Ngā mahere whakaurutau mō te takutai

Shoreline Adaptation Plan Programme

Understanding Shoreline Adaptation Plans

Volume 1 Revision 1

May 2025

Shoreline Adaptation Plan Volume 1: Understanding Shoreline Adaptation Plans

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Reviewed and recommended for publication by:

Name: Natasha Carpenter

Position: Coastal Management Practice Lead, Resilient Land and Coasts, Auckland Council

Approved for publication by:

Name: Paul Klinac

Position: General Manager Resilient Land and Coasts, Auckland Council

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Front cover:
Artist's reconstruction of Piha Beach, reflecting aspirations in coastal adaptation in alignment with the natural landscape of the coast. Artwork by Karamvir Talwar (source: Buzzly Shoreline Adaptation Plan Challenge, 2025).

Mātauranga Protection Statement (Disclaimer)

Auckland Council acknowledges that all cultural information within this document is the intellectual property of iwi who have contributed to the development and co-authoring of this Shoreline Adaptation Plan (SAP). To ensure the protection of Mātauranga Māori, cultural information must not be recirculated to other workstreams without direct consultation with and approval by iwi, to whom this information belongs. To ensure that cultural values and associations are recognised and provided for in any works programme, it is fundamental that this partnership and co-management approach is applied to each specific coastal stretch when implementing the direction set out in this SAP. Failure to do so has the potential to result in significant adverse cultural impacts. Early and meaningful engagement with the relevant iwi groups on projects under this SAP is necessary. This will ensure that Auckland Council and Auckland Council-owned organisations meet their obligations to Ngā Mana Whenua o Tāmaki Makaurau and Te Tiriti o Waitangi. Iwi must be given the opportunity to act in their role as Kaitiaki when implementing projects under the Shoreline Adaptation Plan programme.

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1 What are SAPs? (Executive Summary)

Shoreline Adaptation Plans are being developed across Auckland to provide a long-term adaptation strategy for Auckland Council-owned land and assets in response to the impacts of coastal hazards and climate change (including sea-level rise).

The Shoreline Adaptation Plan (SAP) work programme was initiated by the Coastal Management Framework adopted by Auckland Council in 2017[1] and responds to the community and coasts priority area in Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan.

SAPs are non-statutory living plans which guide asset management planning and decision making. The programme is developed collaboratively across Auckland Council including Council-controlled organisations, Auckland Transport and Watercare and Eke Panuku. Once completed, the SAP plans will inform regional prioritisation and funding of implementation actions. This presents an opportunity for iwi and other programme partners to collaborate in their implementation.

SAPs apply to Auckland Council land and assets, they DO NOT apply to private land and assets

SAPs do not commit Auckland Council to fund the identified adaptation strategies (read more at Section 3.0)

SAPs may have implications for private land. Further consultation with communities and private landowners when plans are implemented (read more at Section 3.0)

Development of each SAP has included engagement with ngā iwi o Tāmaki Makaurau (the 19 iwi of Tāmaki Makaurau), Local Board, local community and infrastructure providers. Our engagement identified specific values and objectives for shoreline management in each area (see Section 5.0). In combination with the technical results of a coastal hazards exposure assessment and advice from asset owners, these objectives are used to determine an appropriate series of shoreline adaptation strategies to respond to different climate scenarios (Section 4.0) which include varying degrees of sea-level rise. Section 3.0 provides further detail on the development and implementation process.

The strategies provide high-level guidance on how Auckland Council-owned land and assets located in coastal areas can be adapted over time to sustainably manage the escalating impacts of coastal hazards and climate change. Strategies are identified in Section 6.0 below.

[1] Refer to the minutes here ENV/2017/116, https://infocouncil.aucklandcouncil.govt.nz/Open/2017/09/ENV_20170912_MIN_6832.htm

2 How to use this document and navigate the SAPs

What's included in this document

This document is intended to function as a key reference document across the SAP programme and for each specific SAP area across the Auckland region. It includes key information about why and how SAPs are being developed, and sets out key concepts and information which are used consistently across all the 20 area-based documents.

Way finding and structure across all the shoreline adaptation plans

Volume 1 is a key, overarching reference document for the SAP programme. Each SAP area-based plan is comprised of a Volume 2 which applies to the full SAP area (as spatially identified) and Volume 3 which includes the detail of the adaptation strategies for each coastal area at a 'unit' and 'stretch' scale. Figure 2-1 provides a visual overview of what you will find in each volume.

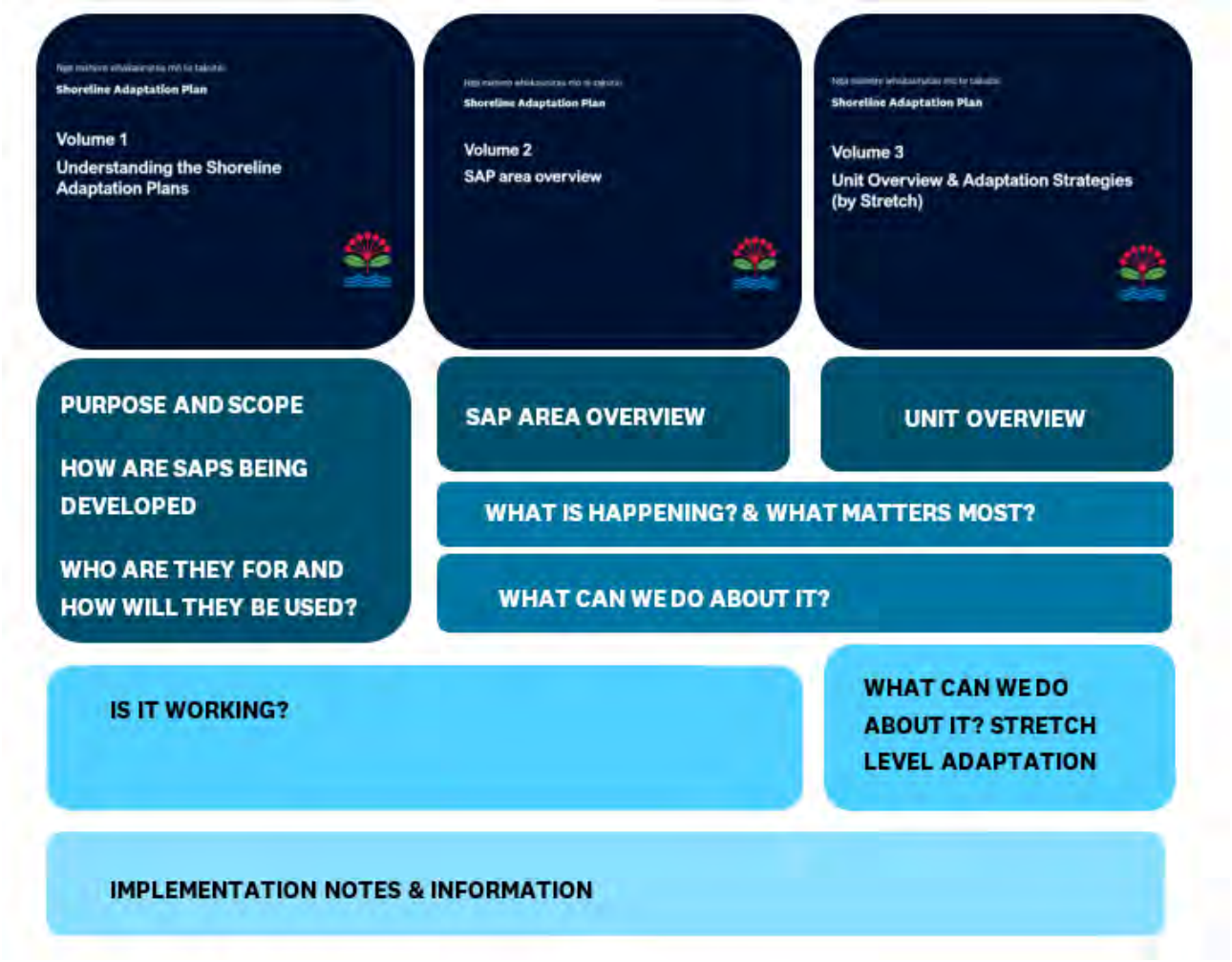
Volume 1:
Regional scale applicable to all SAP areas

Volume 2:
SAP area scale (20 of these areas)

Volume 3:
Unit scale (multiple units located within an SAP area)

Figure 2-1: How the SAP volumes are structured

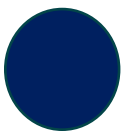
Each plan is developed involving inputs from technical experts and with reference to our best available natural hazards and climate change science and modelling (see Section 4.0 below). The questions of '**what is happening**', '**what matters most**' and '**what can we do about it**' are used to structure information across the three volumes of the SAP reports.



What to look for across the SAP documents

We know a picture can speak a thousand words. To assist in navigating lots of information we have used a series of infographics to help readers envisage the various types of features and values an area may have and the hazards that may be experienced there.

Look out for triangles for our **hazards,** where we talk about **risk** and where we identify measures which may already be used to **mitigate** coastal hazard risk. Read more at Section 4.0 'what is happening'.



Look out for the circular icons for our **assets** and **values**, with different colours to guide if these values, assets or matters are Auckland Council assets, community assets or uses, ecological or cultural sites, features and values. These are set out in more detail under Section 5.0 below 'what matters most'.

We use squares for our four **adaptation strategies** with constant colours across our text tables, infographics and maps. Read more at Section 6.0 'what can we do about it'.

2.1 Navigating the SAP geographies and scales

This document '*Volume 1 Shoreline Adaptation Plans Programme*' is applicable and complementary to all of the Auckland region, including all twenty (20) area-based plans (and one 'mini' SAP plan) as identified in Figure 2-3 below. If you are looking for information on a specific area of our coast, please refer to Volumes 2 and 3.

Shoreline Adaptation Plan Areas

SAP areas, units and stretches are based on coastal processes and geographic boundaries. They do not strictly reflect current governance, rohe or historical cultural boundaries, which often extend over multiple units or coastal stretches.

- Pākiri to Matheson Bay
- Ti Point to Sandspit
- Snells Beach to Ōrewa
- Whangaparāoa
- Weiti Estuary to Devonport Peninsula
- Waitemata Harbour West
- Waimanawa Little Shoal Bay Mini SAP
- Central Auckland
- Orakei to Tahuna Torea
- Tamaki Estuary
- Highbrook to Whitford
- Beachlands and East
- Waiheke Island
- Aotea Great Barrier and the Hauraki Gulf Islands
- Kaipara Harbour Moana
- Whatipu to South Head
- Manukau Harbour North
- Manukau Harbour East
- Pahurehure Inlet
- Manukau Harbour South
- Āwhitu

The scale and size of stretches respond to distribution of assets and coastal geomorphic landscapes

The inland extent of unit reflects the potential extent of coastal hazards (including sea level rise) and their interaction with catchment flooding.

Because we need to make decisions based on more localised areas, these 20 SAP areas are divided into units which contain stretches, as depicted below.

Figure 2-2: Difference between SAP area, units and stretches

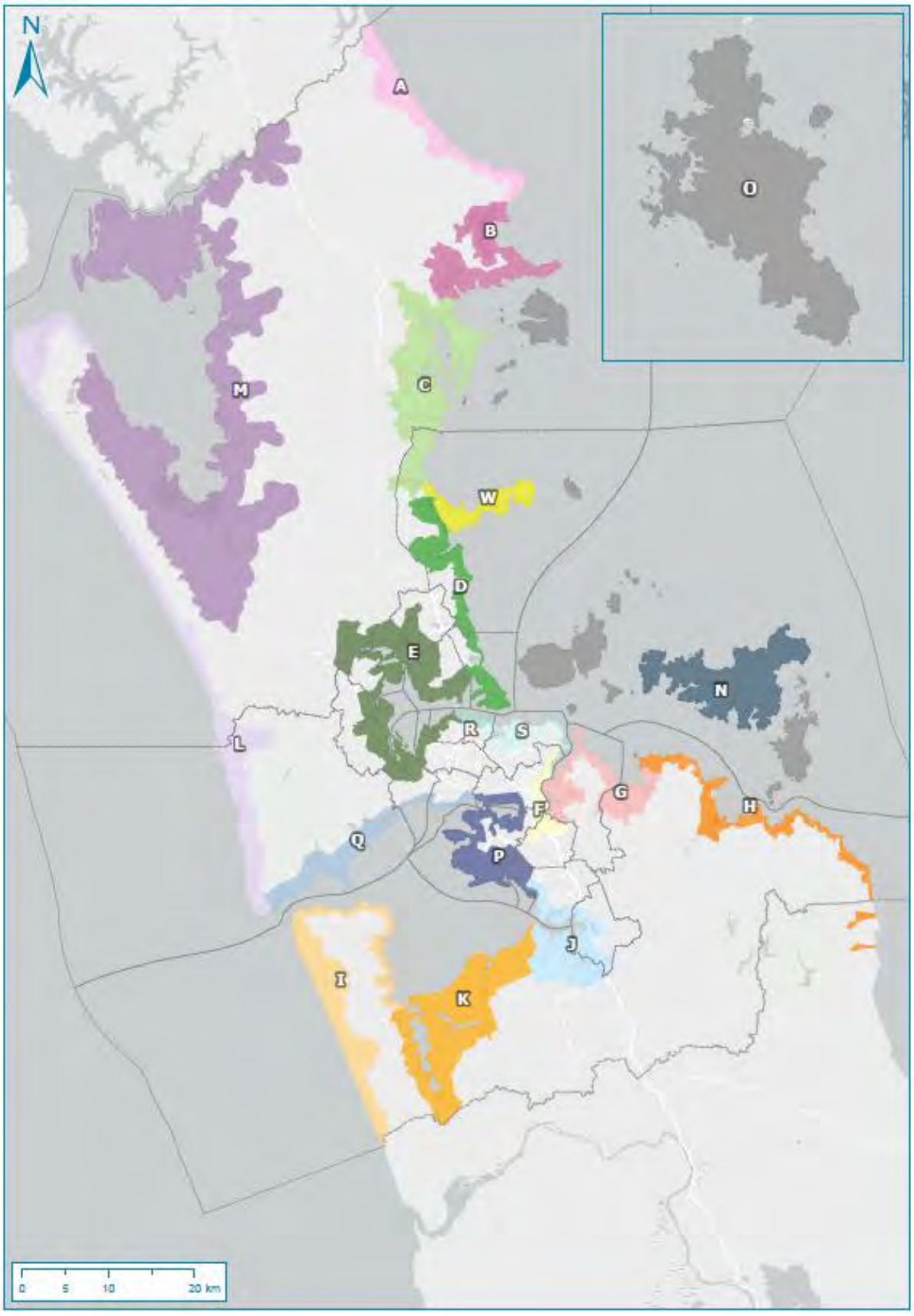


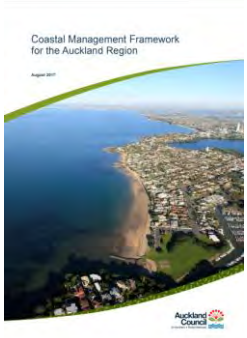
Figure 2-3: Overall view of the Shoreline Adaptation Programme

3 How Shoreline Adaptation Plans are being developed

3.1 Why do we have a Shoreline Adaptation Plan programme?

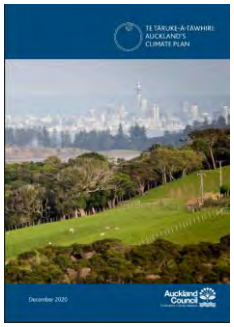
Auckland is characterised by 3,200 km of coast of high environmental, social, cultural and economic value. However, the complexity of coastal processes, combined with the future pressures associated with climate change and future growth, pose significant future management challenges.

In 2017, Auckland Council published the Coastal Management Framework (CMF) for the Auckland region. This provides a framework for best practice coastal management in a manner which is transparent and consistent. The frameworks sought to respond to diverse values (cultural, social and ecological) and diverse Auckland Council requirements (such as asset owners, local boards and specialists). The Framework identifies the need for a long-term view of coastal management (and climate change), supporting an environmentally and financially sustainable approach.



In 2017, the Ministry for the Environment (MfE) released the first of a series of updates to national guidance on coastal hazards and climate change. This guidance adopts an adaptive approach and provides a 10-step decision process (see section below) and sets out key principles[2], established through case law and practice, for managing coastal hazards under a changing climate, with an emphasis on preparing now so that we are ready for what may happen in the future.

In 2019, Auckland Council declared a climate emergency. In 2020 Council published Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan, which sets out a mandate to adapt to the impacts of climate change by ensuring we plan for the changes we face. This plan identified an outcome which states that "communities and individuals are prepared for our changing climate and coastline".



[2] Sustainability and resilience, Meet the reasonably foreseeable needs of future generations, Avoid, remedy or mitigate adverse effects, Precautionary principle, Stewardship/kaitiakitanga, Community engagement, Proportionality, Financial responsibility and disclosure (refer to Table 2 MfE Guidance 2024)

Working together

To plan for the long-term future management of our coast we need to work together. This requires a collective first step towards an adaptive approach for the future of our coast for current Aucklanders and the generations to come.

SAPs, although developed to inform Auckland Council asset owners and managers, are a first step in thinking about a long-term adaptive approach for coastal management for all Aucklanders. What the plans may mean for iwi, communities, local boards and other stakeholders is set out below. This is not intended as a fulsome list but forms the foundation for working together for the future of our coasts.

SAPs are non-statutory documents as they have not been prepared as directed by any specific legislative requirement. Instead, they are complementary and provide a more comprehensive approach to asset management planning across multiple asset classes (or groupings such as coastal protection structures, roads and water infrastructure and park facilities) that Auckland Council is responsible for. Overall, SAPs are not intended as plans or directives for land-use planning purposes but may be considered when preparing future plans under the Resource Management Act 1991 or the Reserves Management Act.

Taking an adaptive approach

The SAP plan programme follows the approach set out in the MfE's *Coastal Hazard and Climate Change Guidance*[3] which sets out a 10-step decision cycle to inform the development of adaptation plans.

The SAP programme commenced in 2021 with two pilot plans developed for Whangaparāoa and Beachlands & East, and the development of a 'stretch scale' focused SAP at Waimanawa Little Shoal Bay. What we learned through the development of these plans helped to guide the development of the remaining 18 plans across the region.

