

Northern Adaptation Area: Draft Adaptation Pathways

Northern Adaptation Area is separated into four sub -areas:

- Otaki Beach
- Te Horo Beach
- PekaPeka Beach
- Rural Northern Adaptation Area

Each sub-area has been further split into two 'management units' based on the hazard source (e.g. erosion and inundation).

Possible high-level pathways of adaptation options which give effect to the Draft NAA Objective (from CAP workshop, 29th March, 2023) have been formed for CAP discussion.

The aim of this workshop session is for CAP to:

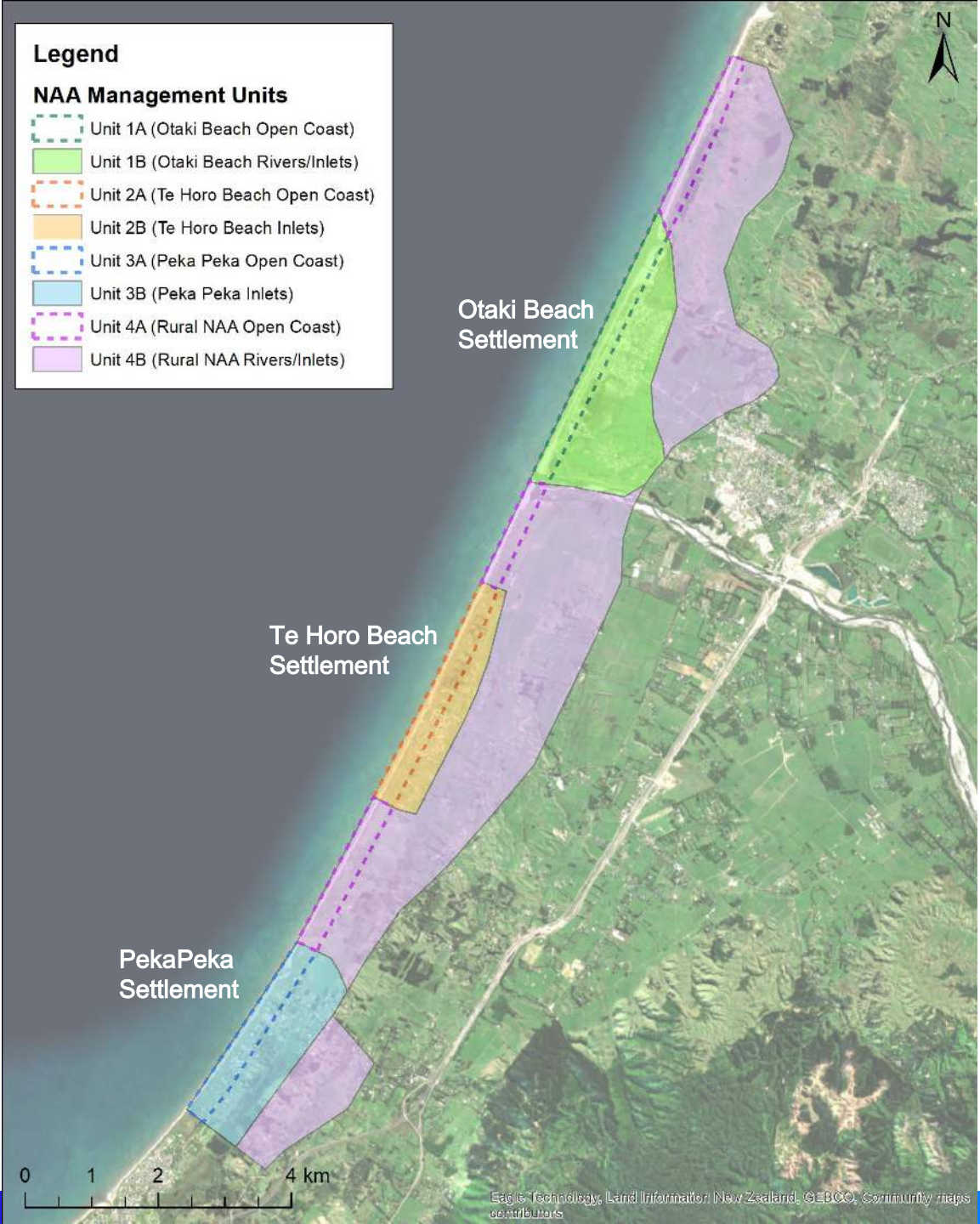
1. Select a short-list of pathways for each sub area that they think require further consideration (economic assessment and MCDA scoring);
2. Define what package of actions could be used for each option in the short-listed pathways.

