

Aberdeenshire Coastal Change Adaptation Plan

Regional Plan

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Contents

Part A – Background and Motivation	1
1. Introduction	2
1.1 Overview	2
1.2 What is a Coastal Change Adaptation Plan?	2
1.3 Why is it needed?	3
1.4 What is the Regional CCAP?	3
1.5 Where are we on the adaptation journey?	4
2. Supporting Plans and Projects	5
2.1 Local Flood Risk Management Plans (LFRMP)	5
2.2 Aberdeenshire Local Development Plan – 2023	7
2.3 Aberdeenshire Local Place Plans	7
2.4 Dynamic Coast – 2021	8
2.5 Scottish Government Coastal Change Adaptation Plan Guidance*	8
2.6 Climate Change Adaptation Plan	12
2.7 Spatial definition of the CCAPs	12
2.8 Spatial definition of the LPPs	13
3. Delivery	15
3.1 Governance	15
3.2 Review Process	16
3.3 Reporting	17
3.4 Ecosystem	17
Part B – Technical Information	19
1. Coastal Processes	20
1.1 Sediment Cells	20
1.2 Hydrodynamics	31
1.3 Wave climate	34
1.4 Sea Level Dynamics	36
2. Sea level rise	40
2.1 Mechanism	40

2.2	Historic SLR	41
2.3	Future Predictions	41

Part C – Local Plan Prioritisation 45

1.	Plan Prioritisation	46
1.1	Influence Factors and Indicators	46
1.2	Methodology	49

Part D – Regional Plan 52

1.	Regional Plan Overview	53
1.1	Plan Coverage	53
1.2	CCAP Delivery Framework	54
2.	Regional CCAP Process	57
2.1	Delivery	57
2.2	Stakeholders	59
2.3	Proactive Actions	59
2.4	Regional pathway process	62
3.	Phase 0 Summary	63
3.1	Adaptation Framework	63
3.2	Local CA Prioritisation	63
3.3	Regional Pathway Process	64
3.4	Next Steps	64

Appendices 65

Key Abbreviations

CA	Community Areas
CCAG	Cross-Council Action Group
CCAP	Coastal Change Adaptation Plan
LDP	Local Development Plan
LPPS	Local Place Plans
CMEMS	Copernicus Marine Environmental Monitoring Service

Glossary

Actions*

A plan or policy option that promotes an adaptive approach to coastal change making use of long term or resilient solutions.

Adaption Framework

A framework to support Coastal Change Adaption Planning across the Region, through the integration of sustainable land-based and management practices into Local Development Planning and Policy.

Community Area

A geographic area (community level) where detailed plans for adaptation are developed and will be delivered. These aim to align with Community Councils. Aberdeenshire Council Committee Areas may include more than one Community Area, and several coastal settlements.

Cross Council Action Group

The Aberdeenshire Council team responsible for overseeing the governance and delivery of the Plans.

Coastal Management Unit

A subdivision of a Community Area that reflects variation in coastal type, structures, and risk.

Triggers*

Either a physical process or an enabler/inhibitor that when action should be taken.

Coastal Change Adaptation Plan Ecosystem

The network of plans, policies, priorities and projects across the Council and relevant stakeholders that collectively influence how coastal adaptation is approached, delivered and governed

Climate Ready Aberdeenshire

A voluntary cross-sector network bringing together views and expertise across diverse stakeholders.

*Term definitions from Scottish Government Coastal Change Adaptation Plan Guidance¹.

¹ https://www.dynamiccoast.com/files/ccapg_2023feb.pdf

Part A – Background and Motivation

1. Introduction

1.1 Overview

Aberdeenshire Council have worked in collaboration with JBA Consulting to develop a series of Coastal Change Adaptation Plans (CCAPs) for the Aberdeenshire Local Authority area in northeast Scotland. Plans have been developed at two levels. An overarching Regional Plan, covering the entire Aberdeenshire Council coastline, and Local Plans for communities where a more refined approach to adaptation is desirable. These Plans are “living documents” whereby changes in knowledge will trigger reviews and the implementation of defined actions.

This document details the Regional CCAP for Aberdeenshire.

1.2 What is a Coastal Change Adaptation Plan?

The climate is changing, and throughout history the coast has responded to changes in sea level, storms, and other climate parameters. The current position of Aberdeenshire’s coast is dynamic, rather than fixed and will continue to evolve.

As sea levels continue to rise as a result of sea level rise (SLR), Aberdeenshire’s coastal edge will, in many places, retreat landwards. This means that places that are on land today may be flooded or eroded in the future. As a result, the pressure on the present land-sea boundary will grow. This will inevitably lead to losses of land, assets, and amenities for communities and individuals. The focus of these Plans is therefore on the direct impact of hazard from the sea (flooding and erosion). Whilst it is acknowledged that other drivers and extreme weather hazards affect coastal communities (and may increase with climate change), these are not the focus of the CCAPs. Upon delivery of the Plans, the overall framework and governance structure must, however, aim to integrate with wider climate and natural hazard resilience challenges being faced (Part A – Section 3).

Just as the coast is changing because of these risks, society also needs to adapt so that it can learn to live with a dynamic coast. This will improve the resilience of the ecosystems, communities, infrastructure, and human well-being supported by the natural coastal environment.

Although there is uncertainty associated with future coastal flood and erosion risk extents, the science shows that coastal erosion around Scotland is already accelerating and will increase in the future. It is no longer a question of “if”, rather “when” risks will be realised.

Due to increased concentrations of greenhouse gas (GHG) emissions in the atmosphere, a certain amount of SLR, along with the associated impacts on storms, is locked in, regardless of future efforts to reduce GHG emissions. This has profound implications on the approach to reducing the impacts of coastal flood and erosion risks, and on affected assets and communities.

Relying on traditional coastal risk management approaches is no longer sufficient to protect communities against these risks. Instead, it is important to become more resilient, by adapting to a changing coast. This can be achieved through coastal risk management and resilient development planning and practices.

To enable this, it is important to make proactive combined decisions which provide space for the coast to naturally respond. This is imperative to avoid tying future generations into maintaining unsustainable and costly approaches to coastal management. Developing and implementing these adaptation plans now, to address how society responds to current and future risks, can help to reduce future costs and negative impacts, such as assets eroding into the sea or suffering repeat, frequent flooding. More positively, a proactive approach to adaptation and climate resilient development planning now, can generate wider benefits and opportunities for coastal communities and the ecosystems which sustain and support them.

Coastal adaptation needs to be embedded into planning, thinking, and development. CCAPs are the first step in this process. They encourage and reward proactive measures, which aim to build future resilience now, through measures such as safeguarding space on land for landforms to adjust dynamically to coastal change. They provide time to develop risk assessments and monitoring for the longer-term. They are a practical mechanism to enable proactive engagement with, and involvement of, communities to co-develop a shared vision for long-term societal resilience to coastal change. These can then be enacted across the range of statutory and non-statutory policies that set strategies across Aberdeenshire.

1.3 Why is it needed?

Aberdeenshire has approximately 265 kms of coastline accommodating several large settlements, as well as other assets such as harbours, beaches, coastal trails, and agricultural land. These settlements and assets are important for the economy, natural and cultural heritage of the region. The increasing pressures of climate change, including the consequences of sea level rise, will continue to change our coastline and put existing and planned development and infrastructure at risk.

Substantial parts of the Aberdeenshire coastline are made up of soft material susceptible to erosion. Evidence from the Dynamic Coast² project has indicated that the proportion of soft coastline experiencing erosion has increased in recent years. This includes the Buchan East Community Area and South of the Ythan Estuary accounting for 9 km of estimated eroding coastline. There is likely to be increased erosion and flooding to be managed in the future.

1.4 What is the Regional CCAP?

The Regional Plan is the high-level plan covering the entire Aberdeenshire coastline. It will:

- Define and understand coastal flood and erosion risk using the best available data
- Identify and define region-wide Influence Factors and Indicators that will inform and support an approach to adaptation planning

² Dynamic Coast - <https://www.dynamiccoast.com/>

- Prioritise the coastline for detailed Local CCAPs
- Identify region-wide Triggers that will influence adaptation decision making
- Set region-wide Actions to support a vision for the future Aberdeenshire coastline.

Fundamentally, the Plan sets out a framework to support coastal change adaptation planning across Aberdeenshire. It focuses on the management component of adaptation and is supported by the implementation of associated land-based aspects for avoidance of future risk to new developments. Specifically, this is supported by National Planning Framework 4 (NPF4)³:

- **Policy 10: Coastal Development** - *To protect coastal communities and assets and support resilience to the impacts of climate change. Coastal areas develop sustainably and adapt to climate change.*
- **Policy 22: Flood Risk and Water Management** - *To strengthen resilience to flood risk by promoting avoidance as a first principle and reducing the vulnerability of existing and future development to flooding.*
 - *Places are resilient to current and future flood risk.*
 - *Water resources are used efficiently and sustainably.*
 - *Wider use of natural flood risk management benefits people and nature.*

Integration of this CCAP into Aberdeenshire Local Development Plan (LDP) policies will provide the overall framework to support coastal adaptation, through delivery of sustainable land-based and management practices.

1.5 Where are we on the adaptation journey?

The aim of this first publication of the CCAP is to consolidate our understanding of the physical risks and how these interact with communities and their assets, to identify the present day and future hazards of our changing coast.

Adaptation is a continuous and ongoing process, in large part due to the levels of SLR that are already locked in over the coming years because of climate change (see **Part B – Technical Information**). Adapting Aberdeenshire for a more sustainable and resilient future will require more detailed assessments of risk, economics, community engagement, environmental factors, and engineering—going beyond the scope and level of detail achieved so far.

This CCAP therefore promotes and develops a framework for adaptation across the region that, when followed, will allow Aberdeenshire Council to undertake the relevant assessments and develop robust Adaptation Pathways that can ultimately be delivered on with confidence.

³ Scottish Government. 2024: National Planning Policy Framework 4.
<https://www.gov.scot/publications/national-planning-framework-4/>

2. Supporting Plans and Projects

Critical to implementation of the Plan and adaptation success is incorporation and alignment with key strategic regional and national plans and projects. At the national level, Climate Ready Scotland provides the overarching framework to support the nation in adapting and responding to the changing climate⁴. This includes a five-year programme (2019-2024) to prepare Scotland for the challenges ahead. A draft copy of the Third Scottish National Adaptation Plan (SNAP3), covering the period 2024-2029 was released for public consultation from the 31st of January 2024 to the 24th of April 2024⁵.

As well as the Climate Ready Scotland Framework, here more specific plans and projects have been identified and reviewed to aid the development of this Plan. These are summarised below.

2.1 Local Flood Risk Management Plans (LFRMP)

Strategic flood risk planning for Aberdeenshire is included in the North East Local Plan District – Local Flood Risk Management Plan (LDP05)⁶. The purpose of this plan is to set out how and when actions to reduce impacts from flooding will be implemented and to identify areas at greatest risk of flooding, as well as those that will benefit most from investment. LFRMPs are cyclical and update every six years, with the current cycle running from 2022 to 2028.

A total of eight coastal areas in Aberdeenshire were identified through these as potentially vulnerable to flooding:

- Portsoy
- Banff and Whitehills
- Macduff
- Fraserburgh and Rosehearty
- Peterhead
- Stonehaven
- Portlethen
- Cruden Bay

Table 2-1 summarises the latest LFRMP findings on current and future flood risk from various sources to people and properties in each Potentially Vulnerable Area (PVA). It should be noted that in locations where the main concern is coastal flooding, that sea level rise caused by climate change is expected to increase coastal flood risk. However, coastal flood risk is

⁴ Scottish Government. 2019. Climate Ready Scotland: Second Scottish Climate Change Adaptation Programme 2019-2024. - <https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/>

⁵ Scottish Government. 2024. Scottish Government: Scottish National Adaptation Plan 2024-2029 <https://www.gov.scot/publications/scottish-national-adaptation-plan-2024-2029-2/>

⁶ Aberdeenshire Council. 2022. North East Local Plan District - Local Flood Risk Management Plan 2022-2028. <https://www.aberdeenshire.gov.uk/media/27479/local-flood-risk-management-plan-2022-2028.pdf>

likely to be underestimated due to the impact of waves not being included in the SEPA flood maps used for the LFRMP.

Table 2-1. Summary of Aberdeenshire PVAs from the most recent 2022 LFRMPS

Area	Target areas	Current People at risk of flooding	Current Properties (residential and businesses) at risk of flooding	Future People at risk of flooding	Future Properties (residential and businesses) at risk of flooding
Portsoy	Portsoy (399)	140	70	140	70
Banff and Whitehills	Banff (400)	230	130	350	210
	Whitehills (401)	120	70	140	80
Macduff	Macduff (402)	160	80	170	90
	Gardenstown (458)	Not available*	Not available*	Not available*	Not available*
	Crovie (459)	10	10	10	10
Fraserburgh and Rosehearty	Fraserburgh (408)	680	410	880	540
	Pennan (460)	Not available*	Not available*	Not available*	Not available*
	Sandhaven (461)	20	20	20	20
	Rosehearty (462)	90	50	90	60
Peterhead	Boddam (406)	70	50	80	60
	Peterhead (407)	800	520	1000	670
Stonehaven	Stonehaven (419)	3100	1600	3600	1800
Portlethen	Portlethen (425)	630	310	810	400
Cruden Bay	Cruden Bay (447)	100	50	100	60
* SEPA coastal flood maps used to derive LFRMP statistics did not include an allowance for wave overtopping. The updated maps reflect this and have been used in these CCAPs to derive properties counts and provide a mechanism to include this in the prioritisation of Local CCAPs (Part C)					

It should be made clear that the intention of the CCAPs is not to replace actions identified in the LFRMP. Where defined actions or detailed assessments focused on coastal flooding are undertaken, the CCAPs will integrate these into the decision-making process. An example being the 2018/2019 Coastal Flood Study in Stonehaven⁷. The outcomes of this are still included for prioritisation with SEPA for Scot Gov capital funding. Should this progress (or not) the decision would be incorporated into any Local CCAP for Stonehaven.

2.2 Aberdeenshire Local Development Plan – 2023

Aberdeenshire Council's current LDP was formally adopted on 13th January 2023 and was written to accord with the National Planning Framework 3 and be consistent with the Aberdeen City and Shire Strategic Development Plan 2020.

The LDP aims to deliver the following six core policies:

1. To promote sustainable mixed communities with the highest standards of design.
2. To take on the challenges of sustainable development and climate change.
3. To protect and improve assets and resources.
4. To increase and diversify the economy.
5. To protect, enhance and promote green-blue networks within and between settlements.
6. To make efficient use of the transport network, reduce the need to travel and promote walking, cycling, wheeling and public transport.

Aberdeenshire Council are also currently in the process of updating their LDP. The forthcoming LDP is expected to be published in 2029 and will cover the period between 2029 and 2039.

Aberdeenshire Council have published 33 topic papers⁸ as part of developing an Evidence Report to support the 2029 LDP. This CCAP will integrate with the LDP through:

- Provision of additional supporting evidence
- Supporting identification of suitable locations for allocated development
- Highlighting any conflicts with existing development planning
- Setting combined land and management-based actions to support a holistic approach to adaptation.

2.3 Aberdeenshire Local Place Plans

Aberdeenshire Council has begun the process of developing Local Place Plans (LPPs)⁹, which provide a community-led and collaborative approach to local placemaking. LPPs allow communities to set out proposals for the development and use of land, identify local priorities,

⁷ <http://www.stonehavenbaycoastalfloodstudy.com/>

⁸ Aberdeenshire Council. 2023. Aberdeenshire Local Development Plan 2029.

<https://www.aberdeenshire.gov.uk/planning/plans-and-policies/ldp-2028/>

⁹ [Local Place Plans introduction - Aberdeenshire Council](#)

highlight spatial challenges, and propose opportunities for future development. Because LPPs feed directly into the Local Development Plan, they carry material weight within the planning process. It is proposed that the Council will form local place teams to support communities to prepare and deliver these plans, although this arrangement is still to be formalised.

It is clear LPPs present a strong opportunity to incorporate and deliver the priorities of local CCAPs. Building on the work already undertaken to understand coastal change risks, LPPs can take this further by identifying the land, assets, and places that communities value, and by setting out their own vision for how adaptation should be approached. This helps ensure that coastal adaptation needs are reflected within local placemaking and long-term planning, while still being guided by community aspirations. Many communities in Aberdeenshire already have Community Action Plans that can provide a starting point for developing an LPP, reducing duplication and supporting the integration of coastal resilience into wider community priorities. Bringing CCAPs into the LPP process strengthens community ownership, supports place-specific adaptation planning, and ensures that community visions for the future align with the evolving challenges of a changing coast.

2.4 Dynamic Coast – 2021

The Dynamic Coast 2 (DC2) project provides an updated national assessment of coastal change and strategic evidence on the risk of coastal erosion across the whole of Scotland¹⁰. It was delivered and managed through a collaboration between Nature Scot, Scottish Government, and the University of Glasgow.

The aim of the project was to improve the evidence and awareness of coastal erosion at a national scale and support decision makers in adapting and becoming resilient to coastal change as sustainably as possible. Results from DC2 can be used to identify areas at high risk of coastal erosion and help support decision-making.

It combines evidence-based historic coastal change with anticipated future change based on climate change projections. Here, results from DC2 inform the extent of past and anticipated coastal change risk along the Aberdeenshire coast.

The DC2 data underpin this initial phase of CCAP development, supporting both the Regional and Local plan development. Full details of the DC2 datasets used in the development of the Regional CCAP are provided in **Part C- Local Plan Prioritisation**.

2.5 Scottish Government Coastal Change Adaptation Plan Guidance*

Coastal management planning in Scotland is changing and moving towards an adaptive approach. To enable national consistency and alignment of opportunities Scottish Government have developed Interim CCAP guidance¹¹. The aim of this guidance is to support Local Authorities in Scotland to plan for the long term (50 to 100 years) adaptation and resilience of coastal areas, communities, and assets. The guidance encourages a proactive

¹⁰ Rennie et al. (2021) Dynamic Coast, The National Overview (2021) CREW.

