Minutes:
CAP Meeting – Central Adaptation Area: MCDA Scoring of Shortlisted Pathways

Date: Wednesday, 30 August 2023
Location: Robin's Nest, Ngā Manu Nature Reserve, 74 Ngā Manu Reserve Road, Waikanae (MS teams-link in invite)
Time: 1.00 pm – 6.00 pm

Attendees: Jim Bolger (Chair), Donald Day, Martin Manning, Susie Mills, John Barrett, Melanie McCormick, Moira Poutama, Mark Taratoa, Olivia Bird, Kelvin Nixon, Te Rangimārie Williams, Stephen Daysh, Kate MacDonald, Monique Eade, Damian Debski, Rhys Girvan, Deanna Rudd, Kris Pervan, Jason Holland, Ashlyn Gallagher, Yvonna Chrzanowska, Alfred Lison, Aastha Shrestha and Abbey Morris

Observers: Tim Sutton and Michael Moore

Apologies: Derek Todd, Jerry Mateparae, Iain Dawe, Sandhira Naidoo, Glen Olsen, and Sophie Handford

Agenda Item	Comments
Opening & Introductions	**Opening Karakia** by **John** **Welcome** by **Jim Bolger, Chair** Roundtable introductions from all the attendees
Confirmation of the Minutes	**Confirmation of the Minutes** • Jim motioned to move the minutes. • Susie supported the motion to move the minutes and Don seconded the motion.
Debrief from Raumati Engagement Workshop	**Kris Pervan, KCDC** Kris provided an update and outlined Council's response to the feedback from the Raumati values community workshop. Of note, she: • Informed CAP that the Mayor and Councillors are supportive of CAP's work and acknowledge the value of the work. • Acknowledged the significance of community conversations and the passionate views of some individuals. She noted that this is expected that this kind of passion may be expressed during community engagements. • Mentioned she had discussed, and emphasised, with the Coastal Project team Council officer's role in more comprehensively supporting CAP in future community engagements, particularly related to wellbeing and safety for all attendees - CAP members, members of the community, Elected Members and Council staff. • Shared the Council's proposed changes in response to the feedback received from the community, CAP and Council staff: – RSVPs for workshop sessions. Sign-in will be required at the workshops. – Capping workshop attendance to 40-60 people (depending on venue) in order to run workshops effectively. Additional workshops will be added, if required, based on community interest. – Implementing stronger facilitation and room management techniques, including breaks for food during workshops. – Security will be present at all community engagements. – Ensuring a safe and well-managed environment, especially as the general election approaches. This will include conducting security risk assessments of venues.

	– Providing Council staff and CAP with access to supervision for debriefing and support, considering the potential impact of challenging sessions. • Emphasised that support, including optional counselling, would be available for Council staff who may be impacted by community comments. She reassured CAP that the Council is committed to learning and improving its engagement processes to ensure the safety and well-being of everyone involved (CAP, community and Council staff). • Noted that if anyone has follow-up questions or concerns, they can always touch base with her directly. The Council management team, behind the project, is very open to take on board the feedback and is committed to continuous learning and improvement.
Project Update	**Abbey Morris (KCDC)** • Jacobs is currently working on an addendum to the Jacobs Report, which will include updates to reflect several updates from the IPCC, the NZ SeaRise Programme, and Ministry for the Environment (MfE). • Council will be writing to MfE and DOC due to receiving a range of feedback from the community on the Jacobs Report and concerns of the plausibility versus implausibility of the scenarios that are being used for the project. • The Central Adaptation Area (CAA) community feedback session (currently scheduled for mid-September) will need to be delayed as there will not be time within this CAP meeting to finalise the CAA MCDA scoring of the pathways. Additionally, the MCDA te ao Māori values criterion for the CAA has not yet been scored by mana whenua yet. Abbey will arrange an additional CAP meeting to finalise the MCDA scoring for the CAA.
Overview of Received Feedback on Draft Northern Adaptation Area Pathways	**Stephen Daysh, Mitchell Daysh with support from Coastal Advisors, KCDC** • Stephen ran the CAP through the PowerPoint presentation which gave an overview of the community feedback received for the CAP draft recommended NAA pathways. 29 feedback submissions were received. • Stephen informed CAP that a summary report is being finalised which will be available for CAP before being publicly released. This report will include an appendix containing all the feedback received from the community for reference and full transparency. • Stephen noted that some of the preferences in the community might change given once the economic analysis has been undertaken for the pathways (which will happen towards the end of the project) – like what happened in the Hawkes Bay. Discussion: • Martin commented about the importance of framing questions in future literature concerning psychological perspectives of change. For instance, asking, "What if Cyclone Gabrielle struck your property?" demands a critical approach. • Jim noted that after witnessing the devastation caused by Cyclone Gabrielle, many individuals wanted to retreat by selling their homes. This transition from theoretical discussions to wanting immediate retreat in response to natural disasters is interesting. • Jason pointed out that the Hawke's Bay media also portrayed some land negatively after the event, sparking an ongoing debate about its classification. Some argue it should be deemed unusable, while others believe it remains usable. • Stephen added that in Esk Valley, an area severely impacted, there are coastal communities that should never have been developed. He pointed

	out that whilst some people move along, other lifelong residents are willing to take the risk and return to these properties for rebuilding. People are constrained by the options provided by the Hawke's Bay Regional Council.
Confirming Multiple Criteria Decision Analysis (MCDA) Weightings for Central Adaptation Area	**Stephen Daysh, Mitchell Daysh** • Stephen asked if CAP were ready to confirm the weightings (from draft CAA MCDA Weighting Chart). • Mel commented that whilst she agrees with the comment "speaks to kaitiakitanga" in the te ao Māori values, she will need more time to suggest other comments to put in the column. • CAP confirmed they were comfortable with the weightings. ***The CAP's confirmation of the weightings for the CAA can be found in Appendix 1 of these minutes.***
Multiple Criteria Decision Analysis (MCDA) Assessment of Shortlisted Pathways for Central Adaptation Area	**Stephen Daysh, Mitchell Daysh** • Stephen ran the CAP partially through the PowerPoint presentation until they requested to get to scoring the pathways, due to it being a recap of the CAP's short-listed pathways for the CAA. • Stephen noted that Beach Scraping, as an adaption pathway option for the CAA, has been removed as per the CAP's decision during the 26 July 2023 CAP Meeting. This has been reflected in the material prepared by the TAG for this CAP Meeting, along with an updated CAA High-level Menu of Pathway Options being created. For the CAA, the adaptation option of Soft Engineering Protection will be done in the form of either Dune Reconstruction or Beach Renourishment. **Discussion:** • Kate elaborated that Dune Reconstruction involves either redistributing sand from lower down the beach or importing it from elsewhere. This entails bringing in sediment, building up the dunes, and replanting them. In the case of Beach Renourishment, sediment is placed further down the beach and naturally integrated into the profile through wave actions and sediment redistribution. • John inquired about the level of biosecurity and biodiversity in relation to replenishing efforts. Kate responded that these would be addressed during the detailed conceptual design phase of the consenting process. This includes careful consideration of where the material will come from and how it will be sourced, ensuring that the process is 100% controlled to prevent the introduction of unwanted elements. • Stephen added that resource consents would likely be required before Dune Reconstruction could commence. In some cases, nourishment materials come from areas rich in sand or gravel, some of which may naturally feed the beaches through rivers. Additionally, sand quarries are significant in certain parts of NZ, allowing for local sourcing from the beach. For example, Oriental Bay sources sand from Nelson, Golden Bay – this requires a resource consent. • John commented that impacts on delicate ecosystems should be considered. • Susie asked for clarification on the distinction between enhancement and reconstruction for dune management. She mentioned discussions in Waikanae about dune reconstruction without importing new material, focusing on recontouring. She wanted to know if recontouring falls under "enhance" when considering the materials involved. • Kate clarified that the key distinction between enhancing dunes through the Enhance adaptation option, and Dune Reconstruction through Soft

	Engineering Protection adaptation options, lies in the use of machinery on the beach. Enhance typically involves a more natural approach, such as planting and non-invasive methods. On the other hand, Dune Reconstruction would entail using machinery to build up the dune, especially if the required material cannot be sourced from the nearby surroundings. • Stephen commented that it is very important to make this distinction. • Kate further explained that Dune Recontouring is a form of Dune Reconstruction and the method used would be considered on site-specific basis when it comes to design elements. • Kelvin inquired whether the word “modify” should be used instead of “increase” to describe the Dune Reconstruction adaptation option within the CAA High-level Menu. Kate replied with "modify," explaining that Dune Reconstruction involves altering the volume and elevation of dunes to the extent practical. Therefore the menu wording will be changed accordingly to replace “increase” with “modify”. • Te Rangimārie shared concerns from their iwi engagement regarding dunes and sand. They mentioned historical burial sites for ĀkW along the coast, with kōiwi (human skeletal remains) still being washed up during storms. Additionally, certain areas have sand considered as tāpu with specific cultural significance. They raised concerns about Dune Reconstruction involving sand from other places, potentially conflicting with the cultural importance of local sands. Te Rangimārie emphasised the need to understand the purpose of Dune Reconstruction and its impact on burial sites to inform iwi decisions on its appropriateness as an adaptation option. • Kate explained that Dune Reconstruction is just one of several adaptation options for Soft Engineering Protection. It proves effective when dealing with lower sea level rise (SLR) scenarios where projected future shoreline positions are slightly less impacted. However, for higher SLR scenarios, Dune Reconstruction may become less effective due to increased storm frequency and material loss, making Soft Engineering Protection approaches harder to maintain and more costly. In such cases, the alternatives include Hard Engineering Protection, Retreat, or evaluating the benefits of maintaining the shoreline through Dune Reconstruction. • Te Rangimārie questioned would the purpose be holding the line and protecting what is behind the dunes. This was confirmed as yes. • Jason suggested a way for the CAP's report to Council to capture valuable nuances. He explained that CAP's role isn't solely about recommending pathways to Council without context. CAP can document and highlight points like Te Rangimārie's as important considerations for Council during the implementation of recommendations. This ensures that critical factors aren't overlooked when developing an implementation plan and conducting necessary investigations into the recommendations, even if CAP is not entirely certain about certain recommendations. • Jim supported Jason's idea about providing broader commentary around recommended adaptation options in the CAP’s report. • Stephen added that another way of capturing ĀkW’s concerns was their scoring the CAA pathways against the te ao Māori values criteria. • Jim asked what the long-term projections of SLR is. Kate stated that it is the 0.8 to 1.25 meters SLR range. • Jason noted that the effectiveness of the CAP recommendations would also depend on the specific triggers that drive the second arrow to move between the first adaption option to the second adaptation option within an adaptation pathway.

	• Susie directed a question to the TAG about the scientific aspect of how seawalls interrupt streams and redirect them back into the river. Kate responded by explaining that around seawall ends, there is target of energy. For example, at QEII Park from Raumati South, this can be addressed through careful design, consenting process, and efforts to minimise adverse effects. • Te Rangimārie inquired about what the term "along the front of settlement" covers as part of the definition attributed to the seawall pathway within the PowerPoint presentation – eg slide 13. Kate clarified that it refers to the general term for area in front of the properties and encompasses the entire Erosion Unit area, which is quite densely built up. • Te Rangimārie conveyed the strong opposition to hard engineering solutions expressed during iwi engagement, particularly around river mouths. She emphasised that seawalls are unattractive to ĀkW and raised concerns about the fairness of using ratepayer funds to alter the Waimeha Stream mouth and install seawalls, which seem to provide protection for only a few properties. • Stephen acknowledged the context provided by Te Rangimārie, recognising that seawalls may not be an appropriate consideration for certain areas. • Kate explained that a general approach has been taken with an engineering perspective. The MCDA scoring process looks at ways an adaptation option and adaption pathway relate to values including te ao Māori values. • Jim reiterated that the primary purpose of the CAP is to enhance security rather than maintain the status quo. • Stephen asked a follow-up question to Kate, seeking clarification on whether the Waimeha Stream would still flow into the sea if a seawall was constructed. Kate responded that the stream would continue to flow into the sea given design consideration, and that significant consideration of the dynamic stream environment would need to be considered as part of a design. Kate noted that the effectiveness of pathways for the MCDA scoring has been analysed based on a seawall not blocking the steam. • Kate emphasised that the purpose of the detached breakwater is to break the waves into different vortices, preventing them from directly attacking the beach. This layered structure helps disperse wave energy and facilitates the deposition of materials behind the breakwater, ultimately creating salient beaches that are beneficial for recreational purposes. However, these changes may lead to morphological alterations to the beach which CAP may also wish to consider. • Kate explained that for Management Unit 5A: Waikanae Beach (erosion unit) for Pathway 4, this shows an example where choosing Enhance would involve building up natural interventions to the dunes to the best capability. But if the beach does not respond as expected due to faster SLR, and the community wishes to stay, then a hard protection intervention like seawall could be constructed. If seawall maintenance costs become unaffordable, then further intervention in the form of retreat could occur. The transitions between these adaption options within this pathway would be guided by the signals, triggers and thresholds which the CAP will look into later in the project. • John asked CAP about the extent of their recommendations and their long-term effectiveness. Jim responded that there would not be black and white answer to that as CAP has got fairly broad mandate. Kelvin responded that it would be determined by the scoring. • Damian elaborated further, explaining that one aspect of scoring involves assessing the effectiveness of the measures. While there may be some

	uncertainties as the process evolves, the overarching goal is to design appropriate solutions. • Kelvin stressed that much depends on RSLR and emphasised the need for, and importance of, an ongoing review process. • Kate added that a pathway which contains retreat might score high in terms of effectiveness because retreat removes all the residual risk. But when the costs are factored in, CAP might reconsider spending a significant financial amount building a seawall in the short- or medium-term if retreat is the long-term adaptation option. • Martin suggested that the concept of seawall (design) might be outdated and potentially deceptive, unless better ways to approach is recognised. • Abbey clarified that post-CAP recommendations, it is anticipated that Council would consider designs to implement adaptation options including possibly seawalls. The CAP's recommendations are to be high level and not to specify a particular type of seawall if the CAP wish to recommend a seawall. As time goes on, new advancements and better-designed (modern/ state of the art) seawalls may be designed in the future. • Jason suggested the CAP's recommendation report could include a note to Council, acknowledging the possibility of unexplored hard protection options that CAP didn't fully explore. CAP could encourage Council to consider these alternative options as an explanatory note alongside their primary recommendations. • Stephen asked if there are images of model seawalls, like those in the Netherlands and Petone. Kelvin and Yvonna mentioned they could find out the name of the company that designed the seawall in Nelson/Petone. • Kate suggested viewing seawalls in an aspirational sense, highlighting their potential for creating recreational pathways along the top, where it's acceptable to have some narrowing of the beach. CAP can recommend to Council that they adopt an aspirational approach, such as incorporating ecological features like tetra blocks within seawalls. Kate emphasised that seawalls should be seen as trying to hold the line and stay in place. • Kelvin raised the question of whether using the term "seawall" creates a mental block for people and if there's a more favourable way to refer to it. • Damian responded by mentioning that there are other explored options and innovative ways to describe them. • Stephen added some assumptions come with costs that also need to be considered. • Abbey highlighted the importance of providing specific names for high-level information that CAP uses to make decisions. She mentioned the need to use non-technical definitions of adaptation options that people can recognise as part of the CAP recommendations, especially when seeking feedback from the community. • Yvonna mentioned that CAP isn't the designer and stressed the need for technical expertise given the various protection options, including hard or soft protections (e.g., multiple types of seawalls). She suggested CAP to take an aspirational approach, encouraging them to prioritise ecological and cultural benefits in protection designs, which may lead to innovative concepts. Stephen, in agreement with Yvonna, suggested that Kate share examples of seawall designs for the CAP's benefit.
TEA BREAK	
MCDA Assessment Continued…	**Stephen Daysh, Mitchell Daysh with support from Yvonna Chrzanowska, KCDC** *Focusing on the following criteria:*