As mentioned, SAPs are a first step for a regionally consistent approach to adapting to our dynamic coastal areas and the future challenges of climate change and sea-level rise. Adaptation planning is a journey which will take decades to release and will need to remain adaptive to changing governance, community and economic factors as well as respond to our changing environment.

[3] Available here https://environment.govt.nz/publications/coastal-hazards-and-climate-change-guidance/

The development of each SAP follows the steps identified in the ten-step decision cycle (Figure 3-1):

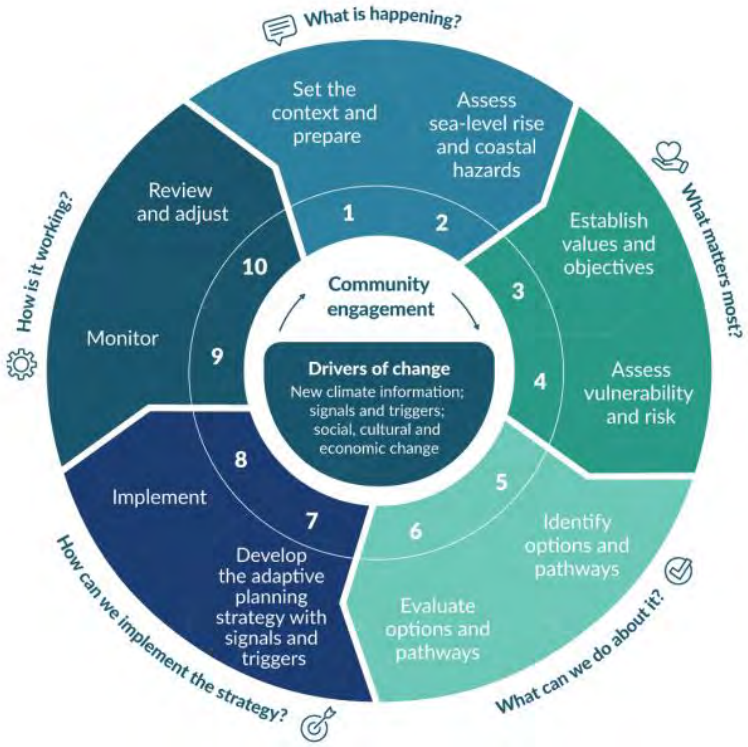


Figure 3-1: Ten-step decision cycle adapted from Max Oulton (University of Waikato and UN_Habitat (2014)

The start of the journey

Although our SAPs focus on Auckland Council-owned land and assets, there is a need for holistic 'systems' thinking both in relation to coastal management and adaptation. This 'first series' (Series 1) of plans have been developed to provide a 'roadmap' for changing coastal management strategies over time (over three climate scenarios) which can be further developed to implement a Dynamic Adaptive Planning Pathways approach including locally defined signals, triggers and thresholds for change.

The SAP development and implementation process also allows for consultation and collaboration with mana whenua and communities. This is reflected in Figure 3-2 below and discussed in the following section.

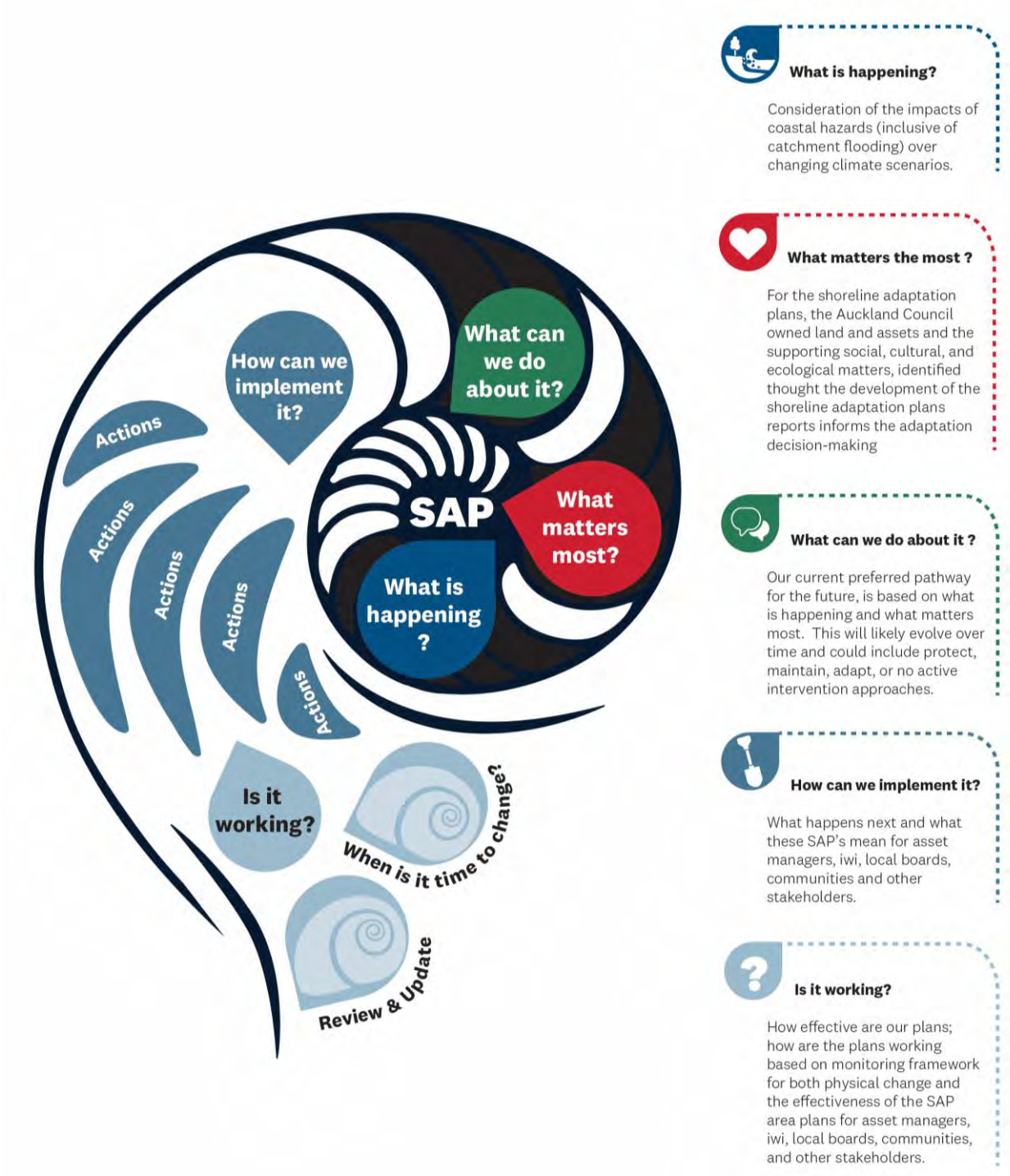


Figure 3-2: A schematic of the Shoreline Adaptation Programme development process

What is happening?

The focus of the SAP programme is on Auckland Council land and assets and the need to manage risk in a manner which supports good coastal management practice.

We use national and regional hazard and susceptibility information, including regional mapping of coastal inundation, coastal erosion and instability and regional and catchment scale modelling for flood hazards. The information we use is available on Auckland Council's GeoMaps (see also Section 4.0 below)

Our consideration of sea-level rise follows Central Government guidance, Auckland Council guidance (Auckland Council Climate change scenarios) and is informed by national research programmes such as SeaRise and Coastal Change.

What matters most?

The Auckland region includes three major harbours and some of the most densely populated coastline of Aotearoa, New Zealand. This diverse coast is home to unique and important coastal species and the ecosystems that support them, both on land and in the sea.

The SAP programme is focused on Auckland Council's responsibility, on behalf of the people of Auckland, to look after coastal land and assets owned and managed by Council.

In understanding what matters most, it is essential to work in partnership with mana whenua and our communities to understand their objectives and aspirations for our coastal areas. We have worked with local iwi to determine principles, values and aspirations and engaged with our communities to identify how they use and value public coastal spaces and assets.

Some things may be more vulnerable to the impacts of coastal hazards and sea-level rise than others. This depends on their susceptibility to and ability to cope with the adverse impacts of these hazards. To understand how vulnerable Auckland Council land and assets may be, we have consulted with asset owners to understand how susceptible their different assets and services are. While this work is ongoing, we are able to use this to inform the 'risk' to Auckland Council land and assets.

What can we do about it?

The SAPs identify four general strategies to categorise the scale of 'intervention' which may be needed to manage risk to Auckland Council land and assets.

These four options (no action, maintain, protect and adaptation priority) are evaluated based foremost on the presence of Council land and assets, asset management practices, and the values, features and attributes of each coastal area (including cultural, environmental and social).

How can we implement it?

The strategies give us a regional picture so we can start to plan for how we can reduce risks through asset management decision making across all of Auckland Council's focus areas; transport, water, the built and natural environments, community, economic and cultural development and well-managed local government.

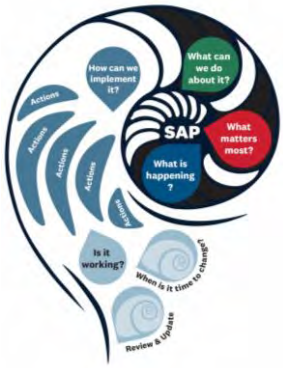
In the long-term, forming this regional view will help us understand and plan for investment in adaptation planning including how we can support detailed place-based development of signals, triggers and thresholds for adaptation actions and how we can finance this over the coming decades.

Is it working?

To understand how well the strategies are working, we need to monitor how effective the plans are at managing risks to Council land and assets in response to climate and coastal change. We also need to know how the plans may be meeting the objectives and values identified by iwi and communities. This may include quantitative (measurable with metrics or numbers), understanding of assets at risk and qualitative (more descriptive and experiential) understanding of how decision making regarding the design and location of assets may be evolving.

Adaptation planning for climate change is always evolving. There will be a need to continue to improve, refine and remain dynamic, including how develop and implement adaptive plans and pathways.

4 What is happening?



Natural processes, such as coastal inundation and erosion, become hazards when they have the potential to negatively impact things of value. The Auckland region is subject to several natural hazards; this includes catchment flooding, coastal inundation or storm surge, coastal erosion or instability, landslides, wildfire, extreme weather events, as well as low probability but high potential impact events, such as volcanic activity, tsunami, and earthquakes.

Climate change and natural hazards are interlinked. We know that global changes in temperatures directly influence the frequency and severity of many natural hazards. Tāmaki Makaurau / Auckland is frequently affected by natural hazard events and is likely to experience more frequent and severe events in the future due to climate change. Sea-level rise will increase the zone of exposure of coastal hazards. For shoreline areas with assets and infrastructure, or cultural heritage sites near the coastal edge (including recreational and environmental areas), the impacts of coastal hazards and climate change can be significant.

4.1 Coastal hazards and the Shoreline Adaptation Plans

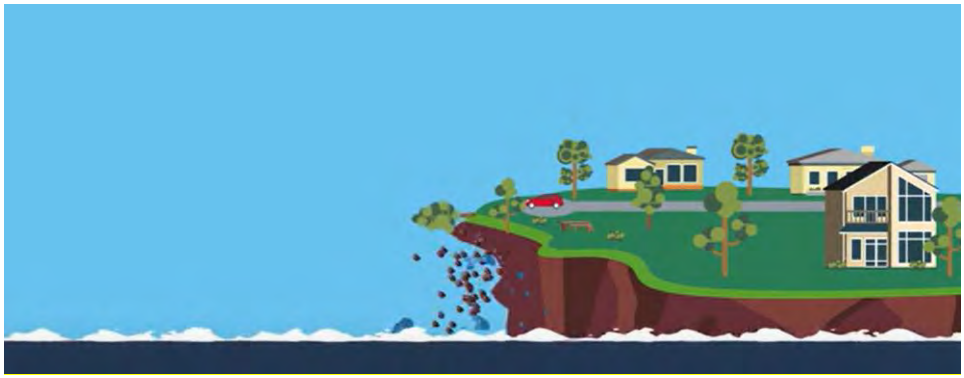
SAPs consider the more commonly experienced natural hazards relating to the coastal environment: coastal inundation, coastal erosion and land instability, and catchment flooding (where this interacts with coastal areas). These hazards are briefly described and links for further information are set out below.

The impacts of climate change

Impacts of climate change on coastal hazards could include worsening scenarios from coastal hazard events (magnitude, changing frequency, persistence and compound or multiple contributors), or a progressive change or trend (e.g. high-tide flooding extending further inland, groundwater rise, salinisation of land and freshwater) from the ongoing rise in mean sea level and other climate drivers.

Coastal hazards at a regional scale

Coastal erosion



Coastal erosion is the removal of the material forming the land due to natural processes, resulting in the coastline moving inland over time. It is a complex process caused by factors including wave energy, changes to sediment availability and land use, and sea-level rise. Although some types of shorelines (e.g. beaches) may undergo short-term periods or episodes of erosion and then recover (i.e. build out again), other types of shorelines (e.g. cliffs) continuously erode with no cycle of recovery. Coastal instability is the irreversible movement of land (typically as a landslide) resulting from the loss of support caused by coastal erosion.

Find a short video here: https://www.youtube.com/watch?v=ggyf53Sh_OU

Find Auckland Council's technical report here: https://www.knowledgeauckland.org.nz/publications/predicting-auckland-s-exposure-to-coastal-instability-and-erosion/

Link to GeoMaps here: https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html

Coastal inundation

Coastal inundation is the flooding of low-lying coastal land that is normally dry, due to elevated sea levels. Extreme high sea-water levels (commonly referred to as storm tides) are a result of storm surge. Storm surge occurs due to relatively low atmospheric pressure (the "inverted barometer" effect, e.g. a 1 hpa fall in pressure causes a resultant 1 cm rise in sea level). Low pressure events are typically combined with strong onshore winds which can further elevate water levels through wave set-up and run-up (overtopping) processes.

Find a short video here: https://www.youtube.com/watch?v=K0I4LI_ADns

Find Auckland Council's technical report here:
https://www.aucklandcouncil.govt.nz/environment/what-we-do-to-help-environment/Documents/coastal-inundation-in-auckland.pdf

Link to GeoMaps here (add the Natural hazards 'theme'):
https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html

Link to Auckland Council's Flood Viewer here:
https://experience.arcgis.com/experience/cbde7f2134404f4d90adce5396a0a630

Catchment flooding

Flooding is a result of extreme rainfall when the drainage capacity of the natural and/or built environment system cannot cope. It is a natural occurrence but is typically exacerbated by land use practices and is Auckland's most commonly occurring natural hazard. The flooding event with the highest probabilistic risk is a 1 % Annual Exceedance Probability (AEP) event because an event of such intensity is likely to result in more severe consequences than flooding events that are more common but of lesser intensity. A 1% AEP event has a 1% probability of occurring in any given year and is often alternatively referred to as the 1 in 100 year Average Recurrence Interval (ARI).

Find a short video here: https://www.youtube.com/watch?v=BOKz996Ql7g

Link to GeoMaps here: https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html

Link to Auckland Council's Flood Viewer here:
https://experience.arcgis.com/experience/cbde7f2134404f4d90adce5396a0a630

4.2 Sea-level rise

A key impact of climate change is sea-level rise. Sea levels influence where coastal processes interface with the landward edge and consequently, are an important consideration for the changing exposure of land, assets and facilities. For example, the future location of mean high-water springs and the location of the land-sea interface will change because of sea-level rise over time.

Current and historic sea level rise

When measuring sea-level rise, it is important to have long records to ensure that yearly and decadal (10 yearly) cycles can be distinguished from longer term trends. As identified in the MfE's coastal hazard guidance, measurable sea-level rise has been recorded in New Zealand since the early 1900s. Figure 4-1 below identifies measured sea level based on tide gauges located at the four main ports and at Moturiki from 1900 to 2020. This shows a sea-level rise of 0.21 m on average over this period[4].

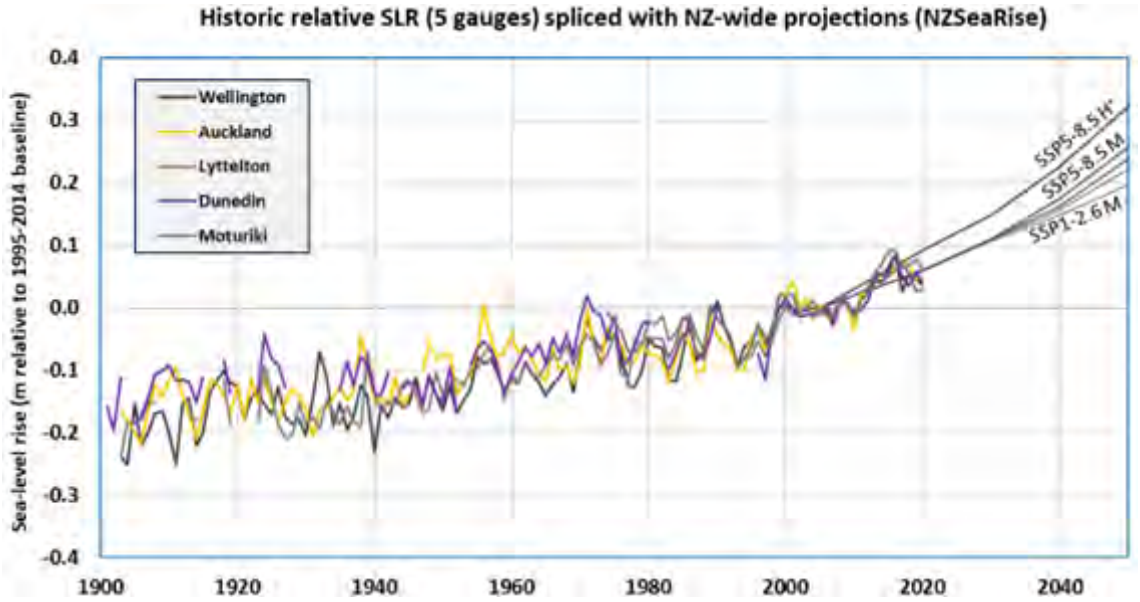


Figure 4-1: Change in annual mean sea level for the four main ports and Moturiki between 1900 and 2020, spliced with a range of New Zealand averaged sea-level rise projections based on shared socio-economic pathway scenarios to 2050 source: MFE coastal hazards and climate change guidance 2024.