Overview of Management Units

Legend

NAA Management Units

- Unit 1A (Otaki Beach Open Coast)
- Unit 1B (Otaki Beach Rivers/Inlets)
- Unit 2A (Te Horo Beach Open Coast)
- Unit 2B (Te Horo Beach Inlets)
- Unit 3A (Peka Peka Open Coast)
- Unit 3B (Peka Peka Inlets)
- Unit 4A (Rural NAA Open Coast)
- Unit 4B (Rural NAA Rivers/Inlets)



Re-cap – Northern Adaptation Area Draft Adaptation Objective

Draft Adaptation Pathways have been formed to achieve this draft objective:

Secure long-term coastline resilience through nature-based adaptation solutions, where possible, that:

- *Maintains safe access to the beach;*
- *Maintains food basket values (mahinga kai); and*
- *Provides flexibility for the community to respond to increasing sea level rise risks over time.*

Short-list Adaptation Options

OPTIONS

ENHANCE

ACCOMODATE

PROTECT

RETREAT

AVOID

We keep doing what we are doing, and do it better



- Enhance existing inundation protection
- Dune resilience 'package' (planting, managing access, sand trap fencing)
- Education and emergency management

We adapt where we are and learn to live with the hazard



- Floodproof buildings and infrastructure
- Adaptable and relocatable buildings
- Elevate floor levels of buildings

We protect ourselves from the hazard



- Soft Engineering
 - Renourishment
 - Beach scraping/ dune reconstruction
- Hard Engineering
 - Sea walls
 - Stopbanks
 - Culverts and floodgates
 - Detached breakwaters
 - Pumpstations

We move to safer ground



- Retreat

We avoid developing in places we know will be at risk in the future



- Zoning and setback controls
- Trigger-based or time limited land use controls
- Building design
- Reducing further intensification or development

ACTIONS

Pathways Template

Sub-area:

For each pathway, include the possible adaptation option and example of possible action under that option



Management Unit	Pathway	Short term	→	Medium term	→	Long term
Management Unit A: Open Coast Erosion/Inundation	Pathway 1		→		→	
	Pathway 2		→		→	
	Pathway 3		→		→	
	Pathway 4		→		→	
	Pathway 5		→		→	
Management Unit B: Inlets/Rivers inundation	Pathway 6		→		→	
	Pathway 6		→		→	
	Pathway 8		→		→	
	Pathway 9		→		→	
	Pathway 10		→		→	

- All pathways at all timeframes to include “ Avoid” option through land -use planning (e.g short term is new coastal hazard provisions in Coastal Environment District plan change).
- Under existing RMA legislation, the success of planning actions is limited to re -developments and new developments by existing u se rights. For re-development, this is dependent on the “turn -over” of building stock.

Draft Adaptation Pathways for each Management Unit

Management Units – Otaki Beach

Element	SLR Scenario	Coastal Erosion		Coastal Inundation	
		SSP2 4.5	SSP5 8.5	SSP2 4.5	SSP5 8.5
	2130	2130	2130	2130	2130
Built Environment					
Properties - Whole Adaptation Area		L	L	M	E
Properties - Otaki Beach		M	H	H	E
Properties - Te Horo Beach		M	H	M	M
Properties - PekaPeka		L	M	M	M
Water Supply Infrastructure		M	H	L	L
Wastewater Infrastructure		M	H	L	H
Stormwater Infrastructure		M	H	M	H
Roads and Bridges		L	H	H	E
Electrical Transmission and supply infrastructure		M	H	L	M
Natural gas supply mains		No Exposure		L	M
Ecological					
Dunes		L	H	M	H
Ecological Sites		L	H	M	E
Wetlands		L	L	M	H
Significant Bird Habitat		L	L	H	H
Key Indigenous Trees		L	L	L	L
Human					
Displacement		L	M	M	H
Inequities		M	M	H	E
Health		M	M	E	E
Daily Routines		L	M	M	M
Natural Character					
CTA1: Ōtaki (Coastal Terrestrial Area)		M	M	M	M
Otaki Dunes (High Natural Character)		M	M	M	M
Te Horo Dunes (High Natural Character)		L	M	L	L
Part of CTA2: Waikanae and Paraparumu (Coastal Terrestrial Area)		M	H	M	H
Peka Peka Dunes (High Natural Character)		M	H	M	M



