

Minutes: CAP Meeting – Central Adaptation Area: Developing Pathways

Date: Wednesday, 26 July 2023

Location: Robin's Nest, Ngā Manu Nature Reserve, 74 Ngā Manu Reserve Road, Waikanae (MS teams-link in invite)

Time: 1.30 pm – 4.30 pm

Attendees: Jim Bolger (Chair), Jerry Mateparae, Donald Day, Martin Manning, Susie Mills, John Barrett, Moira Poutama, Mark Taratoa, Olivia Bird, Kelvin Nixon, Te Rangimārie Williams, Stephen Daysh, Derek Todd, Kate MacDonald, Iain Dawe, Elspeth McIntyre, Jason Holland, Sandhira Naidoo, Ashlyn Gallagher, Yvonna Chrzanowska, Aastha Shrestha and Abbey Morris

Observers: Tim Sutton, Michael Moore, Glen Olsen, and Sophie Handford

Apologies: Melanie McCormick, Kris Pervan and Alfred Lison

Agenda Item	Comments
Opening & Introductions	Opening Karakia by John Welcome by Jim Bolger, Chair
Confirmation of the Minutes	Confirmation of the Minutes <ul style="list-style-type: none"> Jim motioned to move the minutes with minor changes Don seconded the minutes following some suggested amendments.
Debrief from NAA Community Feedback Session	Jim Bolger (Chair) <ul style="list-style-type: none"> Jim debriefed CAP about the community feedback at Ōtaki noting about more in-depth interest and enquiry from the public. John commented that the response from public has been interactive and engaging and useful.
Project Update	Abbey provided an update that: <ul style="list-style-type: none"> While the TAG has been using the projected years to understand when the effects of sea level rise may occur, it is important to note that timeframes are not the only focus. Instead, Relative Sea Level Rise (RSLR), which is based on depths in metres, will be used going forward. This also helps to reflect that pathways may need to change when certain triggers (to be discussed at the later CAP workshop) occur instead of at a particular timeframe. This will be reflected in information and communication material going forward, with updates where needed. As a follow up to CAP's request at the previous CAP meeting, a breakdown of the CAA Summary Report (based on location – Paraparaumu vs Waikanae) was tabled. Abbey asked CAP if there is anything within the draft summary report that raised questions or if they have had an opportunity to read over the report. Jim opened the floor to CAP members to share any of their observations. No comments were noted. Discussion: <ul style="list-style-type: none"> Martin shared that the literature referenced in the IPCC report relies heavily on detailed satellite data generated from a limited number of jointly operated satellites in the US and Europe, which both countries analyse independently.

He mentioned he can provide websites for accessing this satellite data if requested. Martin explained that he prefers using the European data over the American one due to its more frequent updates. The data is publicly available and has a spatial resolution of 25 km. However, to make meaningful sense of the data, it needs to be averaged and analysed over time (to look at timeframes).

- Kelvin asked about the frequency at which the data becomes applicable to use.
- Martin responded that while the IPCC report is based on satellite data (primarily focusing on American and European data) which might not be entirely relevant for New Zealand).
- Kelvin further asked how CAP can incorporate this information into their work.
- Martin clarified that CAP is currently using global averages rather than regional averages in their work. He emphasised that properly examining the data reveals differences in results, both online and in the IPCC report. These differences aren't always quantified in terms of decades and years. He mentioned that a detailed report from MfE (Rob Bell in 2017) contains relevant data for New Zealand (appended to the MfE report). However, some sources have not been integrated into the MfE mainframe yet, which should be addressed.
- Jerry reminded CAP that it needs to base its work on the information provided by MfE, which is derived from those sources. He acknowledged that this issue has been discussed before and everyone in CAP agrees, but the challenge lies in how to incorporate this data effectively.
- Martin agreed with Jerry, highlighting the dilemma of relying on government reports or the IPCC report.
- Derek discussed the MfE guidelines, issued after the latest IPCC reports, that shows updated SLR scenarios. Jacobs have provided Council with the difference between the scenarios used within the Jacobs report vs the updated MfE guidance. This included the move from RCP to SSP and SSP is now being used for the risk assessments. The fully updated MfE guidance will be landed later this year. While Jacobs report show a broader range SLR scenario, in terms of the CAP process, this is where the consideration of thresholds and triggers becomes important. CAP are advised to prioritise beach and flood responses, and if these accelerate due to SLR surpassing predicted scenarios, corresponding actions will be prompted through signals and triggers. He notes that CAP process, which is following the Dynamic Adaptative Pathways Planning (DAPP) model, this serves as the mechanism to adjust to any scientific changes as needed. These changes might manifest sooner or later, but the Council must ensure ongoing monitoring, not just of SLR, but also of beach and flood responses. This might shift the timelines, but it doesn't necessarily alter the prescribed adaptation response.
- Abbey explained that the adaptation pathways account for changing years and incorporate short-term, medium-term, and long-term considerations. Flexibility is essential, given that scientific knowledge constantly evolves over time. More monitoring could be considered as part of CAP's final recommendations.
- Martin pointed out that a gap currently exists and suggests an effective monitoring system will be required. Multiple variables, including low-resolution data and local land movements, contribute to an incomplete picture. He highlighted that NZ lacks comprehensive data compared to places like California, where regularly updated satellite data and reports are accessible to the public.
- Derek responded that nationally, the focus is on tracking SLR and land movements, requiring collective attention by several agencies. However, at