¹¹ Scottish Government (2023) Coastal Change Adaptation Plan Guidance – Interim
https://www.dynamiccoast.com/files/ccapg_2023feb.pdf

approach that will maximise opportunities and minimise risk from climate change impacts. As part of development of this CCAP, this guidance has been reviewed.

To support development, the guidance has been distilled into four key pillars of adaptation (Figure 2-1). The CCAP therefore aligns with the guidance through focus on these pillars to define the processes, pathway, and actions to support adaptation across the region. Fundamentally they provide a direction to support a balanced approach to guide current and future practices to aid investment. The aim being that **actions must be identified, set, and delivered across all pillars to make sure that adaptation is holistic and considers all aspects to support a more resilient future for the coast.**

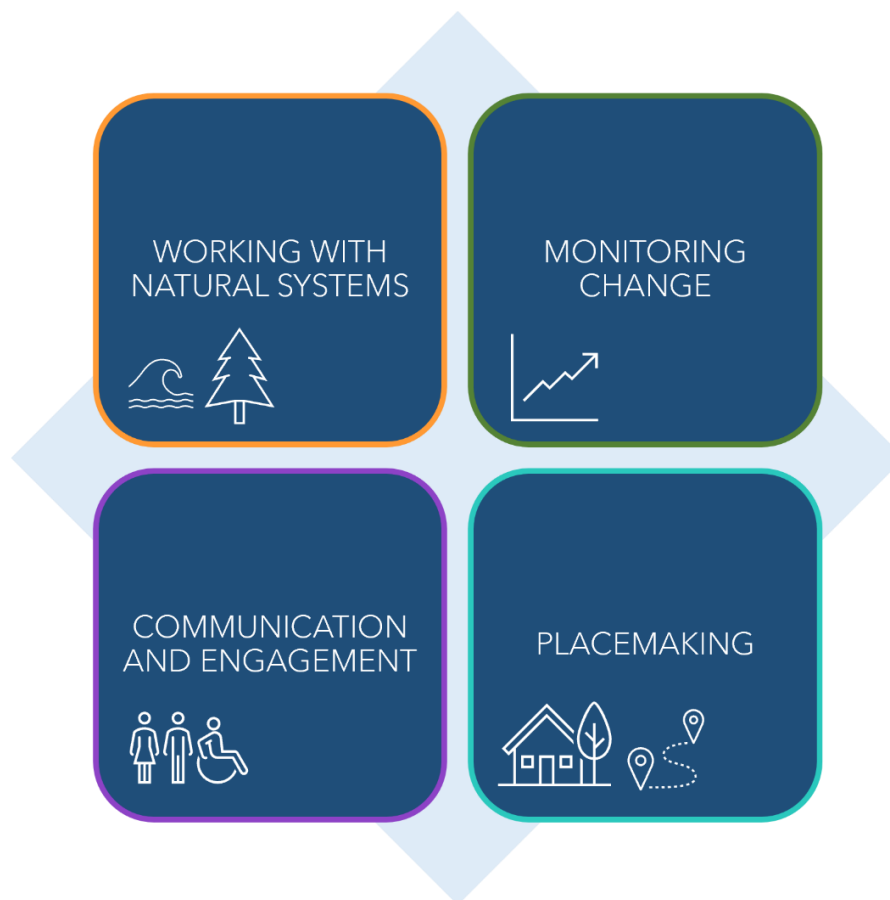


Figure 2-1 Four pillars of coastal adaptation for Aberdeenshire.

These pillars are summarised as:

Working with natural systems:

Coasts provide a range of natural systems, including dunes, beaches, and saltmarshes which can provide protection from coastal flooding, erosion, and erosion induced flooding. Using nature-based management approaches to maintain, enhance, or restore the protective functions of these systems can offer a relatively inexpensive, low-commitment way to maintain or even increase resilience. For this natural and nature-based risk alleviation to continue, particular in the face of the ongoing impacts of climate change, space on land needs to be given for these systems to evolve and migrate.

There is therefore a need for land-based policies to make space to accommodate erosion by designating space for the inland migration and adjustment of such features in statutory policies, such as LDPs. Similarly, avoiding new or replacement “permanent” development, such as traditional housing stock or transport infrastructure such as roads, in locations where there is erosion and/or flood risk, should be a key pillar of climate resilient development pathways. In some locations, it may be possible to allow for temporary developments, which can allow economic activity to continue in areas at risk. Such developments should have clear short term community benefit and be supported by a longer-term plan for adaptation when risk increases. Examples may include facilities that are required to continue to support tourism or recreation, developed in the short-term while a longer-term, permanent strategy can be implemented. The suitability of this should generally only be considered where flood or erosion risk is predicted to only be realised in the future.

In areas on land that are already developed, existing assets at risk may require relocation now, or in the future. Accommodation space for these, as well as community engagement, is needed to help manage these risks in the most resilient and cost-effective ways for current and future generations. The interim guidance discourages the installation of new, artificial coastal defences, and instead focusses on maintaining existing artificial structures to a level of performance deemed acceptable for their function. Where possible, the use of natural processes and solutions should be developed to extend defence life and improve performance. Furthermore, development of spaces should be avoided where inland migration of coastal features is needed.

In addition to the risk reduction benefits, natural processes can create opportunities for environmental enhancement, biodiversity gain, and the capture of GHG emissions. Habitats such as sand dunes^{12,13}, seagrass, wetlands, saltmarsh¹⁴, and woodlands are particularly effective. These opportunities should be considered, when working with natural systems, to develop a multiple benefits approach and to use coastal adaptation as an opportunity to improve the overall ecological resilience of the coast.

Monitoring change:

Adaptation can only be delivered effectively if supported by a robust monitoring and evidence collection programme. This focuses on the collection of data to understand processes and help better identify, review, and update Trigger points. Trigger points, at a local level, identify when critical thresholds, in terms of damaging impacts to coastal assets are approached. These, therefore, need to be adjusted in response to data availability and increased knowledge of coastal processes, at both a local and regional level, which can be accomplished with improved monitoring and a solid and transparent governance structure.

While it is important that the processes are understood. It is critical that a monitoring programme is developed in such a way that it can be efficiently integrated into the overall adaptation framework. Monitoring should be proportionate, and explore innovative methods

¹² <https://engage.angus.gov.uk/montrose-coastal-erosion>

¹³ <https://jncc.gov.uk/our-work/west-sands-dune-management/>

¹⁴ [Saltmarsh Creation for Natural Flood Defence in the Tay & Eden Estuaries & the Dornoch Firth](#)

for collection, storage, and assimilation of data, such that it can support efficient and robust decision making.

Communication and engagement:

Moving towards an adaptive practice represents a shift in how people, practitioners, and managers typically understand coastal management. It will place more onus on communities and individuals to understand and take responsibility for their own resilience as the climate changes.

The draft CCAP guidance highlights the use of The National Standards for Community Engagement (NSCE)¹⁵ to guide fair and effective involvement of communities, as well as how and who to involve in the CCAPs. The NSCE Standards include seven components to address in any communication of the CCAP process:

1. Inclusion
2. Support
3. Planning
4. Working together
5. Methods
6. Communication
7. Impact

Engagement with groups across administrative boundaries is also critical to enable a joined-up delivery approach to adaptation. Engagement activities specifically focused on knowledge exchange and awareness raising can be particularly useful.

Placemaking:

As with the LDP, placemaking is championed in the Interim Guidance. This promotes an approach¹⁶ to deliver multiple benefits to coastal environments and communities. Taking a place-based approach considers the collective physical, social, and economic aspects of a place, and deals with the complexities of optimising each aspect. For placemaking to be in line with the “climate resilient development planning” goals of the 6th IPCC, it is important that land for future adaptation and landward migration of natural processes is specified in the next cycle of LDPs.

Nevertheless, placemaking needs to be considered early as a necessary supporting step for the adaptation pillars to be delivered effectively. This will provide a window of opportunity to accommodate future erosion and flooding and migration of coastal assets such as beaches and dunes, with minimal future costs (i.e. fewer assets on land will require relocation).

By doing this, positive interrelationships between all aspects of a place, now and in the future, can be identified and enhanced to solve problems that may not be possible if each aspect was considered individually. A place-based approach considers the potential of a place and

¹⁵ SCDC [The National Standards — VOiCE \(voicescotland.org.uk\)](#)

¹⁶ [Our Place | Our Place](#)

identifies opportunities driven by community engagement. Using a place-based approach effectively and consistently throughout CCAPs aims to receive greater support from local stakeholders than traditional approaches. This is extremely challenging and requires strong collaboration within the Council and with external partners. Key is the development of a clear and consistent governance structure whereby delivery of any adaptation actions at a local level requires integration with wider, community focused, initiatives and plans. Core to this is the concept that, while individual assets may be lost or moved, the overall community will not be lost.

Building a Wellbeing Economy is a policy priority in Scotland¹⁷ and is also identified in the National Strategy for Economic Transformation¹⁸. A Wellbeing Economy recognises the importance of wellbeing as an indicator for a successful society, not just economic growth. Wellbeing encompasses the quality of life and health of both the people and the relied upon environment. Building a Wellbeing Economy delivers social justice and environmental health, and an inclusive, sustainable, prosperous, and resilient economy.

As well as the four pillars defined here, the CCAP guidance recommends taking a precautionary approach, by using upper estimates for climate change predictions (see **Part B**). This allows planning for the coast to adapt to long-term climate change and to potential, worst-case, scenarios more effectively.

2.6 Climate Change Adaptation Plan

Aberdeenshire Council has developed a Climate Change Adaptation Plan which covers the assets, services, and functions of Aberdeenshire Council. The plan focuses on informational and awareness actions in the short term, with longer term actions to develop an extreme weather event plan and cost code, a communication and engagement plan for communities, and an employee redeployment and volunteer plan.

The Regional CCAP will serve to inform future developments of the Aberdeenshire Council Climate Change Adaptation Plan.

2.7 Spatial definition of the CCAPs

To enable the development of the CCAPs the Aberdeenshire coastline has been subdivided into 20 Community Areas (CAs). The subdivision of the coastline was informed by existing Community Council Areas with coasts, with a view of creating defined areas to support governance and delivery at a local level (Figure 2-2).

The CAs also form the basis for Local CCAP prioritisation (see **Part C – Local Plan Prioritisation**).

¹⁷ <https://www.gov.scot/groups/wellbeing-economy-governments-wego/>

¹⁸ <https://www.gov.scot/news/scotlands-national-strategy-for-economic-transformation/>

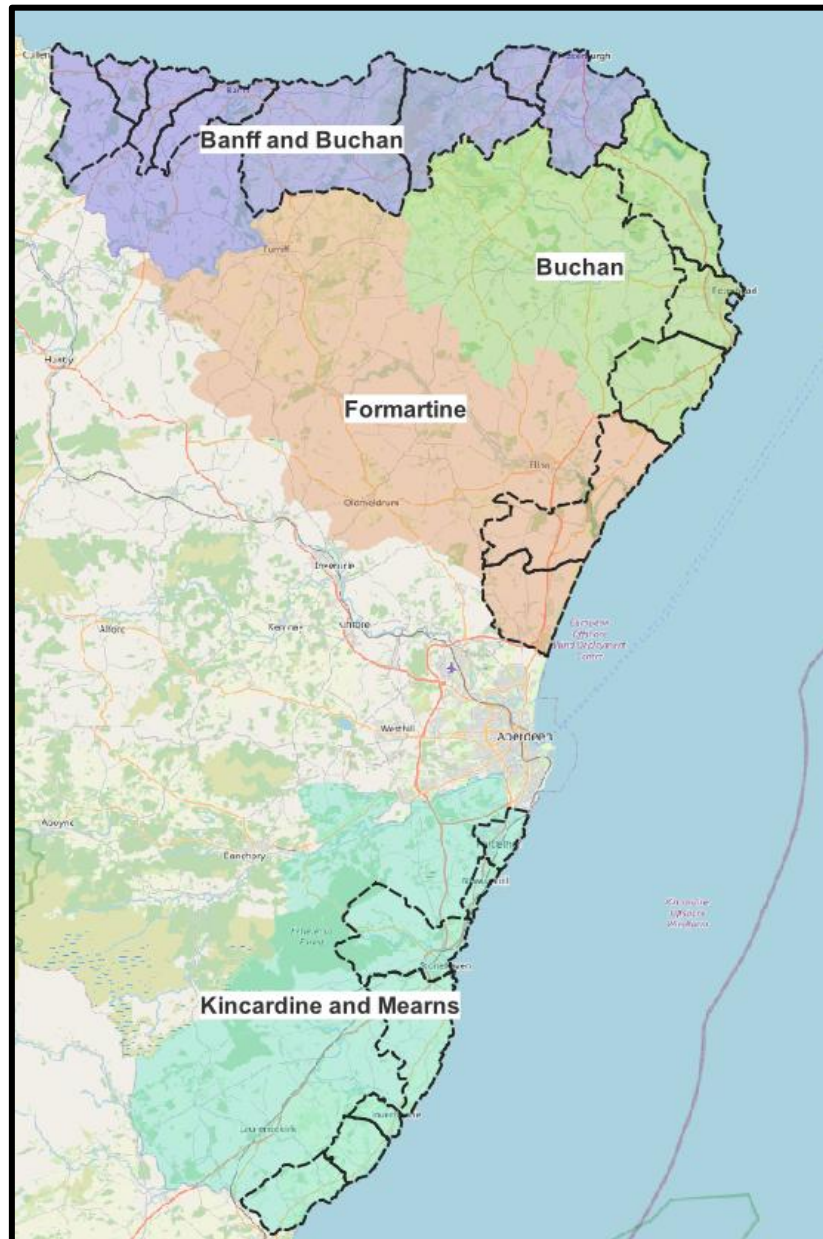


Figure 2-2. Extent and location of CAs within Aberdeenshire Council Committee Areas.

2.8 Spatial definition of the LPPs

LPPs are being developed at academy town level, as these act as central hubs for surrounding communities and provide clear catchment-based boundaries. As this work progresses, there is a need to explore how these academy-based LPP areas align with the local CCAP CAs to support effective integration and coordinated delivery of coastal adaptation priorities at a community level. It is recommended that the delivery of Local CCAPs is aligned with, and where appropriate undertaken through, the emerging LPPs, as these provide a practical and community-focused platform for implementing coastal adaptation actions. The intersection between the CCAP CAs and the proposed coastal Local Place Plan areas are shown in Figure 2-3.

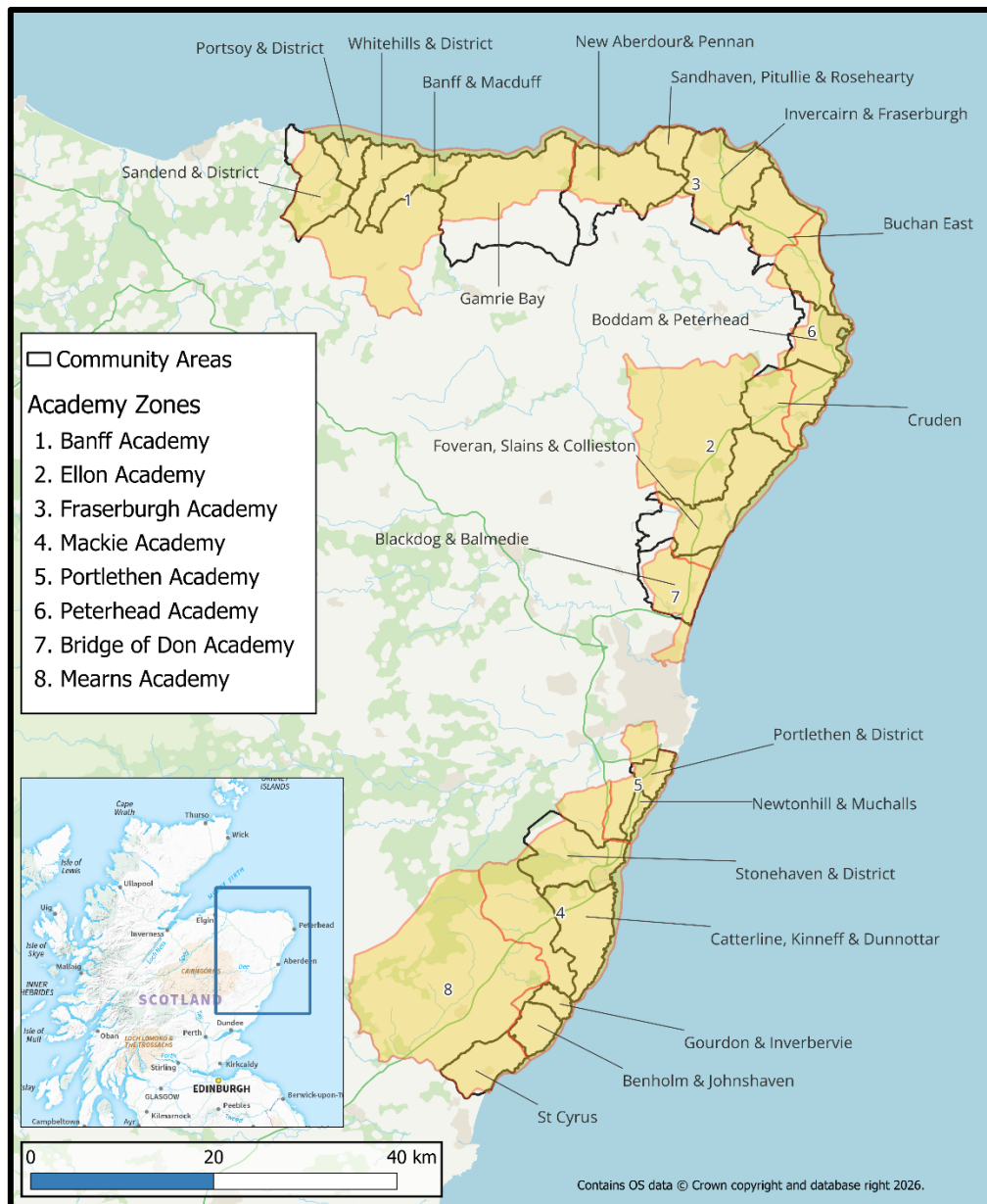


Figure 2-3 Extent and location of CAs within Aberdeenshire Council Proposed Local Place Plan Areas (Academy Zones)

3. Delivery

3.1 Governance

Delivery of adaptation requires a collaborative approach across the Council and with key regional partners. Establishing an effective governance structure for this work is inherently complex, as it must bring together multiple services, partners, and responsibilities while ensuring clarity, coordination, and accountability. To support establishment, the Regional CCAP has been developed with engagement across the Council and with Climate Ready Aberdeenshire (CRA). The aim of this was to raise awareness of the process and work toward establishment of a Cross-Council Action Group (CCAG) to enable governance and strengthen the Council's ability to implement CCAPs effectively.

