate adaptation research, given that, as already recognised, research plays an important role in policy development on climate change. The activities of the Climate Research Coordination group are reported annually, [three reports have been published to date](#). These reports include a summary of investments, progress on strategic goals, and related developments, as well as the activities of the CRCG and its members. The reports cover competitive research funding committed by members of the CRCG, leveraged funding from EU schemes, and core research activities carried out by CRCG members themselves.

The recently published IPCC AR6 Climate Science Report (2021) and the forthcoming IPCC AR6 report on Climate Change Impacts and Adaptation (due March 2022) will also provide relevant updates on climate change impacts.

International Science-IPCC

The scoping document discusses the Intergovernmental Panel on Climate Change (IPCC) working group 1 report. The scientific context for the proposed revision should also include findings from AR6 WG report 2-due for publication in March 2022.

2021 EU Strategy

The EU Working Group 6 on Climate Change Impacts and Adaptation is an important source of policy information. Ireland is represented on this group by DECC. It would be useful to put in place a mechanism by which the key outputs from this working group are disseminated nationally.

It is suggested that the NAF scoping document provides more detail on the opportunities to incorporate activities underway at an EU level into the revised framework. For example, engagement with Horizon Europe/Adaptation Mission and the role of national stakeholders.

2. Response to key questions for stakeholders

Policies, plans and programmes

- There are a number of new and existing areas requiring attention including, coastal zones, cultural and heritage assets, costing of adaptation, development of national level resilience scenarios and the linkages between mitigation and adaptation which is becoming increasingly relevant.

The NAF through the proposed national level risk assessment should be able to monitor changes in priority sectors over time and respond accordingly.

- To better integrate work undertaken at a sectoral level, a review of goals and implementation from each sector based on a set of agreed criteria should be developed to inform the new NAF to better understand challenges, cross cutting issues and implementation.

Mitigation

- There is a need to better link mitigation and adaptation strategies within the NAF. International best practice is evolving to consider both mitigation and adaptation together. Leaders in this area include countries, such as, Denmark, Sweden and the Netherlands. The NAF review process should incorporate an assessment of policy evolution in these countries to understand this process to inform the new Framework.

Implementation of adaptation actions

- The CCAC Annual Review of adaptation action has reported that insufficient progress has been made on the implementation of adaptation action. A review should be conducted to understand what the barriers to implementation are and how they can be overcome, tracking progress, regular reporting of implementation actions.

Finance and economic considerations

- The NAF should include a standalone section that will address the costings of climate change impacts and financing future adaptation needs. The framework should incorporate a mechanism to capture details of adaptation costs and financing information from sectors and local authorities.
- It is considered that a national level study on the current and future costs (economic and social) of impacts and adaptation responses to climate change in Ireland is required.

The economic impacts of climate change can be better reflected in adaptation planning processes through improved capturing of data by sectors and local authorities. The Framework

should require relevant Departments and Authorities maintain records to form the basis of assessments of climate adaptation spending. These can support reporting of actual spend and support improved spending projections.

- The methodology for any socio-economic analysis should be designed to capture the social and economic costs of adaptation.

Just Transition

- An underlying set of principles for the NAF should include the concept of just resilience. The concept of just resilience relates to i) how different groups of society are affected by climate change impacts, ii) how benefits and burdens of adaptation responses are distributed across different groups and how different groups. At an operational level this means understanding social vulnerability to climate change impacts and identifying and assessing and selecting adaptation options that take account of the social elements of adaptation.

Just resilience can be better integrated into the NAF by identifying who is most vulnerable to climate change in Irish society, which can be achieved by conducting social vulnerability assessments and designing adaptation responses that take account of those most vulnerable to climate change.

The European Environment Agency Technical report 2021/2 Overview of Knowledge and Practice for Just Resilience provides a useful summary of Just Resilience and its integration into policy across Europe.