	<p>the local level, responsibility lies with local government to understand beach responses, flood management, and erosion.</p> <ul style="list-style-type: none"> • Jim recognised that some segments of the community may not agree with the accuracy of the science and related data being used. He stressed the importance of presenting CAP's recommendations with supporting data, as part of CAP's continued efforts to gain public trust. • Jerry agreed with Jim, noting the dual nature of the challenge. On one hand, there could be criticism for using later science, while on the other hand, some might argue that CAP is not using the right science, undervaluing its efforts. Jerry raised the question of how to navigate this situation, and proposed potential approaches, such as moving away from specific timeframes to a generic one linked to SLR (as done). However, he also cautioned against potential drawbacks of this approach. Another consideration he mentioned was the possibility of emphasising trigger points within the report, as suggested by Derek. The question remains: how can CAP effectively incorporate these considerations into its work? • Derek clarified that the current reporting method focuses on assessing the hazard's effects based on specific SLR amounts, rather than determining trigger points for adaptation. He emphasised that the decision to take action hinges on establishing acceptable erosion levels, considering factors like proximity to landmarks, flood frequency, and depth - ranging from yearly occurrences to increments like half a meter over ten years – these all could be part of the triggers, signals and threshold decisions. Importantly, he stressed that while "none of it is perfect science," the adaptive nature of the DAPP process, along with implementing timely monitoring, allows for some preparation before trigger points are reached. • Stephen encouraged CAP to utilise the available information and guidance, informing them about upcoming MfE guidance (being peer-reviewed by Stephen) that may address concerns raised by Martin. • Damian further explained that discussing future SLR involves different actions and models related to sea response and climate change, which is separate from measuring historical SLR trends. While accurate estimates of the past decade's sea level changes or specific heights are obtainable, integrating these into public understanding, especially in the future context of climate change scenarios, presents challenges. • Jim commented that the challenging aspect of CAP's work lies in the multitude of possibilities.
<p>Update on Ātiawa ki Whakarongotai's Engagement, Central Adaptation Area Cultural Risk Assessment & Cultural Values Report</p>	<p>Te Rangimārie Williams, TAG & ĀkW</p> <ul style="list-style-type: none"> • Te Rangimārie provided a summary of update on their iwi engagement with Ātiawa ki Whakarongotai, including a Taiao Committee meeting, a haerenga (journey) to some significant spots throughout ĀkW's rohe, and a survey amongst the iwi. • Te Rangimārie outlined several core principles of partnership, participation and collective decision making. These principles guide the ĀkW approach to projects with the Council and their internal interactions with ĀkW. With Takutai Kāpiti, the approach comprises of a Mana Whenua house, a Kawanatanga house, and convening in the Te Tiriti house for decision-making. This strategic involvement allows ĀkW decision-makers to enter discussions well-informed, combining technical advice through her role in the TAG, and by supporting Mel and John in the CAP. • For decisions relating to Takutai Kāpiti, ĀkW Trust's environmental arm, including the Taiao Unit (where Te Rangimārie is based) and led by Mel, plays a key role. The Taiao Committee, involving John, holds delegated authority on specific environmental matters. ĀkW emphasises adhering to their traditional systems, ensuring iwi-endorsed decisions.