The CCAG, once formally established, will provide the overall governance structure for the CCAPs. Its role will be to ensure that all identified actions:

- Are aligned with and do not conflict with one another.
- Support and do not conflict with wider Council initiatives.
- Have appropriate funding mechanisms identified.
- Set an achievable timescale for delivery.

Individual Actions will be delivered by the relevant Council Service area, with support from wider council colleagues and external stakeholders where appropriate. The CCAG will provide a consistent approach to coordination, oversight, and decision-making, ensuring a joined-up approach that supports successful implementation. The structure is intended to be flexible, allowing additional people and teams to be brought in as required.

At this stage, the CCAG is not yet formally established. Since adoption of the Plan, wider engagement has taken place across the Council and with Climate Ready Aberdeenshire (CRA). Although the CCAG is still in development, significant progress has been made and feedback to date has been supportive of the proposed approach. An initial proposal for the CCAG structure has been prepared (Figure 3-1) following this engagement. The recommended structure comprises of three constituent elements:

Technical Oversight – Responsible for the understanding of coastal risks, impacts, advances in science and technical practicalities of delivering Actions.

- Environment & Infrastructure Services, including:
 - Roads and Infrastructure
 - Housing and Building Standards
 - Planning and Economy
 - Environment and Sustainability

Delivery – Responsible for enabling the delivery of actions through funding commitments, identification of delivery pathways, influence over budgets, and overall resource planning.

- Heads of Services

- Local Place Teams

Awareness – Responsible for managing external relationships and coordinating engagement to support delivery. This includes ensuring partners and communities are involved at the right time, avoiding conflicts, and identifying complementary opportunities.

- Climate Ready Aberdeenshire
- Area Managers

The initial structure of the CCAG is presented in Figure 3-1 below.

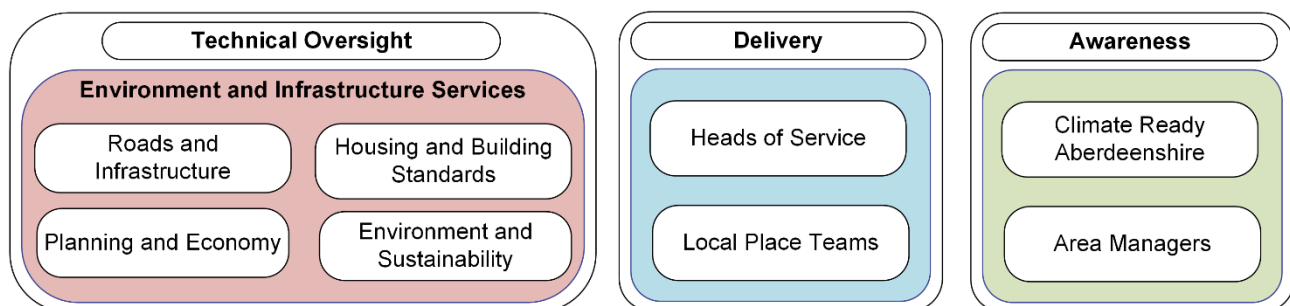


Figure 3-1. CCAG Structure.

The next step is to formally establish this group to provide a consistent governance structure and oversee coordinated delivery of the CCAP actions.

3.2 Review Process

Delivery and implementation of the Plans (Regional and Local) will be the responsibility of the Technical Oversight element of the CCAG (as detailed above in Figure 3-1). The following formal review process is recommended.

- A full review, revision, and republication of the Plan **every 6 years**. Where possible this should follow on from the LFRMP.
- This will include details of all Triggers realised within the period, the associated Actions, and the impact on the revised plan. Revisions of this CCAP will not be made upon each individual Trigger realisation.
 - An interim review and publication of a Progress Report **every 3 years**.
- The Progress Report will include:
 - Evidence of delivery of Proactive Actions.
 - Evidence and documentation of Trigger Realisation.
 - Evidence of delivery of associated Indirect and Direct actions after Triggers are realised.

3.3 Reporting

Outside of the formal review period, relevant members of the Technical Oversight element will be responsible for monitoring the underlying data and Triggers that have been identified and, should these be realised, raising associated Actions with the Delivery element.

A formal reporting process of Trigger realisation and progress on Regional Actions will be developed utilising Area Committees, Infrastructure Committee, and the Sustainability Committee. While it is acknowledged that this has yet to be finalised, upon doing so it is critical that this be used as a mechanism to support delivery of the Plan.

3.4 Ecosystem

This (and associated Local) CCAPs describe only one aspect of how Aberdeenshire Council must adapt to climate and coastal change. It is therefore critical that the development and delivery of the Plan is not only supported by other Aberdeenshire Council areas and policies, but that the content is used to inform other areas where future coastal flood and erosion risk must be considered.

Through engagement with Council services and CRA, several initial connections and dependencies have been identified. Together, these form what we refer to as the *CCAP ecosystem*. This *ecosystem* represents the network of plans, policies, priorities and projects across the Council and relevant stakeholders that collectively influence how coastal adaptation is approached, delivered and governed. For clarity, these connections have been grouped into four categories:

- Require only awareness of the CCAPs (or vice versa)
- Provide information or evidence to the CCAPs
- Dependent on CCAP information or decisions
- Are integrated into the CCAPs (both informing and being informed by them)

The *ecosystem* is illustrated in Figure 3-2 showing how the CCAP interacts with a wide range of national, regional and local plans across various service areas. The colour coding reflects the four categories described above and highlights the different types of relationships these plans have with the CCAP, demonstrating the interconnected system within which coastal adaptation must be delivered.

These connections are to be considered alongside the role of the CCAG to ensure a whole systems approach to the delivery of coastal adaptation. Ensuring a complementary approach across these plans will support the development of a coordinated adaptation delivery programme across Aberdeenshire. Initial discussions with relevant third-party stakeholders have highlighted further opportunities to align and coordinate the delivery of adaptation and resilience measures beyond the Council. These opportunities should continue to be explored through the CCAG and through alignment with the plans and linkages identified within the *CCAP ecosystem*.

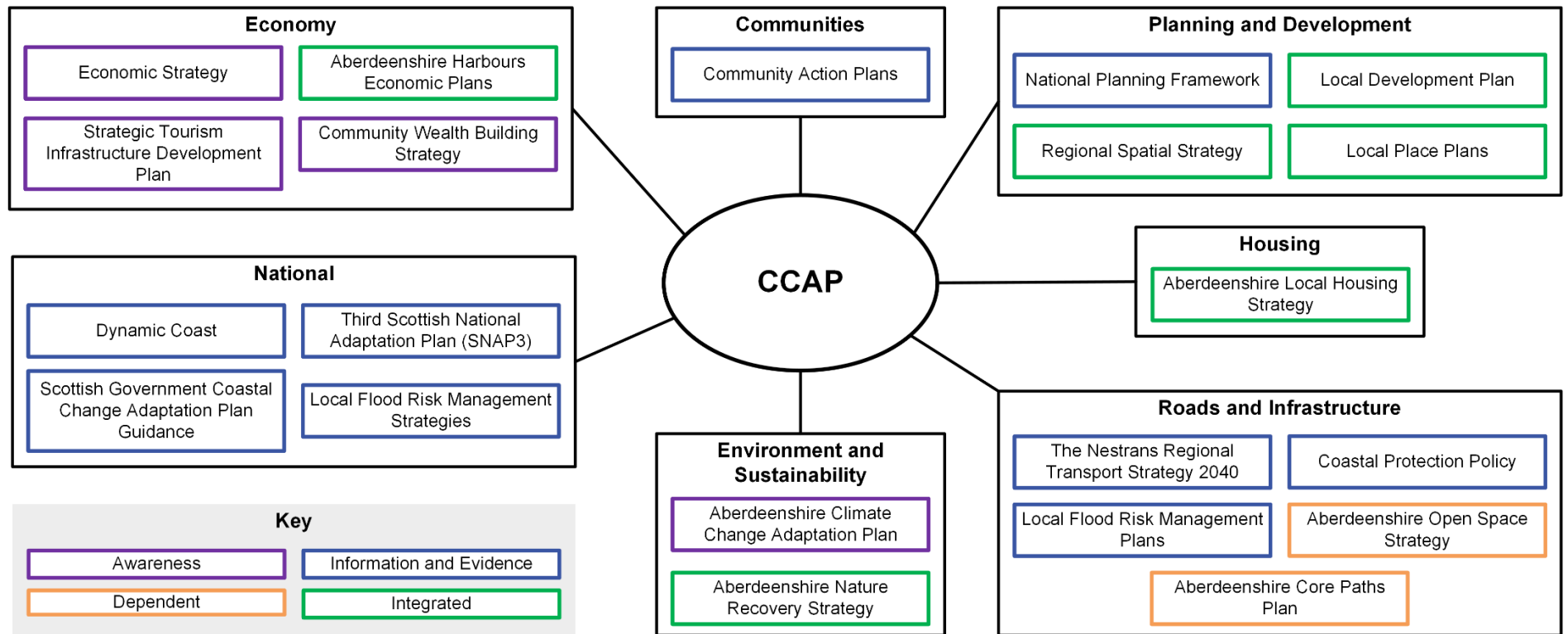


Figure 3-2 Mapped CCAP Ecosystem

Part B – Technical Information

1. Coastal Processes

1.1 Sediment Cells

The Scottish coast has previously been subdivided into cells related to longshore sediment transport, with boundaries between cells located at points where sediment availability at the coast changes or is interrupted¹⁹. An idealised sediment cell is to be self-contained, in that there would be no net loss or gain of sediment from inside or outside the cell²⁰.

These sediment cells subdivide the coastline in terms of natural processes, rather than with administrative boundaries for Shoreline Management Plans, and in this case a CCAP. Along the Aberdeenshire council coastline there is a dominant anticlockwise sediment drift direction (south to north Montrose to Fraserburgh, then east to west Fraserburgh to Cullen) due to the orientation with respect to the predominant wave climate (Figure 1-1).

Of relevance to Aberdeenshire Council is Sediment Cells 2 and 3, which extends between St Cyrus to Portsoy. Within Cells 2 and 3 the Aberdeenshire coastline contains sections of sub-cell 2b (St Cyrus to Johnshaven), sub-cell 2c (Johnshaven to Aberdeen), sub-cell 2d (Aberdeen to Invercairn), and sub-cell 3a (Invercairn to Portsoy). These sub-cells are further subdivided into smaller sections along the coastline.

Interruptions in sediment transport along the Aberdeenshire coastline occur at key locations, such as headlands and changes in sediment availability, notably near Portsoy and Invercairn. These natural boundaries mark transitions between sub-cells, influencing sediment drift and deposition patterns. The dominant North-westerly sediment drift direction emphasises the importance of aligning shoreline management strategies with natural sediment processes to ensure sustainable coastal adaptation.

¹⁹HR Wallingford (1997) Coastal Cells in Scotland. Scottish Natural Heritage Research, Survey and Monitoring Report No 56.

²⁰ Ramsay DL and Brampton AH (2000) Coastal Cells in Scotland: Cell 3 – Cairnbulg Point to Duncansby Head. Scottish Natural Heritage.



Figure 1-1: Sediment cell boundaries at the Aberdeenshire coastline in relation to CCAP Community Areas. Geology, morphology, and sediment transport

The type of coastline (soft or hard) is strongly associated to the geology and lithology which, in turn, influences vulnerability to coastal flooding and erosion. These geological factors also influence the morphology and sediment availability, which can both enhance or reduce risk of flooding and erosion. Bedrock geology and superficial deposits (625k scale) maps sourced from the British Geological Survey (BGS) are shown in Figure 1-2 to Figure 1-7.

Longshore sediment transport is controlled by waves, tides and currents and is also influenced by the type of available sediment (linked to geology) and morphology of the coastline. Coastal erosion or accretion reflects the divergence of longshore transport, i.e. erosion occurs where there is net sediment deficit, and accretion occurs where there is net sediment surplus. Understanding geology sediment transport pathways and coastal characteristics aids planning and management decisions. Geological characteristics of the coast are combined with habitat information sources to provide a general coastal classification for the council area (Figure 1-8 to 1-10 and Table 1-1 to 1-3).

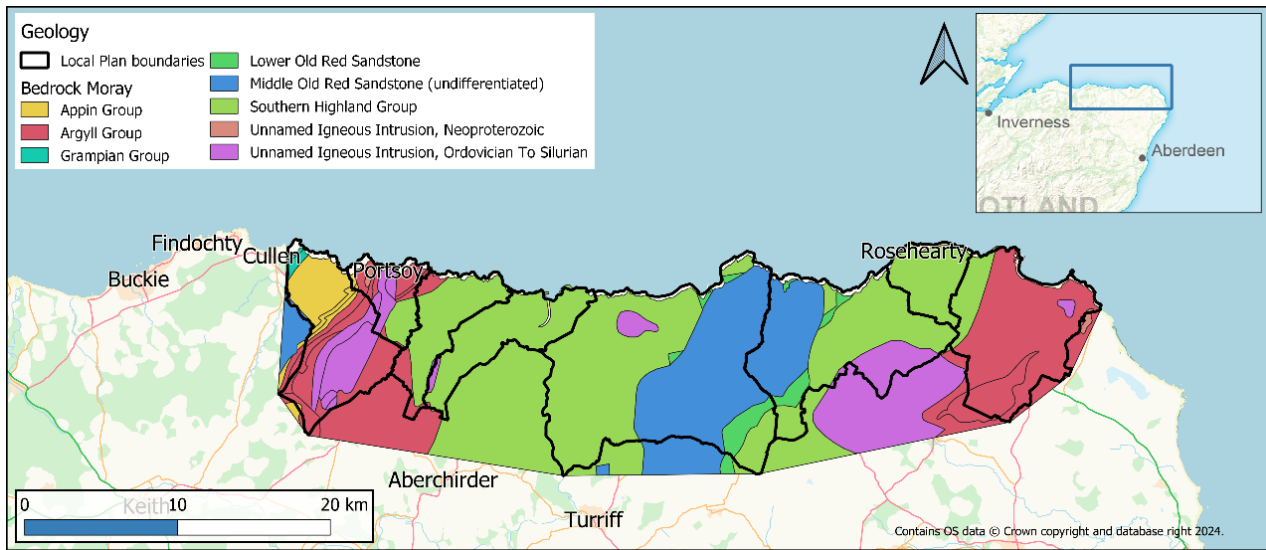


Figure 1-2: Bedrock Geology (BGS) at North Aberdeenshire Coast.

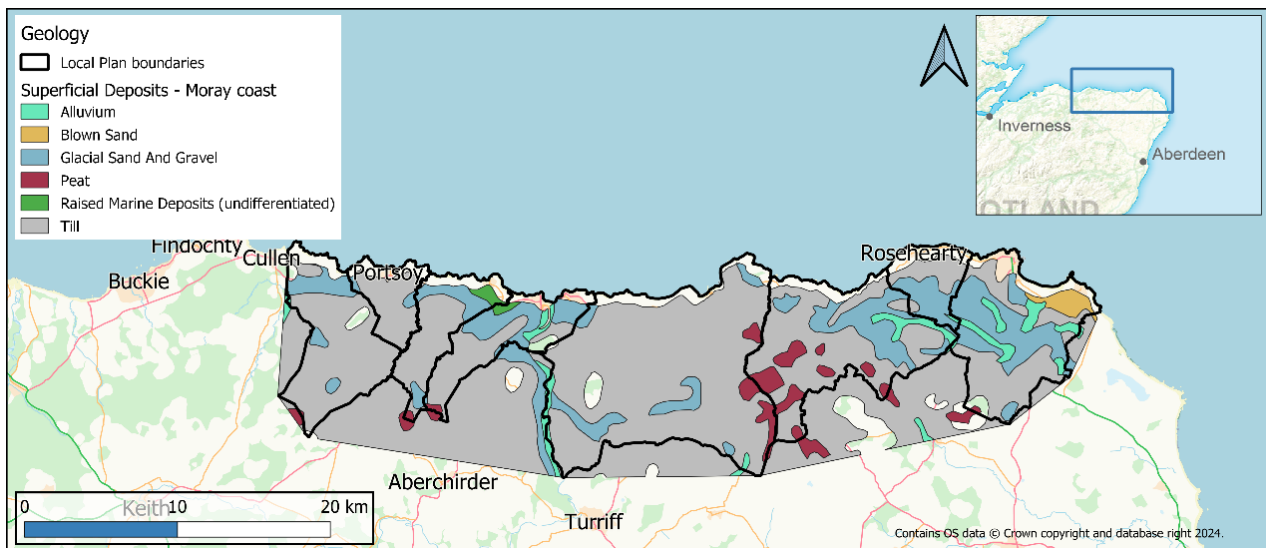


Figure 1-3: Superficial deposits (BGS) at North Aberdeenshire Coast.