Sub-area 1: Otaki Beach Settlement

Starter for Discussion

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



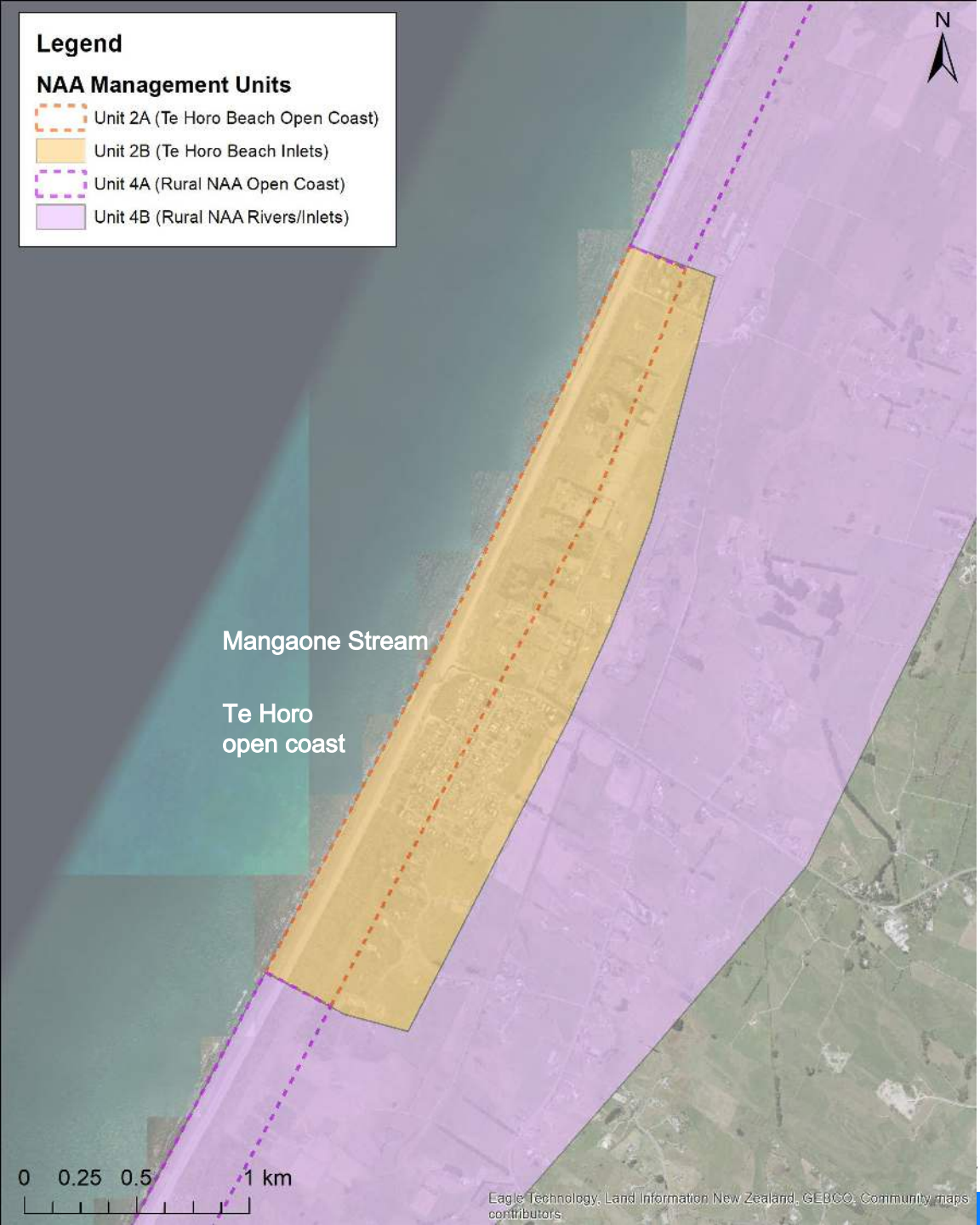
Management Unit	Draft Pathway	Short term (0 -30 years)	→	Medium term (30 -50 years)	→	Long term (50 -100 years)
Management Unit 1A: Open Coast Erosion/Inundation	1 (best under SSP24.5)	Status Quo (continue current dune maintenance)	→	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	2 (SSP58.5 only)	Status Quo (continue current dune maintenance)	→	Enhance (Increase Dune Resilience)	→	Hard Engineering Protection Or Retreat (Infrastructure & Properties)
	3 (best under SSP24.5)	Enhance (Increase Dune Resilience)	→	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	4 (SSP58.5 only)	Enhance (Increase Dune Resilience)	→	Enhance (Increase Dune Resilience)	→	Hard Engineering Protection Or Retreat (Infrastructure & Properties)
	5 (best under SSP24.5)	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	6 (SSP58.5 only)	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)	→	Hard Engineering Protection Or Retreat (Infrastructure & Properties)
Management Unit 1B: Inlets/Rivers inundation	7 (best under SSP24-5)	Status Quo (maintenance of current structures)	→	Status Quo (continue maintenance of current structures)	→	Enhance (strengthen existing structures)
	8 (best under SSP24-5)	Status Quo (maintenance of current structures)	→	Enhance (strengthen existing structures)	→	
	9 (Either scenario)	Status Quo (maintenance of current structures)	→	Enhance (strengthen existing stopbanks)	→	Accommodate Or Additional Hard Protection Or Retreat (Infrastructure & Properties)
	10 (Either scenario)	Enhance (strengthen existing structures)	→	Enhance (strengthen existing stopbanks)	→	
	11 (SSP58.5 only)	Enhance (strengthen existing structures)	→	Accommodate Or Additional Hard Protection Or Retreat (Infrastructure & Properties)	→	Accommodate Or Additional Hard Protection Or Retreat (Infrastructure & Properties)