	<ul style="list-style-type: none"> • Te Rangimārie highlighted that ĀkW recognises the significance of Takutai Kāpiti and aims to engage their broader iwi. • ĀkW have prepared a “draft ĀkW comment value statement” which includes six values that guide ĀkW’s decision-making, interaction and relationship with the environment. This value statement shall inform risk assessments for Adaptation Areas within ĀkW’s rohe, supporting John and Mel’s decision-making for Takutai Kāpiti. • The engagement done will collectively contribute to finalising their value statement, enabling them to identify which spots hold specific risks to ĀkW values and guide their participation in Takutai Kāpiti. • Regarding decision-making, John and Mel are currently participating in the decision-making process for the CAP. ĀkW’s approach is similar to the process that NHoŌ participated in for the NAA. John and Mel will contribute to the CAP’s decision-making and subsequently relay that information back to the iwi on multiple occasions. ĀkW have identified that instead of going back to iwi multiple times across the different adaptation areas, consolidating these interactions into a single instance would be more practical, as it may not be feasible for them to do so. • Jim asked about biggest concern as iwi - moving forward. • Te Rangimārie responded that for ĀkW, they have values around protecting for future generations. One of the things that always come up in the kōrero is maintaining connection to the coast and how that looks like regarding access, ability to continue to practice mahinga kai, and how whānau would travel to different sites along the coast, sharing kōrero and upholding the tradition of whakawhanaungatanga along the coast. • John agreed with Te Rangimārie, commending her comprehensive explanation. • Jerry asked John if it would be useful if the CAP was given the principles that Te Rangimārie talked about, ensuring they consistently considered when engaging with the community. • John agreed it would be beneficial for the CAP to share these principles and encourage socialising them to the communities.
<p>Developing Pathways for Central Adaptation Area</p>	<p>Stephen Daysh, Mitchell Daysh & Derek Todd</p> <p>Derek and Stephen walked the CAP through the PowerPoint presentation regarding developing pathways for the CAA.</p> <ul style="list-style-type: none"> • Derek and Damian clarified that the areas projected to be inundated within 100 years due to a coastal storm with a 1.25 m SLR, representing the highest standard for an exceptionally large coastal storm, are being considered. This represents a worst-case scenario projection. • Derek and Damian reminded the CAP that the property numbers shown on some slides (top right corner above the map) covers the predicted number of impact to properties at particular projected RSLR depths and across the SSP2-4.5 and SSP 4-8.5 scenarios. Damian explained that when assessing the risk to properties, even a small area of water within a property boundary is counted. The risk assessment takes a closer look at these aspects to determine the potential exposure, hazard levels, and depths of water. This information is then translated into low, medium, or high-risk categories. It’s important to note that this assessment doesn’t specifically consider the height of the floor level above the water; it focuses on the presence of water within the property, not necessarily inside a dwelling. • Derek added that in the scenario of a 1% (or 1 in 100 year) coastal storm or storm surge combined with an astronomical tide, resulting in flooding that extends up to the stream (from Waimea through Waikanae and the gaps and

dunes), it is anticipated that around 107 properties could experience some level of inundation (or some depth).

- Derek emphasised the importance for the CAP to consider not only consider the impact on properties, but also the significant risks to ecological and wetland areas, infrastructure, the high risk of coastal erosion affecting dunes, and risks to the human domain when making decisions about adaptation pathways.
- Stephen reiterated the importance of considering a wide range of adaptation pathways for the MCDA scoring for each management unit.
- Jim asked whether CAP should suggest that eventually all areas will need to retreat. Derek clarified that retreat might not be the only option, and the recommendation decision could depend on the level of risk and potential alternatives such as engineering measures. He explained that the long-term risk to properties depends on the rate of RSLR over time. If the risk assessment indicates that larger number of properties are at a level of risk that might suggest it's not feasible to protect all of them, then retreat becomes a potential viable option to consider.
- Jim questioned if retreat is inevitable due to factors like RSLR, is there any rationale for not immediately opting for retreat and instead considering the interim options like soft engineering. Derek replied that the approach to retreat would depend on its execution. Incremental retreat could involve those initially affected deciding whether to stay or leave, with options like blanket retreat or self-initiated retreat, such as selling to the Council. This would depend on how one might manage retreat.
- Stephen directed a question to Derek regarding the suggested pathways and the last option of seawalls. Derek confirmed that if the seawall option is chosen, it will involve designing and locating the seawall to protect at-risk properties from erosion, thus avoiding the need for retreat.
- Jerry asked about the difference between seawall and earth bunds. Derek explained that an earth bund addresses inundation, whereas a seawall focuses on erosion protection and needs to be engineered to certain standards.
- Martin noted that the timing of retreat is influenced by economics and research suggests an early start to the process is beneficial - sooner rather than later.
- Olivia requested a brief overview of how impacts (for two soft-engineering and two hard engineering options) would look like. She raised concerns about the potential ecological impacts of certain engineering options and how they might affect MCDA scoring. Derek responded that discussions from the NAA revealed that beach scraping was unacceptable to the iwi due to its impact on shellfish. The ecological impacts would likely be similar in both northern and southern areas. Detached breakwaters could disrupt visual aesthetics and recreational activities like surfing. The level of impact would determine how it affects options such as seawalls.
- Abbey shared that a range of adaptation options within the starter pathways have been included for the CAP's consideration, even if they might be unacceptable to certain stakeholders. This allows CAP to consider, question and determine if they wish to recommend particular adaptation options for themselves.
- Susie pointed out that some adaptation options should be grouped together to create a package.
- Stephen sought clarification from Derek if dune reconstruction can be achieved without beach scraping. Derek replied that dune reconstruction can involve either beach scraping or beach renourishment.
- Te Rangimārie enquired whether the impacts of these adaptation options regarding values have been thoroughly examined for each sub-area. Stephen