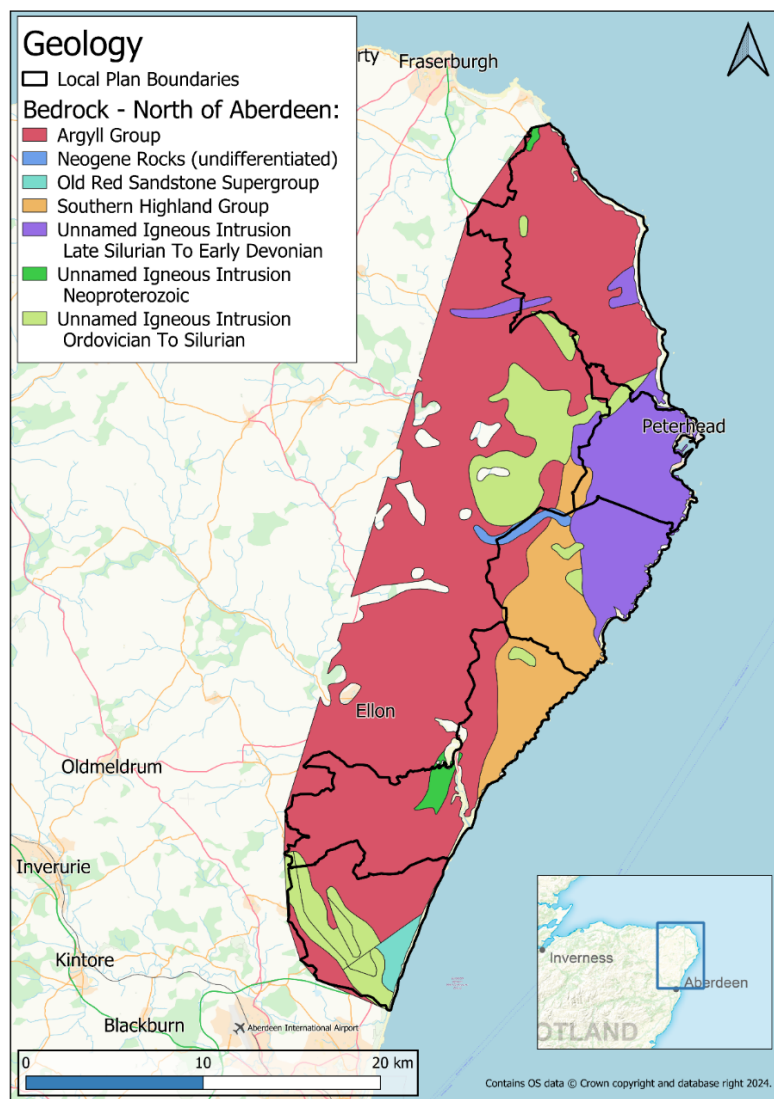


Figure 1-4: Bedrock Geology (BGS) at North Aberdeen coast.

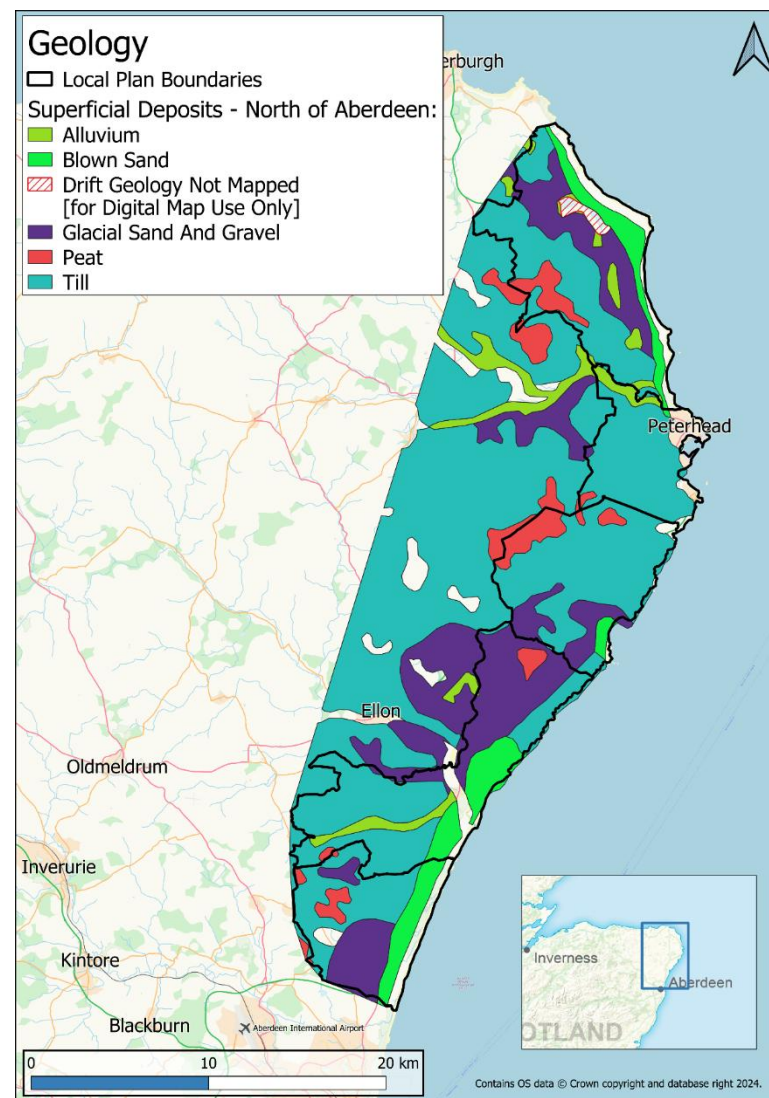


Figure 1-5: Superficial deposits (BGS) at North Aberdeen coast.

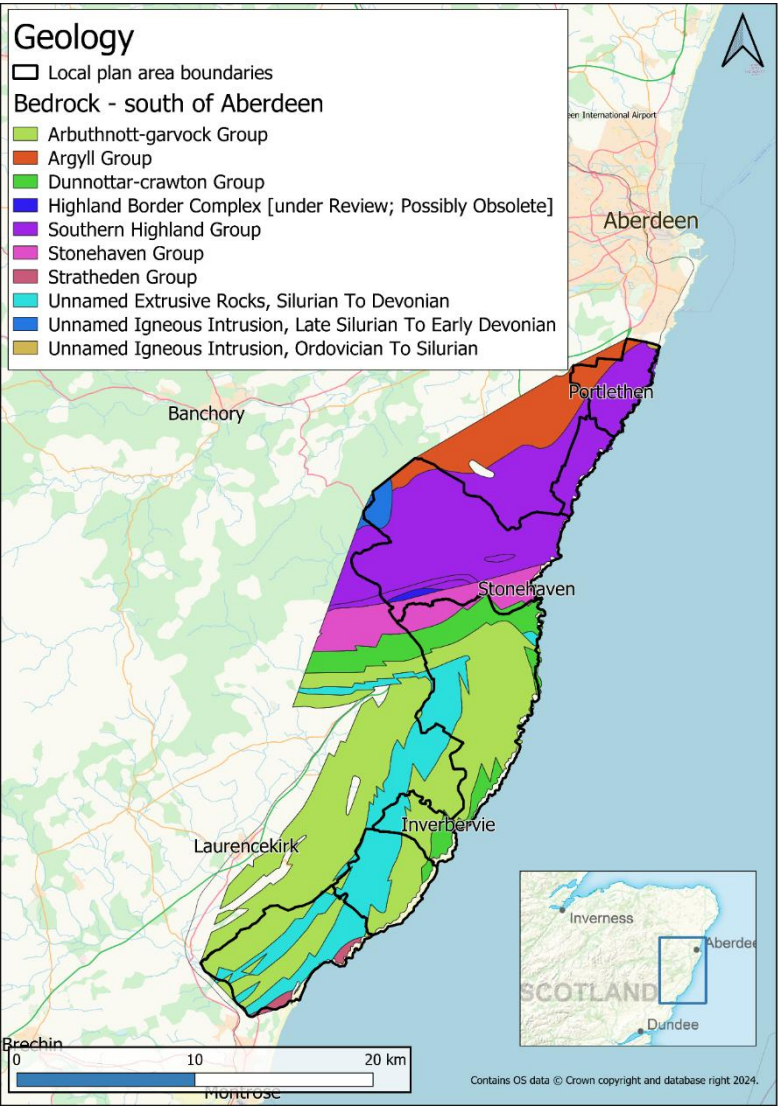


Figure 1-6: Bedrock Geology (BGS) at South Aberdeen coast.

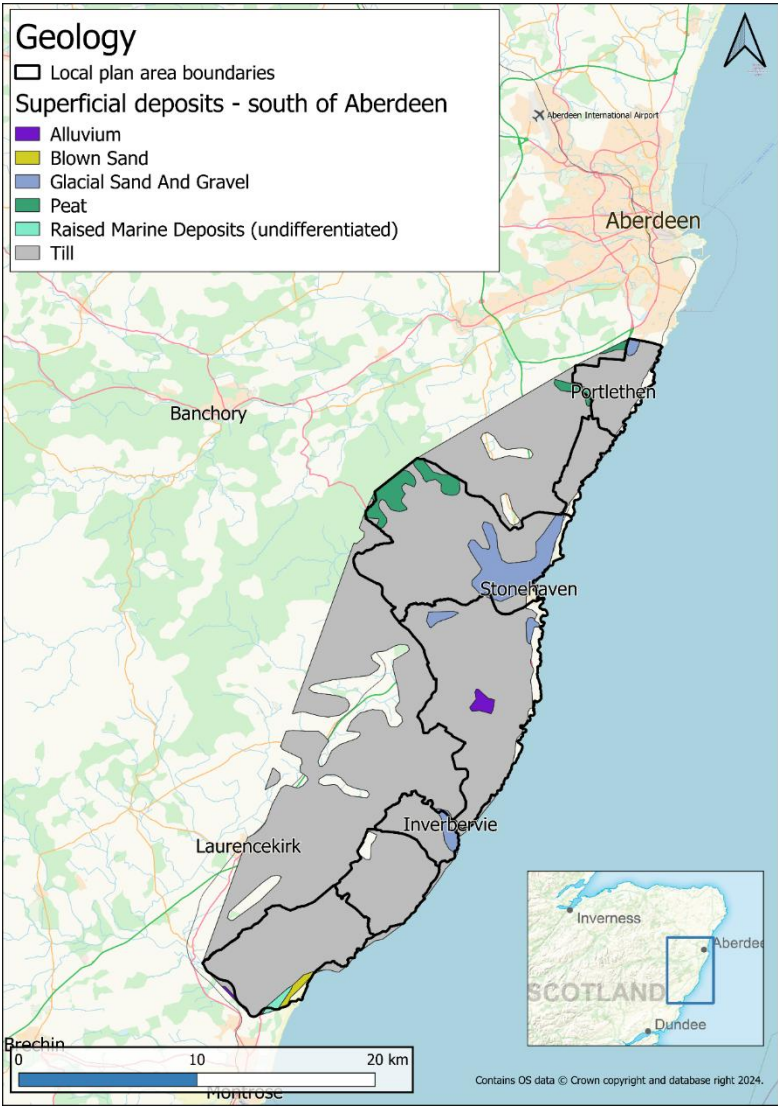


Figure 1-7: Superficial deposits (BGS) at South Aberdeen coast



Figure 1-8: Coast type classification. CA boundaries shown with black lines at North Aberdeenshire coast.



Figure 1-9: Coast type classification at North Aberdeen coast



Figure 1-10: Coast type classification at South Aberdeen coast

Table 1-1: CAs and coast type classification. Descriptions correspond to coastal type subdivisions in Figures 1-8.

CA	Type	Classification
Findlater to Sandend Coast	Hard	Sand beach, Rock shore and Rock cliffs
Sandend Coast to Boyne Bay	Hard	Urban, Rock shore, Rock cliffs and Gravel shores
Boyne Bay to Inverboyndie Coast	Hard	Urban, Rock shore and Rock cliffs
Inverboyndie to Macduff Coast	Hard	Sand beach, Urban, Rock shore, Rock cliffs and Sea walls
Macduff to Pennan Coast	Hard	Rock shore and Rock cliffs
Pennan to Bay of Lochielair	Hard	Rock cliffs, Rock shores and Gravel shores
Bay of Lochielair to Sandhaven	Hard	Urban, and Rock shore
Sandhaven to Charleston Coast	Hard	Sand beach, Urban, Rock shore, Rock cliffs and Sand dune

Table 1-2: CAs and coast type classification. Descriptions correspond to coastal type subdivisions in Figures 1-9.

CA	Type	Classification
Blackdog to Foveran Coast	Soft	Sand beach and Sand dunes
Foveran to Whinnyfold Coast	Hard	Sand beach, Rock shore, Rock cliffs and Sand dune
Whinnyfold to Longhaven Coast	Hard	Sand beach, Rock shore, Rock cliffs and Sand dune
Boddam to Buchanhaven Coast	Hard	Sand beach, Sea walls, and Rock shores.
Buchanhaven to St Combs Coast	Soft	Sand beach and Sand dune and Rock shores

Table 1-3: CAs and coast type classification. Descriptions correspond to coastal type subdivisions in Figures 1-10.

CA	Type	Classification
St Cyrus to Johnshaven Coast	Hard	Rock shores, and Sand dune
Johnshaven to Benholm coast	Hard	Rock shores and Gravel shores
Gourdon to Inverbervie Coast	Hard	Rock shores, and Gravel shores
Kinneff to Dunnottar Coast	Hard	Rock shores, Rock cliffs and Gravel shores
Stonehaven to Cowie Coast	Hard	Sand dune, Rock shores, Rock cliffs and Gravel shores
Muchalls to Downies Coast	Hard	Gravel shores and Rock cliffs
Downies to Findon Coast	Hard	Rock cliffs and Gravel shores

1.1.1 Sub-cell 2b

The Sub-cell 2b, which extends from Deil's Head to Milton Ness, includes Montrose Bay. This area primarily consists of sandy beaches and dunes, as evidenced by its features like Kinnaber Links and the Montrose golf course frontage. The bay experiences both erosion and accretion, with sediment being transported due to natural processes such as riverine input and longshore drift²¹.

The geology south of St Cyrus Beach in sub-cell 2b is dominated by the Stratheden Group, composed of Late Devonian sandstones, and locally occurring extrusive volcanic rocks from the Silurian to Devonian period, such as basalt and andesite, which form harder, erosion-resistant outcrops. Superficial deposits in this area include dynamic blown sand forming dunes at the southernmost parts and small elevated raised marine deposits composed of ancient sand and gravel, remnants of higher sea levels.

The rest of sub-cell 2b is predominantly covered by till deposits, a mix of glacially derived materials like clay, silt, sand, and gravel, creating a more stable but varied landscape compared to the dynamic southern dunes. This combination of bedrock and deposits shapes a coastal system with contrasting features, from shifting sands in the south to glacially influenced terrains in the north.

1.1.2 Sub-cell 2c

Sub-cell 2c, stretching from St Cyrus to Aberdeen, includes Stonehaven and Nigg Bay (Aberdeen). Sub-cell 2c is dominated by deformed and regionally metamorphosed sedimentary rocks²¹.

Between St Cyrus Beach and Miltonhaven, the bedrock consists of the Stratheden Group, dominated by Devonian sandstone and conglomerates. Overlying these fluvial deposits are extensive layers of till, a glacial sediment formed. The till blankets the bedrock, illustrating the region's glacial history and its impact on reshaping earlier sedimentary landscapes.

From Johnshaven to Gourdon, the Arbuthnott-Garvock Group bedrock comprises red sandstones, siltstones, and occasional volcanic interbeds, indicative of terrestrial and volcanic activity during the Devonian period. Like the Stratheden Group, this area is also capped by widespread till deposits, showcasing the influence of glacial processes that covered much of this bedrock with unsorted glacial debris.

Between Gourdon and Kinneff, the Dunnottar-Crawton Group bedrock, characterised by conglomerates, sandstones, and siltstones of alluvial origins, underlies glacial sediments. In Inverbervie, glacial sand and gravel deposits dominate.

From Kinneff to Stonehaven, the geology transitions to a mix of the Dunnottar-Crawton Group, Arbuthnott-Garvock Group, and igneous rocks from the Late Silurian to Devonian periods. The deposits in this area are primarily till, with small patches of glacial sand and gravel. This combination suggests a dynamic glacial environment where ice movement

²¹ Fitton, J.M., Rennie, A.F., and Hansom, J.D. (2017) Dynamic Coast - National Coastal Change Assessment: Cell 2 - Fife Ness to Cairnbulg Point, CRW2014/2.

deposited till while localised meltwater streams created sand and gravel accumulations over diverse bedrock types.

In Stonehaven, the Stonehaven Group bedrock, consisting of Silurian sandstones and mudstones, is extensively overlain by glacial sand and gravel deposits. These sorted glacial sediments dominate the surface, representing significant meltwater activity that reworked earlier glacial till into more stratified deposits, shaping the local topography.

Between Cowie and Cove Bay, the Southern Highland Group bedrock, composed of metamorphic quartzites and phyllites, underlies thick till deposits. Rocks are capped by glacially derived till, highlighting a stark contrast between the deep marine origins of the bedrock and the unsorted glacial material left behind by ice sheet movements.

1.1.3 Sub-cell 2d

Sub-cell 2d, features abundant long beaches and common rock coasts. It stretches from Girdle Ness to Cairnbulg Point.

Between Blackdog and Balmedie, the bedrock consists of igneous intrusions from the Ordovician to Silurian periods alongside the Old Red Sandstone Supergroup. The deposits in this area are predominantly alluvium, and the coastal section features sandy beaches, highlighting the influence of sediment transport and deposition.