	• *Community Social and Economic Wellbeing* • *Public Access and Recreation* Yvonna walked the CAP through the commentary regarding the impacts of pathways for the human domain criteria. Discussion: • Martin highlighted the need for critical groundwater analysis in specific areas. He mentioned that in lower-lying areas with lagoons, heavy rain can result in surface water taking up to 4 to 5 days to recede. This leads to flooding of homes before erosion occurs and people losing access before they lose their properties. Martin pointed out the interconnection between these issues and stressed the importance of thorough groundwater analysis in these areas. • Stephen agreed with Martin and Jim asked if Council are looking into groundwater issues. Jason responded that he has discussed with the Council Infrastructure team regarding when the timing of the flood modelling will be completed. There is still uncertainty about the expected completion date. He anticipates that the technical work should be finished by the end of the year. However, the process doesn't end there; the results will need to be communicated to the community to ensure they make sense to people and reflect their expectations. This community engagement regarding the flood modelling would be covered by the Infrastructure team. • Jason added that Council has a Flood Risk Plan Change in its forward work program, which may be notified a bit later than initially planned, possibly in 2026 subject to future Council decision-making. He noted that flood risk maps are already included in the Operative District Plan and these maps and their associated rules provide a modern planning framework for managing risks. • Jason elaborated that the work completed by Jacobs includes bathtub modelling of inundation in the adaptation areas which is within the CAP's scope. While the bathtub modelling may not be as sophisticated as the AWA modelling, it still provides valuable data for CAP to work with. • Damian pointed out for Kāpiti, there are challenges regarding flood risk in certain areas as the flooding can result from multiple sources for one place. He explained that the simple bathtub modelling aims to demonstrate susceptibility to flooding, likely from storm sources. However, areas are also prone to high groundwater levels during heavy rainfall, mainly because the stormwater system cannot handle it, in addition to rising sea levels. Damian supported the inclusion of commentary in CAP's recommendation report highlighting the issues and the significance of groundwater as a source of flooding, as well as the importance of groundwater monitoring. • Melanie commented that upon reflecting her position on the CAP (as an iwi representative) she believes she is not in the best place to represent the community. So, she'd like to reserve her vote in the MCDA scoring within this CAP meeting if that's within her rights to do at this point in time. Jim said that she is well within her rights to do so. • Yvonna shared breakwaters can change beach conditions such as beach narrowing, affecting beach access at high tides and that beach renourishment can also increase recreational injuries. Olivia asked about the risk of a steeper shore break in Waikanae and Yvonna noted that would likely be assessed in the design and implementation. • Kelvin suggested changing the wording from 'Managed Retreat' to 'Planned Relocation'.

	• Regarding retreat in Waikanae, Susie noted retreat could also mean that areas that have been retreated, could be turned into recreational value areas such as parks. ***The CAP's scoring of these two criteria can be found in Appendix 2 of these minutes.***
TEA BREAK	
MCDA Assessment Continued…	**Stephen Daysh, Mitchell Daysh with support from Yvonna Chrzanowska, KCDC Continued…** *Focusing on the following criteria:* *• Community Social and Economic Wellbeing* *• Public Access and Recreation* Discussion continued: • For Management Unit 8A Paraparaumu Beach (erosion) Pathway 6 (Enhance & Protect Package, Retreat, Retreat), CAP noted that Paraparaumu Beach is a different geographic location than Waikanae Beach when thinking about Retreat. Susie noted there is more infrastructure in Paraparaumu Beach, such as the skatepark and public recreational areas, and that houses are not as close to the beach as in Waikanae Beach.
MCDA Assessment Continued…	**Stephen Daysh, Mitchell Daysh with support from Monique Eade, Jacobs** **Focusing on the Regulatory consenting and policy risk criterion.** *Work on this criterion was deferred to an additional CAP meeting due to timing restrictions.*
MCDA Assessment Continued…	**Stephen Daysh, Mitchell Daysh with support from Rhys Girvan, Boffa Miskell** Rhys walked the CAP through the commentary regarding the impacts of pathways for the landscape criterion. ***The CAP's scoring of these two criteria can be found in Appendix 2 of these minutes.***
MCDA Assessment Continued…	**Stephen Daysh, Mitchell Daysh with support from Ashlyn Gallagher, KCDC** **Focusing on the Ecology criteria.** *Work on this criterion was deferred to an additional CAP meeting due to timing restrictions.*
MCDA Assessment Continued…	**Stephen Daysh, Mitchell Daysh with support from Damian Debski, Jacobs** **Focusing on the Effectively manages the risks of coastal inundation criterion.** *Work on this criterion was deferred to an additional CAP meeting due to timing restrictions.*
Next Steps	**Abbey Morris (KCDC)** It was determined that additional CAP workshop was required to finalise the CAP's scoring of the Central Adaptation Pathways,
Closing Karakia	By **John**

ATTACHMENTS
Updated CAA High-level Menu of Pathway Options
CAA Shortlisted Pathways for MCDA Assessment PowerPoint Presentation

ACTIONS		
	Kate to prepare a list of examples of seawall designs	

Takutai Kāpiti.

Kāpiti Coast DISTRICT COUNCIL
Me Huri Whakamuri, Ka Titiro Whakamua

Appendix 1: Takutai Kāpiti: Central Adaptation Area MCDA Weighting Chart

	#	Criteria	Description	Weighting	Key Reasons
Impact Criteria	1.	**Ecology**	▪ Impact or enhancement on indigenous biodiversity values and habitat; and ecosystem functioning within the coastal environment and surroundings. ▪ Ability to protect the natural adaptive capacity of the ecosystem.	3	▪ Important to conserve ecosystems and they protect other criteria such as natural landscape, economy, social ▪ Maintenance of ecology directly relates to te ao Māori values ▪ Ecology is another form of soft engineering ▪ Aligns with CAA objective ▪ Ecology was important to the CAA community
	2.	**Landscape**	▪ Impact on the natural character of coastal environment and surroundings. ▪ Aesthetic outcomes of implementing the option and the meaning of this to the community. ▪ Ability to protect the natural adaptive capacity of natural character.	2	▪ Structures are not always there forever – they come and go. ▪ Temporary/transitionary nature – changes over time ▪ Function over form
	3.	**Te ao Māori values**	▪ Impacts on or enhancement of the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga. ▪ Maintains access to, and enables the carrying out of customary activities, such as mahinga kai.	3	▪ Speaks to kaitiakitanga
	4.	**Community Social and Economic Wellbeing**	▪ The community has choice around: • Health and safety of the community • Certainty around future of community • Social cohesion within the community • Maintain the insurability of personal assets.	3	▪ Contributes to wellbeing of future generations ▪ Gives a sense of purpose and hope ▪ Speaks to the community at large ▪ This criteria is supported by a range of other highly rated criteria eg ecology, te ao Maori, landscape ▪ Community commented that there is the wellbeing link with

					being able to access nature ▪ Keeping people safe ▪ Mana enhancing
	5.	**Public Access and Recreation**	▪ Wider community/district use of the coastal environment ▪ Opportunities for recreation ▪ Public access to the coastal environment	3	▪ Access to the beach was the most requested topic by the community ▪ Core part of the CAA objective
Technical Criteria	**6.**	**Regulatory consenting and policy risk**	▪ Regulatory consenting and policy risks of implementing an option including: - Consenting requirements; - District plan changes; and - Consistency with statutory framework. - Carbon footprint associated with the pathway.	1	▪ The goal is the solutions not the ease of getting the pathways in place ▪ Need to do the best options – so be it if extra work is needed to get these pathways into action
	7.	**Effectively manages the risks of coastal erosion**	▪ Effectively manages the risks of Coastal Erosion. ▪ Proportionate to the nature and scale of the risk over time. ▪ Avoids the exacerbation of risk in other areas. ▪ Approaches are supported by best practice and a robust consideration of the science/Mātauranga	3	▪ Heart of the exercise/project ▪ Access to the beach and te ao Māori values have high ranking for protection from coastal erosion. ▪ CAA is accreting currently ▪ High risk of erosion impacting houses, infrastructure, ecology, assets and people for NAA
	8.	**Effectively manages the risks of coastal inundation**	▪ Effectively manages the risks of Coastal Flooding. ▪ Proportionate to the nature and scale of the risk over time. ▪ Avoids the exacerbation of risk in other areas. ▪ Approaches are supported by best practice and a robust consideration of the science/Mātauranga	3	▪ Heart of the exercise/project ▪ There are lots of areas within the CAA that are exposed to inundation ▪ Inundation causes higher impacts across all domains within the CAA

	Guidance • All criteria must be 'weighted' on a scale of 1 to 3 (no half numbers) • Weightings are assigned to reflect relative importance between criteria • All criteria are important – wouldn't be included if they weren't • Weightings reflect that while all criteria are important, they are not all equally important to the task at hand • The Panel must debate and ultimately agree which weighting to apply to each criteria

Takutai Kāpiti.

Kāpiti Coast DISTRICT COUNCIL
Me Huri Whakamuri, Ka Titiro Whakamua

Appendix 2: CAP's MCDA Scoring of CAA Pathways (partially completed)

MCDA Criteria/Weighting

	CAP Weighting	Ecology	Landscape	Community Social and Economic Wellbeing	Public Access and Recreation	Regulatory consenting and policy risk	Effectively manages the risks of coastal erosion	
		3	2	3	3	1	3	Weightings TBC by CAP