Note: Annual sea level for each gauge site is relative to the mean sea level to a local land datum, averaged from 1995 to 2014 (period used for the Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC, 2021) and NZ SeaRise projections, with mid-point at 2005). Accurate sea-level measurements are only possible a few kilometres offshore (which excludes near-shore effects on coastal sea level) due to the land-shadow effect on the altimeter signal. See Section A.3.3 of Climate change, sea-level rise and coastal hazards science: Coastal hazards and climate change guidance – Supplement A for more commentary.

Source data: Stats NZ coastal sea-level rise marine indicator series (http://www.stats.govt.nz/indicators/coastal-sea-level-rise) combined with sea-level rise projections from a central location (± 0.025 metres by 2130 across New Zealand) from the NZ SeaRise platform without including vertical land movement (NULLhttp://www.searise.nz/maps-2).

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[4] This occurred, on average, across the four main port records. See www.stats.govt.nz/indicators/coastal-sea-level-rise.

Projecting future change

The NZ SeaRise: *Te Tai Pari O Aotearoa Programme* (NZ SeaRise, 2024) has completed sea-level rise projections for the New Zealand coastline. This is based on the Intergovernmental Panel on Climate Change (IPCC) Assessment Report 6 (AR6) projections and includes and assessment of vertical land movement (VLM) specific to New Zealand. The combination of projected (eustatic) sea-level rise combined with vertical land movement results in total *relative* sea-level rise, indicating more localised changes in sea level.

The SSP scenarios align with the former RCPs as follows:

- **SSP1-2.6 M** ⇔ *NZ RCP2.6 M*
- **SSP2-4.5 M** ⇔ *NZ RCP4.5 M*
- **SSP3-7.0 M** ⇔ n/a
- **SSP5-8.5 M** ⇔ *NZ RCP8.5 M*
- **SSP5-8.5 H+** ⇔ *NZ RCP8.5 H+.*

Four plausible climate and socio-economic futures (represented by SSP scenarios) are outlined in the MfE Guidance which cover a range of processes that contribute to sea-level rise. The guidance recommends using the upper range of the SSP5-8.5 H+ emissions scenario for coastal hazard screening, risk assessments and planning (Ministry for the Environment, 2024). This is because the world has been on a high emissions trajectory over the past few decades, and the physical interactions at play that drive sea-level rise operate on very long timeframes (decadal to centuries). This also means that there is a certain amount of sea-level rise that is 'locked in' for the future because of this long time frame, but the timeline of this is uncertain.

There is uncertainty on future emissions and planetary tipping points, meaning the level of 'expected' sea-level rise has the potential to occur faster (Ministry for the Environment, 2024). **Error! Reference source not found.** below sets out MfE's projections for the years in which absolute sea-level rise could be reached for a central location in New Zealand.

Summary of approximate year when absolute sea-level rise (SLR) heights could be reached using the recommended projections for a central location in Aotearoa New Zealand (Source: Ministry for the Environment, 2024)

SLR (metres)	Year achieved for SSP5 -8.5 H+ (83rd percentile)	Year achieved for SSP5 -8.5 (median)	Year achieved for SSP3-7.0 (median)	Year achieved for SSP2-4.5 (median)	Year achieved for SSP1-2.6 (median)
0.2	2035	2040	2045	2045	2050
0.3	2050	2055	2060	2060	2070
0.4	2055	2065	2070	2080	2090
0.5	2065	2075	2080	2090	2110
0.6	2070	2080	2090	2100	2130
0.7	2080	2090	2100	2115	2150
0.8	2085	2100	2110	2130	2180
0.9	2090	2105	2115	2140	2200
1.0	2095	2115	2125	2155	>2200

SLR (metres)	Year achieved for SSP5 -8.5 H+ (83rd percentile)		Year achieved for SSP5 -8.5 (median)	Year achieved for SSP3-7.0 (median)	Year achieved for SSP2-4.5 (median)	Year achieved for SSP1-2.6 (median)
1.2	2105		2130	2140	2185	>2200
1.4	2115		2145	2160	>2200	>2200
1.6	2130		2160	2175	>2200	>2200
1.8	2140		2180	2200	>2200	>2200
2.0	2150		2195	2200	>2200	>2200

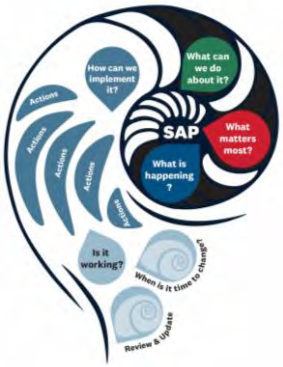
Sea-level rise has the potential to increase the frequency of future coastal storm surge events. For example, a coastal storm with a present day 0.5 % AEP (chance of occurring in any calendar year), will increase in frequency to a 50% AEP with the addition of 0.5 m of sea level rise, as illustrated by Table 4-1.

Table 4-1: Predicted storm tidewater levels in metres above Auckland mean sea-level datum

AEP (percent) Return Interval	50 percent 2 yr	20 percent 5 yr	10 percent 10 yr	5 percent 20 yr	2 percent 50 yr	1 percent 100 yr	0.5 percent 200 yr
Present day (2007) (m AVD-46)	1.89	1.97	2.03	2.09	2.17	2.24	2.34
0.5m (m AVD-46)	2.39	2.47	2.53	2.59	2.67	2.74	2.84
1.0m (m AVD-46)	2.89	2.97	3.03	3.09	3.17	3.24	3.34
1.5m (m AVD-46)	3.39	3.47	3.53	3.59	3.67	3.74	3.84

Table 6. Predicted storm tidewater levels in metres above Auckland mean sea level datum (AVD-46) at the Auckland Ports Ltd. gauge site and their approximate AEP (% and approximate ARI) for the present day and for local relative mean sea-level rise of 0.5, 1.0, and 1.5m relative to present day (2007 MSL).

5 What matters most?



As identified in Sections 1 to 3, the programme is focused on the management of risk to Auckland Council land and assets. However, it is essential to understand the history, context and purpose of these areas and assets. To do this, a methodology for the identification of social, cultural and ecological context for each of the SAP areas was established. This supports testing adaptation pathways for each coastal area and identifies crucial considerations for further adaptation planning and implementation of the SAPs.

As a first-generation adaptation planning exercise, including the need to consider the entire region's coastline with a focus on Council land and assets only, this assessment has been undertaken in a desktop form and is based upon publicly available information. New and changing information will always be forthcoming over the development of plans and adaptation processes and it is important to acknowledge gaps and identify opportunities for improvements in future process. This is addressed in Section 8.0 below.

The following sections identify how information has been gathered to inform the SAP programme development.

Cultural context

- Working in partnership, ensuring iwi and hapū are engaged to speak.
- Values, aspirations and guiding principles.
- Shared features, landscapes, places, assets and sites.

Community

- Values, use, and concerns, in terms of coastal areas, hazards and climate change.
- Aspirations and outcomes for coastal areas.
- Asked what people think of draft strategies, ideas and insights.

Ecology context

- Stewards for ecological resources on Council land and at the coast. Wider ecosystems values and services and the value they hold.
- Opportunities for nature-based solutions, for restoration and giving space for our coasts.
- How do we consider coastal retreat of ecosystems, coastal squeeze and narrowing taking a regional view?

Social and Policy

- National, regional and local applicable statute and policy direction.
- Coastal policy direction - coastal character, amenity and landscapes.
- Council land and assets support social outcomes - including connections, facilities, and networks that support community resilience.

5.1 Auckland Council assets and land

What do we mean when we say Auckland Council owned land and assets?

Auckland Council, as a unitary authority, has the responsibility to manage land and assets across the Auckland region. Different areas of the organisation manage different assets, including parks and community facilities, watercare services, waste solutions and closed landfills. In addition, Council-controlled organisations or CCOs are organisations in which the Council has the responsibility to appoint at least 50% of the board of directors or trustees. Auckland Council currently has five substantive CCOs (including Watercare Services, Auckland Transport, Eke Panuku and Tātaki Auckland Unlimited) and a number of legacy non-substantive CCOs. Noting CCO reforms are underway. Auckland Council also owns Port of Auckland (POAL) which is governed under the Port Companies Act 1988 and is not a CCO. This governance structure is identified in the diagram below:

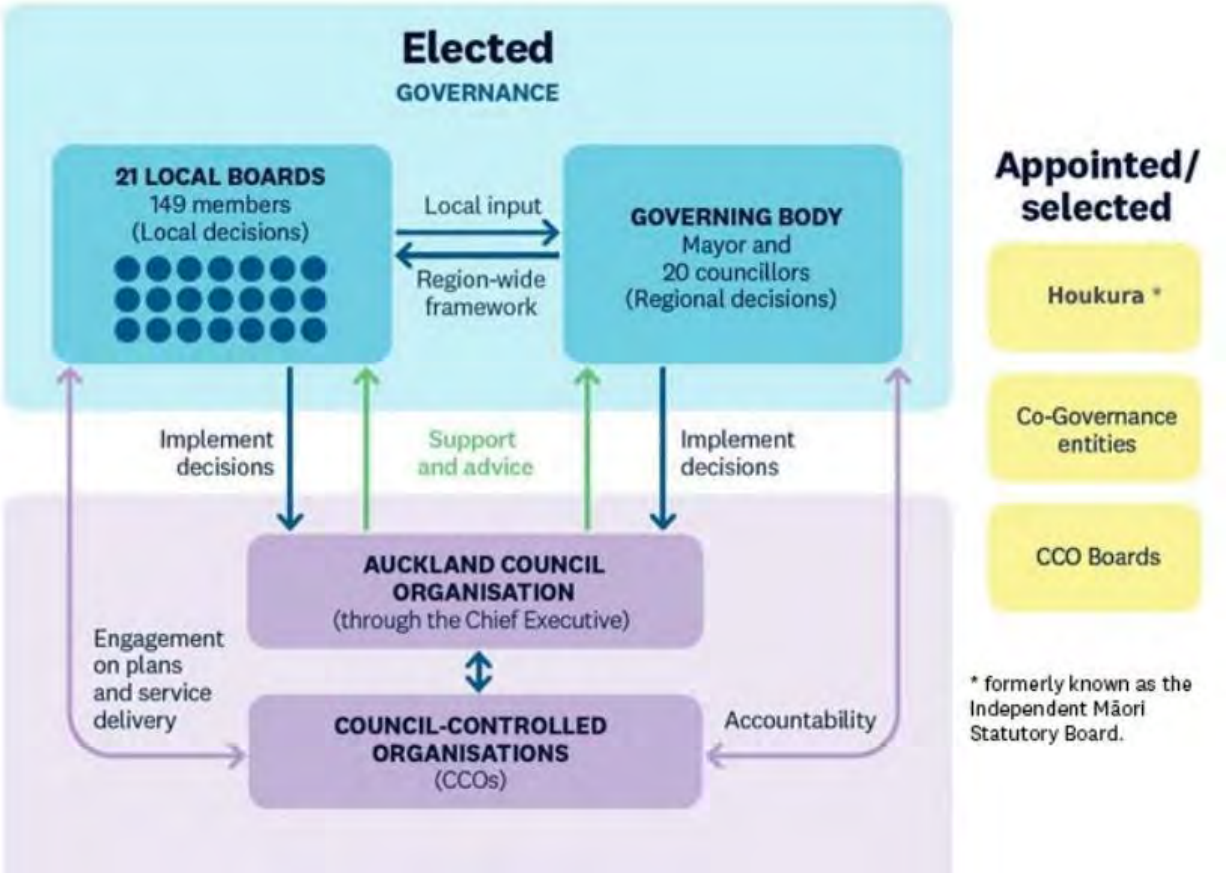


Figure 5-1: Auckland governance structure. Source Local Governance Statement 2025 https://www.aucklandcouncil.govt.nz/about-auckland-council/how-auckland-council-works/Documents/local-governance-statement.pdf

The SAP programme considers all Council land and assets, including those managed by different asset owners and managers, identified as within the coastal margin. Broadly these can be grouped as follows:

Council land and parks

- Regional parks[5]
- Local parks, which may be for different uses such as organised sport facilities like playing fields for recreational use (green spaces) or supporting a range of outcomes including ecological outcomes.
- Land held or owned by other assets owners/managers for a range of purposes. This may include land held by CCOs for the purpose of operating their infrastructure/assets.
- Many parks and park connections also include walkways, bridleways, cycleways and shared paths which provide important elements of a transport and recreational network.
- Land which is held under co-governance agreements (such as Tūpuna Maunga Authority and co-governed parks) is identified due to the interest and responsibility Auckland Council has for maintaining land and assets and supporting the outcomes identified for these areas. This is clearly identified and the governance arrangements acknowledged.

Water Infrastructure

- Stormwater infrastructure including pipes, stormwater management ponds, the management of stream channels and waterways. This may also include land held for drainage purposes.
- Potable (drinking) water infrastructure owned and/or operated by Watercare Services Limited as a current CCO. This can include pipes, storage facilities and pump stations.
- Wastewater networks owned and/or operated by Watercare Services Limited as a current CCO. This can also include pipes, storage facilities and pump stations. In many cases, these pipes are located underground, however in a few coastal locations, pipes are located above ground.

Facilities and structures

- This includes buildings (and associated structures) which are owned by Auckland Council.
- Across the Auckland region this can vary between large regional facilities like stadiums, Auckland Zoo, Wynyard Point, or be more local in scale such as local playground facilities, community halls, boat ramps and swimming pontoons.
- Importantly in a hazard management context, structures may also include coastal and flood protection structures such as seawalls, revetments, dykes (or stop banks) and management practices, e.g. sand nourishment and dune planting.
- Closed landfills are also included as a Council asset, noting they often provide a function both as a park area and have associated management considerations due to their past use.

[5] For further information on the parks visit https://www.aucklandcouncil.govt.nz/parks-recreation/Pages/search-index.aspx

Roads and access

- Roads and access ways can include roads of varying importance (or criticality) and scale; these may be sealed or metaled ('dirt'), they may have footpaths, shared paths or dedicated cycleways and can include parking areas.
- Road landholding in many cases includes road reserves and unformed or developed road ends, many of which end at the coast or provide access to the coast. In some cases, road reserve and parks areas may be difficult to distinguish between.
- Access also includes shared pathways, essential for commuters and recreational travellers alike.
- Busways which are owned and operated (or are of a shared responsibility) by Auckland Transport. Noting that there are in many cases shared interests with NZTA Waka Kotahi in relation to where State Highways and busways are integrated.
- Ferry and water-based transport infrastructure, including wharves, boat ramps, pontoons and other coastal structures. Transport assets in coastal areas may also be owned and managed by private companies or the Department of Conservation (DOC).
- Rail interests where Auckland Transport is responsible for delivering services and maintaining assets which support these services. This is often in collaboration with KiwiRail which is a Central Government agency.

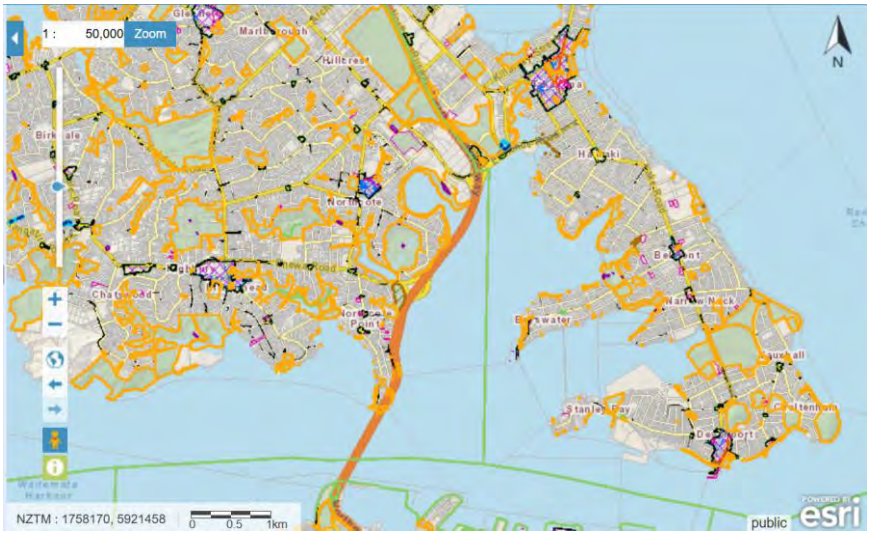
There are many other assets and infrastructure which are publicly owned by other entities and agencies, such as for power, road and rail, emergency services, public services including schools, healthcare facilities and prisons. These are beyond the scope of Auckland Council land and assets and are not identified as being subject to SAPs. For clarity, the Port of Auckland and Auckland International Airport are not Council-owned land or assets, nor are they CCOs.

How do we identify Council land and assets?

Our primary source to identify Council land and assets within the coastal margin is our geospatial mapping tool GeoMaps. This is supported by a comprehensive asset database which is used to locate land and assets across the region.

Examples of how this provides us with layers of information is included below. Much of this information is publicly accessible at Auckland Council's GeoMaps webpage/viewer. This can be accessed on the Council website.

Auckland Council GeoMaps showing parks areas (with orange outlines) and associated facilities and assets.