From Balmedie to Newburgh, the Argyle Group bedrock dominates, with deposits primarily composed of blown sand. The coastal section here is characterised by expansive sandy beaches, shaped by wind-driven processes and the deposition of fine sediments.

Between Collieston and Whinnyfold, the bedrock is part of the Southern Highland Group, consisting of metamorphic rocks. The deposits in this section are predominantly till, and the coastal morphology is defined by rugged rock cliffs, showcasing the area's glacial history and erosional processes.

From Cruden Bay to Peterhead, the bedrock features igneous intrusions from the Late Silurian to Early Devonian periods. The deposits are a mix of till and blown sand, with a dominance of till. The coastal section transitions between sandy dunes at Cruden Bay Beach, rock cliffs from Cruden Bay to Boddam, and occasional rock shores, reflecting the diverse interactions between glacial, aeolian, and marine processes.

Between Buchanhaven and Cairnbulg, the Argyle Group bedrock dominates, with deposits primarily of blown sand. The coastal section is largely sandy beaches throughout the year, with a rock shore at Scotstown Beach. This area also includes igneous intrusions from the Late Silurian to Early Devonian period, contributing to the geological complexity in certain parts.

1.1.4 Sub-cell 3a

The bedrock geology in sub-cell 3a is dominated by deformed and regionally metamorphosed sedimentary rocks²².

²² Ramsay D.L. and Brampton A.H. (2000) Coastal Cells in Scotland. Cell 3 – Cairnbulg Point to Duncansby Head. Scottish Natural Heritage.

Metamorphosed sedimentary rocks underlines the St Combs to Fraserburgh coastline but mostly covered with blown sand deposits.

The cliffs from east of Fraserburgh to Aberdour Beach are sedimentary and volcanoclastic rocks. Erosion of glacial deposits is the main source of beach material in sub-cell 3a.

Old Red Sandstone underlines the Aberdour Beach coastline to Downie Bay coastline but is mostly covered with glacial sand and gravel.

Metamorphic rocks are exposed along the coastline between Northfield and Easter Whitehills, with beach material primarily derived from the erosion of glacial deposits. Additionally, from Mains of Melrose to Portsoy, the area features glacial sand and gravel deposits.

From Portsoy to Cullen, the bedrock is composed of a variety of geological classes, including metasedimentary rocks and igneous intrusions, spanning the Ordovician to Silurian periods.

The coastline in sub-cell 3a is dominated by rock coast, with limited and small pocket beaches. Within the Moray section of sub-cell 3a, a pocket beach is located at Cullen.

1.2 Hydrodynamics

Hydrodynamics are the ocean processes that influence sediment transport, the shape of the coast and control the flood and erosion risk. For the purposes of coastal adaptation, they are classified into:

- Waves.
- Sea levels (tides and storm surge).

Review, understanding and incorporation of these processes into risk assessments help to inform flood and erosion risk, and how these may change through time. Here we present a range of local and national datasets we can use to help us understand past and future hydrodynamic conditions and associated response of the Aberdeenshire coastline.

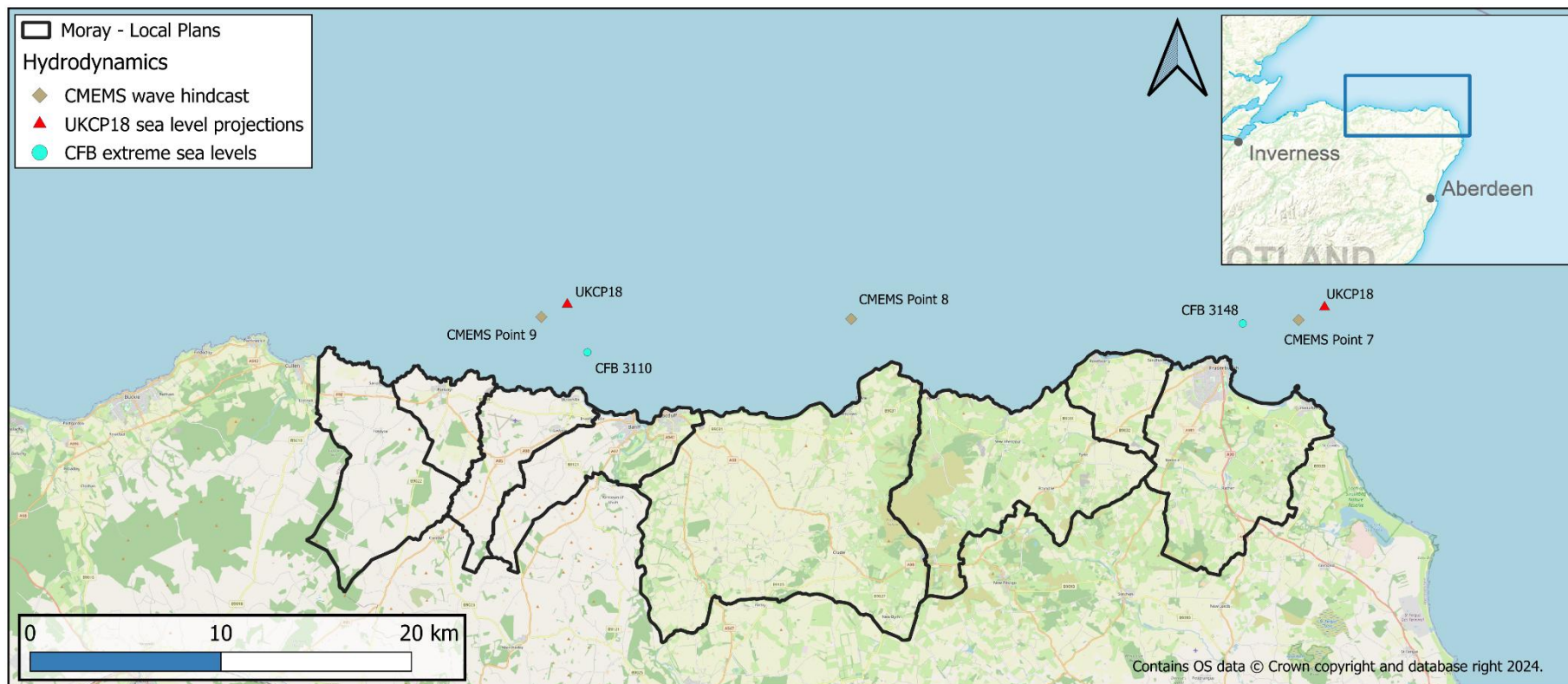


Figure 1-11: Map showing CFB Extreme Sea Levels, CMEMS Wave Hindcast, and UKCP18 future sea level projection data points at Moray coast.



Figure 1-12: Map showing CFB Extreme Sea Levels, CMEMS Wave Hindcast, Tide Gauge, and UKCP18 future sea level projection data points at North Aberdeen coast.



Figure 1-13: Map showing CFB Extreme Sea Levels, CMEMS Wave Hindcast, Tide Gauge, and UKCP18 future sea level projection data points at South Aberdeen coast.

1.3 Wave climate

To achieve a consistent analysis of wave conditions along the coastline, wave data from the Copernicus Marine Environmental Monitoring Service (CMEMS) has been used. This dataset provides consistency in record length and comprehensive coverage of the coastline, enabling reliable comparisons of wave climate across different locations. The analysis focuses solely on nearshore wave conditions.

CMEMS provides modelled hindcast wave data from 1980 to 2024 using various global and regional models. Here the European Northwest Shelf Wave Physics Reanalysis product is used (NWSHELF_REANALYSIS_WAV_004_015²³) to understand variation along the Aberdeenshire coast. In the three sections covering Aberdeenshire, each have three points (total of nine points nearshore) which were extracted and interrogated (Figure 1-11, Figure 1-12, and Figure 1-13).

The nearshore CMEMS data point (point 5) estimates the highest significant wave heights (H_s), with median H_s of 1.20 m and maximum H_s of 7.02 m between 1980 and 2024 (Table 1-4, Table 1-5, and Table 1-5)

Nearshore wave directions differ across the study area. The Moray region predominantly experiences offshore waves from the northeast (NE), with some influence from the east (E) in specific areas (Figure 1-14). In the North Aberdeen region, two of the northern nearshore locations experience waves predominantly from the northeast (NE), while the southernmost nearshore location receives waves primarily from the southeast (SE) (Figure 1-15). In contrast, the South Aberdeen region generally sees waves originating from the southeast (SE), with occasional contributions from the east (E) (Figure 1-16).

Table 1-4: Significant wave height (m) 50th, 75th, 90th-100th percentiles from CMEMS data from 1980 to 2024 at South Aberdeen coast.

Percentiles	Wave Point 1	Wave Point 2	Wave Point 3
50th	0.58	0.87	0.81
75th	0.92	1.31	1.24
90th	1.35	1.88	1.80
95th	1.69	2.31	2.23
97.5th	2.05	2.77	2.69
99th	2.50	3.38	3.29
100th	4.83	6.46	6.34

²³ <https://doi.org/10.48670/moi-00060>

Table 1-5: Significant wave height (m) 50th, 75th, 90th-100th percentiles from CMEMS data from 1980 to 2024 at North Aberdeen coast.

Percentiles	Wave Point 4	Wave Point 5	Wave Point 6
50th	0.81	1.20	1.19
75th	1.26	1.73	1.72
90th	1.83	2.40	2.39
95th	2.27	2.90	2.90
97.5th	2.72	3.40	3.40
99th	3.30	3.99	4.03
100th	6.10	7.02	6.76

Table 1-6: Significant wave height (m) 50th, 75th, 90th-100th percentiles from CMEMS data from 1980 to 2024 at Moray coast.

Percentiles	Wave Point 7	Wave Point 8	Wave Point 9
50th	1.09	0.79	0.74
75th	1.61	1.25	1.17
90th	2.28	1.84	1.73
95th	2.80	2.30	2.16
97.5th	3.31	2.77	2.62
99th	3.95	3.37	3.19
100th	6.78	6.53	6.40

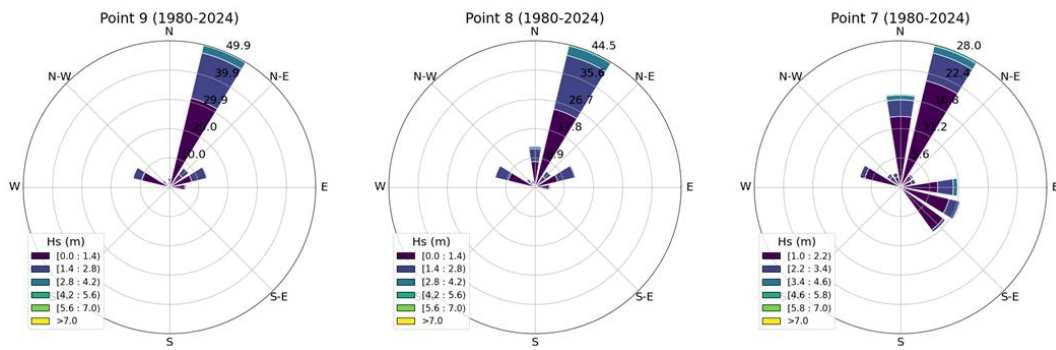


Figure 1-14: Wave roses for the three Moray nearshore CMEMS data points.

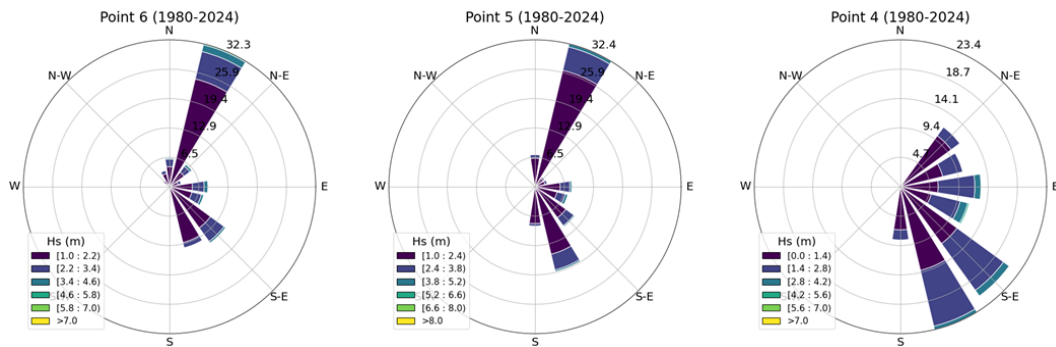


Figure 1-15: Wave roses for the three North Aberdeen nearshore CMEMS data points

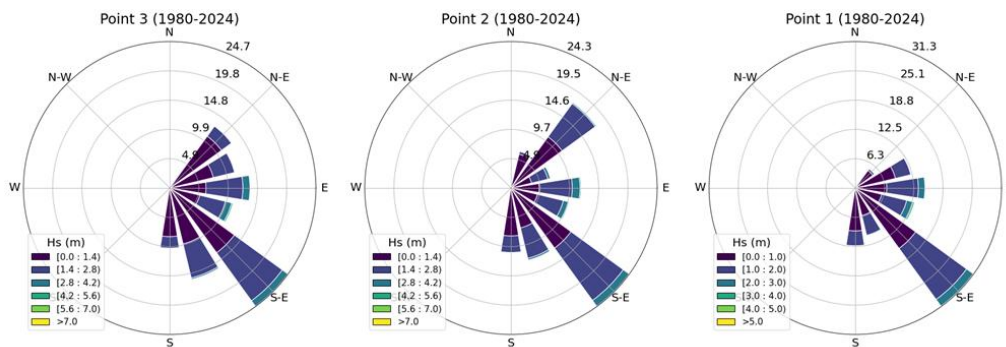


Figure 1-16: Wave roses for the three South Aberdeen nearshore CMEMS data points

1.4 Sea Level Dynamics

The data used to understand present and future sea levels are summarised in Table 1-7. The Class-A gauge at Aberdeen provides the evidence of observed sea levels. Extreme sea level estimates are defined through three Coastal Flood Boundary (CFB) data points. Future sea level projections are taken from the UKCP18 dataset.

Table 1-7: Sea level data summary

Dataset name	Data type	Source	Temporal coverage
Coastal Flood Boundary (CFB) (Points 3110, 3148, 3164, 3210, 3236, 3266)	Extreme sea levels	Environment Agency	2018
Aberdeen mean sea level gauge (Environmental Agency)	Mean sea levels	Permanent Service for Mean Sea Level	1931–present
UKCP18	Sea level projections	UKCP18	Derived for epochs 2050 and 2100

1.4.1 Tides

Tides are the regular variability in sea level elevation because of the gravitational forces exerted by the sun and moon. They are predictable and form the base component of total sea level. The Aberdeenshire coast experiences a macrotidal (> 4m range) semi-diurnal regime (two high and low tides per 24 hours).

Tide levels for Whitehills, Fraserburgh, Peterhead, and Stonehaven are summarised in Table 1-8. Peterhead is a Standard Harmonic port, while the other three are secondary non-harmonic ports, with predictions based on the primary harmonic port at Aberdeen. Tide levels are consistent across the three port locations at Aberdeenshire coast. The tidal regime of the Moray coastline is mesotidal, with a typical spring range between -1.9–1.9 m. Mean High Water Spring (MHWS) is approximately 1.50 m above ordnance datum (mAOD).

Table 1-8: Tide Levels (mAOD) along the Aberdeenshire coast from TotalTide.

Tide Level	Whitehills	Fraserburgh	Peterhead	Stonehaven
HAT	2.50	2.10	2.20	2.55
MHWS	1.90	1.60	1.80	2.05
MHWN	1.10	0.80	1.00	1.15
MSL	0.36	0.15	0.25	0.17
MLWN	-0.30	-0.70	-0.60	-0.75
MLWS	-1.30	-1.40	-1.50	-1.85
LAT	-1.90	-1.80	-2.10	-2.45

1.4.2 Sea Levels

Aberdeen has a primary class-A tide gauge which is part of the national UK Tide Gauge Network (UKTGN). This is owned and operated by the Environment Agency. The gauge at Aberdeen is the only publicly accessible record on the Aberdeenshire Coast, although private

gauges may exist at major harbours (e.g. Fraserburgh and Peterhead). The tide gauge data collection started in 1930 and can be accessed through the National Tidal and Sea Level Facility²⁴.

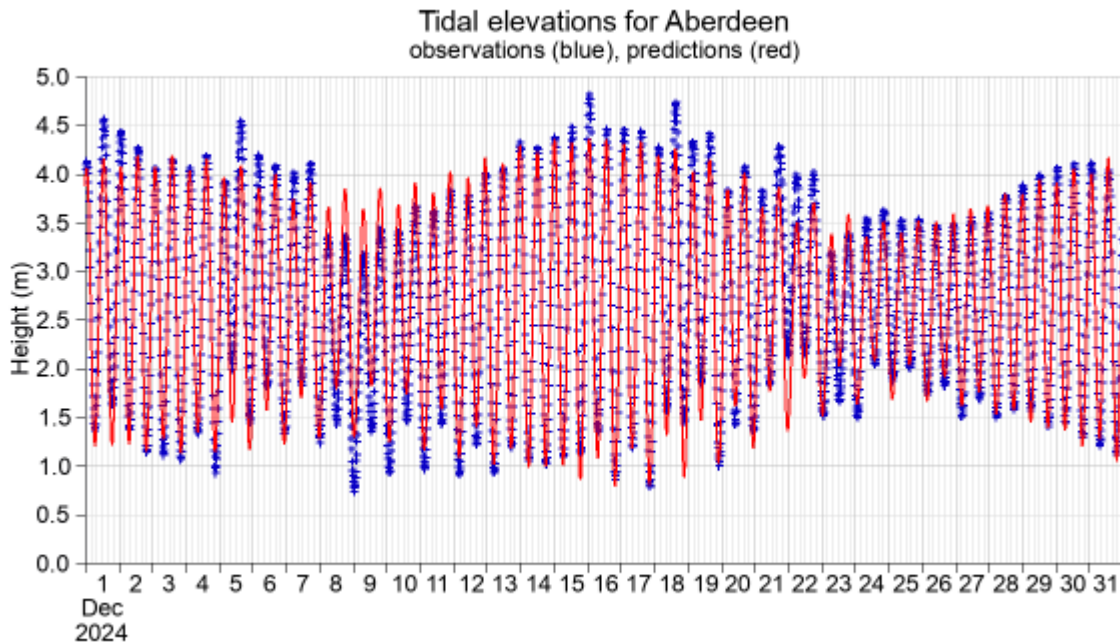


Figure 1-17: Measured and predicted sea levels (December 2024) from Aberdeen tide gauge. Height is in meters above chart datum (2.25m above Ordnance Datum Newlyn)

The Coastal Flood Boundary dataset (CFB)²⁵ provides extreme sea level estimates at a 2 km spacing around the UK coastline. This project was commissioned by the Environment Agency and Defra. Table 1-9, Table 1-10 and Table 1-11 provides a summary of 2018 referenced sea levels at various points along the Aberdeenshire coastline.