MCDA Scoring

Pathways for Waikanae Beach

Management Unit	Pathways	Pathway Descriptions			Ecology		Landscape		Community Social and Economic Wellbeing		Public Access and Recreation		Regulatory consenting and policy risk		Effectively manages the risks of coastal erosion		Weighted MCDA Total Score:	RAW MCDA Total Score:
		Short term	Medium term	Long term	Score	Notes	Score	Notes	Score	Notes	Score	Notes	Score	Notes	Score	Notes		
Waikanae Unit 5A	1	**Enhance** - Dune and wetland resilience, community education and emergency management	**Soft Engineering** - Dune reconstruction	**Soft Engineering** - Beach renourishment		• Enhancement of existing native populations will likely initially promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Soft engineering through beach renourishment **and** dune reconstruction may disrupt bird habitats and shellfish populations but can modify and enhance habitats in the form of enhanced dunes for beach flora and fauna. • Beach renourishment projects however have found negative ecosystem effects on terrestrial communities following renourishment in the short and medium term due to the stress on species from the repetitive nature of infilling, and any cascading impacts up the food web from mortality associated with sediment fill.	4	• Initial enhancement of dunes and wetland areas will maintain existing open sand beach and vegetated dune context and associated natural character and open coastal edge. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Ongoing implementation of soft engineering would continually disrupt natural patterns and processes, but otherwise maintain an open dynamic coastline influenced by existing settlement with little change in context of present day.	4	• Increasing **dune resilience** over short term aligns with stated community values. If community is actively included in implementation, it could promote social and economic wellbeing, as well as enhance social cohesion & health outcomes. • Over medium-long term, the community may need further information on **dune reconstruction** option (eg. evidence of suitability, effectiveness, costs & engagement) before supporting. • In the long term, the ongoing beach monitoring required to assess the ongoing success of **beach renourishment**, could potentially be done at the local/community level, if they are given appropriate training and technology. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	4	• Short term **dune resilience** will maintain the natural amenity and landscape values of the coastal environment. • Ongoing **dune maintenance and protection** in medium and longer term is likely to further benefit ecosystems, foster nature appreciation & supports community values. • Both the medium (**Dune reconstruction**) and long term options **(beach renourishment**) may temporarily impact access during construction, but overall, public access to the coastal environment will be maintained. • Recreation that damages dunes needs to be restricted to protect ecosystems & encourage dune stability. Beach renourishment can result in changes to the beach profile and increased swimmer injuries, eg. steeper, more dangerous shore break.	3	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the medium and long term will have some consenting requirements and may be challenged but is aligned with the current statutory framework.	3	• Dune enhancement and reconstruction are both effective measures that are proportionate to the nature and scale of risk over the short-medium term. • If designed and managed properly, is likely to effectively manage impacts under lower SLR scenarios. • Design would be informed by best practise. • Some uncertainty around the effectiveness of renourishment in the long term under higher SLR scenarios, as would require significant sand source input. • Would not exacerbate erosion issues in adjacent areas, southward transport of sediment used for renourishment would have added benefit to Paraparaumu Beach.	**50**	20
	2	**Enhance** - Dune and wetland resilience, community education and emergency management AND **Soft Engineering** - Dune reconstruction	**Enhance** - Dune and wetland resilience, community education and emergency management AND **Soft Engineering -** Beach renourishment	**Protect - Hard Engineering** - Sea wall		• Enhancement of existing native populations will likely initially promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Soft engineering through beach renourishment and dune reconstruction may disrupt bird habitats and shellfish populations but can modify and enhance habitats in the form of enhanced dunes for beach flora and fauna. • Beach renourishment projects however have found negative ecosystem effects on terrestrial communities following renourishment in the short and medium term due to the stress on species from the repetitive nature of infilling, and any cascading impacts up the food web from mortality associated with sediment fill. • Ongoing sea wall protection however has the potential to reduce ecology by damaging beach, dune, and estuary ecology, and overall may support lower biodiversity and prevent the natural migration of habitats.	2	• Dune and wetland enhancement combined with soft engineering will initially maintain existing open sand beach and vegetated dune context along the coastal edge but with ongoing disruption to natural patterns and processes which will likely reduce natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Eventual introduction of seawall will modify the existing open beach profile and dune sequence and reduce natural character, resulting in potential longer term adverse landscape effects.	4	• Over the short and medium term, increasing **dune resilience** aligns with stated community values. If community is actively included in dune resilience/enhancement activities, it will promote social and economic wellbeing, as well as enhance social cohesion & health outcomes. Community may need further information on **dune reconstruction** option (eg. evidence of suitability and effectiveness, costs & engagement) before supporting. • In medium-long term, the community may require further information on effectiveness, costs and suitability of the **beach renourishment** and long term **seawall** options, prior to acceptance and/or implementation. • The ongoing beach monitoring required to assess the success of beach renourishment, could potentially be done at the local/community level, if they are given appropriate training and technology. • Insurability of personal assets will be determined by insurance companies *(based on own site specific risk assessment).*	3	• This short-med term **dune resilience & dune reconstruction** option will maintain the natural appeal of the coastal environment. Ecosystem protection could enhance community values and foster nature appreciation. • Public access to the coastal environment will be maintained. Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stability. • The long term **seawall** option may contribute to beach narrowing which may restrict public access to beach at high tides. However, seawall could potentially be designed to incorporate amenity / recreational value. • During seawall construction, public access to beachfront nay be temporarily restricted.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the short and medium term will have some consenting requirements and may be challenged but is aligned with the current statutory framework. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Hard-engineering approaches trigger more stringent consenting requirements and are discouraged under the NZCPS and RPS because of the adverse effects they can have on the environment. • Consenting a new structure is likely to be more challenging than upgrading an existing structure.	4	• Dune enhancement and reconstruction are both effective measures that are proportionate to the nature and scale of risk over the short-medium term. • Some uncertainty around the effectiveness of renourishment in the medium term under higher SLR scenarios, as would require significant sand source, but combined with planting and dune management could be effective. • Hard engineering would be effective at preventing further retreat of the shoreline in the long term. • Over the long term, hard engineering may exacerbate the erosion hazard directly to the north and south of the wall due to end effects. • Design would be informed by best practise to reduce these effects but there will be environmental impacts and changes to the beach associated with this option over the longer term (i.e. beach narrowing and loss of volume).	**45**	17
	3	**Enhance** - Dune and wetland resilience, community education and emergency management AND **Soft Engineering** - Dune reconstruction	**Enhance** - Dune and wetland resilience, community education and emergency management AND **Soft Engineering -** Beach renourishment	**Protect - Hard Engineering** - Detached Breakwater		• Enhancement of exisiting native populations would likely promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Beach renourishment projects have found negative ecosystem effects on terrestrial communities following renourishment in the short and medium term due to the stress on species from the repetitive nature of infilling, and any cascading impacts up the food web from mortality associated with sediment fill. • Foreign material fill if it is not of similar size and composition of local material can affect the types of animals which inhibit an areas, disrupt nesting birds, and encourage invasive species to grow if the fill material is optimal for those species. • Most ecological effects from detatched breakwaters would occur in the marine environment (i.e. disturbance and species mortality during installation), however could promote artificially protected conditions that provide a calm environment onshore which can facilitate planting rehabilitation and recovery for present ecology.	3	• Dune and wetland enhancement combined with ongoing disruption resulting through soft engineering will generally maintain existing open sand beach and vegetated dune context with a slight reduction in natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Detached breakwater would likely extend sense of modification into presently open coastal marine areas and disrupt present-day open and unmodified coastal views. The design of the breakwater could potentially reduce the overall scale of effects.	3	• Over the short and medium term, increasing **dune resilience** aligns with stated community values. If community is actively included in dune resilience/enhancement activities, it will promote social and economic wellbeing, as well as enhance social cohesion & health outcomes. • Community may need further information on **dune reconstruction** option (eg. evidence of suitability and effectiveness, costs & engagement) before supporting. • The community may need further information re: **beach renourishment** and long term **detached breakwater** options (effectiveness, costs, etc) prior to supporting. • The ongoing beach monitoring required to assess the success of **beach renourishment**, could potentially be done at the local/community level, if they are given appropriate training and technology. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• This short-med term **dune resilience** and **reconstruction** option will maintain the natural appeal of the coastal environment. Ecosystem protection could enhance community values and foster nature appreciation. • Public access to the coastal environment will be maintained. Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stabliility. • The long term **breakwater** option may change beach conditions, eg. beach narrowing (may restrict public access to beach at high tides). • During breakwater construction, public access to beachfront nay be temporarily restricted.	1	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the short and medium term will have some consenting requirements and may be challenged but is aligned with the current statutory framework. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Hard-engineering approaches trigger more stringent consenting requirements and are discouraged under the NZCPS and RPS because of the adverse effects they can have on the environment. • Consenting a new structure is likely to be more challenging than upgrading an existing structure. • Consenting an offshore structure is likely to be more challenging than a sea wall as the whole coast is recognised as a site of significance for mana whenua and there is greater uncertainty in the effects of the structure. • Parts of Waikanae Beach are scheduled in the Natural Resources Plan for the Wellington Region as containing sites of significance for mana whenua. The area has also been identified as having a significant surf break.	3	• Dune enhancement and reconstruction are both effective measures that are proportionate to the nature and scale of risk over the short term. • Some uncertainty around the effectiveness of renourishment in the medium term under higher SLR scenarios, as would require significant sand source, but combined with planting and dune management could be effective. • Detached breakwater in the nearshore would reduce wave energy approaching the beach, and could be effective at reducing erosion risk in Waikanae Beach. • However, the breakwater will likely result in morphologcal changes to the beach due to reduction in wave energy, and could have some lee-side erosion effects downdrift of the breakwater (e.g. Paraparaumu) as a result of sediment trapping. • The scale and nature of the works required to effectively manage the risk is unlikely to be proportionate to the scale of the hazard. • Design would be informed by best practise.	**34**	13
	4	**Enhance** - Dune and wetland resilience, community education and emergency management AND **Soft Engineering** - Dune reconstruction	**Protect - Hard Engineering** - Sea wall	**Retreat**		• Enhancement of existing native populations will likely initially encourage positive ecological benefits. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Ongoing sea wall protection however has the potential to reduce ecology by damaging beach, dune, and estuary ecology, and overall may support lower biodiversity and prevent the natural migration of habitats. • Retreat while allowing for the natural migration of biodiversity, is going to be occurring in an already altered environment following the placement of a sea wall and present dense urbanisation. This would likely not allow for *naturally occurring* positive ecological benefits and this would need heavy management.	2	• Dune and wetland enhancement combined with soft engineering will generally maintain existing open sand beach and vegetated dune context along the coastal edge but with some ongoing disruption to natural patterns and processes. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Ongoing engineering and introduction of hard structures including a sea wall has potential reduction in natural beach profile which would likely reduce natural character and may result in adverse landscape effects in context of existing settlement. • Retreat would occur in the context of an increasingly modified coastal environment with likely ongoing sense of modification and reduction in natural character.	2	• Over the short term, increasing **dune resilience** aligns with stated community values. If community is actively included in dune resilience / enhancement activities, it will promote social and economic wellbeing, as well as enhance social cohesion & health outcomes. Community may need further information on **dune reconstruction** option (eg. evidence of suitability and effectiveness, costs & engagement) before supporting. • In medium term, the community may require further information on the **seawall** option(eg. effectiveness, costs and suitability, etc), prior to acceptance and/or implementation. • In long term, the community may require assurance and further information on **managed retreat** • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• This short term **dune resilience & dune reconstruction** option will maintain the natural appeal of the coastal environment. Ecosystem protection could enhance community values and foster nature appreciation. While public access to the coastal environment will be maintained, it may be temporarily restricted while **dune reconstruction** works are being done. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stabliility. • The medium term **seawall** option may contribute to beach narrowing which may restrict public access to beach at high tides. However, seawall could potentially be designed to incorporate amenity value/ recreational access. • During seawall construction, public access to beachfront will be temporarily restricted.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the short term will have some consenting requirements and may be challenged but is aligned with the current statutory framework. • Hard-engineering in the medium term will have some consenting requirements and may be challenged. • Hard-engineering approaches trigger more stringent consenting requirements and are discouraged under the NZCPS and RPS because of the adverse effects they can have on the environment. • Consenting a new structure is likely to be more challenging than upgrading an existing structure. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	4	• Dune enhancement and reconstruction are both effective measures that are proportionate to the nature and scale of risk over the short term. • A sea wall in the medium term will hold the shoreline seaward of private proterties and effectively manage the risks. • Hard engineering would be effective at preventing further retreat of the shoreline in the medium term, but may exacerbate the erosion hazard directly to the north and south of the wall due to end effects. • Design would be informed by best practise to reduce these effects but there will be environmental impacts and changes to the beach associated with this option (i.e. beach narrowing and loss of volume). •Retreat in the long term will remove all risk from the erosion hazard to private property; however the sea wall in the medium term would have modified the coastal environment, and therefore either continued maitenance of the sea wall would be required, or signficant rehabilitation to reform the dunes would be required to re-establish protection.	**36**	14