Mainstreaming

- The EPA's State of the Environment Report identified the need for an overarching national environmental policy position that integrates and delivers across multiple related strategies, plans and programmes. This recognises that environmental issues and challenges such as climate change, air quality, water quality and biodiversity cannot be looked at in isolation as they are complex, interconnected and need to be tackled in an integrated way. An overarching environmental policy position for Ireland should articulate our ambition to protect Ireland's environment in the short, medium and long-term and our commitment to live up to the image of a Clean Green Island. A new national adaptation framework should seek to address the challenge of policy and sectoral integration in its preparation and implementation.

Capacity Report

- Capacity building within government sectors and the Local Authorities has been supported by the data, information, tools and guidelines available on Climate Ireland.

Specific support for the local authority sector has included the development of the Climate Action Regional Offices Local Authority Climate Action Training Programme. As part of this programme Climate Ireland has developed and is delivering the Climate Action Raising Awareness course online through the Climate Ireland Learning Platform. In addition, Climate Ireland has co-ordinated the development and is contributing to the delivery of the Climate Action Building Capacity course which targets climate action teams within the Local Authorities. By Dec 2021 the Climate Action Raising Awareness course has been rolled out to 12,458 learners and has achieved an average completion rate of 72%. The Climate Action Building Capacity course has been delivered to 351 Climate Action Team members across Ireland's Local Authorities. These courses are currently under review by the CAROS's.

Capacity building in the area of adaption should be kept under review and sustained due to the continuous nature of staff turnover within the sectors and local authority sector. It should be targeted, and outcome focused.

Structural capacity must also continue to be supported through the further development of observation, analytical and research infrastructure. The NAF review should include an assessment of current capacity/infrastructure and identify gaps that need to be addressed. This review should start with recommendations included in the Status of Ireland's Climate 2021, and the outcomes from the EPA 5YA.

Cross Cutting Issues

- A clear approach to cross cutting themes such as water, air quality, flooding, droughts, etc is required in the new NAF. The UK has taken a thematic approach to developing its adaptation policies and there may be learnings for the NAF from this.
- The issue of changing the focus of the NAF to a thematic approach would represent a large change for the NAF. To ensure that it is understood and possible to implement it would be necessary to gauge the views of key stakeholders already operational in this policy space such as sectors and local authorities.

Governance

- The Governance structures should take account of changes since the previous NAF; e.g setting up of CAROs, development of local authority climate action teams, etc. The aims and purpose of the national steering group should be revised to accommodate new stakeholders within the climate adaptation planning and implementation system. The National Adaptation Steering Group has a central role to play in the national structure. It is suggested that the Terms of Reference of this group should be reviewed, membership expanded and more frequent meetings held.
- A pilot indicator project is proposed under the CAP 2021, which should begin immediately with a view of rolling it out across all sectors in 2023. A process of reporting on these indicators should be put in place at the same time. Such a process should follow best practice and capable of being used for UNFCCC, EU and national level reporting on adaptation.

Under the Climate Ireland work programme 2022, EPA will lead the development of indicators for a pilot sector. The project will address adaptation reporting. The objective is to consider international best practice and also the EU and international reporting requirements. By taking such an approach administration burdens should be lessened.

International

- From a national level perspective, the transboundary element of impacts and adaptation is of relevance. Common areas include river basins, catchments and infrastructure (e.g roads). For example, EPA funded research, "Transboundary Climate Risks for Island of Ireland (TCRII)" starts 04/01/2022 and is due to be completed 03/01/2023. It could be beneficial for NAF review to link in with this project.
- The links between sectoral and local levels can be improved through governance structures such as the national adaptation steering group. It can also be improved through the proposed indicators project.

Consultation

- An overview of the implementation across sectors/regions is required, setting out what was achieved or not. Such a review also needs to interrogate the barriers to implementation and recommend how they can be overcome.
- It would also be useful to seek international review from countries that have undertaken similar adaptation processes, e.g. UK, Denmark, Netherlands, to ensure that the NAF is consistent with current international best practice and provide an opportunity to learn from experience of others.
- The public consultation element of the NAF could be promoted in a similar way to the consultation developed for the CAP 2021, via the 'Climate Conversations' approach.