Extreme sea levels increase from east to west along the north coast and from south to north along the east coast. This variation is influenced by a combination of tidal patterns and surge propagation. Figure 1-1 illustrates the direction of wave movement.

²⁴ <https://ntslf.org/tides/uk-network/portinfo?port=Aberdeen>

²⁵ Environment Agency (2018) Coastal flood boundary conditions for the UK: update 2018

Table 1-9: Coastal flood boundary extreme sea level estimates across Aberdeenshire (Moray).

Return period	CFBD Point 3110 ESL (mAOD) (Banff)	CFBD Point 3148 ESL (mAOD) (Fraserburgh)
MHWS	1.92	1.62
2 year	2.52	2.45
50 year	2.83	2.76
100 year	2.89	2.82
200 year	2.96	2.88
1000 year	3.10	3.02

Table 1-10: Coastal flood boundary extreme sea level estimates across Aberdeenshire (North Aberdeen).

Return period	CFBD Point 3164 ESL (mAOD) (Seatown)	CFBD Point 3210 ESL (mAOD) (Foveran)
MHWS	1.68	2.02
2 year	2.41	2.72
50 year	2.73	3.05
100 year	2.79	3.11
200 year	2.85	3.18
1000 year	2.99	3.31

Table 1-11: Coastal flood boundary extreme sea level estimates across Aberdeenshire (South Aberdeen).

Return period	CFBD Point 3236 ESL (mAOD) (Portlethen)	CFBD Point 3164 ESL (mAOD) (Inverbervie)
MHWS	2.06	2.13
2 year	2.79	3.02
50 year	3.12	3.36
100 year	3.18	3.43
200 year	3.24	3.50
1000 year	3.38	3.66

2. Sea level rise

2.1 Mechanism

Understanding how flood, erosion, and erosion-induced-flood risks are changing as a result of climate change is critical to adaptation on the coast. While changes to the wave and storm surge climate may occur, these are superimposed on the impacts of rising mean sea level. Sea level rise (SLR) is complex and involves both changes to the sea surface and the level of the land. Although there are multiple global and local factors that can influence the rate of SLR, and absolute increase in SLR, the main causes can be reduced to three factors²⁶:

1. Ocean expansion as water temperatures increase.
2. Addition of water from melt of land-based ice sheets and glaciers.
3. Changes to land water storage.

Additional factors that may alter SLR at a specific location relative to the global mean SLR include local ocean changes, changes in the Earth's gravity field and vertical land motion. In Scotland, for example, SLR is still being partially offset by glacial isostatic rebound.

During the last glacial period, Scotland was mostly covered by a large ice sheet that suppressed the land. Following the melt of this ice sheet, starting approximately 20,000 years ago, glacial isostatic rebound is causing the ongoing rise of land elevation still today across Scotland²⁷. This land uplift caused by glacial isostatic rebound has however slowed over time and is now outpaced by global sea level rise²⁸.

Greenhouse gases, specifically carbon dioxide, can stay in the atmosphere for centuries after it has been emitted; this causes a lag in the response of the climate system. A further lag is caused by ocean temperature adjustment and glacial melting. Practically, it means that if human-produced carbon dioxide emissions were to stop entirely today, the associated atmospheric warming and sea level rise would continue for decades, and potentially 1,000 years²⁹. Although there are uncertainties associated with the magnitude of future SLR, linked to future greenhouse gas emissions, continued SLR because of this system lag is evidenced and guaranteed. A minimum of 30cm of global SLR is projected for the year 2100 no matter what, with the actual increase likely to be much more³⁰.

Consequently, flood and erosion risk are widely expected to increase over the 21st century and beyond under all future emission scenarios considered³¹.

²⁶ Met Office (2022) <https://www.metoffice.gov.uk/weather/climate-change/organisations-and-reports/past-and-future-sea-level-rise>

²⁷ SEPA (2022) CCAP

²⁸ Rennie and Hansom (2011) Sea level trend reversal: Land uplift outpaced by sea level rise on Scotland's coast. *Geomorphology*. 125-1.

²⁹ Chu (2017) <https://climate.nasa.gov/news/2533/short-lived-greenhouse-gases-cause-centuries-of-sea-level-rise/>

³⁰ Lowe et al. (2019) Met Office Hadley Centre Climate Briefing Note. Met Office.

³¹ Met Office (2018) UKCP18 Science Overview report

2.2 Historic SLR

Global SLR has been measured using satellite altimeters for the past 30 years. From 1993 to present, the average rate of global SLR has been measured as 3.34 mm/yr³². In contrast, gauges have shown mean sea level around the UK has risen by 1.4 mm/yr from the start of the 20th century³³. It is irrefutable that human activities are the main driver of observed global mean SLR since 1971³⁴.

At a local level, the Class-A tide gauge at Aberdeen has recorded mean sea level from 1931 to present-day. Here, from 1932–2014 (year 0 to year 82, Figure 2-1), mean sea level has risen at an average rate of 0.97 mm/yr³⁵. From 1975–2014 (year 43 to year 82, Figure 2-11) however, the rate of average mean sea level rise has increased to 3.8 mm/yr higher than the global average (Figure 2-11).

Compartmentalising the data shows different trends and supports the suggestion that SLR is increasing, as observed in global satellite data.

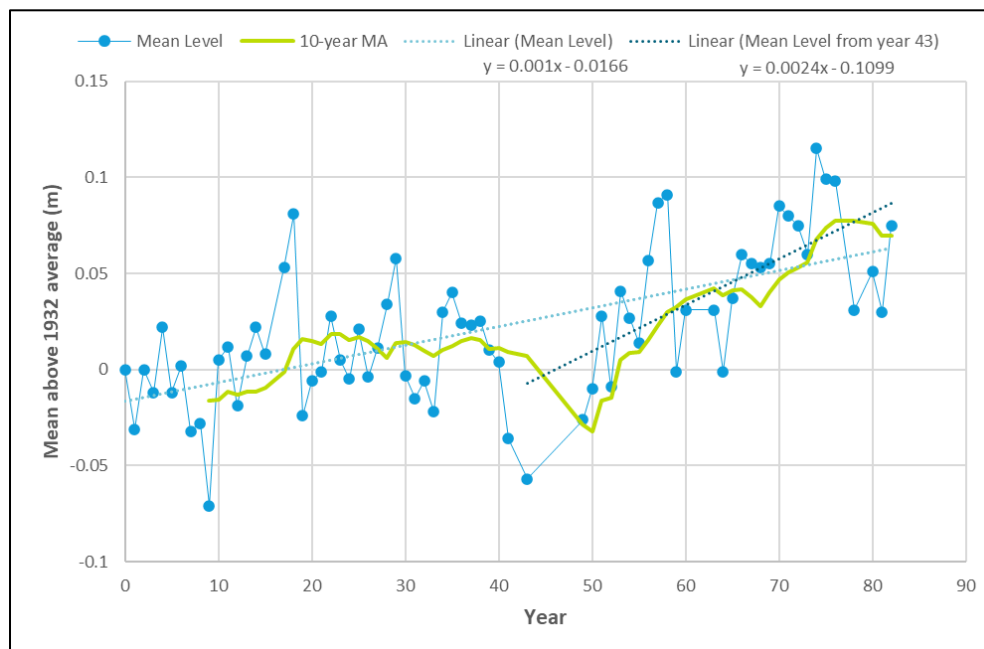


Figure 2-1: Mean Sea level above 1932 average at Aberdeen gauge station. The green line shows a 10-year moving average (MA) and the dashed line shows the linear trend in mean sea level from 1932.

2.3 Future Predictions

To predict coastal risks under future climate change, forecasts of sea level rise are needed. In 2018 The UK Climate Projections (UKCP18) estimated the potential relative increase in sea level. The data derived in UKCP18 provides the local time-mean sea level projection of

³² Beckley et al. (2017) On the “Cal-mode” Correction to TOPEX Satellite Altimetry and Its Effect on the Global Mean Sea Level Time Series. 122 (11) *JGR Oceans*.

³³ SEPA (2022) Coastal Change Adaptation Plan Guidance.

³⁴ Arias P.A. et al. (2021) Technical Summary. *Climate Change 2021: The Physical Science Basis. Contribution of Working Group 1 to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*.

³⁵ Sea level and tides (2022) <https://marine.gov.scot/sma/assessment/sea-level-and-tides>.

relative sea level change around the UK under a range of Representative Concentration Pathways (RCP) scenarios. RCP scenarios are used to model future climate evolution, including SLR, by considering economic, social, and physical changes to the environment that will influence climate change.

RCPs relate to Shared Socio-economic Pathways (SSPs), as used in the 2020 IPCC special report³⁶. The concentration of greenhouse gases represented in each RCP scenario results in a range of global mean temperature increases (Table 2-1) the associated projections on SLR for Aberdeen are included in Table 2-2.

Table 2-1: Representative Concentration Pathways (RCPs) and associated global temperature increase.

RCP	Change in Temperature by 2100 (°C)
RCP2.6	1.6 (0.9–2.3)
RCP4.5	2.4 (1.7–3.2)
RCP6.0	2.8 (2.0–3.7)
RCP8.5	4.3 (3.2–5.4)

In 2015 the Paris Agreement set goals to limit global warming to preferably 1.5°C³⁷. Recent reports show that, even with national pledges to reduce greenhouse gas emissions, there is now no credible pathway to 1.5°C³⁸. Even if a warming projection of 1.5°C was possible, this would still result in ca. 20-30 cm of SLR at the Aberdeenshire coast by 2100 (Figure 2-33).

The 2030 gap between the, now unachievable, 1.5°C and the current policy and action driven +2.5-2.9°C of warming is substantial (Figure 2-2). The warming projection based on current policy and actions (+2.5-2.9°C) is expected to result in more than 60 cm of SLR at the Moray coast by 2100 (Figure 2-3). This means actions taken in the next ten years are critical to the warming projection pathway and resultant magnitude of sea level rise for the next century and beyond.

Current global policies are projected to result in ~2.7°C of warming³⁹, but the current trajectory of global warming and associated sea level rise is following the RCP8.5, or High Emission Scenario (HES) scenario⁴⁰ (Figure 2-3).

³⁶ IPCC (2022) Summary for Policy Makers. 2020 Intergovernmental Panel on Climate Change.

³⁷ UNFCCC (2022) The Paris Agreement. <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.

³⁸ United Nations Environment Programme (2022) The Closing Window. Emissions Gap Report 2022

³⁹ Climate Action Tracker (2021) <https://climateactiontracker.org/global/temperatures/>

⁴⁰ Schwalm, C.R., Glendon, S., & Duffy, P.B. (2020) RCP8.5 tracks cumulative CO2 emissions. Proceedings of the National Academy of Sciences, 117(33), 19656-19657

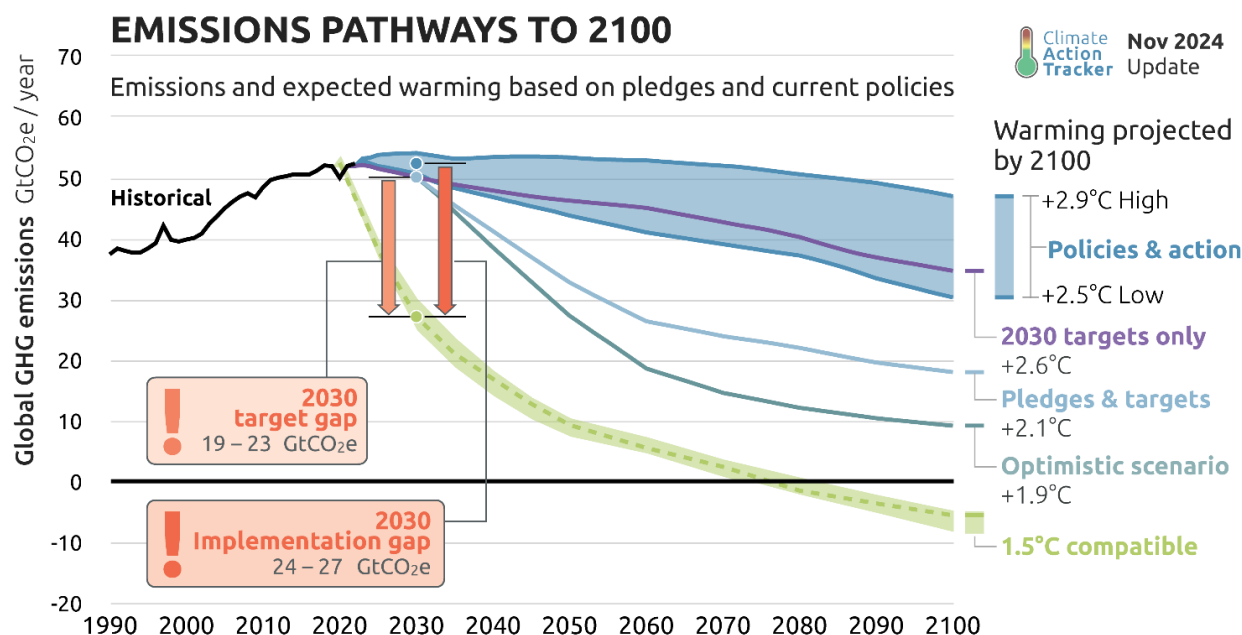


Figure 2-2: 2100 global warming projections based on different emission scenarios. Credit: Climate Action Tracker⁴¹.

In the UK, the UKCP18 dataset offers projections of future sea level rise from 2007 to 2100. The UKCP18 sea level rise data utilised in this context were derived from the grid location specified by the latitude and longitude coordinates listed in the Table 2-2. In UKCP18 projections, the 70% and 95% confidence intervals indicate the probability that sea level rise will stay below a given value. 70% Upli means a 70% chance of being below that level, while 95% Upli means a 95% chance. These estimates account for uncertainties like emissions and ice sheet changes but may still be exceeded.

Table 2-2: UKCP18 Locations for Sea Level Rise Projections.

UKCP18	CA Names	Latitude	Longitude	70.0% Upli	95.0% Upli
128	Banff	57.72	-2.58	0.87	1.25
132	Fraserburgh	57.72	-1.92	0.89	1.27
143	Seatown	57.61	-1.75	0.89	1.28
164	Foveran	57.28	-1.92	0.88	1.26
182	Portlethen	57.06	-2.08	0.87	1.25
191	Inverbervie	56.83	-2.25	0.86	1.24

The 70th and 95th percentile confidence estimates from the RCP8.5 scenario are summarised in Table 2-3. For the 95th percentile, the relative increase in sea level of 0.2 m in 2050 and 0.84 m in 2100 is relative to the sea level in 2022. The most extreme (low likelihood but credible) scenario projects relative sea level to increase by as much as ca. 1.8 m by 2100⁴² and should be considered for very long-term decision making or critical infrastructure planning.

⁴¹ Climate Action Tracker (2021) <https://climateactiontracker.org/global/temperatures/>

⁴² Met Office (2023) [Past and future sea level rise - Met Office](#)

SEPA has set out a generalised climate change allowance, which is a prediction of anticipated change, in this case in SLR, caused by future climate change⁴³. Aberdeenshire is in the Northeast region and has been assigned a cumulative SLR of 0.87 m between 2017 and 2100⁴⁴.

To summarise, SEPA's cumulative SLR of 0.87m should be used in planning, however, it is important to consider UKCP18's more extreme value of 1.8m SLR for long term decision making.

Table 2-3: UKCP18 relative sea level rise uplifts for years 2050 and 2100, relative to the year 2022.

Year	70th percentile (m)	95th percentile (m)
2050	0.15	0.20
2100	0.59	0.84

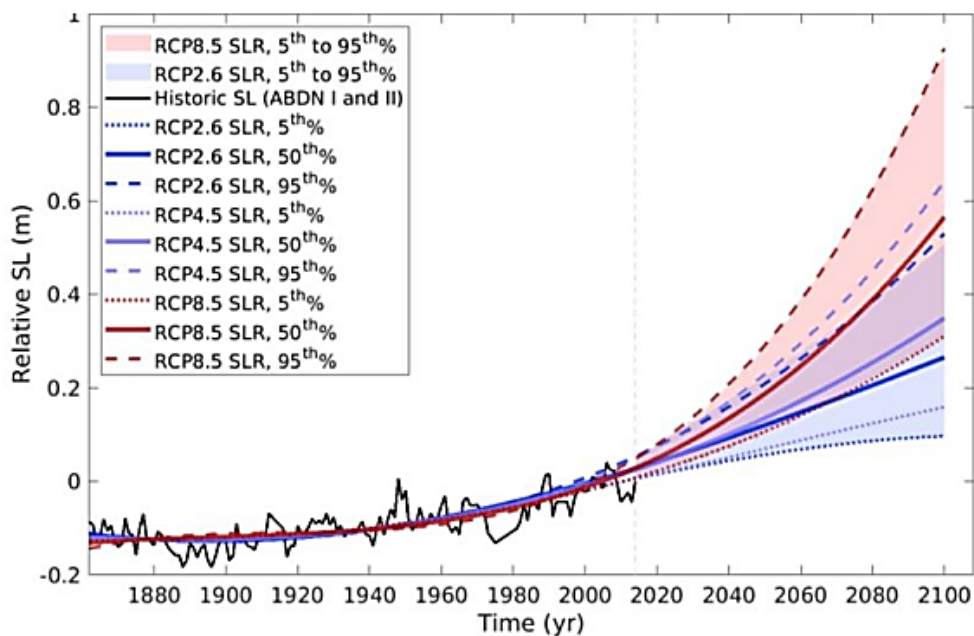


Figure 2-3: Relative Sea level rise scenarios from UKCP18, based on three representative concentration pathways. Projections extend to 2100 for the representative site of Aberdeen, with the Permanent Service for Mean Sea Level record⁴⁵.