	5	**Enhance** - Dune and wetland resilience, community education and emergency management AND **Soft Engineering** - Dune reconstruction	**Protect - Hard Engineering** - Detached Breakwater	**Retreat**		• Enhancement of existing native populations will likely initially encourage positive ecological benefits. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Most ecological effects from detatched breakwaters would occur in the marine environment (i.e. disturbance and species mortality during installation), however could promote artificially protected conditions that provide a calm environment onshore which can facilitate planting rehabilitation and recovery for present ecology. • Retreat favours ecological restoration by providing habitats for species to recolonise neighbouring areas that may become destroyed.	3	• Dune and wetland enhancement combined with soft engineering will generally maintain existing open sand beach and vegetated dune context along the coastal edge but with some ongoing disruption to natural patterns and processes which will likely reduce natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Detached breakwater would likely extend sense of modification into presently open coastal marine areas and further disrupt existing unmodified views. • Retreat would occur in the context of an increasingly modified coastal environment with likely ongoing sense of modification and reduction in natural character.	2	• The option to increase **dune resilience** over short term aligns with stated community values. If community is actively included in dune resilience / enhancement activities, it will promote social and economic wellbeing, as well as enhance social cohesion & health. Community may need further information on **dune reconstruction** option (eg. evidence of suitability and effectiveness, costs & engagement) before supporting. • In medium term, the community may require further information on the **detached breakwater** option(eg. effectiveness, costs and suitability, etc), prior to acceptance and/or implementation. • In the long term, the community is more likely to support **retreat** if they are assured that suitable land is available to relocate to, are aware of any financial implications. Also, important to ensure that support is in place to promote social and economic wellbeing, and enhance social cohesion & health outcomes. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• This short term **dune resilience and reconstruction** option will maintain the natural appeal of the coastal environment. Ecosystem protection could enhance community values and foster nature appreciation. • While public access to the coastal environment will be maintained, it may be temporarily restricted while dune reconstruction works are being done. Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stabilitity. • The med-term **breakwater** option may change beach conditions, eg. beach narrowing (may restrict public access to beach at high tides). • During breakwater construction, public access to beachfront nay be temporarily restricted. • Long term **retreat** may offer opportunities for ecological restoration of the foredunes and opportunities for managed public access & recreation.	1	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the short term will have some consenting requirements and may be challenged but is aligned with the current statutory framework. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Hard-engineering approaches trigger more stringent consenting requirements and are discouraged under the NZCPS and RPS because of the adverse effects they can have on the environment. • Consenting a new structure is likely to be more challenging than upgrading an existing structure. • Consenting an offshore structure is likely to be more challenging than a sea wall as the whole coast is recognised as a site of significance for mana whenua and there is greater uncertainty in the effects of the structure. • Parts of Waikanae Beach are scheduled in the Natural Resources Plan for the Wellington Region as containing sites of significance for mana whenua. The area has also been identified as having a significant surf break. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	3	• Dune enhancement and reconstruction are both effective measures that are proportionate to the nature and scale of risk over the short term. • Detached breakwater in the nearshore would reduce wave energy approaching the beach, and could be effective at reducing erosion risk in Waikanae Beach. • However, the breakwater will likely result in morphologcal changes to the beach due to reduction in wave energy, and could have some lee-side erosion effects downdrift of the breakwater (e.g. Paraparaumu) as a result of sediment trapping. • The scale and nature of the works for the detached breakwater to effectively manage the risk is unlikely to be proportionate to the scale of the hazard in the medium term. • Design would be informed by best practise. • Retreat in the long term will remove all risk from the erosion hazard to private property.	**31**	12
	6	**Enhance** - Dune and wetland resilience, community education and emergency management AND **Soft Engineering** - Dune reconstruction	**Retreat**	**Retreat**		• Enhancement of existing native populations will likely initially encourage positive ecological benefits. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Retreat favours ecological restoration by providing habitats for species to recolonise neighbouring areas that may become destroyed however this will be occurring in an already highly urbanised environment so may take sufficient time and require active management as this is unlikely to occur naturally.	4	• Dune and wetland enhancement combined with soft engineering will generally maintain existing open sand beach and vegetated dune context along the coastal edge but with some ongoing disruption to natural patterns and processes which will likely reduce natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Retreat would occur in the context of adjoining dune restoration and within more modified urban environment with potential ongoing opportunities to restore natural character.	1	• The option to increase **dune resilience** over short term aligns with stated community values. If community is actively included in dune resilience / enhancement activities, it will promote social and economic wellbeing, as well as enhance social cohesion & health. Community may need further information on **dune reconstruction** option (eg. evidence of suitability and effectiveness, costs & engagement) before supporting. • In medium-long term, the community is more likely to support **retreat** if they are assured that suitable land is available to relocate to, & are aware of any financial implications. Also, important to ensure that support is in place to promote social and economic wellbeing, and enhance social cohesion & health outcomes. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	3	• This short term **dune enhancement** options will maintain the natural appeal of the coastal environment and ecosystem protection could enhance both community and environmental values and foster nature appreciation. • While public access to the coastal environment will be maintained, it may be temporarily restricted while **dune reconstruction** works are being done. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stabilitity. • The med-long term option for **retreat** could allow opportunities for land to be incorporated into public space. This could allow for continued ecological restoration, and recreation and public access could be planned for (prior to the actual relocation of affected properties).	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the short term will have some consenting requirements and may be challenged but is aligned with the current statutory framework. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat this could make managed retreat more challenging in the medium term. • Managed retreat currently requires regional and district plan changes to implement.	5	• Effectively manages the risks of coastal erosion over time, and takes actions in the short term to reduce risks over that period and increase the timeframe before retreat would be required. •Enhancement and dune recontouring will be proportionate to the scale of risk in the short term. •There will be no exacerbation of erosion risks on adjacent areas from short term actions in this pathway. • Retreat of beachfront properties would result in total removal of risk to those individuals from erosion, and would be proportionate to the nature and scale of the risk to those impacted.	**43**	17
Waikanae Unit 5B	**1**	**Status Quo** AND Community Education and Emergency Management	**Status Quo** AND Community Education and Emergency Management	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management		• A significant amount of ecology across the Waikanae area is presently at risk under flooding scenarios and with the status quo will continue to decline. Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Long term enhancement of existing stopbanks in Waikanae will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds.	3	• More frequent flooding would likely extend coastal environment inland and disrupt existing more modified landscape values within the present day coastal context. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Enhancement of existing inundation protection plus dune and wetland enhahcnement occurs in context of existing modification with limited consequent change to natural character.	2	• In the short and medium term, maintaining existing dunes and current infrastructure aligns with community values. However, with 10% of Waikanae properties likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5), a **Status Quo** approach may not be tolerated by the community - engagement on medium term status quo approach may be needed. • Ongoing education and increased awareness of risk will ensure community preparedness. E.g. Landowners may need to be supported to identify dwellings at risk from inundation and to undertake proactive efforts on dwellings to accomodate risks to health and safety. Likely to be made on a case-by-case basis. • In the long term, **enhanced inundation protection** may provide the community with some assurance. Improved **dune and/or wetland resilience** aligns with community values, with potential social and/or economic benefits. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• In the short-medium term, infrastructure will be maintained & public access to recreation areas will continue subject to any public safety issues, eg. due to required maintenance, health risks or flood events. • To maintain goodwill and support for adaptation options, the community will need to be informed on changes to public access and why. • Ongoing education and increased awareness of risk will ensure community preparedness. • In the long term, increased inundation protection may restrict access to some areas while works are being undertaken.	5	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term.	1	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk.	**35**	16
	2	**Status Quo** AND Community Education and Emergency Management	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and ccommunity education and emergency management	**Protect -** Additional Hard Protection **-** e.g. stopbanks, Culverts and Pump stations		• Current ecological systems are presently under threat and may decline in the short term under status quo. • Long term enhancement of existing stopbanks in Waikanae will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margins through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat. • Hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Increased hard walls along rivers and streams can deter migratory and spawning fish and nesting habitats for migratory birds from these sites due to no natural shady habitat present along banks, and can result in abrupt shifts from freshwater to estuarine communities of which native fish are particularly sensitive to.	3	• More frequent flooding would likely extend coastal environment inland and disrupt existing more modified landscape values within the present day coastal context. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Enhancement of existing inundation protection plus dune and wetland enhahcnement occurs in context of existing modification with limited consequent change to natural character. • Introduction of hard structures and bank protection may reduce natural character with adverse landscape effects in context of existing settlement.	2	• In the short term, maintaining existing dunes and current infrastructure aligns with community values. However, with 10% of Waikanae properties likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5), a Status Quo approach may not be tolerated by the community - engagement on medium term status quo approach may be needed. • Ongoing education and increased awareness of risk will ensure community preparedness. E.g. Landowners may need to be supported to identify dwellings at risk from inundation and to undertake proactive efforts on dwellings to accomodate risks to health and safety. Likely to be made on a case-by-case basis. • In the medium term, enhanced inundation protection may provide the community with some assurance. Improved dune and/or wetland resilience aligns with community values, with potential social and/or economic benefits. In the long term, **additonal hard protection** may provide the community with further assurance during flood events. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	3	• In the short-medium term, infrastructure will be maintained & public access to recreation areas will continue subject to any public safety issues, eg. due to required maintenance, health risks or flood events. • To maintain goodwill the community will need to be informed on changes to public access and why. • Ongoing education and increased awareness of risk will ensure community preparedness and response during flood events. • In the long term, **additional hard protection** may restrict access to some areas while works are being undertaken.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Stopbank, floodgates, pump station and culverts trigger the NPS-FM and NES-F and may trigger the NZCPS depending on location. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Consenting a new structure is likely to be more challenging than upgrading an existing structure.	1	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk.	**38**	15
	3	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and ccommunity education and emergency management	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Accommodate -** Elevate floor levels of buildings and flood proofing buildings and infrastructure		• Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Waikanae will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds. • The introduction of accommodating for hazards is likely to neither positively or negatively impact flora and fauna if best practice is followed which can allow for natural migration of existing species.	3	• Enhancement of existing inundation protection plus wetland and dune reslience occurs in context of existing modification with limited consequent change to natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Accommodating buildings and infrastructure in flood prone areas would occur in context of existing modification with likely localised landscape impacts.	3	• In the short -medium term, **enhanced inundation protection** aligns with community values. Inundation protection could provide the community with some assurance. Improving **dune and/or wetland resilience** aligns with community values, with potential social and/or economic benefits. • **Ongoing community education** and increased awareness of risk will ensure community preparedness. E.g. Landowners may need to be supported to know how to respond to flood risk and to identify dwellings at risk and undertake proactive accomodation efforts to reduce risks to health and safety. • In the long term **Accomodate** allows homeowners to plan for and choose effective flood mitigation measures relative to affordability & whether they have continued access to roading & critical infrastructure. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	4	• In the short-medium term, public access to recreation areas will continue subject to any public safety issues, eg. health risks or flood events. **Enhanced inundation protection** or required infrastructure maintenance, may restrict access to some public areas while works are being undertaken. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • Ongoing education and increased awareness of risk will ensure community preparedness. • In the long term, most **Accomodat**e options are unlikely to impact public access and recreation.	5	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Elevating buildings and flood proofing will have building consent (and possibly resource consent) requirements. Given the anticipated timeframe of this action this may occur naturally with the turnover of buildings. Consenting hurdles are not anticipated.	1	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk.	**44**	19

	4	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Accommodate -** Elevate floor levels of buildings and flood proofing buildings and infrastructure	**Retreat**		• Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Waikanae will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds. • The introduction of accommodating for hazards is likely to neither positively or negatively impact flora and fauna if best practice is followed which can allow for natural migration of existing species. • Retreat favours ecological restoration by providing habitats for species to recolonise neighbouring areas that may become destroyed, however this is going to occur in an altered heavily urbanised area and is unlikely to naturally provide ecological benefits without intensive management.	3	• Enhancement of existing inundation protection plus wetland and dune reslience occurs in context of existing modification with limited consequent change to natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Accommodating buildings and infrastructure in flood prone areas would occur in context of existing modification with likely localised landscape impacts. • Retreat may offer ability to restore natural character and promote beneficial landscape outcomes in the longer term.	2	• In the short term, **enhanced inundation protection** aligns with community values. This option could provide the community with some assurance. Improving **dune and/or wetland resilience** aligns with community values, with potential social and/or economic benefits. • Ongoing community education and increased awareness of risk will ensure community preparedness. E.g. Landowners may need to be supported to know how to respond to flood risk and to identify dwellings at risk and undertake proactive accomodation efforts to reduce risks to health and safety. • In the medium term **Accomodate** allows homeowners to plan for and choose effective flood mitigation measures relative to affordability & whether they have continued access to roading & critical infrastructure. • In the long term affected homeowners and Councils can plan for **Retreat** (eg. relocatable homes, spatial planning, level of infrastructure maintenance, etc). • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	3	• In the short term, public access to recreation areas will continue subject to any public safety issues, eg. health risks or flood events. **Enhanced inundation protection** or required infrastructure maintenance, may restrict access to some public areas while works are being undertaken. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • Ongoing education and increased awareness of risk will ensure community preparedness. • In the medium term, most **Accomodate** options are unlikely to impact pubic access and recreation. • In the long term, **retrea**t may provide opportunities for land to be aquired for ecological restoration or managed public access for low impact recreation.	3	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Elevating buildings and flood proofing will have building consent (and possibly resource consent) requirements. Given the anticipated timeframe of this action this may occur naturally with the turnover of buildings. Consenting hurdles are not anticipated. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	2	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk. • Only a small number of houses that were retreated for flood hazard would also be impacted by erosion hazard.	**39**	16
	5	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Protect -** Additional Hard Protection **-** e.g. stopbanks, Culverts and Pump stations	**Retreat**		• Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Waikanae will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and alter existing habitat for migratory and spawning fish species, and habitats for migratory birds. • Hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Increased hard walls along rivers and streams can deter migratory and spawning fish from these sites due to no natural shady habitat present along banks, and can result in abrupt shifts from freshwater to estuarine communities of which native fish are particularly sensitive to. • Retreat provides opportunity for ecological restoration, however this would occur in an already modified environment and is unlikely to create any positive ecological benefits if not managed correctly over a sufficient amount of time.	3	• Enhancement of existing inundation protection plus wetland and dune reslience occurs in context of existing modification with limited consequent change to natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Hard protection in the form of stopbanks, culverts and pumpstations would likely reduce natural elements, patterns and processes and reduce natural character. • Retreat offers more limited ability to restore natural character and promote positive landscape outcomes in context of increased modification.	3	• In the short term, **enhanced inundation protection** &improving dune and/or wetland resilience aligns with community values, and has potential social and/or economic benefits. This option could provide the community with some assurance. • Ongoing **community education** and increased awareness of risk will ensure emergency preparedness. E.g. Landowners may need to be supported to know how to respond to flood risk and to identify dwellings at risk and undertake proactive accomodation efforts to reduce risks to health and safety. • In the medium term **additional hard protection** will provide further reassurance in the event of flood events and allow homeowners time to plan for and/or choose other effective avoidance measures. • In the long term affected homeowners and Councils can plan for **Retreat** (eg. relocatable homes, spatial planning, level of infrastructure services, etc). • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	3	• In the short term, public access to recreation areas will continue subject to any public safety issues, eg. health risks or flood events. **Enhanced inundation protection** or required infrastructure maintenance, may restrict access to some public areas while works are being undertaken. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • Ongoing education and increased awareness of risk will ensure community preparedness. • In the medium term, **additional hard protection** options are may impact pubic access and recreation while works are being done. • In the long term, **retreat** may provide opportunities for land to be aquired for ecological restoration or managed public access for low impact recreation.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Stopbank, floodgates, pump station and culverts trigger the NPS-FM and NES-F and may trigger the NZCPS depending on location. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Consenting a new structure is likely to be more challenging than upgrading an existing structure. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	2	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk. • Only a small number of houses that were retreated for flood hazard would also be impacted by erosion hazard.	**44**	17