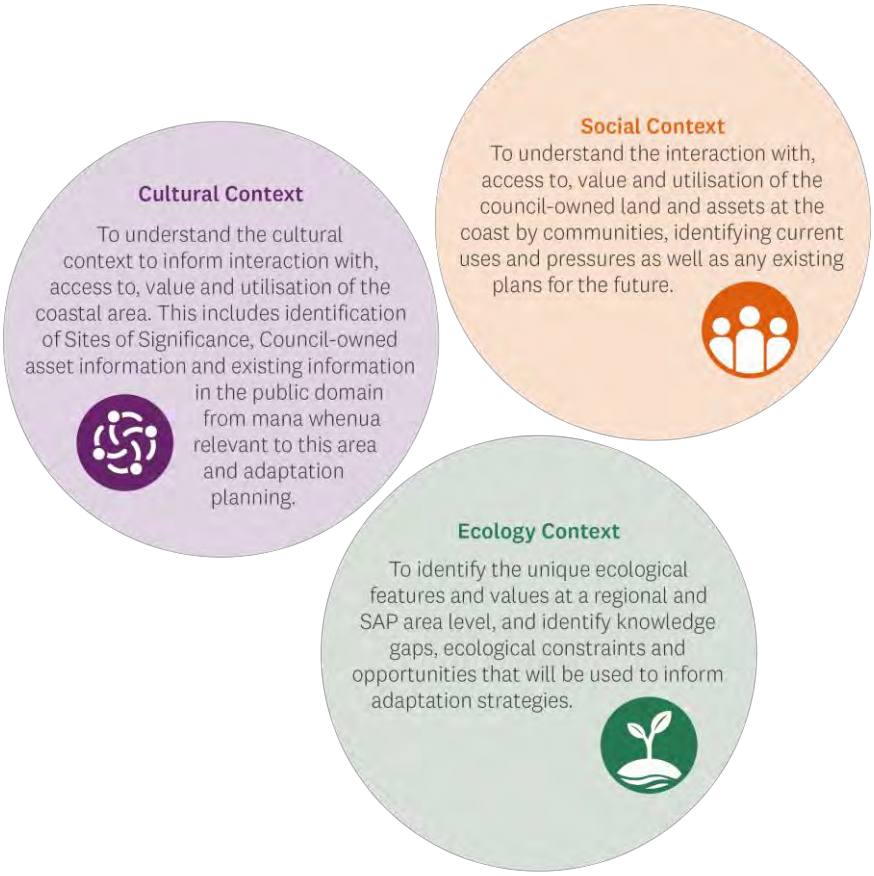


Auckland Council GeoMaps showing underground water services (red is wastewater, blue is potable water and green stormwater).

5.2 Cultural, social and ecological context

To support our understanding of the social, cultural and ecological context for each SAP area, a substantive amount of research and a comprehensive analysis of publicly available information was undertaken. This research and analysis lays the groundwork, information and evidence base for this and future coastal management and adaptation planning processes which may have a different scope (including private land).

Identification of the social (and policy), cultural and ecological context of each SAP area provides an excellent foundation for testing adaption strategies, as well as for engagement with iwi and communities to better determine what matters most to them. This is outlined in the diagram below and expanded on in the further sections.



What have we considered?

We identified relevant information, assessed its importance to the current scope of the SAP process, undertook targeted engagement with Council teams, then analysed the gathered information which was subsequently communicated in supporting reports.

We identified:

- All legislation and regulation at national, regional and local levels
- Policies and plans relevant to the SAP area
- Publicly published documents relevant to the SAP area
- Historic, existing and projected data and modelling assessments
- Visual representations of these sources, such as maps and presentations.

Key factors used to determine if a typical source would be included in the context of this report were:

- The general context of sources being relevant to the SAP area, and people and community within the area
- The significance of sources, in terms of the nature of the information, that is affecting and/or will be affecting the shoreline environment of each SAP area
- The quality and accuracy of the sources.

Analysis involved reviewing all collected sources and filtering those considered relevant and significant in the context of this report and for the development of the SAP. Targeted engagement included wider Council and CCO staff.

The outcome of this analysis and further engagement was structured to follow the three key themes of cultural, ecological and social, supported across all three volumes of the SAP reports by icons, images and graphics. This was to ensure consistency, and be concise in identifying relevant considerations for the use and implementation of these plans.

To gain a good understanding of cultural and community values, further engagement occurred as set out below.

5.3 Cultural

As an adaptation workstream within *Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan*, the SAPs seek to respect and acknowledge te ao Māori by giving effect to the Te Tirti o Waitangi, Kia Ora Tāmaki Makaurau and Te Ora ō Tāmaki Makaurau frameworks and recognising and providing for te ao Māori concepts, Read more at Attachment A.

From the programme's inception in 2021, engagement and collaboration with ngā iwi o Tāmaki Makaurau sought to establish in partnership with Mana Whenua, the creation and implementation of the SAP programme. The programme principles are intended to reflect those of the Te Ora ō Tāmaki Makaurau Wellbeing Framework under which there are three dimensions of wellbeing (Taiao / environment), Whenua / earth, Tāngata / people) that form a holistic approach These dimensions are discussed in greater detail at Attachment A and reflected in the following guidance principles developed for the SAP programme by the Auckland Council Mana Whenua Kaitiaki Forum:

Mana Whenua Kaitiaki Forum Principles for the Shoreline Adaptation Plan programme

- responsive to iwi management plans
- accept reversal of infrastructure to rectify hazard issues
- naturalise, let nature take its course
- look at emissions as well (if any)
- whenua concepts are written up and understood by all in plans
- protect koiora (biodiversity) and traditional mahinga kai (fish stocks, kaimoana)
- protect heritage where possible
- reconnect to ancestral shorelines.

Treaty settlement processes are ongoing, and it is important to recognise that there are unresolved claims and disputes between the Crown and iwi/hapū. This can result in iwi who have strong affiliation or whakapapa to an area not holding a Statutory Acknowledgement[6].

Working in partnership

To inform the development of each SAP, publicly available information, such as Iwi and Hapu management plans, were reviewed and iwi formally approached to engage. This resulted in the development of relationships and contributions from several iwi partners.

Adaptation planning is an ongoing process and engagement with iwi is essential and expected to continue to inform and guide the implementation of the SAP area plans and further adaptation planning actions. Engagement to date has includes hui, wānanga and hikoi with many of Tamaki Makaurau's iwi:

- Ngāi Tai ki Tāmaki
- Ngāti Manuhiri
- Ngāti Maru
- Ngāti Paoa Iwi Trust
- Ngāti Rehua
- Ngāti Tamaoho
- Ngāti Tamaterā
- Ngāti Te Ata Waiohua
- Ngāti Wai
- Ngāti Whanaunga
- Ngāti Whātua o Kaipara
- Ngāti Whātua Ōrākei
- Patukirikiri
- Waikato-Tainui
- Te Ākitai
- Te Ahiwaru
- Te Kawerau a Maki
- Te Rūnanga o Ngāti Whātua
- Te Uri o Hau

Aspirations, values and principles

The lands and waters that now comprise Tāmaki Makaurau Auckland have been occupied and accessed for over 1,000 years by tāngata whenua as the first inhabitants of Tāmaki Makaurau and form the ecological and cultural fabric of the region. Te Ao Māori calls for the protection and preservation of whole living systems, and for maintenance, sustainability and regeneration of the whakapapa relationships that enable the wellbeing of these systems. Our coastal environment plays an important part of this system, with coastal sites and places of significance to iwi having both tangible and intangible cultural values in association with historic events, occupation and cultural activities. The historical and customary significance of these sites and features imbues mana whenua with inter-generational kaitiakitanga responsibilities to protect the mauri and wairua of these landscapes and tāonga, ensuring the continued integrity, mana, and well-being of iwi/hapū for generations to come.

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6 https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/auckland-plan/about-the-auckland-plan/Pages/iwi-tamaki-makaurau.aspx

Auckland Council has been working with the representatives of each iwi/ representative group to provide cultural statements and cultural commentary to help guide the foundation of adaptation planning at a SAP-area level (reflected in Volume 2) and adaptation approaches set out within Volume 3 of each SAP.

Auckland Council acknowledges that iwi and hapū involvement is critical to the success of the SAP programme. Engagement with the above local iwi groups will continue throughout the development and implementation of the SAP Programme, ensuring iwi and hapū have been engaged to speak to and identify:

- Their cultural values and associations of an area
- Any impacts to their cultural values and associations
- Any necessary mitigation and management of any impacts and effects on cultural values and associations.

The values and associations shared have enabled more detailed consideration of the strategies included in Volume 3 of the SAPs. Noting the need to continue to ensure that engagement takes place in all aspects of implementation.

What we have identified

To inform engagement with mana whenua, initial research has been undertaken using publicly available information, including that which is identified on the Auckland Unitary Plan: Operative in Part (AUP:OP) maps, within the Cultural Heritage Inventory, legacy parks planning documents and research from other publicly available iwi planning documents.

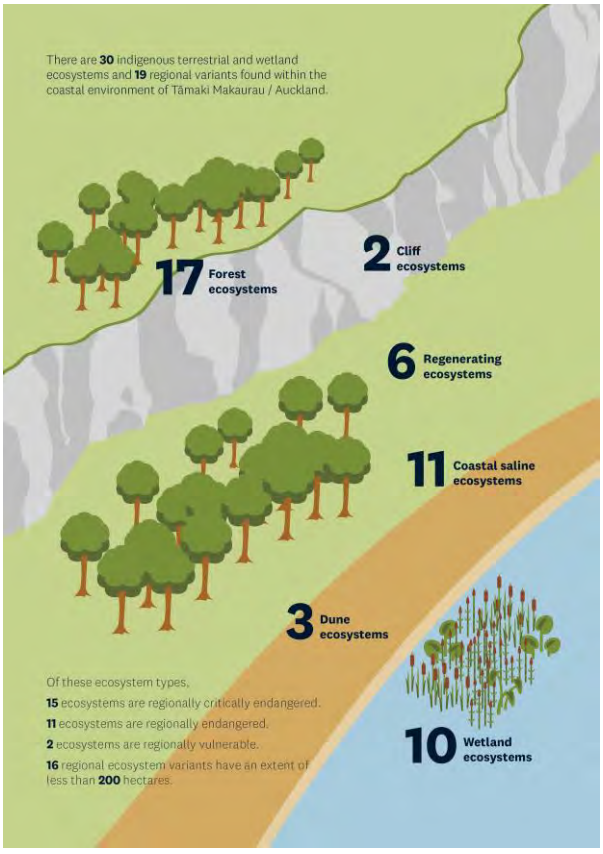
With iwi's agreement, some information identified from publicly accessible sources and shared through engagement is included in the SAPs. This may be presented as values, aspirations and guiding principles for coastal management and adaptation across their rohe (generally included in Volume 2 of the SAP reports) and/or it may be identified within Volume 3 within infographics and text. In this instance icons may also be used as identified below:

- Mana Whenua Marae and significant community marae may be identified and, in some cases, may be located on Council reserve landholdings.
- Places/site of significance include those publicly identified in the Auckland Unitary Plan or where the location and nature of these sites has been confirmed as appropriate to include by iwi.
- Landscapes and features such as Pā sites, portages and important connections to place have been identified where this is publicly available or identified by iwi for inclusion in the plans.

5.4 Ecology

Auckland covers a land area of approximately 5,000 km^2, making up less than 2% of New Zealand's total land mass. Despite its comparatively small size, Auckland contributes significantly to New Zealand's biodiversity, encompassing 12 ecological districts and a diverse range of indigenous ecosystems, species, and unique landforms.

Auckland's 3,200 km coastline encompasses a diverse range of environments, ranging from major harbours, rugged west coast beaches, offshore islands, coastal forests, and complex estuarine systems. However, when it comes to indigenous biodiversity in the Tāmaki Makaurau / Auckland region, it is under severe pressure. Only 25% of the original extent of indigenous ecosystems remain in Tāmaki Makaurau, the smallest proportion for any region in the country. Almost 40% of Tāmaki Makaurau's indigenous ecosystem types are identified as Critically Endangered.



The variable coastal environment plays an important role in supporting a wide variety of unique species, many of which are threatened or endemic to the region. Coastal ecosystems are strongly influenced by a combination of natural physical processes and extensive human coastal development. These ecosystems and their species are particularly vulnerable to anthropogenic climate change due to their exposure to storm events, salt deposition, and rising sea levels (Auckland Council, 2019). This is explored further below.

Many of Auckland Council's landholdings, in the form of parks, reserves, roads and other lands, include coastal ecosystems and ecological values and special features. These are critical considerations for adaptation planning.

Opportunities to support vulnerable indigenous biodiversity at the coast

Vulnerability, in this context, is the degree to which a species or the natural environment is susceptible to, or unable to cope with, the adverse impacts of climate change, and is a function of exposure, sensitivity and adaptive capacity (IPCC 2022; Xu et al., 2020; Auckland Council, 2019).

Understanding the most vulnerable ecological features and values of Auckland is important in understanding how to approach SAP planning. Vulnerability is influenced by the exposure, sensitivity and adaptive capacity of an ecosystem or species (see Table 5-1 below).

Table 5-1 Vulnerable indigenous biodiversity

Function	Definition
Exposure	• As mentioned, SAPs are a first step for a regionally consistent approach to adapting to our dynamic coastal areas and the future challenges of climate change and sea-level rise. Adaptation planning is a journey which will take decades to release and will need to remain adaptive to changing governance, community and economic factors as well as respond to our changing environmental disadvantage due to the location or position of a species or system at risk.
Sensitivity	• The ability of a species or system to meet a climatic threat and receive a possible impact due to the occurrence of an adverse weather event or climate change stimuli.
Adaptive capacity	• The potential, ability, or capability of a system to adapt to, cope with, and recover from the effects of an adverse weather event or climate change stimuli.

Traditionally, popular coastal protection options consisted of hard, engineered solutions such as seawalls, groynes and rock revetments in front of coastal infrastructure and assets. While these structures provide localised protection, they can often impact on surrounding ecosystems causing negative changes to morphology, hydrodynamics, sediment and nutrient budgets. Combined with the impacts of sea-level rise, these impacts are identified or described as 'coastal squeeze' and 'coastal narrowing' as a result of the observed changes to coastal environments due to installing engineering solutions which keep the coastline in place. These are illustrated in Figure 5-2 below.

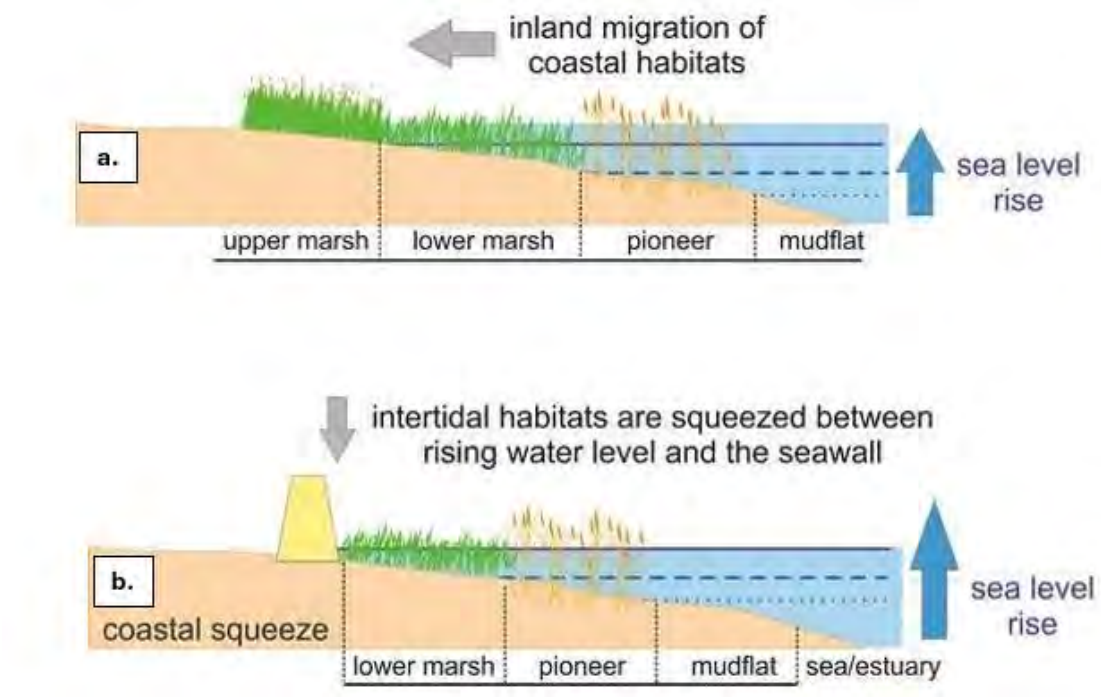


Figure 5-2: Natural habitats tend to migrate inland as a response to rising sea levels, however hard engineering structures (i.e. seawalls) will invariably fix the landward limit of intertidal areas. The loss of coastal habitats due to rising sea levels in front of artificially fixed shorelines is known as coastal squeeze (adapted from Luciana S. Esteves, 2016).

Providing space for our coasts to adapt and move in response to sea-level rise and increased impacts of coastal hazards is key to adaptive planning. The use of nature-based solutions (or ecological engineering) provides for the protection of coastal communities, infrastructure and assets, in a manner which supports coastal ecosystems. This often has co-benefits in preserving natural coastal values and enjoyment of the marine areas which are highly valued for social and economic considerations. Figure 5-3 below provides an example of an eco-engineering approach to coastal protection providing for intertidal habitat in an urbanised area of Manukau Harbour. For further examples of nature-based solutions and ecological enhancement in the Auckland region refer to Auckland Council (2023). *Shoreline Adaptation Plans: Literature review. The use of nature-based solutions and ecological enhancement as a consideration for Shoreline Adaptation in Auckland Tāmaki Makaurau*.

Figure 5-3: An eco- engineered hybrid approach to coastal protection along St Anne's Crescent in the Pahurehure Inlet. This case study featured salt marsh restoration, with the objective of providing weather protection to the sloping bank. Planted rushes landward of the bund aided in the protection to the bank and the provision of additional visual aesthetic values and functionality. Left. St Annes Crescent in 1993 (T+T, 2009). Right. St. Anne's Crescent salt marsh restoration. Note the planted vegetation between the foreshore and the rocky outcrops.

Understanding how climate change might impact localised ecology will help pinpoint and map opportunities for supporting nature-based solutions and ecological corridors in conjunction with managing risk to Auckland Council-owned land and assets.

What we have identified and how you can navigate it

The identification of ecological elements relevant to adaptation planning at both a regional and local scale is supported by the following National and regional plans and strategies. These documents provide further information on the key principles, policy considerations and outcomes sought for the Auckland region:

- National Climate Change Risk Assessment and National Adaptation Plan
- Auckland Council 'Climate Change Risks in Auckland' and Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan.

These documents set out the key climate risks, sensitivity and adaptative capacity for specific coastal ecosystems and species, that are particularly at risk from coastal hazards, e.g. sea-level rise, storm surge and coastal inundation as well as coastal erosion.