⁴³ SEPA (2022) Climate change allowances for flood risk assessment in land use planning. Version 2.

⁴⁴ Scottish Government (2023) Coastal Change Adaptation Plan Guidance

⁴⁵ M.D. Hurst, F.M.E Muir, A.F. Rennie & J.D. Hansom (2021). Dynamic Coast: Future Coastal Erosion (2021). CRW2017_08. Scotland's Centre of Expertise for Waters (CREW). Available online at: crew.ac.uk/publications

Part C – Local Plan Prioritisation

1. Plan Prioritisation

This Plan, and the subsequent Local Plans, form the first phase in the coastal adaptation journey for Aberdeenshire. To identify the Local Plans to be delivered during this phase, a prioritisation exercise has been undertaken.

1.1 Influence Factors and Indicators

The Regional CCAP has been developed by aligning the four pillars (Part A, Section 2.5) with a series of Indices that underpin the motivations, opportunities, and causes for adaptation. There are five Indices that will be considered.

- Climate Risk
 - How the coast is changing and what is predicted to be impacted from flooding and erosion.
- Management
 - The scale of flood and erosion protection (built and natural), and whether there has been recent or ongoing work in the CA (e.g. capital investment or a flood/erosion study).
- Development
 - Has the LDP identified the CA as a regeneration priority or other development opportunities, and whether these are potentially at risk of erosion.
- Demographic
 - The Scottish Index of Multiple Deprivation rank.
- Economic
 - Whether the LDP has identified the CA as an opportunity for Strategic Growth.
- Known issues
 - Whether the Council are aware of any ongoing issues related to coastal flooding or erosion.

The prioritisation of each CA uses these Indices as a basis and applies a series of quantifiable Indicators against each which can be evaluated. Using available data, values for each Indicator are calculated for each CA, weighted, standardised, and combined into a prioritisation score. Each CA is then ranked according to their overall score to support identification of the first phase of the Local CCAPs.

The section below provides a summary of the Indicators developed for the prioritisation. Full details of the datasets used within each is provided in Appendix B.1.

New or planned future assets are not included in the assessments below.

1.1.1 Climate Risk

1.1.1.1 Properties

From Dynamic Coast, the number of residential and non-residential properties within the coastal erosion influence at 2050 and 2100 in each CA. Dynamic Coast data is also used to count the number of residential and non-residential properties at risk from a 1 in 200-year future flood event.

Units used: count.

1.1.1.2 Roads

From Dynamic Coast, the length of road within the coastal erosion influence by 2050 is calculated for each CA.

Units used: length (m).

1.1.1.3 Greenspace

From Dynamic Coast, the area of greenspace within the coastal erosion influence by 2050 is calculated for each CA.

Units used: area (m²).

1.1.1.4 Paths

From Dynamic Coast, the length of core path within the coastal erosion influence by 2050 is calculated for each CA.

While core paths are an integral part of recreation and character of the Aberdeenshire coast, not all such paths fall under the land management responsibility of Aberdeenshire Council. Responsibility for the maintenance of core paths rests with the respective land manager on whose land the path is situated. Aberdeenshire Council is not under a statutory obligation to maintain core paths, except where it is considered appropriate to do so. Consequently, the Council does not bear responsibility for the maintenance of all core paths identified as being at risk. Subsequently, although the risk from erosion forms a core part of the prioritisation, actions taken to adapt the core path network will be considered on a case-by-case basis in relevant Local CCAPs.

Units used: length (m)

1.1.1.5 Coastal Change

While future estimates of erosion are important to plan for adaptation, it is also important to consider the evidence of where historic change has taken place and the coastline has changed. For evidence of change, Dynamic Coast historic rates are used to quantify the past observed coastal change across the Aberdeenshire coast. The maximum rate of historical shoreline change, the length of shoreline that has historically eroded, and a flag to indicate any historic erosion are used as inputs for each CA. Data is from as far back as the year 1963 to present-day.

Units used: rate (m/yr), length (m) and flag (yes=1/no=0) respectively).

Coastal change indicators that were difficult to measure at a regional scale (e.g. landslips) were excluded from the regional prioritisation, but they will be considered at a local level during the development of each respective Local CCAP.

1.1.2 Management

1.1.1.6 Built Defences

A recent Environment Agency assessment has shown a staggering increase in predicted future maintenance and repair costs for maintaining hard coastal assets in our changing climate. Adaptation will require increased understanding of existing assets and maximisation of performance. Existing built structures are therefore key. To incorporate this, estimated length of artificial coastal structures is calculated for each CA. The objective of this is to draw attention to those CAs where these structures are classed as formal “defences” and to prioritise them appropriately for more detailed local actions.

Defence condition or type is not considered regionally. In the Local CCAPs it is however important to consider the residual design life of existing assets and to use any planned decommissioning and/or replacement of these as windows of opportunity to initiate a particular phase on an Adaptation Pathway.

Unit used: length (m).

1.1.1.7 Natural Defences

To highlight the importance of working with natural systems, another defence category is included to represent naturally defended, such as by the dune systems of Buchan East and Fraserburgh and the shingle beaches of Inverbervie and Stonehaven. The area of Natural defence within the coastal erosion influence at 2100 is calculated for each CA.

Unit used: area (km²).

1.1.1.8 Recent/Ongoing Work

It is important to consider whether there has been recent or is ongoing work to either understand flooding and erosion in more detail, determine coastal management options (e.g. Flood Study) or whether there has been another form of capital investment (e.g. new protection structures). Local CCAPs were prioritised in areas that lack an evidence base, defined management approach and previous investment. The aim of this is to avoid conflicting with outcomes that rely on substantial and central capital investment and provide a balance across the region.

Unit use: Scale of *Substantial (Capital construction or appraisal)*, *Moderate (feasibility level)*, *Minor (repairs)* or *None*

1.1.3 Development

1.1.1.9 Regeneration Priority

Identified in the LDP as part of the regeneration priorities for the Council.

Unit used: yes/ no.

1.1.1.10 Identified Opportunities

Identified in the LDP as having defined areas of land allocated for development opportunities.

Unit used: area (km²)

1.1.1.11 Identified Opportunities (Risk)

Whether any of the allocated development opportunities are at risk of erosion or flooding up to 2100.

Unit used: yes/ no.

1.1.4 Demographic

The Scottish Index of Multiple Deprivation (SIMD) is used to assess the deprivation of each local plan area. The SIMD score considers income, employment, education, and accessibility to healthcare. Inclusion of the demographic Influence Factor in the prioritisation ensures a community focus is considered when selecting sites for local development plans. An inverse weighting is applied so the lowest SIMD Rank (the most deprived) will be given the highest weighting in the prioritisation matrix.

Unit used: SIMD rank.

1.1.5 Economic

Adaptation should promote multiple benefits and seek to support the economic growth opportunities and targets within Aberdeenshire. The Economic Indicator is a flag indicating part of the CA has been targeted for economic growth.

Unit used: yes/no.

1.1.6 Known Issues

Whether the Council is aware of existing issues because of coastal or climate hazards.

Unit use: Scale of *Major*, *Moderate*, *Minor* or *None*.

1.2 Methodology

Prioritisation uses a mixture of numeric and binary values to describe the range of Indicators. These are then transformed on to a relative scale across the CAs from 0 (lowest) and 1 (highest) value. These are then used to assign a ranking between 1 (lowest) and 20 (highest) for each CA. The sum of all the values on this scale is then used to rank the CA from highest (largest value) to lowest (smallest value) priority.

While letting the data talk in an unbiased way is important, it is more **critical that the CAs taken forward for Local CCAPs in this stage also consider the motivations of Aberdeenshire Council to support tangible delivery of Actions during this Phase**. To that end, and in consultation with Aberdeenshire Council, the prioritisation applies weightings to key elements aligned with delivery potential.

These are categorised as High, Medium and Low, with High weighted Indicators having more influence on the scoring for that CA.

High Weighted Indicators

- Properties at risk of erosion by 2050
- Roads at risk of erosion by 2050
- Length of coastline experiencing historic erosion

- Area of natural coastline with NBS potential
- Aberdeenshire Council recent or ongoing work
- LDP Identified Development Opportunities at risk of erosion
- Aberdeenshire Council Known Issues

Medium Weighted Indicators

- Properties at risk of erosion by 2100
- Greenspace at risk of erosion by 2050
- Maximum historic erosion rate
- Length of built defences
- Area of LDP Identified Development Opportunities
- SIMD Rank

Low Weighted Indicators

- Properties at risk of flooding by 2100
- Core paths at risk of erosion by 2050
- Identified as a Regeneration Priority
- Identified as a Strategic Growth Opportunity

The overall prioritisation score is determined using the sum product for each CA based on the normalised scores of Indicators and associated and their associated weighting.

1.2.1 Prioritisation Results

Details of the Indicators for each CA are provided in Appendix A along with a summary of the prioritisation matrix, Appendix B.

The outcomes of this are presented below in Table 1-1.

Table 1-1: CAs prioritisation rank order. CA with highest combined total across all indicators ranked 1.

Rank	Community Area
1	Invercairn & Fraserburgh
2	Gamrie Bay
3	Buchan East
4	Banff & Macduff
5	Blackdog & Balmedie
6	Foveran, Slains & Collieston
7	Gourdon & Inverbervie
8	Sandend and District
9	St Cyrus
10	Whitehills & District
11	Cruden
12	Sandhaven, Pitullie & Rosehearty

13	Boddam & Peterhead
14	Benholm & Johnshaven
15	Portsoy & District
16	Newtonhill & Muchalls
17	Stonehaven & District
18	Portlethen & District
19	New Aberdour and Pennan
20	Catterline, Kinneff & Dunnottar

In addition to the raw prioritisation, delivery of Local CCAPs during this first Phase are balanced across the Committee Areas. This supports the governance structure of the CCAPs where the Council Area Managers are part of the Delivery Component.

Revision of the CAs based on these changes the prioritisation slightly to make sure that at least one local Plan per Aberdeenshire Council Committee area with a section of coastline is developed. The final list of prioritised Local Plans is therefore:

- **Banff and Buchan**
 - Invercairn and Fraserburgh
 - Gamrie Bay
- **Buchan**
 - Buchan East
- **Formantine**
 - Blackdog and Balmedie
- **Kincardine and Mearns**
 - Gourdon and Inverbervie

Part D – Regional Plan

1.Regional Plan Overview

1.1 Plan Coverage

The Aberdeenshire coastline is located on the North Eastern coast of Scotland, North of Edinburgh, stretching approximately 165 miles from just north of Montrose, to just west of Cullen. It constitutes a mix of sandy, gravel, and cliff coasts, as well as some sections with built coastal defences. There are several towns, villages, and features such as harbours, beaches, golf courses, coastal trails, and agricultural land that are vulnerable to both coastal flooding and erosion.

The location and extent of the Aberdeenshire coastline, and the associated Community Council Areas are shown in Figure 1-1 below.



Figure 1-1. Aberdeenshire coastline with Aberdeenshire Community Council Areas shown. Areas with no coastal extents have been omitted.

1.2 CCAP Delivery Framework

The Adaptation Framework for developing and delivering CCAPs (Regional and Local) is presented in graphical format below, in Figure 1-2. Plans are supported by a Governance structure, which is detailed further in **Part A – Background and Motivation** and features a Cross-Council Action Group (CCAG). The CCAG shall consist of relevant departments and individuals from across Aberdeenshire Council and is categorised into either providing technical expertise (Technical Oversight), assisting with delivery and funding of action (Delivery Partners), or raising awareness of the plan and its purpose across other Council initiatives (Awareness).

The Adaptation Framework conceptualises how the Plan will be delivered. Within the framework, the CCAP actions will be developed across two delivery streams which would either be undertaken as a result of Triggers being realised, or through the setting of Proactive Actions identified during the CCAP development.

The Delivery Stream is split into Land-based and Management-based. With Land-Based actions providing the linkage to the LDP to demonstrate how some actions may be best delivered either through, or in combination with, the LDP. The Adaptation Pillars are also critical to the Framework. Delivery of the CCAPs aims to identify and set Actions across both delivery streams, while maintaining balance across all Pillars.

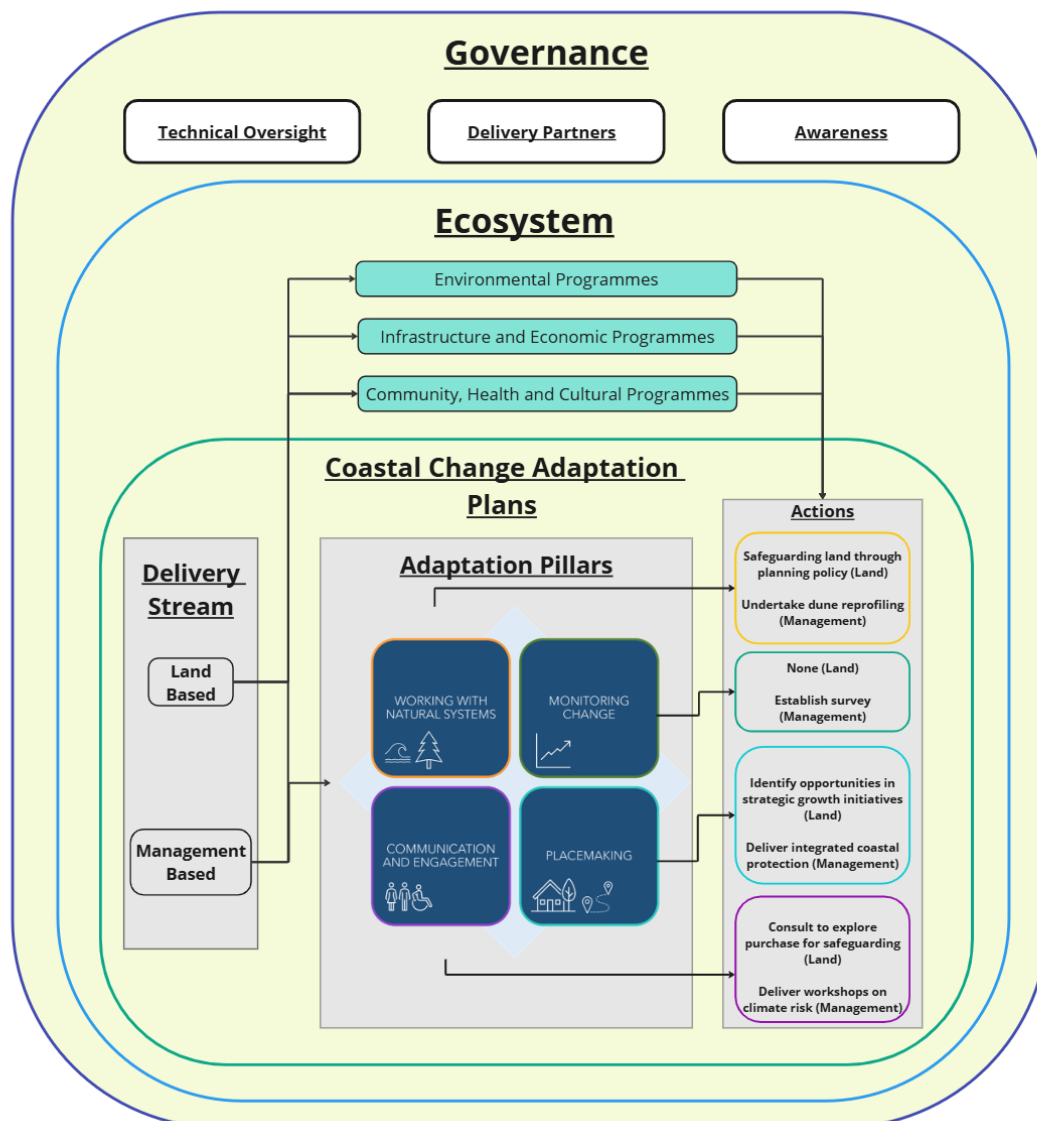


Figure 1-2. Regional Coastal Change Adaptation Plan Structure, with example actions

Examples of Land and Management Based actions are provided below. When developing and confirming the CCAG and overall governance structure, the types of actions that will ultimately be required need consideration. This will make sure that the correct representatives and parties are included at the start of the process, providing the greatest chance for delivery of tangible actions in the future.

Land-Based Adaptation Actions

- Setting and integrating Coastal Change Management Areas (CCMA) into the LDP.
- Revising internal planning policy to restrict development or set additional requirements within CCMA's.
- Identifying and safeguarding land to offset losses from projected erosion.
- Undertaking additional land purchase to offset losses from projected erosion.

- Realign or relocate infrastructure at risk.

Management-Based Adaptation Actions

- Undertake dune restoration works.
- Undertake flood and coastal protection options appraisal.
- Repair / replace existing coastal protection structures.
- Realign or relocate receptors at risk.