Management Units – Te Horo Beach

Element	SLR Scenario	Coastal Erosion		Coastal Inundation	
		SSP2 4.5	SSP5 8.5	SSP2 4.5	SSP5 8.5
		2130	2130	2130	2130
Built Environment					
Properties - Whole Adaptation Area		L	L	M	E
Properties - Otaki Beach		M	H	H	E
Properties - Te Horo Beach		M	H	M	M
Properties - PekaPeka		L	M	M	M
Water Supply Infrastructure		M	H	L	L
Wastewater Infrastructure		M	H	L	H
Stormwater Infrastructure		M	H	M	H
Roads and Bridges		L	H	H	E
Electrical Transmission and supply infrastructure		M	H	L	M
Natural gas supply mains		No Exposure		L	M
Ecological					
Dunes		L	H	M	H
Ecological Sites		L	H	M	E
Wetlands		L	L	M	H
Significant Bird Habitat		L	L	H	H
Key Indigenous Trees		L	L	L	L
Human					
Displacement		L	M	M	H
Inequities		M	M	H	E
Health		M	M	E	E
Daily Routines		L	M	M	M
Natural Character					
CTA1: Ōtaki (Coastal Terrestrial Area)		M	M	M	M
Otaki Dunes (High Natural Character)		M	M	M	M
Te Horo Dunes (High Natural Character)		L	M	L	L
Part of CTA2: Waikanae and Paraparumu (Coastal Terrestrial Area)		M	H	M	H
Peka Peka Dunes (High Natural Character)		M	H	M	M

Legend

- NAA Management Units**
- Unit 2A (Te Horo Beach Open Coast)
 - Unit 2B (Te Horo Beach Inlets)
 - Unit 4A (Rural NAA Open Coast)
 - Unit 4B (Rural NAA Rivers/Inlets)