At a more granular scale, regional and local regulatory, policy and strategic plans and policies identify key features, systems and aspirations. These include but are not limited to:

- The Coastal Management Framework for the Auckland Region 2017
- Auckland Unitary Plan (including the identification of Significant Ecological Areas) Auckland Council's Biodiversity Strategy
- Auckland's Urban Ngahere (Forest) Strategy
- Auckland Council's Water Strategy
- Local Board Plans and the Auckland Council's Long-Term Plan.

We also identify Council and community investment in local areas through consideration of the Biodiversity Focus Area Programme, Regional and Local Parks Projects and Community-led conservation programmes. This came from engagement with relevant Auckland Council teams, publicly available reports and geospatial datasets and through iwi and community engagement.

When developing each of the 20 SAPs, consideration of the physical environment and aspirations were identified. The infographic groupings below reflect what we have identified, what we've heard and understand about what Council, iwi and communities value in relation to the ecological context:

- Freshwater environments which are in proximity to the coast or may be impacted by options for managing risk to Council-owned land and assets in proximity to coastal areas.
- This catchment to coast consideration has been widely supported by mana whenua and community feedback.

- Marine environmental features have been identified including features such as chenier-type shellbanks, mangrove forest and scrub ecosystems and key habitats for our coastal birds.
- This is valuable to marine ecosystems and species but also social and cultural uses and access to marine areas, resources and recreational activities within these environments (i.e. fishing and gathering of kaimoana).

- Terrestrial environments may include the habitat and vegetation across coastal cliff, forest and dune and sandy coast ecosystems, wetlands and the species which inhabit these areas.

- Policy environment which includes areas identified through statutory policy such as Significant Ecological Areas, Marine Protected Areas and areas with key Council investment such as Biodiversity Focus Areas.

5.5 Social and Policy

Auckland's coastal environment is a fundamental part of the region's identity, with high natural, social and recreational value. Coastal activities including visiting the beach; accessing the water and coastal walks are hugely popular; and numerous Council reserves and accessways structures support this interaction with the coastal environment.

In addition to our residents, we know Auckland's coastline is frequented by tourists, both from within the region and beyond, with Auckland's 2022 visitor insights survey indicating that beaches and the waterfront are key attractions in each subregion. Harbours, and key coastal areas such as the Hauraki Gulf provide significant recreational opportunities, fisheries and cruise and water-based tourism.

What do we already know?

When we consider the need for access to and enjoyment of our coastal areas, we need to take a regionally equitable approach which supports all Auckland communities and coastal users. To ensure that both the local view and that of wider coastal users is considered, we consider our current knowledge and what our communities are telling us about the role Council land and assets play in supporting local community outcomes and the wider connection to coastal areas.

We have considered local planning tools (both statutory and non-statutory) such as the Auckland Unitary Plan, local and regional parks plans, Local Board plans and other local area planning tools which support our understanding of how areas are valued and used. This also assists us to identify and clarify shared values around coastal character, amenity and landscapes and the recreational and wellbeing outcomes that coastal areas support.

Statutory and policy context

The national regulatory context is constantly evolving in relation to land use management (under the RMA) and adaptation planning and financing. There are several key pieces of legislation which are relevant to the development of the SAPs, some of which are identified in Figure 5-4 below.

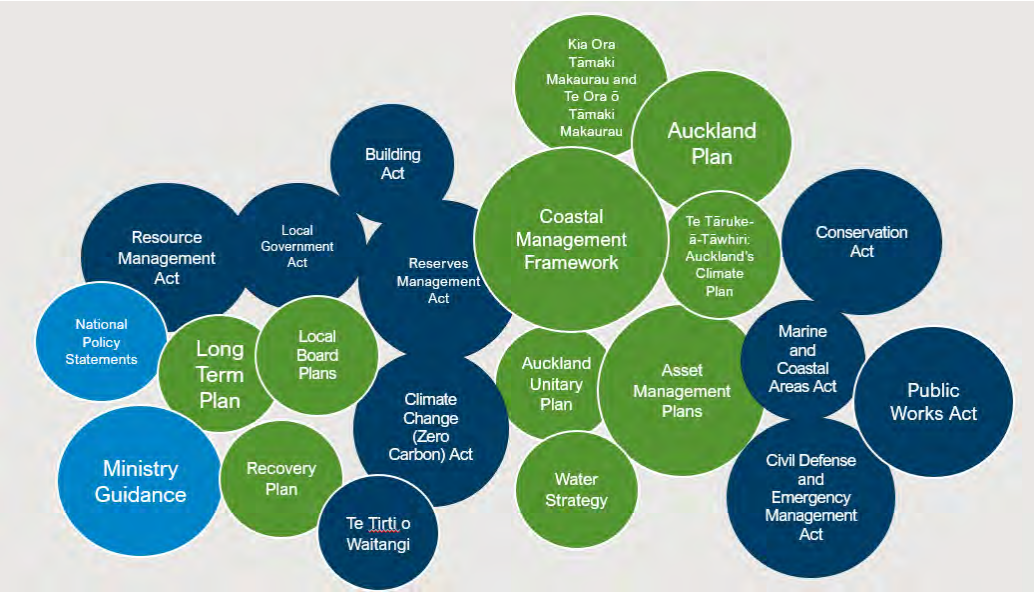


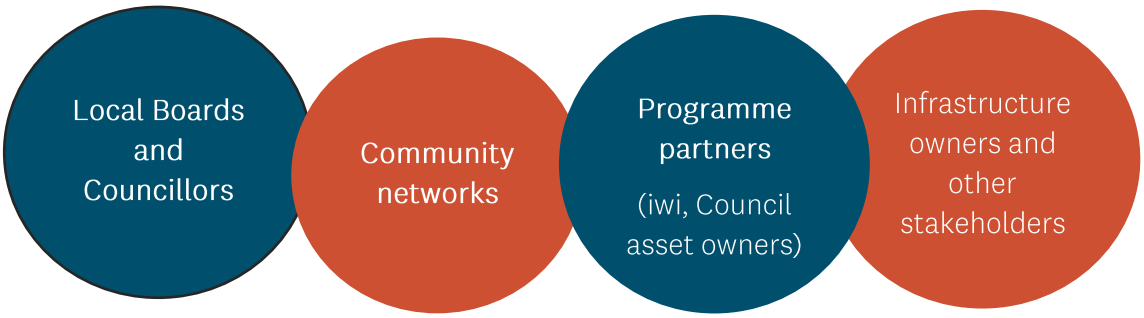
Figure 5-4: Key legislation influencing SAP development

While the RMA is a key piece of legislation for environmental management, successive Governments have been advancing significant resource management reforms and identified the need for further central government direction in relation to adaption. Review of the functions and responsibilities in relation to local government, local democracy and governance have also been signalled at a Central Government level. Regulatory and future development of regulatory tools are explored in detail in several contemporary publications including:

- NZ Parliament Finance and Expenditure Committee- Climate adaptation inquiry *https://www.parliament.nz/en/pb/sc/committees-press-releases/climate-adaptation-inquiry-completed/*
- Ministry for the Environment Coastal Hazards and Climate Change Guidance *https://environment.govt.nz/publications/coastal-hazards-and-climate-change-guidance/*
- MfE direction on Adaptation framework: *https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/adapting-to-climate-change/adaptation-framework/#:~:text=The%20adaptation%20framework%20is%20focused,the%20Government's%20RMA%20reform%20package*
- Environmental Defence Society Climate Change Adaptation project: *https://eds.org.nz/our-work/policy/projects/climate-change-adaptation/*.

What have we heard?

In the MfE Coastal *Hazards and Climate Change: Guidance for local government*, the term 'engagement' is used to describe an interaction or series of interactions between decision-makers, local government iwi/hapū, the community, and stakeholders. Within each SAP area, engagement has taken place with:



The purpose of community engagement throughout the SAP development process is to identify how communities use and value their coastal areas including contemporary interests, issues and aspirations regarding their interaction, and use of coastal areas. This assists with the development of broad community objectives which reflect shared contemporary outcomes or aspirations sought by each community for their coastal areas. These objectives, alongside specialist advice, asset-owners guidance, iwi feedback environmental and policy considerations, can then be utilised to inform the selection of adaptation strategies. In addition, community engagement provides opportunity to:

- Identify risk perceptions and experiences held by communities in relation to coastal change and coastal hazards
- Share information on hazards, risk and climate change and the potential impacts these may have over time. This can assist in educating and upskilling communities about coastal hazard risk, as well as refining signals triggers and thresholds through implementation.

- Facilitate community discourse on adaptive planning, the role of different values and the consideration of options to manage risk such as ***protect, adapt or retreat*** from areas of coastal risk.
- Provide unit or area-specific feedback on the use of coastal assets and land to inform adaption strategy selection and the inclusion of advice notes which will assist in informing asset owners of key considerations for future assets management planning and development.

Community engagement across the SAP programme to date has included:

- In-person community engagement events across each SAP area
- Engagement with Local Boards within each SAP area to inform members of programme updates and upcoming SAPs in their area, then seeking Board endorsement of final plans
- Online events (webinars, drop-in workshops, and clinics/ forums) with local communities
- Community reference groups
- Digital Engagement via 'AK Have Your Say' and 'Social Pinpoint'.

How is this reflected in the shoreline adaptation plan reports?

We defined several key categories to reflect what we identified in relation to the social and policy context. It is important to note that not every community asset and use in every location will be listed. This provides a starting point, a snapshot in time, which informs a wider shared view of 'what matters most' to the wider community, with a focus on Council land and assets. What matters most to both communities and each individual will vary wildly not only between people, but also over time.

Policy

- Regional and local plans, policies and documents, applicable to how land is used and managed, outcomes sought, aspirations or key uses and values.
- While we consider uses and access arrangements, we **do not** consider site-specific legal instruments which may be applicable to specific sites or parcels of land.

Community use

- Key community uses within a SAP area.
- Key community initiatives within Council-owned or managed land holdings.

Community buildings / assets

- Community buildings and assets located within or on Council-owned land (such as clubs or equipment storage).
- Community uses, leases and assets which support interaction with Council land and assets.
- Community uses which include assets.

Emergency services / facilities

- Emergency services locations (fire, ambulance, police).
- Facilities which support marine rescue, coastguard, surf lifesaving clubs and assets.
- Halls, centres or facilities which are identified by the community in supporting resilience and emergency response and support.

Community uses/ values

- How communities use and interact with coastal areas and Council-owned land and assets in these locations.
- What communities value most about the coast; what it means to them.

Community cultural values / comments

- Community views on the cultural values associated with coastal areas.

Community values of ecosystems

- How communities value, use and support the maintenance and restoration of ecosystems at the coast.
- Value, aspirations and experience of ecological values, species and habitats at the coast.

Community experience of hazards / concerns

- How communities have experienced coastal hazards.
- What their perception and experience of the impact of coastal hazards has been.
- Concerns, comments or opportunities related to climate change and sea-level rise.
- An understanding of how coastal hazard impacts may have impacted communities use of coastal areas (and the uses asset located there).

Community values and aspirations

- The values and aspirations communities have for coastal areas. This may include recreational, cultural, ecological or social outcomes.

Community suggestions for management

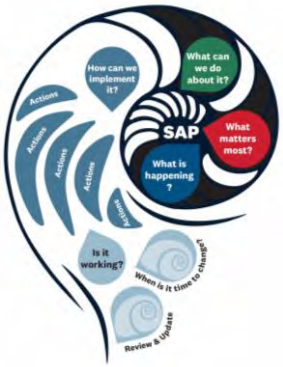
- Communities were asked for views on DRAFT adaptation strategies through the consultation process. Agreement or disagreement with proposed strategies was recorded and communities were asked for their views on the management of risk from coastal hazards and climate change.

Community objectives

We asked communities what they value, use and are concerned about in terms of coastal areas, hazards and climate change. This translated across often diverse coastal areas to key themes and aspirational outcomes that communities share for their coast.

Having a shared view on ‘what does good look like’ is an important tool to evaluate adaptation options. To enable us to do this at an overall SAP level, we developed high-level community objectives, or outcome statements for coastal areas based on the themed feedback provided through engagement processes. These are included in Volume 2 for each SAP area.

6 What can we do about it?



The focus for the SAP programme is Council's land and assets. To form a regional picture of what the 'risk' to land and assets are, we needed to set a foundation and some parameters for what sort of change we might consider.

First, we assessed the scale of change our plans need to address. In line with national policy and guidance, we adopted a minimum planning timeframe of 100 years. Taking a precautionary approach, this means we consider a sea-level rise of over 1 m when looking ahead to the year 2130 and beyond.

The degree to which an area is impacted by changing sea levels and coastal hazards will depend on what we have located in these areas and the nature of the exposure. To consider change in a consistent manner across the Auckland region, we developed three increasing scenarios for change which use our best available regional information of hazard and susceptibility for coastal inundation and coastal erosion and instability. Thus, we consider sea-level rise and coastal hazards consistently across our 3,200 km of coastal areas. We call these our 'scenarios for change' and they include:

- Low climate change scenario (present day sea levels and up to 0.5 m of sea-level rise)
- Moderate climate change scenario (0.5 up to 1 m of sea level rise)
- High climate change scenario (1 m+ of sea-level rise).

Secondly, we can build a regionally consistent picture of the exposure of identified land areas, assets and facilities to these mapped hazard areas. This is our regional risk assessment which provides a quantitative (measurable) regional picture of the risk to assets across the different climate scenarios, considering the 100-year timeframe.

Now we have an idea of **what is happening** and what '**matters most**' with a focus on Council land and assets we need to consider:

What scale of change should the plans consider (at least 100 years)

AND

How do we assess risk and **develop a regionally consistent 'baseline'** so we can take a regionally equitable step toward adaption and sustainable coastal management.

Shoreline Adaptation Plans scenarios for change

The purpose of the Shoreline Adaptation Programme is to identify how Auckland Council-owned land, assets and infrastructure can be managed to adapt to the impacts of coastal hazards and climate change over the next 100 years. Different responses will be needed over time for different parts of the coast depending on levels of risk, exposure, and the types of assets present in each area.

Making decisions about larger scale infrastructure and assets which may be in place for many decades or where we are facing a change in land use to accommodate more people and their

property, in a certain location, these hazards remain relevant consideration for future development strategic planning[7].

For the SAPs, the following scenarios are used to evaluate how exposure to coastal inundation, erosion and instability and sea-level rise may impact coastal land and assets. This is explained in Table 6-1 and involves considering:

- How might mean high water spring (the high tide line) move landward with sea-level rise? What might this look like on a calm day with no coastal storminess?
- What impact could a coastal storm event have if a storm occurred? The storm event we consider is one that has a 1% chance of happening in any given year. How would the impact and what is exposed change for such a storm event with sea-level rise?
- How might our coastline be impacted by coastal erosion processes and be susceptible to instability? How would this change if the tide came higher up our beaches or coastal cliffs if we consider sea-level rise in relation to these processes?
- What do we need to be aware of in terms of how these coastal processes interact with our catchments? How do our rivers, flow paths and flood plains discharge to the coast? If we have catchment flooding and coastal storminess, what area and assets could be exposed to these hazards?

[7] Auckland's Future Development Strategy is Auckland's long-term approach to growth and development. It sets out how Auckland will grow and change over the next 30 years https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/auckland-plan/development-strategy/Pages/default.aspx

Table 6-1: Schematic overview of the elements considered for the low, moderate and high climate change scenario across the three coastal hazards considered and sea-level rise.

	 Sea Level Rise	 Coastal Inundation	 Coastal Erosion	 Catchment flooding
Low climate change	• Present day (relative) sea level • Up to 0.5 m	• 1% AEP storm surge event	• Erosion and instability susceptibility line '2050' • (RCP 4.5) • includes consideration of 0.28 m of sea-level rise)	1% AEP rain fall event + climate change projections for rainfall
Moderate climate change	• 0.5 m • Up to 1 m	• 1% AEP storm surge event plus 0.5 m of sea-level rise	• Erosion and instability susceptibility line '2080 RCP 4.5 and 8.5' • Includes consideration of 0.55 m of sea-level rise	
High climate change	• 1.0 m • Up to 2 m	• 1% AEP storm surge event plus 1.0 m, 1.5 and 2 m of sea-level rise	• ASCIE 2130 (RCP8.5 and 8.5H+) • Includes consideration of 1.18 m and up to 1.52 m of sea-level rise	

Assessing risk to Council land and assets

A coastal hazard risk assessment was undertaken by Tonkin & Taylor to support the development of the SAP reports[8]. This looked at how the risk to Auckland Council-owned land and assets, from coastal hazards, is changing over time due to climate change. The risk assessment process involves assessment of the exposure of land and assets to coastal inundation and coastal erosion susceptibility, including the impacts of climate change.

[8] Manukau Harbour East Shoreline Adaption Plan: Risk Assessment Technical Report, January 2024, Tonkin and Taylor.

Risk assessment framework

The conceptual framework determines the risk based on likelihood, vulnerability and consequence and aggregating the results to provide an outcome at a unit level. The assessment does not prioritise based on the different views, risk tolerances and perspectives from a community, mana whenua or asset owner perspective.

Elements at risk (Council land and assets)

Elements at risk were determined to understand what is at stake: what we value and want to protect. They included Council-owned land and assets, such as reserve areas, coastal defence structures, facilities, roads, and water infrastructure as available from Council's GIS database.

Published geospatial information of sites and areas of cultural heritage and environmental significance were also included. However, it was recognised that these last two items can only provide an indication of exposure of *known* elements. Acknowledgeing that there are likely to be elements, particularly of archaeological/spiritual values, which are unknown or cannot be quantified. Therefore this risk assessment methdology only provides a preliminary indication of the quantum of these items exposed.

Risk assessment

The risk assessment methodology is summarised in Figure 6-1 and determines risk as being the product of hazard exposure (the extent of the asset that is affected by the hazard), vulnerability (the propensity of the asset to be adversely affected) and consequences (the outcome of an event affecting the asset) of these combined likelihood on the specific element at risk.