In certain circumstances, specific Actions may require additional Supporting Steps for delivery. These will require coordination across the CCAG to determine appropriate mechanism. Examples here may include:

- Engagement with third party stakeholders (e.g. SEPA, Nature Scot, Crown Estate, and private business).
- Engagement with private landowners to support purchase or offsetting opportunities.
- Legal advice and support to deliver receptor realignment or relocation.

2. Regional CCAP Process

2.1 Delivery

At a Regional Plan level, the delivery of the CCAP is primarily focused on governance and making sure that the whole of Aberdeenshire takes a consistent approach to CCAP delivery. Delivery of adaptation is an ongoing and evolving process that requires monitoring and a clear understanding of the factors that influence decision making.

To that end, delivery of the Regional CCAP takes a simplified approach, defining Triggers, and associated Actions. This process will follow the adaption planning concept, set out in the draft Scottish Government guidance.

2.1.1 Indexes and Indicators

These have been developed to support prioritisation of the Local CCAPs and development of the overall Adaptation Framework. It is the role of CCAG and the Regional Plan to continually review the data and regional and national initiatives and trends. Fundamental changes to these will act as a Trigger to initiate review of the Regional CCAP or associated Actions.

2.1.2 Triggers

Triggers are due to changes in the data or other external factors that influence delivery of Actions. At the Regional level, these are pre-defined through:

- Changes to the data sources that underpin the Indicators.
- Changes to key policy, guidance (internal or external), or funding sources that impact Plan content.
- Changes to internal Governance or structure of the Council that will influence the CCAG.

2.1.3 Actions

Actions are a defined set of activities that Aberdeenshire Council will deliver in response to the realisation of the identified Triggers. These would either be Direct or Indirect summarised as:

Direct

Actions which Aberdeenshire Council own and can deliver independently of any third party inputs or support.

Indirect

Actions which Aberdeenshire Council are responsible for initiating and coordinating third party involvement necessary to support the adaptation vision.

In short, Direct Actions will result in a tangible short-term outcome or product, and Indirect Actions will initiate necessary supporting processes to maximise adaptation opportunities.

Adaptation planning is an ongoing and continuous process that requires regular review, update, and implementation of additional actions and measures. The Regional CCAP is circular with Outcomes driving future Inputs through a feedback loop. Direct Actions may also lead to follow on Local CCAP activities.

Actions will only occur once its associated trigger has been met. Depending on the outcome, these may lead to additional regional actions, local adaptation actions, or no further action being taken. In this scenario the Plan will revert to monitoring of the currently defined regional triggers.

The following are defined as regional actions for Aberdeenshire.

Direct

- Re-prioritisation of CA Local Plans
- Undertake new CA Local Plan
- Update Regional CCAP (this document)
- Undertake Regional proactive actions

Indirect

- Initiate and facilitate third party engagement activities

An example of the delivery process could be:

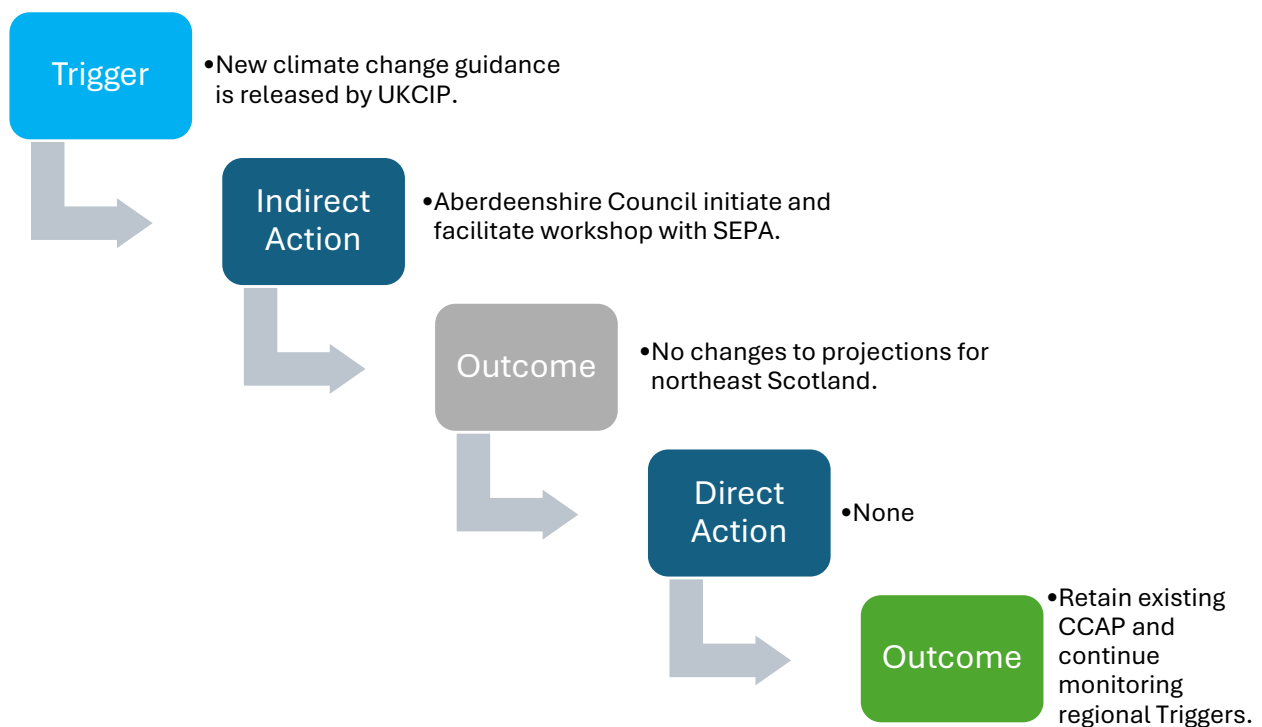


Figure 2-1. Example delivery process for Regional CCAP.

2.2 Stakeholders

CCAPs are collaborative and should promote a shared vision for the future of the Aberdeenshire coast. Stakeholder engagement is therefore important for successful development and implementation. While the development of a core CCAG is key to delivery moving forward, delivery of the Plan will rely on wider engagement and partnership working. This will be delivered through Priority External Stakeholders potentially including:

- Scottish Government.
- SEPA.
- Scottish Water.
- Offshore wind/energy companies.
- Oil and gas companies (land and offshore)
- Nature Scot.
- Transport Scotland.
- Aberdeenshire Council Councillors.
- Private Harbour authorities.
- Community Councils
- Proactive community groups.
- The Crown Estate.
- Other strategic private investors in Aberdeenshire.

2.3 Proactive Actions

Adaptation requires decision-making under uncertainty with a range of potential outcomes, not all beneficial. Proactive Actions can be undertaken to enable effective decision making in future and provide the groundwork to undertake wider actions. This is particularly the case where land needs to be safeguarded, either via statutory planning or via purchase arrangements, to provide capacity for accommodation on land for landforms (natural and nature-based risk alleviation options) and where required, assets to migrate landwards to accommodate coastal change.

Seventeen such Proactive Actions have been identified at this stage. These are reflective of the current Phase of adaptation planning and aim to: develop clear governance, identify critical third parties, close knowledge gaps and support wider aspects of the CCAPs for the region. These have been balanced across all four adaptation pillars to ensure that adaptation is holistic and considers all aspects to support a more resilient future for the coast. Each action has an assigned owner and supporting role, aligned with the CCAG structure, to provide clear roles and responsibility that support effective delivery.

A summary of these actions is provided in Table 2-1 below.

Table 2-1. Regional Proactive Actions. Delivery Stream detailed in Part D Section 1.2

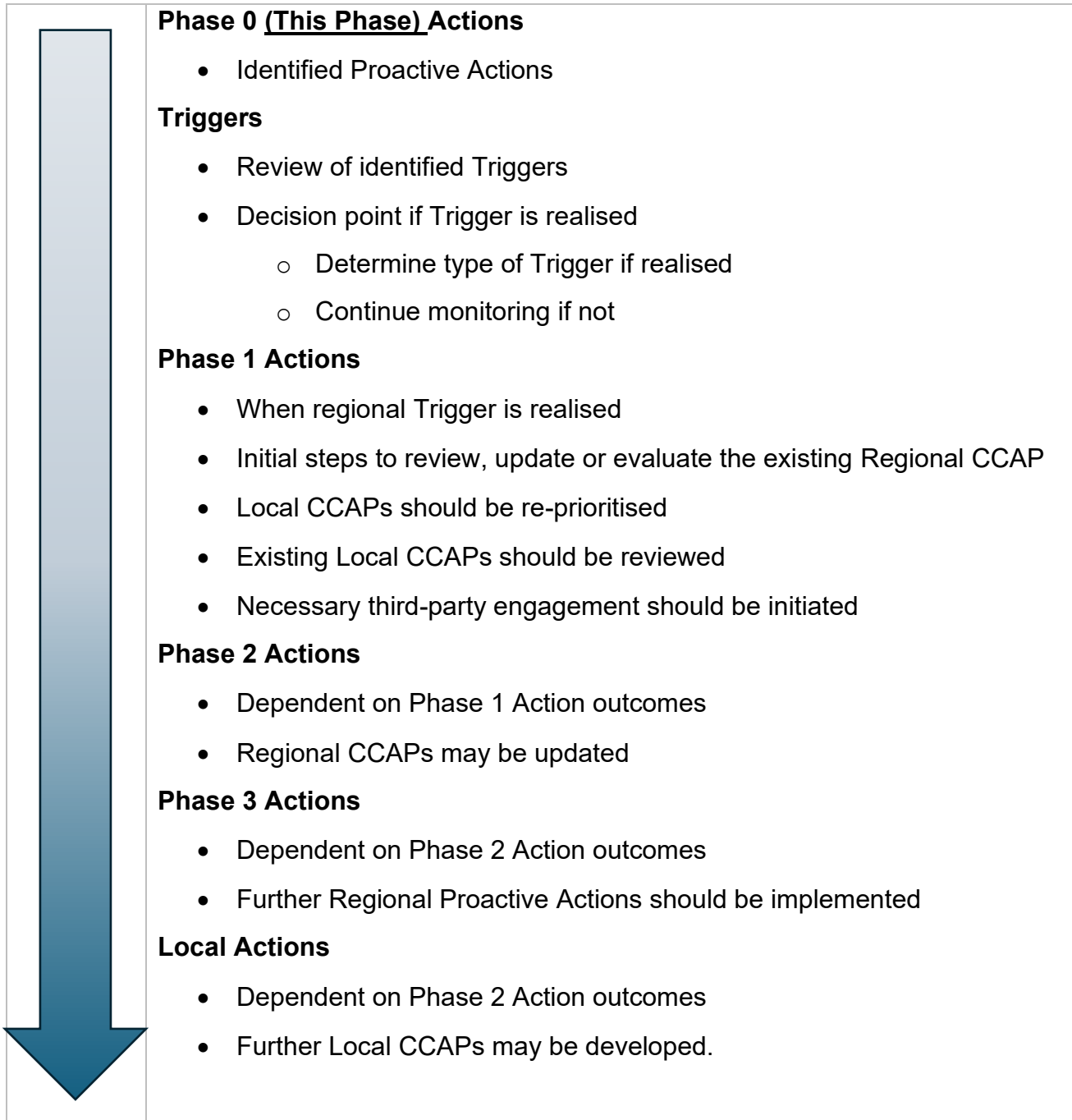
Key: **Action Complete** **Action Underway** **Action Outstanding**

Action	Details	Delivery Stream	Adaptation Pillars	CCAG Owner	Support
R1	Confirm CCAG and overarching CCAP governance structure.	Both	All	AC (Roads & Infrastructure)	AC (All)
R2	Undertake economic opportunities review to identified critical third-party private sector stakeholders and sources of funding.	Both	All	AC (Roads & Infrastructure)	
R3	Undertake engagement with private sector stakeholders to understand opportunities for funding or mixed investment.	Both	All	AC (Economy & Local Place teams)	AC (Roads & Infrastructure)
R4	Establish coordinated and consistent coastal change monitoring plan for the Aberdeenshire Region.	Management	Monitoring Change	AC (Roads & Infrastructure)	SEPA Scotland Gov CRA - East Grampian Coastal Partnership
R5	Establish and standardise defence asset condition database, including a mechanism for updating this and for identifying Triggers in advance.	Management	Monitoring Change	AC (Roads & Infrastructure)	SEPA
R6	Coastal adaptation workshop with Climate Ready Aberdeenshire	Management	Communication and Engagement	Climate Ready Aberdeenshire	AC (Roads & Infrastructure)
R7	Engage with NESCAN to understand opportunities for partnership and community working.	Management	Communication and Engagement	Climate Ready Aberdeenshire	AC (Roads & Infrastructure)
R8	Review CCAP outcomes and information to support delivery of climate adaptation funding	Both	All	Climate Ready Aberdeenshire	AC (Roads & Infrastructure)
R9	Review Regional and Local CCAP findings against the Local Development Plan and defined development opportunities.	Land	Placemaking	AC (Planning & Economy)	AC (Roads & Infrastructure)
R10	Establish defined Coastal Change Management Areas, development constraints and integrate into Local Development Plan policies.	Land	Working with Natural Processes Placemaking	AC (Planning & Economy)	AC (Roads & Infrastructure)
R11	Undertake strategic evaluation and appraisal of impacts of erosion and flooding on road and community connectivity across Aberdeenshire.	Management	Placemaking	AC (Roads & Infrastructure)	CCAG
R12	Identify and agree a reporting process with Aberdeenshire Council committees	Both	All	CCAG	
R13	Asset risk sharing with utility providers	Management	Placemaking	Climate Ready Aberdeenshire	AC (Roads & Infrastructure)

					Scottish Water
R14	Summary reporting on NHSG progress on NHS Scotland Adaptation Planning	Both	Communication and Engagement	Climate Ready Aberdeenshire	NHS
R15	Review and report on Climate Ready Aberdeenshire partner organisations Climate Change Risk Assessments and links to CCAP	Both	Communication and Engagement	Climate Ready Aberdeenshire	NHS Scottish Water AC (Roads & Infrastructure)
R16	Identify projects and develop proposals to support funding applications	Both	All	AC (Roads & Infrastructure)	CCAG

2.4 Regional pathway process

Implementation of the Regional CCAP will follow a pathway process that is determined through the monitoring of the regional Triggers and delivery of associated Actions. The pathway process is summarised below.



3. Phase 0 Summary

3.1 Adaptation Framework

This document presents the Regional Coastal Change Adaptation Plan for Aberdeenshire Council. It is the first iteration (Phase 0) and will be subject to ongoing review and update to effectively guide the adaptation process. The approach for developing the Plan makes use of available, national information on coastal flood and erosion risk and combines this with relevant local datasets.

It has been steered by relevant published documentation and Scottish Government's draft guidance on CCAPs. To reflect the stage that Aberdeenshire Council are at in the adaptation planning process this has been simplified into a concise Adaptation Framework that outlines:

- A governance structure through a CCAG that supports:
 - Technical Oversight
 - Delivery
 - Awareness
- Delivery streams that support both Land and Management-based Actions
- Four key pillars of adaptation to support balanced Actions:
 - Working with Natural Processes
 - Monitoring Change
 - Community and Engagement
 - Placemaking

3.2 Local CA Prioritisation

Using available data to understand the coastal processes and characteristics, the Aberdeenshire coastal region has been subdivided into 20 independent Community Areas (CA) (Part A Section 2.7). Through a structured prioritisation exercise these were assessed against a series of indicators from national and local datasets. Using these data, a relative comparison was made across the CAs to prioritise development of Local CCAPs (Part C Section 1.2.1). The Local CCAPs identified for Phase 0 are:

- **Banff and Buchan**
 - Invercairn and Fraserburgh
 - Gamrie Bay
- **Buchan**
 - Buchan East
- **Formantine**

- Blackdog and Balmedie
- **Kincardine and Mearns**
 - Gourdon and Inverbervie

3.3 Regional Pathway Process

The Regional Plan will be administered following a reduced pathway process by defining regional Triggers and setting future Actions against these. At this stage these are limited to those identified in Section 2.1.2 above.

Triggers focus on updates to data and documentation that has underpinned the development of the plan. Should this change, Actions are set for Aberdeenshire Council to implement.

When Triggers are realised, subsequent Actions may be split into those that are Direct (Aberdeenshire Council will deliver a new or updated document) and Indirect (Aberdeenshire Council will initiate but rely on third parties).

As well as actions that rely on triggers being realised, this initial stage of the adaptation process has identified several opportunities for region wide actions to be delivered upfront. These are captured in the Phase 0 Proactive Actions identified across both delivery streams and all pillars to make sure that the initiation of the process is holistic. These aim to establish clear governance, enable effective decision making, close knowledge gaps and make sure that Aberdeenshire Council can effectively prepare for adapting to the impact climate change will have on the coast.

3.4 Next Steps

Adaptation to coastal change will be a continual journey and the process is ongoing. Upon adoption of this plan sufficient and continuous sources of funding and partnerships need to be determined to enable delivery. As there is currently no allocated funding commitment for further work beyond the 2025/26 financial year, timescales for delivery cannot be provided at this time. Part of the role of the CCAG and governance requirements of the CCAPs is to explore opportunities for alignment of funding from different avenues that complement the aims and objectives of the CCAPs.

Here, the following key steps require implementing by Aberdeenshire Council:

- Develop and confirm the overall governance structure of the Plans including creation of a CCAG and identifying clear roles and responsibilities within.
- Implement internal governance processes through the CCAG (when defined) to review and monitor defined regional Triggers.
- Facilitate regular collaboration between the CCAG members to make sure that additional plans in Aberdeenshire (e.g. LDP, strategic development, economic growth etc.) integrate the CCAP and complement each other.
- Develop and deliver the Local CCAPs.
- Deliver the regional Proactive Actions (Part D Table 2-1).

Appendices

Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
Portsmouth
Saltair
Skipton
Tadcaster
Thirsk
Wallingford
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