Waikanae Estuary Pathways

Management Unit	Pathways	Pathway Descriptions			Ecology		Landscape		Community Social and Economic Wellbeing		Public Access and Recreation		Regulatory consenting and policy risk		Effectively manages the risks of coastal erosion		MCDA Total Score:	RAW MCDA Total Score:
		Short term	Medium term	Long term	Score	Notes	Score	Notes	Score	Notes	Score	Notes	Score	Notes	Score	Notes		
Waikanae Estuary Unit 6A and B	1	**Status Quo** AND Community Education and Emergency Management	**Enhance -** Dune and wetland resilience, community education and emergency management	**Enhance -** Dune and wetland resilience, community education and emergency management		• Continuing with the status quo in the short term may see further loss of species in the Waikanae Estuary. There is a risk that migratory and visiting bird species, as well as miratory fish and spawning fish may change their behaviour patterns in response to erosion and inundation events if nothing further is done. • The eventual enhancement of existing native populations will likely promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces. •	4	• Continuing with the status quo in the short term may see further loss of natural character through increasing impacts of erosion and inundation events. • The enhancement of natural elements, patterns and processes, including native vegetation and associated dune and wetland habitats has potential to restore natural character in the medium and longer term. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place.	2	• Continuing with **status quo** in the short term aligns with current community values. However, monitoring of flood events (eg. frequency, social impact, etc) may be needed to align with changes to community tolerance levels. • Ongoing **community education** could focus on ecosytem protection and the role of wetlands and esturaries, ecological benefits, etc. • Education to increase awareness of risk to public safety will ensure emergency preparedness. E.g. particulary if road / footbridge access around the estuary is at risk, or poses a public safety hazard. • In the med-long term, continued **enhancement of dunes and wetland** areas around the estuary, could support community wellbeing and connection to place. • **Emergency management** efforts will need to continue to be bolstered over time to protect public safety, as flood and/or erosion risks increase.	2	• In the short term, **status quo** allows for continued public access to recreation activities in the estuary (and Otaihanga) area. Access may be restricted during maintenance or for safety reasons. • Recreation that negatively impacts dunes or wetlands may need to be restricted. • In the med-long term, more frequent flood events may restrict public access to the estuary, due to public safety concerns or track maintenance. • Existing receation facilities and tracks may need to be relocated to allow continued public access. • Opportunities for nature appreciation eg. bird watching, could be impacted. This depends on the ecological response from animal populations to changing estuarine conditions.	5	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term.	3	• Increasing wetland resilience by planting and management is likely a proportionate response to the scale of hazard within the estuary. • Wetland planting and management likely to help stabilise banks and reduce retreat, but could get washed out in large fluvial events. • Avoids the exacerbation of risk in other areas.	**43**	19
	2	**Status Quo** AND Community Education and Emergency Management	**Enhance -** Dune and wetland resilience, community education and emergency management	**Protect -** Bank protection		• Continuing with the status quo in the short term may see further loss of species in the Waikanae Estuary. There is a risk that migratory and visiting bird species, as well as miratory fish and spawning fish may change their behaviour patterns if nothing further is done. • The eventual enhancement of existing native populations will likely promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Increased hard walls along rivers and streams can deter migratory and spawning fish from these sites due to no natural shady habitat present along banks, and can result in abrupt shifts from freshwater to estuarine communities of which native fish are particularly sensitive to.	2	• Continuing with the status quo in the short term may see further loss of natural character through increasing impacts of erosion and inundation. • The enhancement of natural elements, patterns and processes, including native vegetation and associated dune and wetland habitats has potential to restore natural character in the medium and longer term. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Introduction of hard structures and bank protection may reduce natural character with adverse landscape effects in context of existing settlement.	2	• Continuing with **status quo** in the short term aligns with current community values. However, monitoring of flood events (eg. frequency, social impact, etc) may be needed to align with changes to community tolerance levels. • Ongoing **community education** could focus on ecosytem protection and the role of wetlands and esturaries, ecological benefits, etc. • Education to increase awareness of risk to public safety will ensure **emergency preparedness**. E.g. particulary if road / footbridge access around the estuary is at risk, or poses a public safety hazard. • In the medium term, continued **enhancement of dunes and wetland** areas around the estuary area by the community, could support their wellbeing and provide connection to place. • In the long term, **Bank Protection** at Waikanae estuary may not provide enough protection for Otaihanga properties *(ie.up to 50% likely be exposed to inundation under 1.25m RSLR, by 2130).*	3	• In the short term, **status quo** allows for continued public access to recreation activities in the estuary (and Otaihanga) area. Access may be restricted during maintenance or for safety reasons. • Recreation that negatively impacts dunes or wetlands may need to be restricted. • In the medium term, more frequent flood events may restrict public access to the estuary, due to public safety concerns or remedial track maintenance. Over time, existing receation facilities and tracks, may need to be relocated to allow continued public access. • In the long term, the design of **bank protection** solution may provide opportunities to maintain recreational access and/or more durable surfaces. • Opportunities for nature appreciation eg. bird watching, could be impacted. This depends on the ecological response from animal populations to changing estuarine conditions.	3	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Bank protection is likely to require consent however it may be easier to consent given the works would be within the same or similar footprint to existing inundation protection.	4	• Increasing wetland resilience by planting and management is likely a proportionate response to the scale of hazard. • Wetland planting and management likely to help stabilise banks and reduce retreat of the shoreline. •Hard protection in the long term will be effective at reducing the shoreline retreat around the estuary banks. • Long term action may exacerbate the erosion risks immediately around the ends of the wall (end effects). Will also result in coastal squeeze of the wetland, reducing marshlands plants which act as wave attenuation protection.	**43**	17
	3	**Enhance -** Dune and wetland resilience, community education and emergency management	**Enhance -** Dune and wetland resilience, community education and emergency management	**Protect -** Bank protection		• The enhancement of existing native populations will likely promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces over the short - medium term. • Hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Increased hard walls along rivers and streams can deter migratory and spawning fish from these sites due to no natural shady habitat present along banks, and can result in abrupt shifts from freshwater to estuarine communities of which native fish are particularly sensitive to.	3	• The enhancement of natural elements, patterns and processes, including native vegetation and associated dune and wetland habitats has potential to restore natural character in the medium and longer term. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • The introduction of hard structures and bank protection may prevent migration of wetland areas and reduce natural character in confined context of estuary which remains in the longer term.	3	• In the short -medium term, **enhancement of dunes and wetland areas** around the estuary area by the community could support their wellbeing and provide connection to place. • Ongoing community education could focus on ecosytem protection and the role of wetlands and esturaries, ecological benefits, etc. • Education to increase awareness of risk to public safety will ensure **emergency preparedness**. E.g. particulary if road / footbridge access around the estuary is at risk, or poses a public safety hazard. • In the long term, **bank protection** at Waikanae estuary may not provide enough protection for Otaihanga properties (ie.up to 50% likely be exposed to inundation under 1.25m RSLR, by 2130).	4	• In the short-medium terms, **dune & wetland resilience** allows for continued public access to recreation activities in the estuary (and Otaihanga) area. Community involvement in enhancement activities is likely to support community wellbeing and provide connection to place. • Public access may be restricted at any time during remedial maintenance, track construction, or for safety reasons. • Recreation that negatively impacts dunes or wetlands may need to be restricted. • In the medium term, existing receation facilities and tracks, may need to be relocated to allow continued public access. • In the long term, the design of **bank protection** solution may provide opportunities to maintain recreational access and/or more durable surfaces. • Opportunities for nature appreciation eg. bird watching, could be impacted. This depends on the ecological response from animal populations to changing estuarine conditions.	3	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Bank protection is likely to require consent however it may be easier to consent given the works would be within the same or similar footprint to existing inundation protection.	4	• Increasing wetland resilience by planting and management is likely a proportionate response to the scale of hazard. • Starting the wetland planting earlier will increase the imeframes it is effective for. • Wetland planting and management likely to help stabilise banks and reduce retreat of the shoreline. •Hard protection in the long term will be effective at reducing the shoreline retreat around the estuary banks. • Long term action may exacerbate the erosion risks immediately around the ends of the wall (end effects). Additional environmental impacts will include coastal squeeze of the wetland, reducing marshlands plants which act as wave attenuation protection.	**51**	20

	4	**Enhance -** Dune and wetland resilience, community education and emergency management	**Protect -** Bank protection	**Protect -** Bank protection		• The initial enhancement of existing native populations will likely promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces over the short - medium term. • However long term hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Protection of banks when engineered may likely influence flora and fauna to stop returning to the area, as there is less vegetated shelter for spawning and feeding by animals, and less natural bank space for plants to thrive. • Increased hard walls along rivers and streams can deter migratory and spawning fish from these sites due to no natural shady habitat present along banks, and can result in abrupt shifts from freshwater to estuarine communities of which native fish are particularly sensitive to.	2	• The enhancement of natural elements, patterns and processes, including native vegetation and associated dune and wetland habitats has potential to restore natural character in the medium and longer term. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • The ongoing implementation of hard structures and bank protection would likely reduce natural character and result in adverse landscape effects in confined context of estuary which remains.	3	• In the short -medium term, **enhancement of dunes and wetland areas** around the estuary area by the community could support their wellbeing and provide connection to place. • Ongoing community education could focus on ecosytem protection and the role of wetlands and estuaries, ecological benefits, etc. • Education to increase awareness of risk to public safety will ensure **emergency preparedness**. E.g. particulary if road / footbridge access around the estuary is at risk, or poses a public safety hazard. • In the med-long term, **bank protection** at Waikanae estuary may not provide enough protection for Otaihanga properties (ie.up to 50% oflikely be exposed to inundation under 1.25m RSLR, by 2130).	4	• In the short-medium terms, **dune & wetland resilience** allows for continued public access to recreation activities in the estuary (and Otaihanga) area. Community involvement in enhancement activities is likely to support community wellbeing and provide connection to place. • Public access may be restricted at any time during remedial maintenance, track construction, or for safety reasons. • Recreation that negatively impacts dunes or wetlands may need to be restricted. • In the med-long term, existing receation facilities and tracks, may need to be relocated to allow continued public access. The design of **bank protection** solution may provide opportunities to maintain recreational access and/or more durable surfaces. • Opportunities for nature appreciation eg. bird watching, could be impacted. This depends on the ecological response from animal populations to changing estuarine conditions.	3	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Bank protection is likely to require consent however it may be easier to consent given the works would be within the same or similar footprint to existing inundation protection.	3	• Increasing wetland resilience by planting and management is likely a proportionate response to the scale of hazard. However, medium term bank protection is unlikely to be proportionate to the scale of hazard. • Starting the wetland planting earlier will increase the timeframes it is effective for. • Wetland planting and management likely to help stabilise banks and reduce retreat of the shoreline, however could get washed out in large fluvial events. •Hard protection in the medium-long term will be effective at reducing the shoreline reteat around the estuary banks. • Bank protection may exacerbate the erosion risks immediately around the ends of the wall (end effects). Additional environmental impacts will include coastal squeeze of the wetland, reducing marshlands plants which act as wave attenuation protection.	**46**	18
	5	**Enhance -** Dune and wetland resilience, community education and emergency management	**Retreat -** retreat recreational infrastructure to make way for wetland migration	**Retreat -** retreat recreational infrastructure to make way for wetland migration		• The enhancement of existing native populations will likely promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces over the short - medium term. • Retreat following wetland resilience and enhancement provides opportunity for further ecological restoration, and if managed correctly could provide shelter and habitat for fish and bird species while allowing for natural wetland and river migration and variability under erosion and flooding events.	5	• The enhancement of natural elements, patterns and processes, including native vegetation and habitats has potential to restore natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Retreat of recreation infrastructure following enhancement provides opportunity to restore natural character, allowing for natural wetland and river migration in presently modified areas.	2	• In the short term, **enhancement of dunes and wetland areas** around the estuary area by the community could support their wellbeing and provide connection to place. • Ongoing community education could focus on ecosytem protection and the role of wetlands and estuaries, ecological benefits, etc and role of **retreat** in restoration. • Education to increase awareness of risk to public safety will ensure **emergency preparedness**. E.g. particulary if road / footbridge access around the estuary is at risk, or poses a public safety hazard. • In the med-long term, **retreat of recreational infrastructure** at Waikanae estuary, may not necessarily signify a loss of a valuable public recreation asset, as there may be opportunities to relocate / redesign amenities to minimise impact and retain public access.	3	• In the short-medium terms, **dune & wetland resilience** allows for continued public access to recreation activities in the estuary (and Otaihanga) area. Community involvement in enhancement activities is likely to support community wellbeing and provide connection to place. • Public access may be restricted at any time during remedial maintenance, track construction, or for safety reasons. • Recreation that negatively impacts dunes or wetlands may need to be restricted. • In the med-long term, **retreat** of recreational infrastructure at Waikanae estuary, may not necessarily signify a loss of a valuable public recreation asset, as there may be opportunities to relocate / redesign amenities to minimise impact and retain public access. • Opportunities for nature appreciation eg. bird watching, could be impacted. This depends on the ecological response from animal populations to changing estuarine conditions.	4	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • The area is a marine reserve and retreating recreational infrastructure to make way for wetland migration is consistent with the purpose of the reserve.	5	• Increasing wetland resilience by planting and management is likely a proportionate response to the scale of hazard and would increase the timeframe before needing to retreat. • Wetland planting and management likely to help stabilise banks and reduce retreat of the shoreline, but could be washed out in a large fluvial event. • Retreat of assets around the edges will allow for room for the wetland to migrate and continue to provide protection. This will remove risks, and therefore retreat will effctively manage the risks. •This approach is proportionate to the scale of hazard.	**56**	23