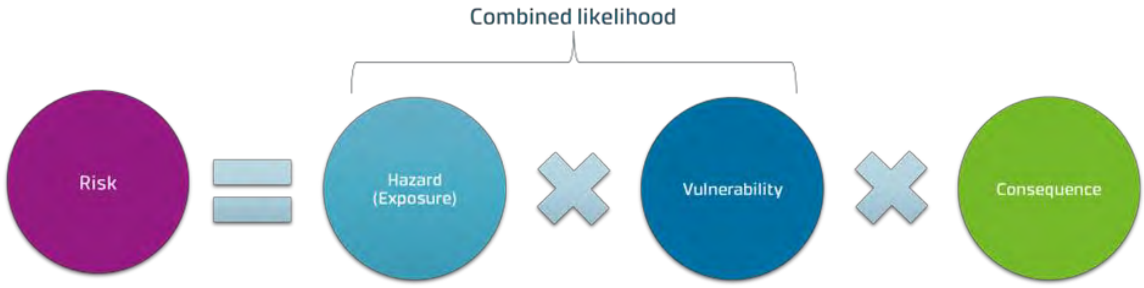


Figure 6-1: Risk analysis methodology

To identify the potential impact of coastal hazards on Council-owned land and assets, a risk assessment was developed and undertaken, which:

- Measured exposure of Council-owned land and assets in coastal areas to two natural hazards: coastal inundation and coastal erosion susceptibility, including climate change
- Considered the changing likelihood of such events across different timescales: short (5-20 years), medium (20-60 years), and long-term (60-100+ years).

A qualitative assessment of element vulnerability and potential consequence to the element, across a range of exposure bands was undertaken.

Hazard likelihood

Coastal erosion and coastal inundation hazard information was taken from previous, peer-reviewed technical reports and studies whose outputs were available as map overlays in Auckland Council's GeoMaps. While climate change scenarios and supporting science is continually evolving, the datasets identified were considered suitable to provide an understanding of the relative risk in the present day and the changing risk over time due to climate change.

Rainfall-induced flooding was not considered as the mapping at a regional scale was not consistent and would not provide a reliable baseline for comparative assessments. However, it is noted that the coastal inundation mapping largely corresponds to areas of identified rainfall induced flooding in proximity to the coast. As such, consideration of coastal hazards was seen as being acceptable for the regional assessment, with rainfall further considered at the individual SAP level assessments.

Three scenarios (which were assigned timeframes) were developed representing the short- (around 20 years), medium- (20 to 60 years) and long-term (60 to 100+ years). This approach represented the expectation that a rare event in the short-term could become possible or even almost-certain in the medium- and long-term.

Exposure and risk have been assessed and aggregated into six groupings at a 'unit scale'. This was then grouped by assets to enable a view of risk to each grouping and the ability to consider the change in risk over time. A summary of the resulting assessment, at a unit scale, at Volume 3 for each respective SAP Unit area.

Table 6-2: Six groupings and descriptions of assets

Grouping	Description
Auckland Council-owned land	• Park and reserve land area
Auckland Council community facilities	• Carparks, accessways, paths and tracks, ramps, seawalls, wharves and jetties, community buildings and park amenities
Transport infrastructure	• Roads, bridges, ferry terminals and train stations
Water assets and infrastructure	• Publicly-owned three waters infrastructure
Environmental	• Areas of ecological significance (SEA) based on the AUP
Culture and heritage	• Cultural heritage points, Mana Whenua areas of significance and sites of historical heritage significance

To explore the need for changing adaptation strategies over various climate scenarios, the risk for the present-day conditions and with climate change effects (including sea-level rise) was assessed.

The risk assessment is not intended to comprehensively cover all assets and values. It is a first pass assessment (in alignment with that recommended by MfE), and has been conducted to provide a comparative assessment of risk between SAP areas and units around the region. This enables future, further analysis of potential varying risk levels between areas of the Auckland region.

The resulting risk scores focus specifically on the particular asset or land area in relation to the particular hazard, agnostic to its value or relationship with the surrounding environment. It also does not consider any interdependences between assets or the wider consequence of damage to a particular element at risk. This means that the results of this assessment provide a baseline level of

risk that can then be considered alongside asset manager or stakeholder expertise of criticality or risk tolerance to better identify the preferred management approach.

What are the strategies?

By considering how the exposure of areas and assets to multiple hazards can change when considering the different climate scenarios, we can begin to consider what change might look like and identify the need for actions to manage risk, adapt uses and consider how and when we might need to change our approach over time with increasing sea levels.

When considering coastal management strategies and adaptation approaches, there are several key areas of alignment in terms of how we manage our coasts and manage risk to what matters to us. In coastal management we typically use the terms:

- Advance the line: This strategy involves extending the land area seaward.
- Managed retreat (or realignment): This involves allowing the shoreline to move inland.
- Coastal protection: This encompasses a variety of hard (e.g. seawalls, groynes) and soft (e.g. beach nourishment, dune stabilization) engineering techniques to defend against erosion and flooding.
- Avoidance: This strategy involves setting back new development or land use from the shoreline.

In adaptation language, we use the following terminology:

- Protect: Involves using engineering measures such as seawalls, levees, and flood defences to protect infrastructure and communities from hazards such as floods and erosion.
- Accommodate: Adjusting lifestyles, practices, and infrastructure to adapt to changing conditions, such as drought or rising sea levels. This is a 'living with change' approach and could include flexible infrastructure that can be easily modified.
- Retreat: Relocating uses and assets from areas that are impacted by hazards. This is ideally a planned process as opposed to a reactive response.
- Avoid: This strategy involves preventing development or land use in areas that are at highly exposed to hazards.

Auckland's SAPs have the challenge of holistically considering all 3,200 km of coast and diverse coastal environments. As a result, we combined some elements of the above approaches to give us bespoke adaptation strategies which enable us to maintain a regionally consistent approach and provide holistic direction to different asset owners.

Because the strategies need to consider multiple hazards and are applicable to multiple assets, they need to remain flexible and principle based. Some further explanation is provided below which illustrates what this may look like in practice. Implementation work with each SAP area plan user and asset owners will guide further guidance; see also Section 7.0 below for further discussion on implementation.

What are the strategies what do they mean?

Maintain

Existing assets and uses are maintained within their general location. Consider design and location to manage risks.

Protect

The coastal edge and/or uses are protected. The coast is often fixed in location and defences (preferably nature-based) are used to achieve this.

No action

No action is required to reduce or manage risk.

Limited or no Council assets are exposed to coastal hazards.

Adaptation priority area

Action is required to manage risk to Council land and assets from coastal hazards and catchment flooding. The values and nature of the coastal area requires further adaptation planning and discussion to confirm the actions required.

What might this look like? Examples of what is considered.

No Action

- Natural coastal processes are allowed to continue with no active management or interventions to protect or maintain assets and infrastructure from climate related risks.
- Includes no investment in the provision or maintenance of any hazard protection structures associated with coastal hazards and flood protection (this does not apply to the management of land stability or subsidence or other hazard risk management).
- This strategy is identified for areas of the coastline where Auckland Council-owned assets are not exposed/vulnerable to identified coastal hazards and catchment flooding within a particular time frame.
- This approach is the preferred strategy where Auckland Council assets are appropriately located out of the hazard zone, and are not at immediate risk from those hazards, within the relevant time scale.

Maintain

- Maintaining and making safe, assets, uses and infrastructure that are at risk.
- Works may support localised realignment of some uses within their local area.
- Does not support a fixed coastline.

Protect

- Defense of the coastal edge may be through nature-based options (e.g. beach nourishment) or engineered hard structures (e.g. sea walls) to protect assets, uses and values from coastal erosion, or to reduce inundation exposure.
- Nature-based options are the preferred method where possible, but in most cases, engineered hard structures would be required.
- An identified use or service is maintained within its existing location, e.g. a road is maintained in a fixed location or park land uses are maintained in an existing location.
- This approach could result in losing some intertidal areas or beach space due to preventing a landward realignment of the coast in response to coastal processes and sea-level rise.
- When assets, uses and/or values are at risk and cannot be easily relocated.
- This approach may not be feasible in high hazard exposure zones.

- Assets and land uses are relocated or realigned from hazard-prone areas to reduce risk to assets and maintain identified values (ecological, cultural, recreational etc).
- Relocation is planned and undertaken proactively over time.
- Planning to retreat or relocate assets and land uses are responsive to community, cultural and ecological opportunities needs and aspirations.
- Supports opportunity for nature-based solutions, and maintenance of coastal values.

How do we choose a strategy?

A Decision-Making Framework (DMF) has been developed from the early pilots of the SAP programme. This provides a framework through which to consistently assess which adaptation strategy is appropriate at each point in time for each stretch of coastline depending on their relevant hazards.

The DMF has been used to support selection of strategies for each unit and their coastal stretches over the low, moderate and high climate change scenarios, recognising that adaptation strategies will need to change over time to reflect escalating risks, changing environments and infrastructure needs.

The purpose of the DMF is:

- To provide a transparent, repeatable way to make decisions
- To document which assets were considered in decision-making
- To provide a mechanism for cultural, ecological or social contextual considerations to be identified for consideration in selecting a risk management approach for Council land and assets.

The detail included in the DMF lays the groundwork on which to build and reflects the first pass at coastal adaptation planning. This will inform future conversations, options assessment, investment and prioritisation in the management of risk for Council land and assets.

The SAP Series 1 reports are strategic documents which set a high-level direction for shoreline management and the assets within those areas. It is important to note there are limitations to the scope of these plans. Key matters are identified below and detailed in the table below.

What is included and not included in decision-making process	
Included	**Not included**
What is happening: • Coastal hazard and susceptibility information drawn from existing Auckland Council regional hazard mapping. • Information provided by technical experts and informed by more local hazard studies where available, e.g. where coastal areas are accreting and where some areas may be reclaimed or coastal areas modified.	**What is happening:** • Land instability. • Wildfire. • Low probability, high magnitude hazard events such as tsunami, earthquakes or volcanic activity. • Do not consider a reduction (lowering) of sea levels.

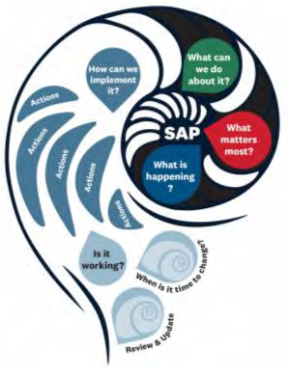
What is included and not included in decision-making process	
• Community understanding and experience of coastal hazards. • Sea-level rise in increments, out to a maximum of 2 m. • Vertical land movement is included as a general consideration in considering overall relative sea level.	• Do not consider events with an annual exceedance probability less frequent than 1% in any calendar year.
What matters most: Council land and assets • Consideration of Council land and assets located within and exposed to coastal hazards and catchment flooding within a unit or stretch. • Transport networks managed by Auckland Transport. • Water services managed by Healthy Waters and Watercare Services. • Council land holdings, facilities and interests involving parks and community facilities, Eke Panuku or Tātaki Auckland Unlimited. • Parks and reserves which Council has a role in the co-management/co-governance and support for the management and maintenance of assets.	**What matters most?** • Do not consider privately-owned land. • Do not apply to or consider storm affected land. • Do not apply to land or assets owned by companies in which Auckland Council has shareholdings such as the Auckland International Airport or Port of Auckland.
What matters most; cultural, social, ecological context • Broad identification of relevant policy considerations and the principal directions from these documents. • Cultural values, aspirations and principles. • Overall community objectives for a SAP area. • Local views and feedback at a local scale. • Feedback in relation to DRAFT adaptation strategies consultation documents.	**What matters most?** • Do not consider site-specific legal mechanisms or specific property arrangements. • Do not include detailed social, ecological or policy assessments at a local scale.
What can we do about it? • Consider the exposure (to multiple hazards and hazard event scenarios) of assets and land and the uses and services located within and traversing these areas. • Provide high-level direction for the intended management of risk to these land and assets.	**What can we do about it?** • Do not provide detailed direction on the management of specific assets in response to the hazard exposure. • Do not include detailed analysis of the pros and cons of different options, including design, feasibility studies, cost estimates/benefit assessments or environmental or social impact assessments.

Changing pathways in response to climate change and coastal hazards

The approach to managing risk from multiple hazards will change over time. It may be possible for different actions to be taken to manage risk within a general strategic approach. This is most relevant to ‘Maintain’ and ‘Protect’. Where hazard exposure changes significantly over time, there may be a need to signal ‘adaptation priority’ today. Where no action is identified under a low climate change scenario, further risk management action may need to be identified when considering a moderate or high change scenario and 1 m or more of sea-level rise.

The identification of preferred strategies for a moderate and high change scenario reflects our best understanding based on what we know today. It is important to acknowledge that these pathways remain living and do not preclude the ability to change pathways in the future.

7 How do we implement it?



The strategies identified in the SAPs are designed to align several different uses and services and provide a clear overall direction for the future management of Council-owned land and assets. They do not commit Auckland Council to any protective actions or funding to implement the recommended strategies.

Each strategy provides flexibility for how it is applied to different assets. The value of the strategic approach is to ensure general continuity across asset management, acknowledging hazard risks and impacts of management of one asset class may impact on or have implications for others.

7.1 Working together

Implementation of the SAP programme is an ongoing and developing process which will require continued collaboration across multiple Auckland Council departments and Auckland Council-controlled organisations and entities, communities, asset owners and businesses. This will be undertaken alongside ongoing engagement with iwi to ensure a partnership/co-management role in the project design, development, and implementation phases.

These plans must remain relevant and living documents which reflect asset management decisions making, fiscal context, legislative change, social change and physical environmental change.

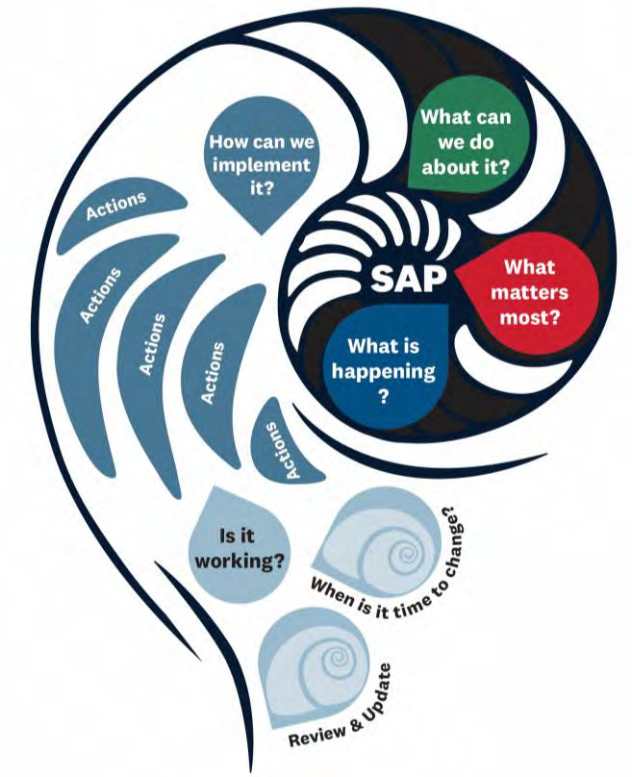
Strategies outlined within SAPs (specifically in Volume 3) only apply to the Auckland Council-owned land and assets located within that identified area.

Adaptation strategies do not apply to offshore activities (such as marine farms) or private property.

What does it mean for iwi and communities

The SAP reports are authored primarily for Auckland Council asset owners and planners to guide the management of risk to Council land and assets.

During the development of SAPs, a lot of interest has been generated from multiple groups who acknowledged the need for discussions to be held about the future of our coasts and how we respond to a changing environment. These discussions will help guide future plans on how to prioritise limited resources and funding. It will also help us create a flexible plan that adapts to changing views on risks, values, and our hopes for future generations.



What a SAP means to mana whenua/ iwi, the community and private individuals will vary. Each plan is a basis for identifying key social, cultural interests and ecological values of each SAP area which will:

- Inform the way strategies are implemented and future decisions made
- Provide a first step for further comprehensive adaptation planning in future.

What does this mean for Auckland Council: Better decision making today

Much of our city's infrastructure is already in place, and a significant amount of funding is dedicated to maintaining and renewing this infrastructure to serve current and future generations. However, when we look to renew our assets and infrastructure, they may no longer fit the needs of our growing city with the added impetus of the impact of climate change.

Traditionally when we consider the renewal of existing infrastructure it is on a case-by-case basis, as assets reach the end of their design life. The SAPs provide a platform for us to do better, to ensure that we are planning for a changing climate, as well as the changing needs of our communities.

The following is tailored towards asset management operational decision-making and planning. Further guidance and supporting advice will be available and developed to support the implementation of the plans once approved.

- Best practice guidance, technical regional publications and guidance documents and national guidance will need to be considered in the implementation of SAPs. Of particular importance for areas with a high number of identified and unidentified cultural and historic heritage sites, are the accidental discovery protocols in the Heritage New Zealand Pouhere Taonga Act 2014 and as set out in the Auckland Unitary Plan.

- The location of new assets in the areas susceptible to coastal erosion and instability should be supported by a risk assessment and how this may be managed through design life, location, or asset relocation.
- Where an asset has a functional need to be within the hazard zone (such as a boat ramp or beach access), the dynamic nature of the coastal environment must be considered and resilient design prioritised.
- The location of new, significant assets in areas at risk of the present-day coastal inundation or rainfall flooding at 1% AEP is not recommended. Avoidance of risk is a priority where practical. Where an asset has a functional requirement to be located within the hazard zone, both increasing and residual risk must be considered.
- Where renewal of existing assets within hazard areas is contemplated, both increasing and residual risk should be considered as well as options which identify appropriate location and resilient design.
- To support natural drainage and not increase the risk of rainfall flooding, all projects in the shoreline area must consider the location of overland flow paths and ensure that future works do not block these paths.
- Consider the operational function of assets in natural hazards events and consider the opportunity provide design responses which increase asset resilience.

The strategies included for each coastal area do not preclude Auckland Council undertaking activities to meet regulatory and statutory obligations (but may help guide the nature and timing of these activities), noting the SAPs are living non-statutory guidance documents. For clarity these include:

- Auckland Council undertaking works to ensure assets are safe
- Spatial planning and regulatory planning actions to 'avoid' future hazard risk
- 'Accommodating' assets, i.e. designing assets to be more resilient to the residual risk. Noting that in a dynamic coastal environment some level of risk and/or residual risk will be present under all strategies
- Repairing and renewing assets that do not interfere with coastal processes, are not exposed to coastal hazards, or have a functional requirement to be in a coastal hazard area (e.g. wharves)
- Planting/nature-based activities at the coast, where this is associated with ecological or other purposes
- Removing coastal protection structures at the end of their life and remediation activities including removal of debris.