Research

- The EPA 's 5 Year Assessment will provide a comprehensive overview of the state of play and research gaps for climate change adaptation in Ireland. The findings of Volume 3-Being Prepared for Ireland's Climate Future should be used to inform the development of the NAF.
- In addition to Volume 3 of the 5YA, Volume 1 (Science: Ireland in a changing world) should also be relevant to the NAF review.
- There is a need to develop national observation, analytical and research infrastructure in respect to climate change.
- The NAF review should assess current capacity/infrastructure and outline how the gaps identified will be addressed. The review should start with the conclusions and recommendations of the Status of Ireland's Climate 2021.
- Further research needs to be undertaken in relation to compound hazard events, where hazards occurring simultaneously or concurrently can create or exacerbate hazardous conditions, e.g. saturated soils prior to a heavy rainfall event.
- There is a requirement for research focussing on the co-benefits of adaptation actions and any potential negative impacts. This is needed to assist with planning of adaptation actions and to inform further risk assessments to take into account the impacts of these actions.

Local Adaptation

- Interaction and collaboration between LAs and Sectors can be improved to deliver better adaptation outcomes through stronger collaboration at a governance and operational level on common themes such as risk assessment frameworks.

New Sectors/SAPs

- The UK approach should be examined when considering other mechanisms to deliver adaptation in areas where sectoral plans may not be the best model. The UK has taken a thematic approach to its decision-making framework and examination of its potential in Ireland is merited. It should be noted that if sectors are grouped along common thematic lines a designated clear lead with responsibility for delivery and driving implementation of actions is needed.
- National level climate change risk assessment should be undertaken to allow for a better understanding of climate risks. A periodic national level risk assessment should be undertaken, and the results communicated widely.

- The priority climate change hazards will emerge from a carefully designed risk assessment, these cannot be decided without including vulnerability and adaptive capacity assessment in the risk assessment approach to be used.
- The NAF should be cognisant of climate tipping points but in doing so being aware of the uncertainties that exist around such events. Tipping points of potential relevance to Ireland in the medium to long term should be identified under a national level risk assessment. The NAF should also specify that the precautionary principle underpins adaptation plans, which help account for the unknowable.

Climate Services/Climate Information

- The proposed development of a National Framework on Climate Services should provide a coherent approach to climate services in Ireland. The approach will allow for better co-ordination at the national level such that the services being provided are fit for purpose, authoritative, reliable and understandable.

The EPA has indicated its willingness to work with Met Éireann to develop and enhance Ireland's existing climate information portal, Climate Ireland. The NAF should reflect the ongoing and evolving nature of climate services and the central role of Climate Ireland in such service development and provision.

The Met Eireann funded TRANSLATE project is highly relevant to the NAF as it will produce standardised climate projections as well as working with some sectors to pilot climate services related to risk assessments.

Data sharing is crucial to risk assessments and has frequently been a barrier taking up a large amount of resources to overcome. Stronger leadership at the national level in relation to ensuring organisations are able to easily share their datasets would be should be a priority.

- The Improved alignment of work programmes across agencies and stakeholders to create strategic awareness of partners goals/ timelines for delivery of mutually relevant products would be beneficial.

Appendix 1. EPA research reports related to climate change adaptation published since 2018.