**Sub-area 2:
Te Horo Beach Settlement**
Starter for Discussion

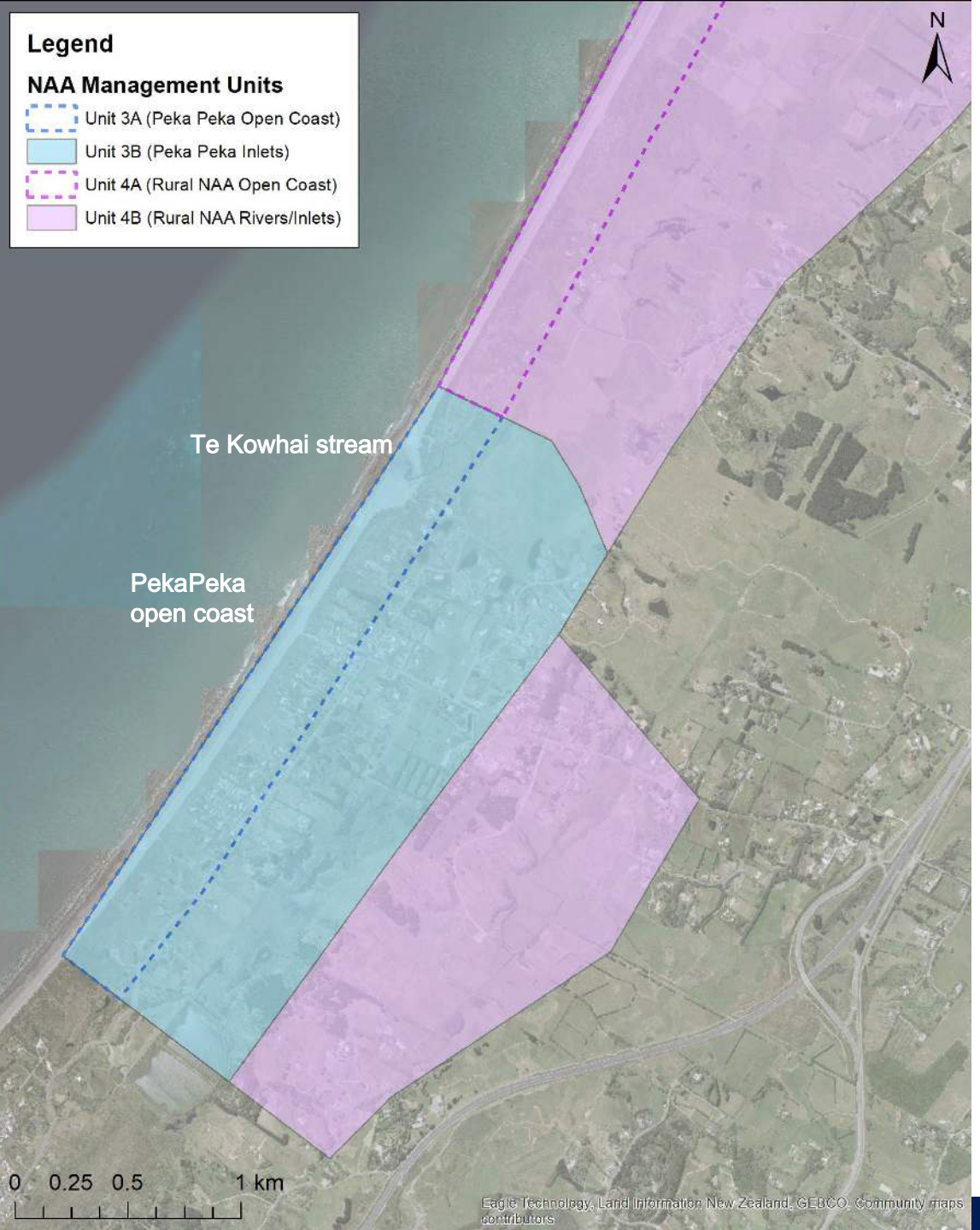
All pathways at all timeframes to include “Avoid” option through land - use planning