Developing signals triggers and thresholds

Implementation will enable the SAP programme to progress the development of signals, triggers, and thresholds in place of generalised sea-level rise estimates and associated timeframes.

Once an adaptation strategy has been identified for a given area, it shouldn't depend on specific timeframes. Instead, the need for action should be triggered by changes in the local environment – whether physical, social or financial based on the area's unique values and features (as identified in Figure 7-1). This approach helps manage the uncertainty of climate change and provides a clearer understanding of when and how quickly impacts like sea-level rise may occur.

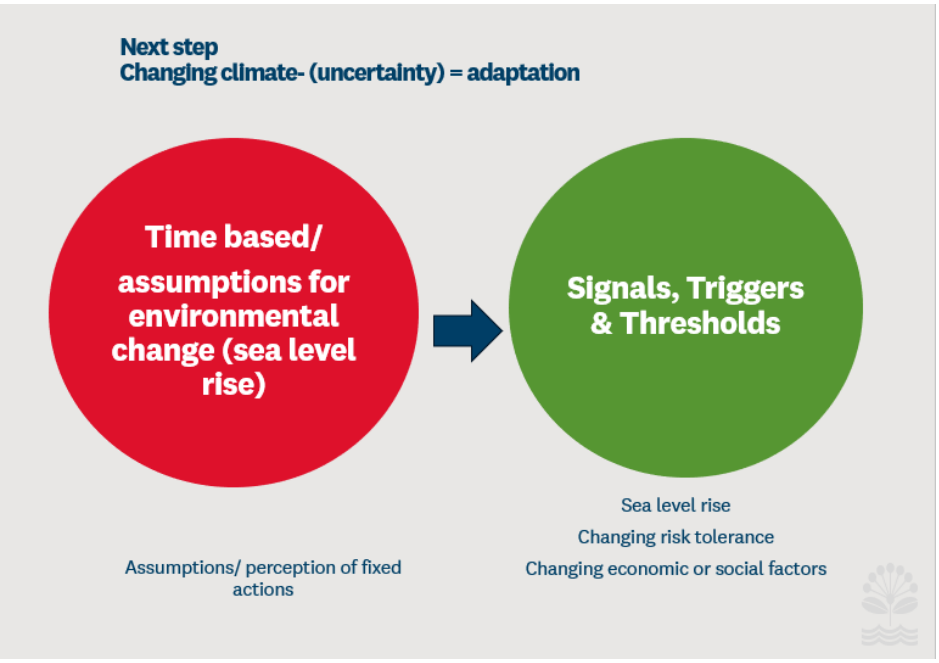


Figure 7-1: Basis for the need for action to implement adaptation strategies

Developing a comprehensive adaptive plan for each coastal location, will ensure that all implementation options remain open with the opportunity to consider different pathways in the future. However, this requires a more detailed view of the numerous assets, land holdings, the values and uses that areas and assets provide and the impacts that projected climate change and coastal hazards may have on them. It will not be possible to undertake detailed planning of this nature for every area all at once. Piloting this and refining the approach will be important to progress this adaptation planning tool for Auckland.

The need to switch from one management strategy to another is usually tied to a 'signal', an indicator that highlights the upcoming need for the next action to be taken, a change to be made or a reassessment to be undertaken. Change may also be driven by a 'trigger', an identified threshold that requires a more immediate change.

The identification of appropriate signals/triggers requires a robust framework which may involve multiple scales and factors. This may include the need for monitoring and feedback associated with physical systems, indications of risk tolerance or other cultural, environmental and/ community-based indicators. Further reading on the development of signals triggers and thresholds and an adaptation approach can be found in Auckland's climate plan and related resources here:

National, regional and local coastal monitoring

Monitoring coastal change and sea-level rise has been undertaken in New Zealand at different scales and utilising different methods. Mātauranga Māori and western science can be referenced to understand environmental change and continue to monitor changes in the natural environment which can act as signals and triggers for change in adaptive planning.

At a national scale, mapping and modelling of hazards, climate change impacts and risk is studied by Crown Research Institutes, universities, Ministries and research programmes. Two programmes which inform an understanding of coastal change are:

- NZ SeaRise which has released location specific sea-level rise projections out to the year 2300 for every 2 km of the coast of Aotearoa New Zealand. These **projections** can be accessed through a new online tool developed by Takiwā, a data management and analytics platform. Further information about this programme is available here: https://www.searise.nz/
- Coastal change which provides nationwide coverage of coastal erosion and accretion patterns from the 1940s to present day. This programme has used both historic vertical aerial photographs (from late 1930s to present) and high-resolution satellite imagery (from early 2000s) to undertake this work. Further information is available here: https://coastalchange.nz/

Further research in this field continues and will be referred to, to inform Auckland Council's implementation of SAPs.

Coastal monitoring

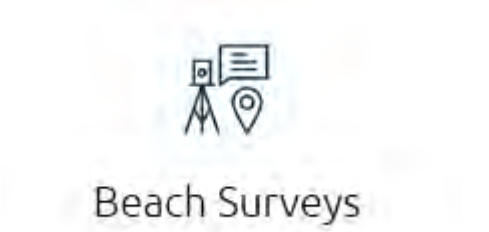
Auckland Council's Environmental Evaluation and Monitoring Unit's Coastal Processes Monitoring (CPM) Programme is responsible for the long-term monitoring of Auckland's beaches. The programme provides scientifically robust evidence that guides our understanding of coastal dynamics and the state of Auckland's beaches. It directly informs policy development, strategic planning, and operational decision-making related to coastal management and resilience. In addition to long-term monitoring, this programme can monitor the impacts of high-energy storm events on our region's beaches using both long-term data sets and additional pre- and post-storm information.

Monitoring beach response to storm events helps improve our understanding of future high-energy events and provides valuable information to Council teams responsible for coastal hazard planning and coastal management decision-making. Findings from the CMP programme will now be reported annually to improve transparency and understanding of the state of Auckland's beaches.

The tools available within this programme include:

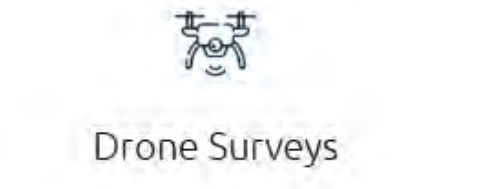
Wave buoys and tidal gauges: These instruments provide real-time wave and water level conditions across the Auckland region. Accurate wave and tide observations are crucial for understanding Auckland's wave climate and its impact on coastlines, especially with the increasing frequency and intensity of coastal storms due to climate change. These measurements enhance marine forecasts, support coastal operations and recreation, and inform coastal infrastructure design.

Beach profiles: Regular beach profile surveys are used to measure changes in sand levels over time, enabling assessment of beach state and trends by assessing variations in beach volumes and beach width. Beach profile data informs operational management of beaches, such as coastal structure design and interventions, sand transfer and dune planting.



Coastal monitoring cameras: Coastal cameras are essential for observing and managing coastal environments providing continuous, real-time visual records of beach conditions. They help capture beach slope changes, sediment movement, seagrass accumulation, public beach use, and responses to storm events. The imagery supports early hazard detection, enhances understanding of seasonal dynamics, and improves predictive capacity for future coastline changes.

Drone surveys: Drone-based aerial surveys capture high-resolution topographic data across the full beach width, improving spatial coverage and resolution of sand level observations. These surveys improve our understanding of local beach processes and identify subtle beach changes across the entire beach face.



Auckland marine forecast: A high-resolution wave and hydrodynamic model provides a 7-day forecast of wave, water level, wind and currents in the Auckland region. The marine forecast is used to predict high wave and water level events in the Auckland region supporting effective management of coastal assets and infrastructure and enhances preparedness for storm events.

All coastal data is publicly available through Auckland Council's Coastal Monitoring Programme Portal here.

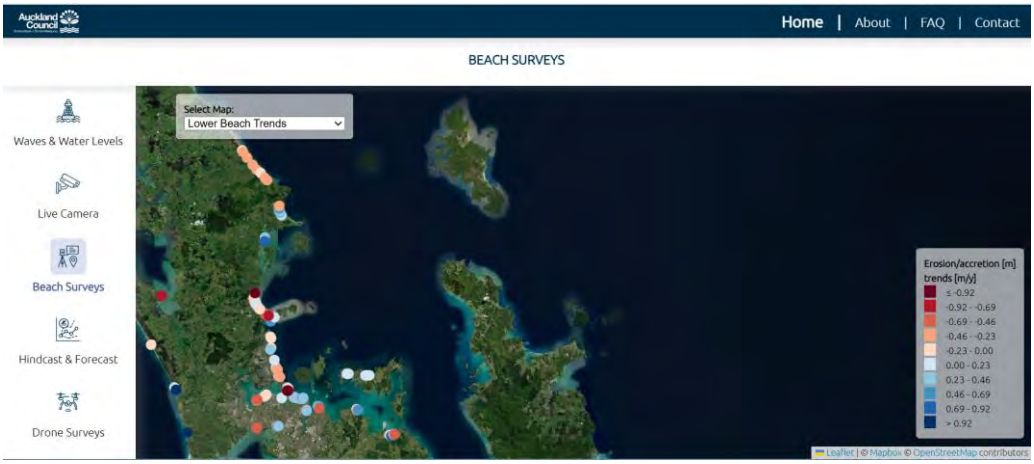


Figure 7-2 : Screen grab of the Auckland Council Coastal Monitoring Portal

Catchment monitoring

Monitoring tools are also used in relation to catchment management for river and stream levels. This informs an understanding and response in relation to rainfall flooding. As part of the Making Space for Water (MSFW) programme, cameras can monitor and analyse images for changes in water levels, flow, and potential debris blockages. This network of cameras are located across the Auckland region as identified in 7-3 below.

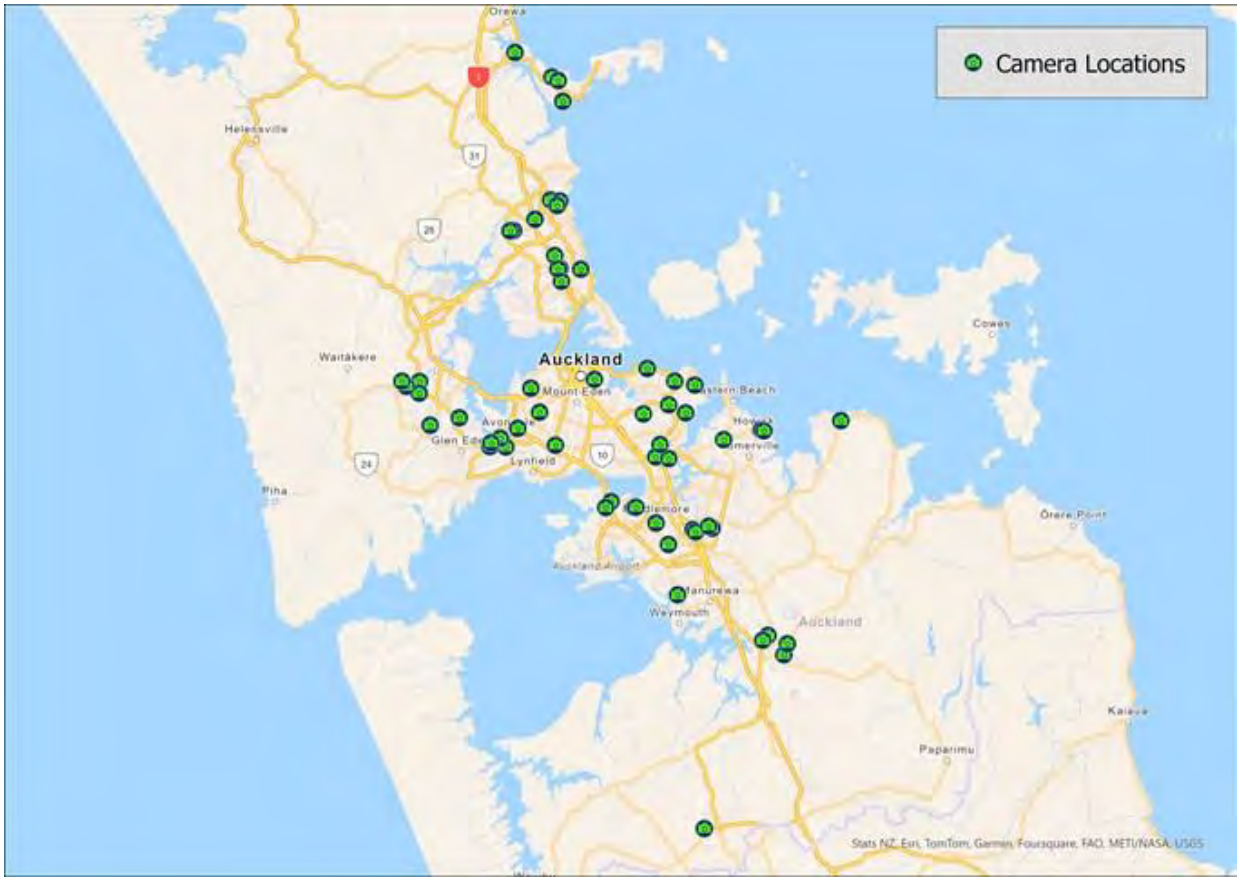


Figure 7-3: Location of stormwater monitoring cameras.

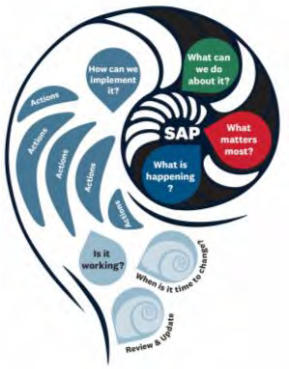
Natural hazard monitoring

Auckland Council used LiDAR surveying along Auckland's 3200 km coastline to create digital models before and after the 2023 North Island Weather Events (NIWE). This allows for a comparison of the two surfaces and the creation of a 3D mesh from the imagery data. Surface differencing monitoring presents another tool which could support an understanding of coastal change and inform the implementation of SAPs. Additionally, an asset database was created to provide information on coastal assets and inform asset owners. This work provides opportunities for:

- Better tracking of coastal erosion: This data allows us to assess coastal cliff erosion rates for pre- and post-2023 storm events and as a comparison with prior datasets.
- Assessment of other changes to the coastline: The data allows us to assess information regarding levels of beaches, intertidal areas, and sand dunes to allow comparison with other surveys to assess change over time
- Improved records of coastal structures: Production of a coastal asset database (including stormwater outfalls, sea walls and jetties), providing information their location and height to advise asset management.

In addition to physical hazard monitoring, the natural hazards risk management action plan identifies and tracks initiatives to respond to natural hazard risk for Auckland. More information on natural hazards and this plan can be found here.

8 Is it working?



Adaptation planning is an iterative and long-term process that will evolve and continued to be supported by different generations of users over time.

When measuring the effectiveness of the plans, the following considerations will be incorporated into evaluation and monitoring measures:

- The ability to quantitatively measure risk and exposure of Council assets to hazards and understand the effectiveness of the strategies to reduce or manage risk regarding location of assets and uses in less exposed areas and using design to reduce the vulnerability of assets to coastal hazards and sea-level rise.
- The accessibility and useability of the plans for asset owners and the utility in providing direction for asset management purposes.
- Reference to the plans to inform discussion, options assessment and decision making by Council, iwi and communities.
- Updates and continued improvements.

How do we measure is it working?

Are the plans being used?

Are the plans managing risk (exposure and/or vulnerability)

How are we supporting iwi and our communities to engage with future updates and review.

How are we progressing with our implementation actions?

Review and updates

SAP area reports are anticipated to be reviewed on a five-yearly cycle. This will enable updated information to become available and considered.

- This may be regional hazard information climate projections
- Priorities; social policy changes, economic drivers or more localised planning for change/future
- Review may also be requested by local boards, community, iwi or required because of a specific trigger or signal being met which requires an accelerated need for change.

Adaptation planning will more generally need to respond to national and regional legislative and policy changes and transition to the use of signals, triggers, and thresholds in place of static timeframes.

9 Concluding note

This document has synthesised the methodology applied in the development of the overarching programme and its respective plans. For further, area, unit and stretch specific information, please refer to Volume 2 SAP Area Plans and respective Volume 3 Strategy Reports.

Attachment A1 Te Ao Māori Frameworks for the Shoreline Adaptation Plans

Attachment A1.1 Te Ao Maori

Te tiro ā Māori ki tōna ake ao, a Māori world view, acknowledges the tangible and intangible, the inter-relationship of all living and non-living things and speaks to the vital connection between tāngata whenua (Indigenous people) and te taiao (the natural environment) in which they live. Within te ao Māori, people, birds, fish, trees, oceans, rivers and streams, and weather patterns - are all interconnected, and these relationships stretch back into the past, sit within the present and look to the future.

The wellbeing of tāngata whenua (indigenous people) and the ecosystems that support them is interlinked with the concept of *'mai te rangi ki the whenua, mai te whenua ki te rangi'* (from Ranginui to Papatūānuku, from Papatūānuku to Ranginui), which underpins the holistic world view for many iwi / hapū of Tāmaki Makaurau, and how the traditional concept of kaitiakitanga is approached. Understanding inter-relationships and interconnectedness is a fundamental part of addressing the impacts of climate change and sea-level rise.

As an adaptation workstream within Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan, the SAP programme considers te ao Māori by giving effect to the Kia Ora Tāmaki Makaurau and Te Ora ō Tāmaki Makaurau frameworks, underpinned by the principles of te Tiriti o Waitangi, and recognising and providing for te ao Māori concepts. This is explained further at the cultural content in Section 5.