	<p>responded that this is done through the MCDA assessment which evaluates the values against the risk assessment criteria.</p> <ul style="list-style-type: none"> • Martin asked about the Status Quo approach. Derek responded that Status Quo involves applying the same level of effort and resources as the Council currently utilises. Whilst in contrast, the dune and wetland resilience adaptation option, involves increasing the resources and improving their application. The Status Quo approach maintains a similar resource level, potentially altering its operation while retaining overall resource levels. • Derek advised CAP that if they're looking at soft engineering in Northern to Central parts of Waikanae, then they should consider applying same techniques across both of those areas. <p>Discussion</p> <ul style="list-style-type: none"> • Jim asked if Council is actively prohibiting the construction of houses in high hazard areas. Jason replied that that a future coastal plan change will involve nuances based on different levels of risk. The advice provided to the CAP regarding potential plan change responses will vary depending on the perceived risks, and there won't be a one-size-fits-all recommendation to the Panel. • Jim further asked if the Council is actively monitoring and preventing new facilities and homes from being built in those locations. • Jason explained that the current District Plan contains coastal hazard provisions from 1999 that are outdated and need reviewing. He reiterated raised that the CAP's recommendations will help guide the future coastal plan change. He explained that other legislations, such as the Building Act, are also in place to manage hazards at a national level. Jason shared that a planning memo will be presented to CAP before Christmas. He shared that he envisions that Council will adopt a risk-based approach, proposing different development constraints for areas with varying levels of hazard risk. Under the District Plan, certain activities might be permitted in low-risk areas but restricted in high-risk areas.
	TEA BREAK
Developing Pathways for Central Adaptation Area cont...	<ul style="list-style-type: none"> • Susie requested for a pathway to include at least two means of protection – pathways were developed accordingly. • Olivia suggested that the option of Dune Reconstruction could be done in tandem with community education and planting and beach nourishment. CAP agreed. • The option of status quo within a pathway for erosion management units was removed with unanimous agreement from CAP • Based on previous CAP conversations today, Abbey asked if CAP wanted Beach Scraping. CAP unanimously agreed to removed beach scraping overall. • Iain shared attempted dune restoration was dependant on width of land available on either side of dunes. • Susie asked if Enhance Existing Inundation Protection includes use of water return valves. Damian confirmed yes. • Discussion by CAP on whether to add Enhance, Accommodate and Retreat as a pathway option for inundation management units. • Jerry suggested why not just Enhance and Retreat. Yvonna raised the short- and medium-term cost implications around engineering efforts if there is a long-term view to retreat. Damian shared the CAP's final decision will look at balancing the effort of putting in solutions vs investment. Derek reminded that

	<p>the function of triggers, signals and thresholds, means that solutions can be put in place to buy time for retreat.</p> <ul style="list-style-type: none"> • CAP was reminded that “avoid” is automatically applied across all pathways and timeframes and will be achieved through land use planning. This could include the incorporation of relocatable homes. • Martin highlighted that hazards may also make maintaining access to properties an issue for homeowners. Damian responded that part of the Enhance and Protect adaption options provides protection and will address the access implications. <p>The outcome of the CAP draft pathways is capture within Appendix 1 of these minutes.</p>
Defining Multiple Criteria Decision Analysis (MCDA) Weightings for Central Adaptation Area	<p>Stephen Daysh, Mitchell Daysh & Derek Todd</p> <p>This agenda item was only briefly discussed due to time constraints. It was decided that it would be confirmed/agreed by the CAP as homework.</p>
Next Steps	<p>Abbey Morris (KCDC)</p> <p>Reminded the CAP that the upcoming Raumati Adaptation Area Community Values Workshop is the time for CAP to listen to the community and not for CAP to be talking to the community. The purpose is to gather what is important to the Raumati community and to understand how they desire to see their community adapting to RSLR.</p>
Closing Karakia	By Mark