Management Unit	Draft Pathway	Short term (0 -30 years)	→	Medium term (30 -50 years)	→	Long term (50 -100 years)
Management Unit 2A: Open Coast Erosion/Inundation	1 (best under SSP24.5)	Status Quo (continue current dune maintenance)	→	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	2 (SSP58.5 only)	Status Quo (continue current dune maintenance)	→	Enhance (Increase Dune Resilience)	→	Hard Engineering Protection Or Retreat (Properties)
	3 (best under SSP24.5)	Enhance (Increase Dune Resilience)	→	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	4 (SSP58.5 only)	Enhance (Increase Dune Resilience)	→	Enhance (Increase Dune Resilience)	→	Hard Engineering Protection Or Retreat (Properties)
	5 (best under SSP24.5)	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	6 (SSP58.5 only)	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)	→	Hard Engineering Protection Or Retreat (Properties)
Management Unit 2B: Inlets/Rivers inundation	7 (best under SSP24-5)	Status Quo (maintenance of current structures)	→	Status Quo (continue maintenance of current structures)	→	Enhance (strengthen existing structures)
	8 (best under SSP24-5)	Status Quo (maintenance of current structures)	→	Enhance (strengthen existing structures)	→	
	9 (Either scenario)	Status Quo (maintenance of current structures)	→	Enhance (strengthen existing stopbanks)	→	Accommodate Or Additional Hard Protection Or Retreat (Properties)
	10 (Either scenario)	Enhance (strengthen existing structures)	→	Enhance (strengthen existing stopbanks)	→	
	11 (SSP58.5 only)	Enhance (strengthen existing structures)	→	Accommodate Or Additional Hard Protection Or Retreat (Properties)	→	Accommodate Or Additional Hard Protection Or Retreat (Properties)

Management Units – Peka Peka Beach

Element	SLR Scenario	Coastal Erosion		Coastal Inundation	
		SSP2 4.5	SSP5 8.5	SSP2 4.5	SSP5 8.5
		2130	2130	2130	2130
Built Environment					
Properties - Whole Adaptation Area		L	L	M	E
Properties - Otaki Beach		M	H	H	E
Properties - Te Horo Beach		M	H	M	M
Properties - PekaPeka		L	M	M	M
Water Supply Infrastructure		M	H	L	L
Wastewater Infrastructure		M	H	L	H
Stormwater Infrastructure		M	H	M	H
Roads and Bridges		L	H	H	E
Electrical Transmission and supply infrastructure		M	H	L	M
Natural gas supply mains		No Exposure		L	M
Ecological					
Dunes		L	H	M	H
Ecological Sites		L	H	M	E
Wetlands		L	L	M	H
Significant Bird Habitat		L	L	H	H
Key Indigenous Trees		L	L	L	L
Human					
Displacement		L	M	M	H
Inequities		M	M	H	E
Health		M	M	E	E
Daily Routines		L	M	M	M
Natural Character					
CTA1: Otaki (Coastal Terrestrial Area)		M	M	M	M
Otaki Dunes (High Natural Character)		M	M	M	M
Te Horo Dunes (High Natural Character)		L	M	L	L
Part of CTA2: Waikanae and Paraparumu (Coastal Terrestrial Area)		M	H	M	H
Peka Peka Dunes (High Natural Character)		M	H	M	M



Sub-area 3: Peka Peka Settlement

Starter for Discussion

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



Management Unit	Draft Pathway	Short term (0 -30 years)	→	Medium term (30 -50 years)	→	Long term (50 -100 years)
Management Unit 3A: Open Coast Erosion/Inundation	1 (best under SSP24.5)	Status Quo (continue current dune maintenance)	→	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	2 (SSP5.8.5 only)	Status Quo (continue current dune maintenance)	→	Enhance (Increase Dune Resilience)	→	Hard Engineering Protection Or Retreat (Properties)
	3 (best under SSP24.5)	Enhance (Increase Dune Resilience)	→	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	4 (SSP5.8.5 only)	Enhance (Increase Dune Resilience)	→	Enhance (Increase Dune Resilience)	→	Hard Engineering Protection Or Retreat (Properties)
	5 (best under SSP24.5)	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	6 (SSP5.8.5 only)	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)	→	Hard Engineering Protection Or Retreat (Properties)
Management Unit 3B: Inlets/Rivers inundation	7 (best under SSP24-5)	Status Quo (maintenance of current structures)	→	Status Quo (continue maintenance of current structures)	→	Enhance (strengthen existing structures)
	8 (best under SSP24-5)	Status Quo (maintenance of current structures)	→	Enhance (strengthen existing structures)	→	
	9 (Either scenario)	Status Quo (maintenance of current structures)	→	Enhance (strengthen existing stopbanks)	→	Accommodate Or Additional Hard Protection Or Retreat (Properties)
	10 (Either scenario)	Enhance (strengthen existing structures)	→	Enhance (strengthen existing stopbanks)	→	
	11 (SSP5.8.5 only)	Enhance (strengthen existing structures)	→	Accommodate Or Additional Hard Protection Or Retreat (Properties)	→	Accommodate Or Additional Hard Protection Or Retreat (Properties)