Attachment A1.2 Principles for partnership for the development of the SAPs

While not exhaustive, other relevant cultural objectives and outcomes sought for the SAP programme include:

- Ensuring iwi are engaged to speak to and identify:
    - Their cultural values and associations of an area
    - Any impacts to their cultural values and associations
    - Any necessary mitigation and management of any impacts and effects on cultural values and associations.
- Prioritising the protection and recognition of wāhi tapu / sites of cultural significance within or adjoining the coastal area
- Recognising and providing enduring kaitiaki opportunities for tāngata whenua
- Supporting iwi to implement and maintain rāhui
- Proactively protecting and restoring nature's first line of defence for the coastline (prioritising nature's ability to absorb the effects of climate change)
- Respecting the role nature has in te taiao, allowing Tangaroa to take back the whenua, tāna mokopuna te ika, that was taken from him by Māui

- A return to native habitats - mangroves and dunes with native planting all around the coastal area, consistent with what was historically present. A planting regime should be commenced in advance of any potential risks
- Proactively protect and enhance taonga species and habitats
- Proactively protect coastal cliffs (pari) and coastal dunes
- Proactively protect and enhance coastal and inland wetlands, and indigenous habitats and biodiversity
- Prioritise protection of, and contribute to the enhancement of, kaimoana / shellfish habitats with a focus on the regeneration for mahinga mātaitai sites
- Make room for wai (water), enable natural processes where possible and naturalising aquatic environments where possible (e.g. daylighting of streams)
- Enhance existing and provide for new, natural connections and access points to the coastal environment
- Prioritise a 'te taiao (environment) centred' approach, over a 'human-centred' approach when implementing the shoreline adaptation approaches
- Ensuring there is a process to revisit the shoreline adaptation strategies into the future as technology and methodologies change.

How these objectives are realised within each SAP needs to be undertaken alongside local iwi. This must be provided for through further engagement.

Attachment A1.3 Ngā hapū me ngā iwi o Tāmaki Makaurau

The hapū and iwi of Tāmaki Makaurau, hold important values as kaitiaki (guardians, protectors). These include their environmental and spiritual ties to ancestral lands, water, sites, wāhi tapu (sacred areas) and other taonga (treasures), and the wellbeing of the entire iwi.

Auckland Council, as set out in The Auckland Plan 2050, looks to recognise and provide for Te Tiriti outcomes. Treaty principles provide guidance for decision-making, partnership, and collaboration between the 19 iwi of Tāmaki Makaurau and government. This can include co-governance and co-management approaches, including for natural resources where holistic, integrated, and sustainable outcomes are sought.

The cultural values, associations, objectives, and outcomes communicated by each iwi involved in the development of each SAP will help to inform the selection of adaptation strategies within each. Such cultural values and outcomes are anticipated to be developed through ongoing involvement of iwi throughout the development of all 20 SAP area plans and their implementation. Guiding frameworks, principles for engagement and regional principles for SAP plan development which have informed the development of the SAP programme to date are set out below and build on these regional principles, identifying those of local iwi who have been involved in the development of this plan.

Attachment A1.4 Te Ora ō Tāmaki Makaurau wellbeing framework

Te Ora ō Tāmaki Makaurau is the wellbeing framework developed by the Mana Whenua Kaitiaki Forum in response to Te Tāruke-ā-Tāwhiri. It is a regional innovation that is built on generations of knowledge and reflects the world view of the various mana whenua, iwi, rangatahi Māori and Māori communities of Tāmaki Makaurau. Te Ora aligns with Te Ora Tāmaki Makaurau and supports the concept of Te Tātai. The Te Ora framework incorporates kaupapa Māori and mātauranga-ā-iwi and is underpinned by the principles of te Tiriti o Waitangi, particularly the principles of partnership and active protection.

Within Te Ora, there are three dimensions of wellbeing that form a holistic approach: **Taiao** (environment), **Whenua** (land, earth), **Tāngata** (people). When considered together, dimensions within the Te Ora framework (Taiao - environment, Whenua -land, Tāngata - people) can frame our adaptation to climate change by taking a whole living systems approach. Our response to climate change is also guided by the following values and principles:

- Manaakitanga
- Kaitiakitanga
- Whanaungatanga
- Rangatiratanga
- Mātauranga
- Oritetanga
- Tōnuitanga.

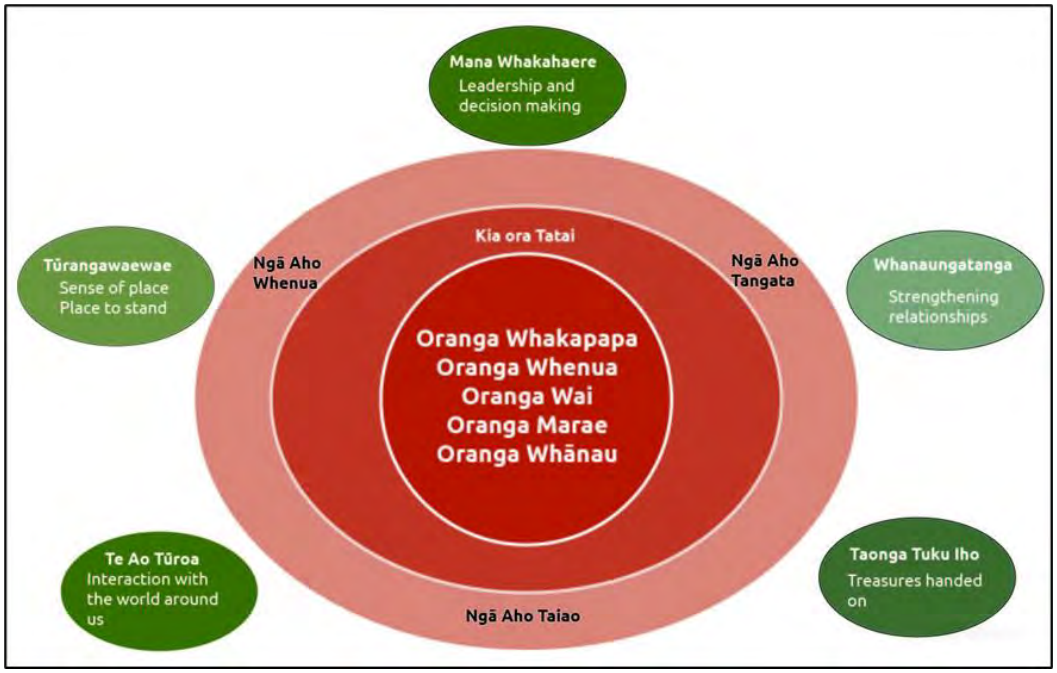


Figure 9-1: Graphic of Te Ora ō Tāmaki Makaurau Wellbeing Framework

Attachment A1.5 Guiding cultural themes

The values identified by each of the iwi have been categorised into three major themes which reflect the Kia Ora Te Tātai outcome being:

- Taiao - Environment
- Whakapapa – Ancestry
- Tāngata Hononga - Connecting People.

These are further expanded below. Additionally, iwi involved in the development of this SAP have contributed some high-level objectives and outcomes that will assist in giving effect to these values across the Manukau North Tranche.

Attachment A1.6 Te Taiao (Environment)

Tangata Whenua of Manukau and Tamaki are coastal people, and the Manukau is intertwined at the heart of natural and cultural heritage and identity. The natural environment is a taonga, it is an integral source of nourishment through mahinga kai (food gathering) and spiritual and physical welfare. The goal is to ensure that the needs of present and future generations are provided for in a manner that goes beyond sustainability towards an approach that enhances the environment. The environment is protected, enhanced, and celebrated through an integrated approach, by natural means first and foremost and in partnership with tangata whenua. This includes proactive enhancement and/or conservation activities that will aim to naturalise and enhance the natural environment and ultimately contribute towards preserving the coastline. Guardianship and stewardship of the environment is enacted via kaitiakitanga. Restoration and enhancement of the mauri should be prioritised.

Attachment A1.7 Whakapapa (Ancestry)

Wāhi tapu sites present physical links to whakapapa (ancestry) and enduring tikanga (cultural practices) fundamental to cultural identity. Historically, mana whenua have been stripped of much of their whenua, losing many wāhi tapu sites. It is essential that wāhi tapu are protected, celebrated, and enhanced through an integrated approach, by natural means, and in partnership with iwi mana whenua. Some wāhi tapu sites are not public knowledge and their locations are intentionally protected by iwi and hapu. Mana whenua need to be collaborated with as partners to identify and manage wāhi tapu sites. The celebration of mana whenua values includes the acknowledgement, respect, and recognition of cultural and spiritual values of tangata whenua. Wāhi Tapu and Taonga must be respected, treasured, and valued. This may include archaeological sites, cultural landscapes, and artefacts as well as sites of spiritual and historic significance to the trust. For example, wāhi tapu may include pā sites, battlefields, burial grounds, significant historic iwi sites, and waka landings.

Attachment A1.8 Tāngata Hononga (Connection People)

Through involving the community, the people are connected and invested in their environment and therefore uplifted. The SAP recognises that people and the environment are holistically intertwined. Resource management should be implemented in a way that sustains and supports the ability of Manaakitanga, ongoing generosity and hospitality, and enables and supports mana whenua's role as kaitiaki.

Attachment A1.9 Infrastructure and Environmental Services Mana Whenua Kaitaiki Forum regional guiding principles for SAPs

In the spirit of partnership, the Auckland Council I&ES Mana Whenua Kaitiaki Forum developed the following guidance principles for all SAPs:

- Responsive to iwi management plans
- Accept reversal of infrastructure to rectify hazard issues
- Naturalise, let nature take its course
- Look at emissions as well (if any)
- Whenua concepts are written up and understood by all in plans
- Protect koiora (biodiversity) and traditional mahinga kai (fish stocks, kaimoana)
- Protect heritage where possible.

These principles align with both the Kia Ora Tāmaki Makaurau and Te Ora ō Tāmaki Makaurau frameworks and help guide the SAP work programme and its implementation.

Attachment B1 Frequently asked questions

The SAP Series 1 reports are strategic documents which set a high-level direction for shoreline management and the assets within those areas. It is important to note there are limitations to the scope of the series 1 plans.

Attachment B1.1 Do the SAPs apply to my private property?

Application is to only Auckland Council-owned land, infrastructure and assets and is not developed with the intention of applying directly to privately-owned land and/or assets within the wider SAP area.

Attachment B1.2 What information have you used to understand coastal hazards?

Data on climate related risks arising from coastal inundation, erosion and instability and sea-level rise has been drawn from the Tonkin and Taylor (2024) Technical Risk Assessment. As this information is at a unit level, it has not been directly utilised in the Decision-Making Framework for individual stretches but has (along with other sources of information including social, cultural and ecological data) informed the creation of the SAP. In the future, the risk information may assist in prioritising the types of land, infrastructure and assets that should be the focus of adaptation strategies.

Attachment B1.3 I can't see the things I value mentioned for my coastal area (stretch)?

The development of SAPs includes a high level consideration of social and regulatory context. Strategies, and associated guidance notes do not constitute a detailed reflection of any site or parcel-specific legal mechanisms, covenants or requirements or identify specific conditions or actions associated with individual resource consents (such as consents for coastal structures or discharge associated with water infrastructure).

Adaptation strategies are selected using standardised decision-making process based upon characteristics of the shoreline stretch and assets (built and natural) within hazard zones. This analysis is supported by the best available information as set out in this report.

Attachment B1.4 Why haven't you considered what could be done to protect or adapt my local coastal area? How will we know when we need to change to the next strategy in our pathway?

SAPs do not consider site-specific options assessments for what may be delivered in implementing each of the adaptive strategies nor do they identify specific triggers for when the next strategy (e.g. short to medium to long-term) is actioned.

Attachment B1.5 When and why will plans be updated?

Each SAP may be updated in future as and when required. Examples of a reason for updates may include:

- Updated climate hazard projections become available or to add
- Further detail such as triggers for a change in adaptation approach at a local scale
- Feedback / input into strategies due to land use or change in coastal environments.

Attachment B1.6 How have costs of the different options been considered?

Delivery of the SAP work programme is regionally funded through the climate action package. No additional funding is sought from local boards to deliver the reports.

Mitigating coastal hazards will become increasingly expensive for Auckland and wider Aotearoa. It will not be affordable or feasible to defend everywhere. SAPs will ensure that coastal projects consider the escalating future risk of climate change and respond in both an environmentally and economically sustainable manner.

No financial investment decisions have been made through the development of the SAPs. The adaptation strategies they identify will be advocated for across relevant Council decision-making. This includes the future management, maintenance and renewal of Council assets and land located along the coast through existing work programmes and associated budgets. Over time, this will result in cost savings as assets are moved out of coastal hazard areas and incur less damage due to coastal erosion and flooding.

Once all SAPs across Tāmaki Makaurau are completed, a regional funding prioritisation approach will be developed for the shoreline adaptation programme. The framework and process for undertaking this exercise will need to be agreed with the Governing Body. This will assist in budgetary requirements and support an equitable approach for areas where managed realignment or other major coastal works have been recommended.

Attachment B1.7 How will we use the plans?

The series 1 plans are developed to inform better and more connected decision making for Auckland Council assets owners and managers.

Attachment B1.8 How do the plans relate to statutory documents?

The SAP plans are not prepared under the Resource Management Act or Reserve Act. The scope and purpose of the SAP programme is clearly set out at Section 3 of this report including the identification of how SAPs consider these statutory plans.

Attachment B1.9 Do the plans commit Council to defending an area of the coast?

No financial investment decisions have been made through the development of the plans. The adaptation strategies will be given effect to across relevant Council decision-making. This includes the future management, maintenance and renewal of Council assets and land located along the coast through existing work programmes and associated budgets. Over time, this will result in cost savings as assets are moved out of coastal hazard areas and incur less damage due to coastal erosion and flooding.

Once all SAPs across Auckland are completed, a regional funding prioritisation approach will be developed. The framework and process for undertaking this exercise will need to be agreed with the Governing Body. This will assist in budgetary requirements and support an equitable approach for areas where managed realignment or other major coastal works have been recommended.

Attachment B1.10 What is Auckland Council doing to plan for climate disruption?

SAP supports community-led discussions about natural hazard risk, adaptation and resilience identified as an area of focus in 'Accelerating a Resilient Tāmaki Makaurau Auckland' resolved by the Planning, Environment and Parks Committee on 29 June 2023 (PEPCC/2023/81). The Resilient Tāmaki Makaurau works program has identified a range of actions that Auckland Council is taking to plan for climate disruption see figure B1-1.

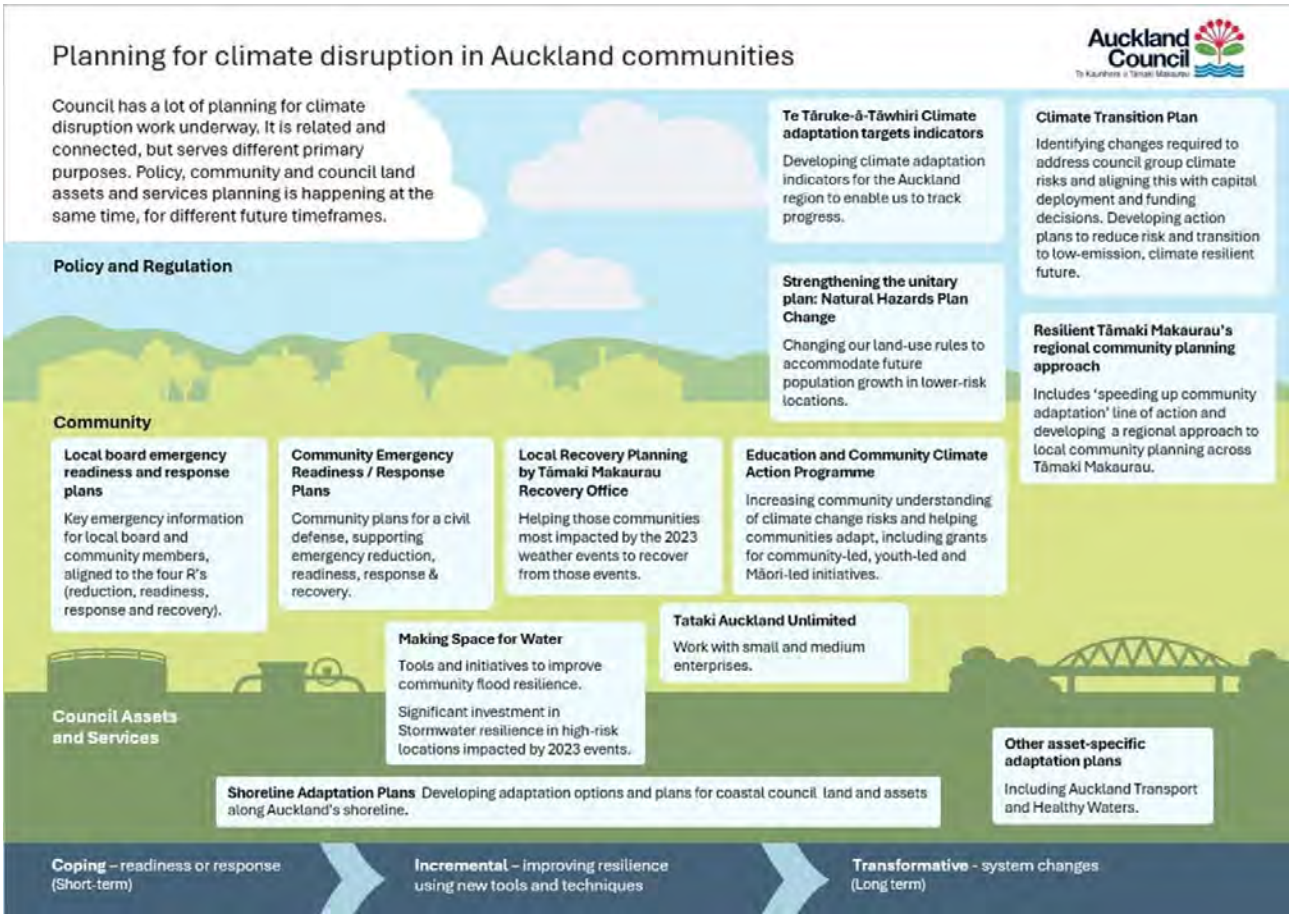


Figure B1-1: Auckland Council work programmes which contribute to planning for natural hazards and climate change

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Auckland Council
Te Kaunihera o Tāmaki Makaurau