ATTACHMENTS
CAA Adaptation Pathways PowerPoint Presentation
CAA High-level Menu of Pathway Options
Takutai Kāpiti MCDA Weighting Chart
MCDA Scoring Criteria

Appendix 1: CAA Draft Pathways

Pathways Template

Sub-area: 5A Waikanae Beach

All pathways at all timeframes to include “Avoid” option through land-use planning



Management Unit	Pathway	Short term	→	Medium term	→	Long term
Management Unit 5A: Waikanae Beach Open Coast Erosion Unit	Pathway 1	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance)	→	Dune Reconstruction * (Protect – Soft Engineering)	→	Beach Renourishment ⁹ (Protect – Soft Engineering)
	Pathway 2	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Dune Reconstruction ¹⁰ (Protect – Soft Engineering)	→	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Beach Renourishment ⁹ (Protect – Soft Engineering)	→	Sea wall ¹¹ (Protect – Hard Engineering)
	Pathway 3	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Dune Reconstruction ¹⁰ (Protect – Soft Engineering)	→	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Beach Renourishment ⁹ (Protect – Soft Engineering)	→	Detached Breakwater ¹⁴ (Protect – Hard Engineering)
	Pathway 4	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Dune Reconstruction ¹⁰ (Protect – Soft Engineering)	→	Sea wall ¹¹ (Protect – Hard Engineering)	→	Retreat ⁸
	Pathway 5	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Dune Reconstruction ¹⁰ (Protect – Soft Engineering)	→	Detached Breakwater ¹⁴ (Protect – Hard Engineering)	→	Retreat ⁸
	Pathway 6	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Dune Reconstruction ¹⁰ (Protect – Soft Engineering) (Enhance)	→	Retreat ⁸	→	Retreat ⁸

Pathways Template

Sub-area: 5B Waikanae Beach

All pathways at all timeframes to include “Avoid” option through land-use planning



Management Unit	Pathway	Short term	→	Medium term	→	Long term
Management Unit 5B: Waikanae Beach Inundation Unit	Pathway 1	Status Quo ¹ and Community Education and Emergency Management ⁴	→	Status Quo ¹ and Community Education and Emergency Management ⁴	→	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)
	Pathway 2	Status Quo ¹ and Community Education and Emergency Management ⁴	→	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Additional Hard Protection (e.g. Stopbanks ¹² , Culverts ¹³ , Pumpstations ¹⁵) (Protect)
	Pathway 3	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Elevate floor levels of buildings ⁷ + Flood proofing buildings and infrastructure ⁵ (Accommodate)
	Pathway 4	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Elevate floor levels of buildings ⁷ + Flood proofing buildings and infrastructure ⁵ (Accommodate)	→	Retreat ⁸
	Pathway 5	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Additional Hard Protection (e.g. Stopbanks ¹² , Culverts ¹³ , Pumpstations ¹⁵) (Protect)	→	Retreat ⁸

Pathways Template

Sub-area: 6A & B Waikanae Estuary

All pathways at all timeframes to include “Avoid” option through land-use planning



Management Unit	Pathway	Short term	→	Medium term	→	Long term
Management Unit 6A & B: Waikanae Estuary Erosion and inundation Unit	Pathway 1	Status Quo ¹ and Community Education and Emergency Management ⁴	→	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance)	→	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance)
	Pathway 2	Status Quo ¹ and Community Education and Emergency Management ⁴	→	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance)	→	Bank Protection ¹¹ (Protect)
	Pathway 3	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance)	→	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴	→	Bank Protection ¹¹ (Protect)
	Pathway 4	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance)	→	Bank Protection ¹¹ (Protect)	→	Bank Protection ¹¹ (Protect)
	Pathway 5	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance)	→	Retreat ⁸ (retreating recreational infrastructure to make way for wetland migration)	→	Retreat ⁸ (retreating recreational infrastructure to make way for wetland migration)

Additional notes:

- Bank protection would be made of the same material listed under menu item 11 (seawall) – either rock, gabions, or concrete, which would run parallel to the bank edge, like a seawall would on the open coast.
- Only other form of hard protection which could be considered is mouth control structures (e.g training walls), but these would act like groynes, which have already been discounted due to down coast effects

Pathways Template

Sub-area: 7B Otaihanga

All pathways at all timeframes to include “Avoid” option through land-use planning



Management Unit	Pathway	Short term	→	Medium term	→	Long term
Management Unit 7B: Otaihanga Inundation Unit	Pathway 1	Status Quo ¹ and Community Education and Emergency Management ⁴	→	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Additional Hard Protection (e.g. Stopbanks ¹² , Culverts ¹³ , Pumpstations ¹⁵) (Protect)
	Pathway 2	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Elevate floor levels of buildings ⁷ + Flood proofing buildings and infrastructure ⁵ (Accommodate)
	Pathway 3	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Elevate floor levels of buildings ⁷ + Flood proofing buildings and infrastructure ⁵ (Accommodate)	→	Retreat ⁸
	Pathway 4	Additional Hard Protection (e.g. Stopbanks ¹² , Culverts ¹³ , Pumpstations ¹⁵) (Protect)	→	Enhance New Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Retreat ⁸
	Pathway 5	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Additional Hard Protection (e.g. Stopbanks ¹² , Culverts ¹³ , Pumpstations ¹⁵) (Protect)	→	Additional Hard Protection (e.g. Stopbanks ¹² , Culverts ¹³ , Pumpstations ¹⁵) (Protect)

Pathways Template

Sub-area: 8A Paraparaumu Beach

All pathways at all timeframes to include “Avoid” option through land-use planning



Management Unit	Pathway	Short term	→	Medium term	→	Long term
Management Unit 5A: Waikanae Beach Open Coast Erosion Unit	Pathway 1	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance)	→	Dune Reconstruction ¹⁰ (Protect – Soft Engineering)	→	Beach Renourishment ⁹ (Protect – Soft Engineering)
	Pathway 2	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Dune Reconstruction ¹⁰ (Protect – Soft Engineering)	→	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Beach Renourishment ⁹ (Protect – Soft Engineering)	→	Sea Wall ¹¹ (Protect – Hard Engineering)
	Pathway 3	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Dune Reconstruction ¹⁰ (Protect – Soft Engineering)	→	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Beach Renourishment ⁹ (Protect – Soft Engineering)	→	Detached Breakwater ¹⁴ (Protect – Hard Engineering)
	Pathway 4	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Dune Reconstruction ¹⁰ (Protect – Soft Engineering)	→	Sea Wall ¹¹ (Protect – Hard Engineering)	→	Retreat ⁸
	Pathway 5 Southern end (special)	Sea Wall ¹¹ (Protect – Hard Engineering)	→	Sea Wall ¹¹ (Protect – Hard Engineering)	→	Retreat ⁸
	Pathway 6	Dune and/or Wetland Resilience ³ , Community Education and Emergency Management ⁴ (Enhance) + Dune Reconstruction ¹⁰ (Protect – Soft Engineering) (Enhance)	→	Retreat ⁸	→	Retreat ⁸

Pathways Template

Sub-area: 8B Paraparaumu Beach

All pathways at all timeframes to include “Avoid” option through land-use planning



Management Unit	Pathway	Short term	→	Medium term	→	Long term
Management Unit 5B: Waikanae Beach Inundation Unit	Pathway 1	Status Quo ¹ and Community Education and Emergency Management ⁴	→	Status Quo ¹ and Community Education and Emergency Management ⁴	→	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)
	Pathway 2	Status Quo ¹ and Community Education and Emergency Management ⁴	→	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Additional Hard Protection (e.g. Stopbanks ¹² , Culverts ¹³ , Pumpstations ¹⁵) (Protect)
	Pathway 3	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Elevate floor levels of buildings ⁷ + Flood proofing buildings and infrastructure ⁵ (Accommodate)
	Pathway 4	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Elevate floor levels of buildings ⁷ + Flood proofing buildings and infrastructure ⁵ (Accommodate)	→	Retreat ⁸
	Pathway 5	Enhance Existing Inundation Protection ² , Dune and/or Wetland Resilience ³ and Community Education and Emergency Management ⁴ (Enhance)	→	Additional Hard Protection (e.g. Stopbanks ¹² , Culverts ¹³ , Pumpstations ¹⁵) (Protect)	→	Retreat ⁸