Pathways for Otaihanga

Management Unit	Pathways	Pathway Descriptions			Ecology		Landscape		Community Social and Economic Wellbeing		Public Access and Recreation		Regulatory consenting and policy risk		Effectively manages the risks of coastal erosion		MCDA Total Score:	RAW MCDA Total Score:
		Short term	Medium term	Long term	Score	Notes	Score	Notes	Score	Notes	Score	Notes	Score	Notes	Score	Notes		
Otaihanga Unit 7B	1	**Status Quo** AND Community Education and Emergency Management	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Protect -** Additional hard protection (e.g. stopbanks, culverts and pump stations)		• Continuing with the status quo in the short term may see further loss of species in Otaihanga. There is a risk that miratory fish and may change their behaviour patterns if nothing further is done. • Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Otaihanga will provide limited ecological benefit as most of the ecology in this area surrounds the Waikanae river, and protection works are likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds. • Hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Increased hard walls along rivers and streams can deter migratory and spawning fish from these sites due to no natural shady habitat present along banks, and can result in abrupt shifts from freshwater to estuarine communities of which native fish are particularly sensitive to.	3	• More frequent flooding would likely extend coastal environment inland and disrupt existing more modified landscape values within the present day coastal context. • The enhancement of inundation protection alongside dune and wetland reslience has limted potential change to natural character in the context of increased modification. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • The implementation of hard structures and bank protection would likely reduce natural character and result in adverse landscape effects in the longer term.	3	• Short term: Continuing with **status quo** aligns with current community values. However, with 23% of Otaihanga properties likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5), this approach may not be tolerated by the community. Monitoring of flood events (eg. frequency, social impact, etc) & engagement may be needed to align with changes in community tolerance levels. • Ongoing **community education** and increased risk awareness (of properties & infrastructure at risk) will ensure emergency preparedness. Efforts in this area to be increased over time. • Landowners may need to be supported to respond to flood risk and take proactive accomodation measures to reduce risks to health and safety. •Medium term: **enhancing existing inundation protection** could provide the community with assurance, along with continued community preparedness. • Long term: **additional hard protection** at Otaihanga could protect the up to 50% of Otaihanga properties likely be exposed to inundation under 1.25m RSLR (by 2130). • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment)	3	• In the short term, **status quo** ensures existing infrastructure will be maintained & public access to recreation areas will continue, subject to any public safety issues, eg. due to required maintenance, health risks or flood events. • To maintain goodwill the community will need to be informed on changes to public access and why. • Ongoing education and increased awareness of risk by local community (and recreation users) to ensure preparedness and emergency response during flood events, eg. road, bridge & recreation track access. • Medium term: **Enhancement of exisiting inundation protection** may restrict access to some area while works are being undertaken. • Long term: construction of **additional hard protection** may restrict access to some areas while works are being undertaken.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Stopbank, floodgates, pump station and culverts trigger the NPS-FM and NES-F and may trigger the NZCPS depending on location. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Consenting a new structure is likely to be more challenging than upgrading an existing structure.	1	•There is no erosion hazard in the Otaihanga area, and this pathway was not developed to manage the erosion hazard. All pathways in this management unit are scored 1 to reflect this and be relative to one another.	**35**	14
	2	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Accommodate -** Elevate floor levels of buildings and flood proofing buildings and infrastructure		• Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Otaihanga will provide limited ecological benefit as most of the ecology in this area surrounds the Waikanae river, and protection works are likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds. • The introduction of accommodating for hazards is likely to	3	• The enhancement of inundation protection alongside dune and wetland reslience has limited potential to restore natural character in the context of areas of increased modification. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Accommodating buildings and infrastructure in flood prone areas would occur in context of existing modification and likely result in localised landscape impacts	4	• In the short-medium term, **enhanced inundation protection** aligns with community values. Inundation protection could provide the community with some assurance, given that 30% of Otaihanga properties are likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5). • Ongoing **community education** and increased community awareness of risk will ensure emergency preparedness and to identify dwellings at risk. • Long term: **Accomodate** allows time for homeowners to plan and choose effective flood mitigation measures. Also to consider affordability & guage if access to roading & critical infrastructure can be continued. High risk to properties (50% of Otaihanga properties are likely exposed to inundation with 1.25mm RSLR ~~by 2130 at SSP8.5). • Landowners may need to be supported to know how to respond to flood risk and and undertake proactive accomodation efforts to reduce risks to health and safety. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	4	• In the short-medium term, public access to recreation areas will continue subject to any public safety issues, eg. health risks or flood events. **Enhanced inundation protection** or required infrastructure maintenance, may restrict access to some public areas while works are being undertaken. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • Ongoing education and increased local community awareness of risk will ensure appropriate emergency preparedness. • Long term: most **Accomodate** options occur on private properties & are unlikely to impact publc access and recreation.	5	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Elevating buildings and flood proofing will have building consent (and possibly resource consent) requirements. Given the anticipated timeframe of this action this may occur naturally with the turnover of buildings. Consenting hurdles are not anticipated.	1	•There is no erosion hazard in the Otaihanga area, and this pathway was not developed to manage the erosion hazard. All pathways in this management unit are scored 1 to reflect this and be relative to one another.	**44**	19
	3	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Accommodate -** Elevate floor levels of buildings and flood proofing buildings and infrastructure	**Retreat**		• Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Otaihanga will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds. • The introduction of accommodating for hazards is likely to neither positively or negatively impact flora and fauna if best practice is followed which can allow for natural migration of existing species. • Retreat favours ecological restoration by providing habitats for species to recolonise neighbouring areas that may become destroyed. This has limited application in Otaihanga for existing flora and fauna as there is limited ecology present, however	3	• Enhancement of existing inundation protection plus dune and wetland reslience occurs in context of ongoing modification with limited reduction in natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Accommodating buildings and infrastructure in flood prone areas would occur in context of existing modification with likely localised landscape impacts • Retreat offers limited ability to restore natural character and promote positive landscape outcomes incontext of ongoing modification in the longer term.	2	• In the short term, **enhanced inundation protection** aligns with community values. This option could provide the community with some assurance, given that 30% of Otaihanga properties are likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5). • Ongoing **community education** and increased awareness of dwellings at risk to ensure community preparedness. • Landowners may need supported to know how to respond to flood risk and and undertake proactive accomodation efforts to reduce risks to health and safety. • Medium term: **Accomodate** allows homeowners to plan for and choose effective flood mitigation measures & consider affordability vs liveability (continued access to roading & critical infrastructure). • Long term: affected homeowners and Councils can plan for **Retreat** (eg. relocatable homes, spatial planning, level of infrastructure maintenance, etc). • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• In the short term, public access to recreation areas will continue subject to any public safety issues, eg. health risks or flood events. **Enhanced inundation protection** or required infrastructure maintenance, may restrict access to some public areas while works are being undertaken. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • Ongoing **education** and increased awareness of risk will ensure community preparedness. • In the medium term, most **Accomodate** options are unlikely to impact publc access and recreation. • In the long term, **retreat** may provide opportunities for land to be aquired for ecological restoration or managed public access for low impact recreation.	3	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Elevating buildings and flood proofing will have building consent (and possibly resource consent) requirements. Given the anticipated timeframe of this action this may occur naturally with the turnover of buildings. Consenting hurdles are not anticipated. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	1	•There is no erosion hazard in the Otaihanga area, and this pathway was not developed to manage the erosion hazard. All pathways in this management unit are scored 1 to reflect this and be relative to one another.	**30**	13

	4	**Protect -** Additional hard protection (e.g. stopbanks, culverts and pump stations)	**Enhance** - Enhance new inundation protection, dune and/or wetland resilience, and c and community education and emergency management	**Retreat**		• Hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Otaihanga will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with increasing or extending existing inundation protection and following protection works, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds. • Retreat is likely to have limited application in Otaihanga for any remaining flora and fauna in the long term as there is already limited ecology present, and more hard protection of rivers and streams is likely to limit any natural benefits of retreat.	3	• Hard protection in the form of stopbanks, culverts and pumpstations would likely reduce natural character and reduce existing natural landscape values within the more modified coastal context. • Enhancement of existing inundation protection plus dune and wetland reslience occurs in context of ongoing modification with a further likley reduction natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Retreat offers more limited ability to restore natural character and promote positive landscape outcomes in context of increased modification.	2	• In the short term, **additional hard protection** is not consistent with community values. However given that 30% of Otaihanga properties are likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5), the option could be further tested with the local community. • Ongoing **community education** to increase awareness of properties and infrastructure at risk to ensure emergency preparedness. Also allows landowners to take proactive measures (accomodate / avoid) to reduce risks to health, safety and dwellings. • Medium term: costs assoicated with **new inundation protection** measures may need to understood for this option to gain support. • Long term: affected homeowners and Councils can plan for **Retreat** (eg. relocatable homes, spatial planning, level of infrastructure maintenance, etc). • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• Short term, public access to recreation areas may be restricted temporarily during construction of **additional infrastructure** and/or required maintenance. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • Ongoing **education** and increased awareness of risk will ensure community preparedness. • In the medium term, **new inundation protection** works are likely to temporarily impact public access to recreation areas. • In the long term, **retreat** may provide opportunities for land to be aquired for ecological restoration or managed public access for low impact recreation. May require removal of existing built structures as part of restoration efforts.	2	• Stopbank, floodgates, pump station and culverts trigger the NPS-FM and NES-F and may trigger the NZCPS depending on location. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Consenting a new structure is likely to be more challenging than upgrading an existing structure. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	1	•There is no erosion hazard in the Otaihanga area, and this pathway was not developed to manage the erosion hazard. All pathways in this management unit are scored 1 to reflect this and be relative to one another.	**38**	15
	5	**Enhance** - Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Protect -** Additional hard protection (e.g. stopbanks, culverts and pump stations)	**Protect -** Additional hard protection (e.g. stopbanks, culverts and pump stations)		• Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Otaihanga will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds. • Long term hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Increased hard walls along rivers and streams can deter migratory and spawning fish from these sites due to no natural shady habitat present along banks, and can result in abrupt shifts from freshwater to estuarine communities of which native fish are particularly sensitive to.	3	• Enhancement of existing inundation protection plus dune and wetland reslience occurs in context of ongoing modification with limited reduction in natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Ongoing implementation of hard protection in the form of stopbanks, culverts and pumpstations would likely reduce natural elements, patterns and processes and reduce natural character over the longer term.	4	• In the short term, **enhanced inundation protection** aligns with community values. This option could provide the community with some assurance, given that 30% of Otaihanga properties are likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5). • Ongoing **community education** to increase awareness of properties and infrastructure at risk to ensure emergency preparedness. Also allows landowners to take further proactive measures (accomodate / avoid) to reduce risks to health, safety and dwellings. • Med-long term: the community may need better understanding of long term costs and effectiveness of **Additonal hard protection** measures in order to support this option.	3	• In the short term, **enhanced inundation protection** may restrict access to some public areas while works are being undertaken. Public access to recreation areas likely to continue subject to any public safety issues, eg. flood events, health risks, or required infrastructure maintenance. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • In the med - long term: **additional hard protection** options may impact publc access and recreation while works are being done. Likely to allow for continued public access for recreation activities. • Hard engineering measures are likely to change the natural feel of the Waikanae river area. Amenity & aesthetic values could be incorporated into hard engineering solutions.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Stopbank, floodgates, pump station and culverts trigger the NPS-FM and NES-F and may trigger the NZCPS depending on location. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Consenting a new structure is likely to be more challenging than upgrading an existing structure.	1	•There is no erosion hazard in the Otaihanga area, and this pathway was not developed to manage the erosion hazard. All pathways in this management unit are scored 1 to reflect this and be relative to one another.	**44**	17

Pathways for Paraparaumu

Management Unit	Pathways	Pathway Descriptions			Ecology		Landscape		Community Social and Economic Wellbeing		Public Access and Recreation		Regulatory consenting and policy risk		Effectively manages the risks of coastal erosion		MCDA Total Score:	RAW MCDA Total Score:
		Short term	Medium term	Long term	Score	Notes	Score	Notes	Score	Notes	Score	Notes	Score	Notes	Score	Notes		
	1	**Enhance -** Dune and/or wetland resilience, community education and emergency management	**Protect - Soft Engineering** - Dune Reconstruction	**Protect - Soft Engineering** - Beach Renourishment		• Enhancement of existing native populations will likely initially promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Soft engineering through beach renourishment **and** dune reconstruction however may disrupt bird habitats and shellfish populations but can modify and enhance habitats in the form of enhanced dunes for beach flora and fauna. • Beach renourishment projects have found negative ecosystem effects on terrestrial communities following renourishment in the short and medium term due to the stress on species from the repetitive nature of infilling, and any cascading impacts up the food web from mortality associated with sediment fill.	4	• Initial enhancement of dunes and wetland areas will maintain existing open sand beach and vegetated dune context and associated natural character along cuspate foreland and open coastal edge. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Ongoing implementation of soft engineering including dune restoration and beach nourishment would disrupt natural patterns and processes, but otherwise maintain an open dynamic coastline influenced by existing settlement.	4	• Increasing **dune resilience** over short term aligns with stated community values. If community is actively included in implementation, it could promote social and economic wellbeing, as well as enhance social cohesion & health outcomes. • Over medium-long term, the community may need further information on **dune reconstruction** option (eg. evidence of suitability, effectiveness, costs & engagement) before supporting. • In the long term, the ongoing beach monitoring required to assess the ongoing success of **beach renourishment**, could potentially be done at the local/community level, if they are given appropriate training and technology. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	4	• Short term **dune resilience** will maintain the natural amenity and landscape values of the coastal environment. • Ongoing **dune maintenance and protection** in medium and longer term is likely to further benefit ecosystems, foster nature appreciation & supports community values. • Both the medium (**Dune reconstruction**) and long term options (**beach renourishment**) may temporarily impact access during construction, but overall, public access to the coastal environment will be maintained. • Recreation that damages dunes needs to be restricted to protect ecosystems & encourage dune stability. • **Beach renourishment** can result in changes to the beach profile and increased swimmer injuries, eg. steeper, more dangerous shore break.	3	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the medium and long term will have some consenting requirements and may be challenged but is aligned with the current statutory framework.	3	• Dune enhancement and reconstruction are both effective measure that are proportionate to the nature and scale of risk over the short-medium term for most of Paraparaumu Beach. • If designed and managed properly, is likely to effectively manage impacts under lower SLR scenarios. • Design would be informed by best practise. • Beach renourishment likely to be effective around the shoreline north of Tikotu Stream in the wave shadow of Kapiti Island. • Pathway will not effectively manage the risks to the built environment south of the Tikotu Stream where some service assets are already at risk. Beach renourishment has been trialed at this end of the shoreline before and was not successful.	**50**	20
	2	**Enhance -** Dune and/or wetland resilience, community education and emergency management AND **Protect - soft engineering** - Dune reconstruction	**Enhance -** Dune and/or wetland resilience, community education and emergency management AND **Protect - soft engineering** - Beach Renourishment	**Protect - Hard Engineering -** Sea wall		• Enhancement of existing native populations will likely initially promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Soft engineering through beach renourishment and dune reconstruction may disrupt bird habitats and shellfish populations but can modify and enhance habitats in the form of enhanced dunes for beach flora and fauna, • Beach renourishment projects have found negative ecosystem effects on terrestrial communities following renourishment in the short and medium term due to the stress on species from the repetitive nature of infilling, and any cascading impacts up the food web from mortality associated with sediment fill. • Ongoing sea wall protection however has the potential to reduce ecology further by damaging beach, dune, and estuary ecology, and overall may support lower biodiversity and prevent the natural migration of habitats.	2	• Initial enhancement of dunes and wetland areas will maintain existing open sand beach and vegetated dune context and associated natural character along cuspate foreland and open coastal edge. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Ongoing implementation of soft engineering including dune restoration and beach nourishment would disrupt natural patterns and processes, but otherwise maintain an open dynamic coastline influenced by existing settlement. • Introduction of hard structures including a sea wall would likely reduce natural beach profile and reduce natural character and result in adverse landscape effects in context of existing open beach adjoining existing settlement.	4	• Over the short and medium term, increasing **dune resilience** aligns with stated community values. If community is actively included in **dune resilience/enhancement** activities, it will promote social and economic wellbeing, as well as enhance social cohesion & health outcomes. Community may need further information on **dune reconstruction** option (eg. evidence of suitability and effectiveness, costs & engagement) before supporting. • In medium-long term, the community may require further information on effectiveness, costs and suitability of the **beach renourishment** and long term **seawall** options, prior to acceptance and/or implementation. • The ongoing beach monitoring required to assess the success of **beach renourishment**, could potentially be done at the local/community level, if they are given appropriate training and technology. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	3	• This short-med term **dune resilience & dune reconstruction** option will maintain the natural appeal of the coastal environment. Ecosystem protection could enhance community values and foster nature appreciation. • Public access to the coastal environment will be maintained. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stability. • The long term **seawall** option may contribute to beach narrowing which may restrict public access to beach at high tides. However, seawall could potentially be designed to incorporate amenity / recreational value. • During seawall construction, public access to beachfront may be temporarily restricted.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the short and medium term will have some consenting requirements and may be challenged but is aligned with the current statutory framework. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Hard-engineering approaches trigger more stringent consenting requirements and are discouraged under the NZCPS and RPS because of the adverse effects they can have on the environment. • Consenting a new structure is likely to be more challenging than upgrading an existing structure.	4	• Dune enhancement and reconstruction are both effective measures that are proportionate to the nature and scale of risk over the short-medium term. • Some uncertainty around the effectiveness of renourishment in the medium term under higher SLR scenarios, as would require significant sand source, but combined with planting and dune management could be effective. • Hard engineering would be effective at preventing further retreat of the shoreline in the long term, especially at the southern end of Marine Parade and at the northern end of Manly Street. • Over the long term, hard engineering may exacerbate the erosion hazard directly to the north and south of the wall due to end effects. • Design would be informed by best practise to reduce these effects but there will be environmental impacts and changes to the beach associated with this option over the longer term (i.e. beach narrowing and loss of volume).	**45**	17