Year	Report title
2021	Research 397: Framework for Achieving the Environmental Sustainable Development Goals
2021	Research 386: The Status of Ireland's Climate, 2020
2021	Research 384: ClimAtt: Tools for Climate Change Attribution of Extreme Weather Events
2021	Research 379: Policy Coherence in Adaptation Studies: Selecting and Using Indicators of Climate Resilience
2021	Research 369: CIViC: Critical Infrastructure Vulnerability to Climate Change
2021	Research 362: Evaluating Ireland's Climate Policy Performance
2021	Research 360: Methodologies for Financing and Costing of Climate Impacts and Future Adaptation Actions: Transport Networks in Ireland
2020	Research 350: Towards a Definitive Historical High-resolution Climate Dataset for Ireland – Promoting Climate Research in Ireland
2020	Research 346: National Risk Assessment of Impacts of Climate Change: Bridging the Gap to Adaptation Action
2020	Research 344: Citizens' Views of Climate Action in Ireland: Insights on Media Use, Trusted Sources and Perceptions
2020	Research 339: High-resolution Climate Projections for Ireland – A Multi-model Ensemble Approach
2020	Research 320: Assessing Vulnerability to Climate Change: An Approach Illustrated through Large Urban Scale Adaptation (Urb-ADAPT)
2020	Research 314: Deepening Public Engagement on Climate Change: Lessons from the Citizens' Assembly
2020	Research 310: EC-Earth Global Climate Simulations: Ireland's Contributions to CMIP6
2019	Research 301: Adaptive Responses to Climate Impacts (ARC)
2019	Research 300: Climate Change in Irish Media
2019	Research 277: Irish Climate Futures: Data for Decision-making
2019	Research 265: Challenges of Transformative Climate Change Adaptation: Insights from Flood Risk Management
2018	Research 263: Reflecting on Adaptation to Climate Change: International Best Practice Review and National MRE and Indicator Development Requirements
2018	Research 258: The Development of an Irish Climate Information Platform (ICIP) - Phase 3 (2015-2017)
2018	Research 257: An Operational Climate Information Platform for Ireland: Summary Report
2018	Research 256: National Preparedness to Adapt to Climate Change: Analysis of State of Play
2018	Research 244: Regional Climate Model Simulations for Ireland for the 21st Century
2018	Research 233: WARNDIS Project Final Report: A Review of Climate Change-related Hazards and Natural Disaster Vulnerabilities and of Agencies Involved in Warning
2018	Research 242: HOMERUN: Relative Homogenisation of the Irish Precipitation Network

Appendix 2 Active projects related to climate change adaptation

Project Title	Projected Completion Date	Status
Climate Resilient Places	30/03/2024	On-going
Transboundary Climate Risks for Island of Ireland (TCRII)	03/01/2023	On-going
INFRAstructure cLimate change risk considering Interdependencies and Cascading hazards	01/03/2023	On-going
Adaptive conservation management considering models of species population changes under climate change predictions	21/06/2021	On-going
Irish Peatland Resilience to changing climate and increased frequency and severity of drought	28/02/2023	On-going
WFD Future Scenarios and Management Tools	30/03/2025	On-going
An Economic Assessment of Climate Change Impacts and Adaptation Options in Ireland	03/01/2023	On-going
BE-Resilient: Built Environment Resilient Futures. Best practice in implementing climate adaptation	01/03/2021	Final report under review
Biological Tools to Measure the Impact of Flow on Ecology in Irish Rivers	01/03/2023	On-going
CARIB: Climate Change Adaptation: Risks and Opportunities for Irish Businesses	22/03/2021	Final report with proof-readers
CROSSDRO: Cross-sectoral impact assessment of droughts in complex European basins	31/08/2022	On-going
EIDRCCAIEP: Enhancing Integration of Disaster Risk and Climate Change Adaptation into Irish Emergency Planning	01/03/2021	Final report under review
High-Resolution Coupled Atmosphere-Ocean-Wave Regional Climate Projections for Ireland	05/01/2022	On-going
RainSolutions: Research based Assessment of Integrated approaches to Nature based Solutions	31/03/2022	On-going
SoMoSAT: SOil MOisture estimates from SATellite based Earth observations	01/09/2022	On-going
TalX: Transboundary Adaptation Learning Exchange	12/01/2022	On-going
Multifactorial causes of fodder crises in Ireland and risks due to climate change	01/10/2022	On-going
HydroPredict - Ensemble Riverflow Scenarios for Climate Change Adaptation	01/01/2023	On-going
The phenology of perennial ryegrass and its potential contribution to grassland carbon sequestration	01/04/2022	On-going
Impact of Climate Change on Phenology in Ireland	01/07/2021	Final report with proof-readers
Achieving Resilience in the Marine and Coastal Environment of Ireland	04/07/2021	Final report under review