Paraparaumu unit 8A	**3**	**Enhance -** Dune and/or wetland resilience, community education and emergency management AND **Protect - soft engineering** - Dune reconstruction	**Enhance -** Dune and/or wetland resilience, community education and emergency management AND **Protect - soft engineering** - Beach Renourishment	**Protect - Hard Engineering -** Detached Breakwater		• Enhancement of exisiting native populations would likely promote ecology and provide greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Beach renourishment projects have found negative ecosystem effects on terrestrial communities following renourishment in the short and medium term due to the stress on species from the repetitive nature of infilling, and any cascading impacts up the food web from mortality associated with sediment fill. • Foreign material fill if it is not of similar size and composition of local material can affect the types of animals which inhibit an areas, disrupt nesting birds, and encourage invasive species to grow if the fill material is optimal for those species. • Most ecological effects from detatched breakwaters would occur in the marine environment (i.e. disturbance and species mortality during installation), however could promote artificially protected conditions that provide a calm environment onshore which can facilitate planting rehabilitation and recovery for present ecology.	3	• Dune and wetland enhancement combined with soft engineering will generally maintain existing open sand beach and vegetated dune context along the coastal edge but with some ongoing disruption to natural patterns and processes which will likely reduce natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Detached breakwater would likely extend sense of modification into presently open coastal marine areas and further disrupt existing open and unmodified coastal views. The design of the breakwater could potentially reduce the overall scale of effects.	3	• Over the short and medium term, increasing **dune resilience** aligns with stated community values. If community is actively included in dune resilience/enhancement activities, it will promote social and economic wellbeing, as well as enhance social cohesion & health outcomes. • Community may need further information on **dune reconstruction** option (eg. evidence of suitability and effectiveness, costs & engagement) before supporting. • The community may need further information re: **beach renourishment** and long term **detached breakwater** options (effectiveness, costs, etc) prior to supporting. • The ongoing beach monitoring required to assess the success of **beach renourishment**, could potentially be done at the local/community level, if they are given appropriate training and technology. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• This short-med term **dune resilience and reconstruction** option will maintain the natural appeal of the coastal environment. Ecosystem protection could enhance community values and foster nature appreciation. • Public access to the coastal environment will be maintained. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stablility. • The long term **detached breakwater** option may change beach conditions, eg. beach narrowing (may restrict public access to beach at high tides). • During breakwater construction, public access to beachfront nay be temporarily restricted.	1	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the short and medium term will have some consenting requirements and may be challenged but is aligned with the current statutory framework. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Hard-engineering approaches trigger more stringent consenting requirements and are discouraged under the NZCPS and RPS because of the adverse effects they can have on the environment. • Consenting an offshore structure is likely to be more challenging than a sea wall as the whole coast is recognised as a site of significance for mana whenua and there is greater uncertainty in the effects of the structure. • Consenting a new structure is likely to be more challenging than upgrading an existing structure. • Parts of Paraparaumu Beach are scheduled in the Natural Resources Plan for the Wellington Region as having sites of significance for mana whenua.	3	• Dune enhancement and reconstruction are both effective measures that are proportionate to the nature and scale of risk over the short-medium term. • Some uncertainty around the effectiveness of renourishment in the medium term under higher SLR scenarios, as would require significant sand source, but combined with planting and dune management could be effective. It has been trialled once at the southern end of marine parade and was not successful. • Detached breakwater in the nearshore would reduce wave energy approaching the beach, and could be effective at reducing erosion risk in Paraparaumu Beach. • However, the breakwater will likely result in morpholgocal changes to the beach due to reduction in wave energy, and could have some lee-side erosion effects downdrift of the breakwater (e.g. Raumati) as a result of sediment trapping, where the erosion hazard is already high. • The scale and nature of the works required to effectively manage the risk is unlikely to be propertionate to the scale of the hazard. • Design would be informed by best practise.	**34**	13
	4	**Enhance -** Dune and/or wetland resilience, community education and emergency management AND **Protect - soft engineering** - Dune reconstruction	**Protect - Hard Engineering -** Sea wall	**Retreat**		• Enhancement of existing native populations will likely initially encourage positive ecological benefits. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Ongoing sea wall protection however has the potential to reduce ecology by damaging beach, dune, and estuary ecology, and overall may support lower biodiversity and prevent the natural migration of habitats. • Retreat while allowing for the natural migration of biodiversity, is going to be occurring in an already altered environment following the placement of a sea wall and present dense urbanisation. This would likely not allow for *naturally occurring* positive ecological benefits and this would need heavy management.	2	• Dune and wetland enhancement combined with soft engineering will generally maintain existing open sand beach and vegetated dune context along the coastal edge but with some ongoing disruption to natural patterns and processes. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Ongoing engineering and introduction of hard structures including a sea wall has potential reduction in natural beach profile which would likely reduce natural character and may result in adverse landscape effects in context of existing settlement. • Retreat would occur in the context of an increasingly modified coastal environment with likely ongoing sense of modification and reduction in natural character.	2	• Over the short term, increasing **dune resilience** aligns with stated community values. If community is actively included in **dune resilience / enhancement** activities, it will promote social and economic wellbeing, as well as enhance social cohesion & health outcomes. Community may need further information on **dune reconstruction** option (eg. evidence of suitability and effectiveness, costs & engagement) before supporting. • In medium term, the community may require further information on the **seawall** option(eg. effectiveness, costs and suitability, etc), prior to acceptance and/or implementation. • In long term, the community may require assurance and further information on **managed retreat** • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• This short term **dune resilience & dune reconstruction** option will maintain the natural appeal of the coastal environment. Ecosystem protection could enhance community values and foster nature appreciation. While public access to the coastal environment will be maintained, it may be temporarily restricted while **dune reconstruction** works are being done. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stablility. • The medium term **seawall** option may contribute to beach narrowing which may restrict public access to beach at high tides. However, seawall could potentially be designed to incorporate amenity value/ recreational access. • During seawall construction, public access to beachfront will be temporarily restricted. • Long term **retreat** may offer opportunities for ecological restoration of the foredunes and opportunities for managed public access & recreation.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the short term will have some consenting requirements and may be challenged but is aligned with the current statutory framework. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Hard-engineering approaches trigger more stringent consenting requirements and are discouraged under the NZCPS and RPS because of the adverse effects they can have on the environment. • Consenting a new structure is likely to be more challenging than upgrading an existing structure. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	4	• Dune enhancement and reconstruction are both effective measures that are proportionate to the nature and scale of risk over the short-medium term. • A sea wall in the medium term will hold the shoreline seaward of private proterties and effectively manage the risks. • Hard engineering would be effective at preventing further retreat of the shoreline in the medium term, but may exacerbate the erosion hazard directly to the north and south of the wall due to end effects. • Design would be informed by best practise to reduce these effects but there will be environmental impacts and changes to the beach associated with this option (i.e. beach narrowing and loss of volume). •Retreat in the long term will remove all risk from the erosion hazard to private property; however the sea wall in the medium term would have modified the coastal environment, and therefore either continued maitenance of the sea wall would be required, or signficant rehabilitation to reform the dunes would be required to re-establish protection.	**36**	14
	5	**Protect - Hard Engineering -** Sea wall	**Protect - Hard Engineering -** Sea wall	**Retreat**		• Implementing sea wall protection has the potential to reduce ecology by damaging beach, dune, and estuary ecology, and overall may support lower biodiversity and prevent the natural migration of habitats. • Retreat while allowing for the expansion of biodiversity through increased habitat space, is going to be occurring in an already altered environment following the placement of a sea wall and present dense urbanisation. This would likely not allow for naturally occurring positive ecological benefits and this would need heavy management. • Retreat would need to be accompanied with heavy community education and increased environmental efforts to retain any remaining ecological value along the Paraparaumu coastline.	2	• Introduction of hard structures including a sea wall would likely reduce natural beach profile and reduce natural character and result in adverse landscape effects in context of existing open beach adjoining existing settlement. • Retreat would occur in the context of an increasingly modified coastal environment with likely ongoing sense of modification and reduction in natural character.	1	• In the short-medium term, a **seawall** at southern end of Paraparaumu beach could be acceptable to the community - it would involve informing the community of the pro and cons and associated costs over the lifetime of the seawall. • properties in this area will have more assurance that they will contine to recieve essential infrastructure services (But - relies on regular maintenance & has costs). • In the long term, the community is more likely to support **retreat** if they are assured that suitable land is available to relocate to, & they are aware of any financial implications. Also, important to ensure that support is in place for those affected, to promote social and economic wellbeing, and enhance social cohesion & health outcomes. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	1	• In the short term, public access to the southern end of Paraparaumu Beach may be restricted duing the construction of the **seawall**, and during periods of ongoing maintenance. • it may be possible to incorporate public access on/ around the seawall depending on the final design. • likely that visual impacts of seawall may deter from the natural feel of the coastline. • seawall could result in beach access being more restricted during mid to higher tides. • In the long term, if ongoing maintenance continues, the seawall may provide safe public access if the area experiences **retreat.**	2	• Hard-engineering in the long term will have some consenting requirements and may be challenged. • Hard-engineering approaches trigger more stringent consenting requirements and are discouraged under the NZCPS and RPS because of the adverse effects they can have on the environment. • Consenting a new structure is likely to be more challenging than upgrading an existing structure. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	3	• Sea wall will effectively manage the erosion risks over the short-medium term. Retreat will remove the risks over the long term. • Sea wall in the short to medium term is only proportionate to the scale of the risks at the southern end of the adaption area. Along the rest of the adaptation area shoreline, a seawall is not proportionate to the scale of the hazard. • There would likely be an exacerbation of the erosion risks at the ends of the walls (end effects) and other environmental impacts such as beach narrowing in front of the wall.	**27**	11
	6	**Enhance -** Dune and/or wetland resilience, community education and emergency management AND **Protect - soft engineering** - Dune reconstruction	**Retreat**	**Retreat**		• Initial enhancement of existing native populations would likely improve exisiting ecology and promote greater habitat and resources for flora and fauna. Community education will also increase knowledge and support for protection of dune and wetland spaces. • Dune reconstruction can allow for more space for present dune flora and fauna to migrate and allow for increased distinct habitats, topogrpahic variability and increased root mass for sand binding species. • Retreat favours ecological restoration by providing habitats for species to recolonise neighbouring areas that may become destroyed however this will be occurring in an already highly urbanised environment so may take sufficient time and require active management as this is unlikely to occur naturally.	4	• Dune and wetland enhancement combined with soft engineering will generally maintain existing open sand beach and vegetated dune context along the coastal edge but with some ongoing disruption to natural patterns and processes which will likely reduce natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Retreat would occur in the context of a modified coastal environment with ongoing opportunities to restore natural character.	1	• The option to increase **dune resilience** over short term aligns with stated community values. If community is actively included in **dune resilience / enhancement** activities, it will promote social and economic wellbeing, as well as enhance social cohesion & health. Community may need further information on **dune reconstruction** option (eg. evidence of suitability and effectiveness, costs & engagement) before supporting. • In medium-long term, the community is more likely to support **retreat** if they are assured that suitable land is available to relocate to, & are aware of any financial implications. Also, important to ensure that support is in place to promote social and economic wellbeing, and enhance social cohesion & health outcomes. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• This short term **dune resilence & dune reconstruction** options will maintain the natural appeal of the coastal environment and ecosystem protection could enhance both community and environmental values and foster nature appreciation. • While public access to the coastal environment will be maintained, it may be temporarily restricted while **dune reconstruction** works are being done. • Recreation that damages dunes will need to be restricted to protect ecosystems & encourage dune stablility. • The med-long term option for **retreat** could allow opportunities for land to be incorporated into public space. Includes activities that promote continued ecological restoration, and public access managed to allow for lower impact recreation uses. Could be planned for prior to the actual relocation of affected properties.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Soft-engineering in the short term will have some consenting requirements and may be challenged but is aligned with the current statutory framework. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat this could make managed retreat more challenging in the medium term. • Managed retreat currently requires regional and district plan changes to implement.	4	• Effectively manages the risks of coastal erosion over time, and takes actions in the short term to reduce risks over that period and increase the tiemframe before retreat would be required. •Enhancment and dune recontouring will be proportionate to the scale of risk in the short term. •There will be no exacerbation of erosion risks on adjacent areas from short term actions in this pathway. • Retreat of beachfront properties would result in total removal of risk to those individuals from erosion. It would be proportionate to the nature and scale of the risk to those impacted to retreat. • Ehance and dune reconstruction is unlikely to be effective at managing the erosion risks at the southern end of Marine Parade where erosion risk is already high in the short term.	**37**	15
	1	**Status Quo** AND Community Education and Emergency Management	**Status Quo** AND Community Education and Emergency Management	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management		• Current ecological systems are presently under threat and may decline in the under status quo. Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Paraparaumu will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds.	3	• More frequent flooding would likely extend coastal environment inland and disrupt existing more modified landscape values within the present day coastal context. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Enhancement of existing inundation protection plus dune and wetland reslience occurs in context of existing modification with limited consequent change to levels of natural character.	2	• In the short and medium term, **maintaining existing dunes and current infrastructure** aligns with community values. However, with 207 (4% of Paraparaumu properties) likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5), a **Status Quo** approach may not be tolerated by the community - engagement on medium term status quo approach may be needed. • **Ongoing education** and increased awareness of risk will ensure community preparedness. Eg. Landowners could be supported to identify dwellings at risk from inundation and to undertake proactive efforts on dwellings to accomodate risks to health and safety. Likely to be made on a case-by-case basis. • In the long term, **enhanced inundation protection** may provide the community with some assurance • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	1	• In the short-medium term, infrastructure will be maintained & public access to recreation areas will continue as status quo, subject to any public safety issues, eg. due to required maintenance, health risks or flood events. • To maintain goodwill and support for adaptation options, the community will need to be informed on changes to public access and why, and impacts to other values eg. ecology. • Ongoing education and increased awareness of risk will ensure community preparedness. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stablility. • In the long term, increased inundation protection may restrict access to some areas while works are being undertaken. Enhanced dune and/or wetland resilience may provide community with opportunties to appreciate nature, foster wellbeing & social cohesion.	5	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term.	1	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk.	**32**	15

Paraparaumu Unit 8B	2	**Status Quo** AND Community Education and Emergency Management	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Protect -** Additional hard protection (e.g. stopbanks, culverts and pump stations)		• Current ecological systems are presently under threat and may decline in the under status quo. Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Paraparaumu will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works removing natural habitats. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Increased hard walls along rivers and streams can deter migratory and spawning fish from these sites due to no natural shady habitat present along banks, and can result in abrupt shifts from freshwater to estuarine communities of which native fish are particularly sensitive to.	3	• More frequent flooding would likely extend coastal environment inland and disrupt existing more modified landscape values within the present day coastal context. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Enhancement of existing inundation protection plus dune and wetland reslience occurs in context of existing modification with limited consequent change to levels of natural character. • Introduction of hard structures and bank protection may reduce natural character with adverse landscape effects in context of existing settlement.	2	• In the short term, maintaining existing dunes and current infrastructure aligns with community values. However, with 10% of Waikanae properties likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5), a **Status Quo** approach may not be tolerated by the community - engagement on medium term status quo approach may be needed. • **Ongoing education** and increased awareness of risk will ensure community preparedness. E.g. Landowners may need to be supported to identify dwellings at risk from inundation and to undertake proactive efforts on dwellings to accomodate risks to health and safety. Likely to be made on a case-by-case basis. • In the medium term, **enhanced inundation protection** may provide the community with some assurance. In the long term, **additonal hard protection** may provide the community with further assurance during flood events. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• In the short term, infrastructure will be maintained at Status quo & public access to recreation areas will continue subject to any public safety issues, eg. due to required maintenance, health risks or flood events. • To maintain goodwill the community will need to be informed on changes to public access and why. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stability. • Med term: enhancing dune and/or wetlands provides community with opportunities to appreciate nature, foster wellbeing & social cohesion. Ongoing education for community on benefits of ecology protection. Increasing awareness of risk will ensure community preparedness and response during flood events. • In the long term, additional hard protection may restrict access to some areas while works are being undertaken. Opportunity to potentially integrate recreation & amenity values into infrastructure design.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Stopbank, floodgates, pump station and culverts trigger the NPS-FM and NES-F and may trigger the NZCPS depending on location. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Consenting a new structure is likely to be more challenging than upgrading an existing structure.	1	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk.	**35**	14
	3	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Accommodate -** Elevate floor levels of buildings and flood proofing buildings and infrastructure		• Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Paraparaumu will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds. • The introduction of accommodating for hazards is likely to neither positively or negatively impact flora and fauna if best practice is followed which can allow for natural migration of existing species.	3	• Enhancement of existing inundation protection occurs in context of existing modification with more limited change in natural character. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Accommodating buildings in restored natural character may enable greater alignment between humans and natural elements, patterns and process within coastal context.	3	• In the short -medium term, **enhanced inundation protection** & dune maintenance aligns with community values. Inundation protection could provide the community with some assurance, given that 10% of Waikanae properties are likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5). • **Ongoing community education** and increased awareness of risk will ensure community preparedness. E.g. Landowners may need to be supported to know how to respond to flood risk and to identify dwellings at risk and undertake proactive accomodation efforts to reduce risks to health and safety. • In the long term **Accomodate** allows homeowners to plan for and choose effective flood mitigation measures relative to affordability & whether they have continued access to roading & critical infrastructure. • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	3	• In the short-medium term, public access to recreation areas will continue subject to any public safety issues, eg. health risks or flood events. Enhanced inundation protection or required infrastructure maintenance, may restrict access to some public areas while works are being undertaken. • Enhancing dune and/or wetlands provides community with opportunities to appreciate nature, foster wellbeing & social cohesion. Ongoing education for community on benefits of ecology protection. Increasing awareness of risk will ensure community preparedness and response during flood events. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stability. • In the long term, most accomodate options are unlikely to impact publc access and recreation.	5	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Elevating buildings and flood proofing will have building consent (and possibly resource consent) requirements. Given the anticipated timeframe of this action this may occur naturally with the turnover of buildings. Consenting hurdles are not anticipated.	1	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk.	**41**	18
	4	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Accommodate -** Elevate floor levels of buildings and flood proofing buildings and infrastructure	**Retreat**		• Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Paraparaumu will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and remove natural habitat for migratory and spawning fish species, and nesting habitats for migratory birds. • The introduction of accommodating for hazards is likely to neither positively or negatively impact flora and fauna if best practice is followed which can allow for natural migration of existing species. • Retreat favours ecological restoration by providing habitats for species to recolonise neighbouring areas that may become destroyed, however this is going to occur in an altered heavily urbanised area and is unlikely to naturally provide ecological	3	• Enhancement of existing inundation protection occurs in context of existing modification with more limited change in natural character. • Dune and wetland resiliance will have limited innitial benefit. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Seeking to accommodate buildings may enable greater alignment between natural elements, patterns and process within coastal context. • Retreat would occur in the context of enhanced wetland areas whitin an increasingly modified coastal context which provides opportunities to improve natural character.	2	In the short term, **enhanced inundation protection** & dune maintenance aligns with community values. This option could provide the community with some assurance, given that 10% of Waikanae properties are likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5). • **Ongoing community education** and increased awareness of risk will ensure community preparedness. E.g. Landowners may need to be supported to know how to respond to flood risk and to identify dwellings at risk and undertake proactive accomodation efforts to reduce risks to health and safety. • In the medium term **Accomodate** allows homeowners to plan for and choose effective flood mitigation measures relative to affordability & whether they have continued access to roading & critical infrastructure. • In the long term affected homeowners and Councils can plan for **Retreat** (eg. relocatable homes, spatial planning, level of infrastructure maintenance, etc). • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• In the short term, public access to recreation areas will continue subject to any public safety issues, eg. health risks or flood events. Enhanced inundation protection or required infrastructure maintenance, may restrict access to some public areas while works are being undertaken. • Enhancing dune and/or wetlands provides community with opportunities to appreciate nature, foster wellbeing & social cohesion. Ongoing education for community on benefits of ecology protection. Increasing awareness of risk will ensure community preparedness and response during flood events. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stabliity. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • Ongoing education and increased awareness of risk will ensure community preparedness. • Med term: most Accomodate options are unlikely to impact publc access and recreation. • Long term: retreat may provide opportunities for land to be aquired for ecological restoration or managed public access for low impact recreation.	3	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Elevating buildings and flood proofing will have building consent (and possibly resource consent) requirements. Given the anticipated timeframe of this action this may occur naturally with the turnover of buildings. Consenting hurdles are not anticipated. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	2	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk. • Only a small number of houses that were retreated for flood hazard would also be impacted by erosion hazard.	**39**	16
	5	**Enhance -** Enhance existing inundation protection, dune and/or wetland resilience, and community education and emergency management	**Protect -** Additional hard protection (e.g. stopbanks, culverts and pump stations)	**Retreat**		• Community education may increase awareness of issues and existing ecology but will not directly positively impact without action. • Enhancement of existing stopbanks in Paraparaumu will provide limited ecological benefit and likely to cause negative impacts on ecology as river banks are further altered and more vegetation may be likely to be removed to make room for protection works. • Wetland resilience through planting may have some positive ecological benefits however this could be limited when coupled with incresing or extending existing inundation protection, removing already existing species. • Maintenance of riparian margin through stopbanks causing the removal of meander bends can narrow and simplify river morphology, increase the flow and energy within the channel, and alter existing habitat for migratory and spawning fish species, and habitats for migratory birds. • Hard protection in the form of stopbanks, culverts and pumpstations may have negative ecological impacts as engineering flood defences typically confine and strangle rivers in place creating deteriorating ecological value, removing the natural adaptive capacity of waterways. • Culverts and flood gates can delay or prevent the natural migration by river dwelling and using species if gates are closed/only periodically opened. • Increased hard walls along rivers and streams can deter migratory and spawning fish and nesting habitats for migratory birds from these sites due to no natural shady habitat present along banks, and can result in abrupt shifts from freshwater to estuarine communities of which native fish are particularly sensitive to. • Retreat provides opportunity for ecological restoration, however this would occur in an already modified environment and is unlikely to create any positive ecological benefits if not managed correctly over a sufficient amount of time.	3	• Enhancement of existing inundation protection occurs in context of existing modification with limited consequent change in context of reduced levels of natural character. • Dune and wetland resiliance will have limited innitial benefit. • Community education may reinforce recognition of indicators of a healthy environment and its contribution to natural character and sense of place. • Additional hard protection in the form of stopbanks, culverts and pumpstations would likely reduce natural elements, patterns and processes and reduce natural character. • Retreat would occur in the context of an increasingly modified coastal context which provides more limited opportunity to improve natural character.	3	• In the short term, **enhanced inundation protection** & dune maintenance aligns with community values. This option could provide the community with some assurance, given that 10% of Waikanae properties are likely exposed to inundation with 0.2m RSLR (~by 2050 at SSP8.5). • Ongoing **community education** and increased awareness of risk will ensure emergency preparedness. E.g. Landowners may need to be supported to know how to respond to flood risk and to identify dwellings at risk and undertake proactive accomodation efforts to reduce risks to health and safety. • In the medium term **additional hard protection** will provide further reassurance in the event of flood events and allow homeowners time to plan for and/or choose other effective avoidance measures. • In the long term affected homeowners and Councils can plan for **Retreat** (eg. relocatable homes, spatial planning, level of infrastructure services, etc). • Insurability of personal assets will be determined by insurance companies (based on own site specific risk assessment).	2	• In the short term, public access to recreation areas will continue subject to any public safety issues, eg. health risks or flood events. Enhanced inundation protection or required infrastructure maintenance, may restrict access to some public areas while works are being undertaken. • Enhancing dune and/or wetlands provides community with opportunities to appreciate nature, foster wellbeing & social cohesion. • Recreation that damages dunes may need to be restricted to protect ecosystems & encourage dune stabliility. • To maintain goodwill and support the community will need to be informed on changes to public access and why. • Ongoing education and increased awareness of risk will ensure community preparedness. • In the medium term, additional hard protection options are may impact public access and recreation while works are being done. Opportunity to potentially integrate recreation & amenity values into infrastructure design. • In the long term, retreat may provide opportunities for land to be aquired for ecological restoration or managed public access for low impact recreation.	2	• Coastal restoration and enhancement is encouraged under the present regulatory framework and will not face any major consenting hurdles in the short term. • Elevating buildings and flood proofing will have building consent (and possibly resource consent) requirements. Given the anticipated timeframe of this action this may occur naturally with the turnover of buildings. Consenting hurdles are not anticipated. • Hard-engineering in the long term will have some consenting requirements and may be challenged. • Consenting a new structure is likely to be more challenging than upgrading an existing structure. • If managed retreat is done well, it should have limited (or positive) effects on the environment. • Currently there is no national direction or precedent on how to undertake managed retreat however, this is likely to be rectified prior to be required. • Managed retreat currently requires regional and district plan changes to implement.	2	• Pathway not designed to address the erosion hazard, and would not effectively manage the erosion risk. • Only a small number of houses that were retreated for flood hazard would also be impacted by erosion hazard.	**41**	16