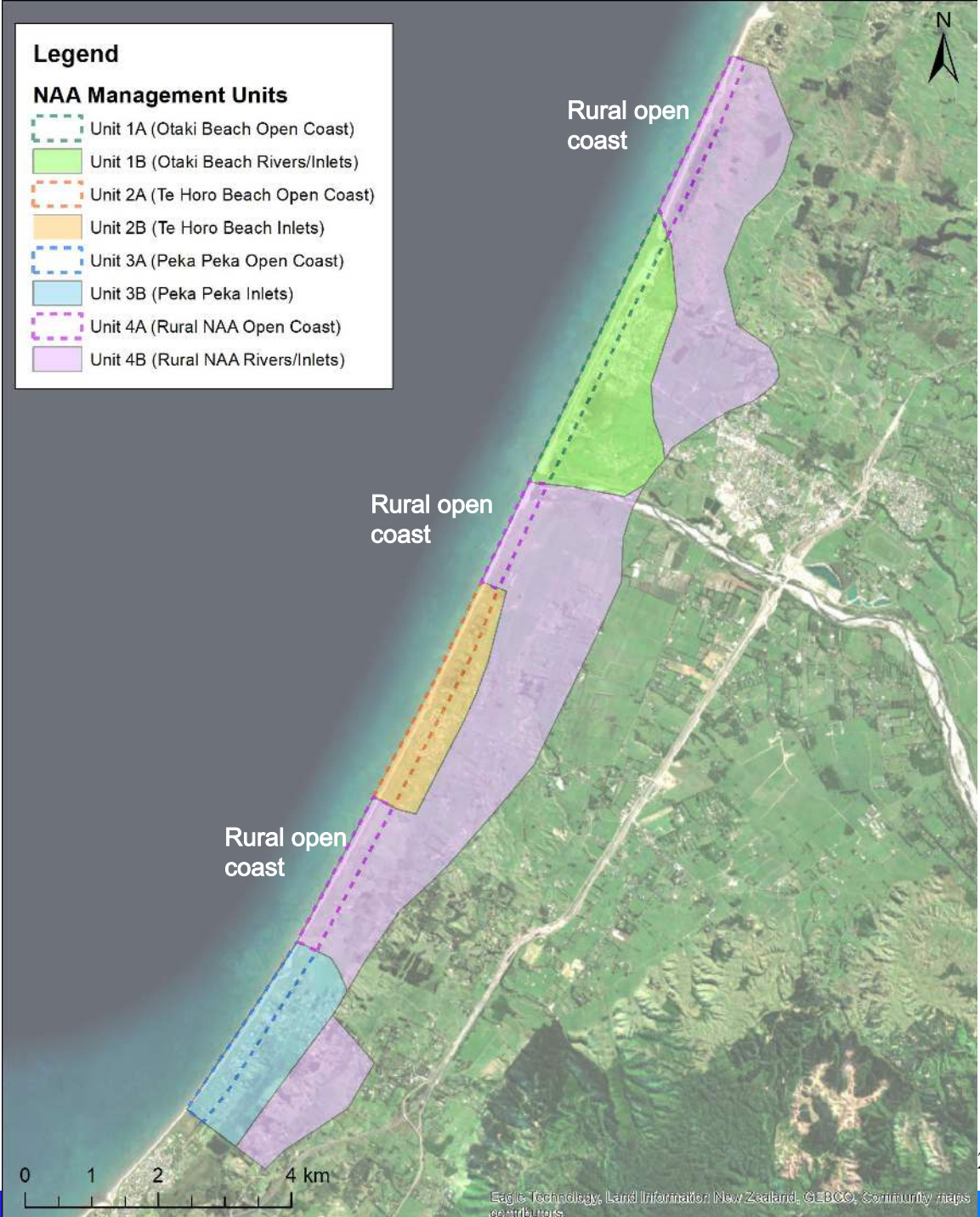
Management Units – Rural NAA

Element	SLR Scenario	Coastal Erosion		Coastal Inundation	
		SSP2 4.5	SSP5 8.5	SSP2 4.5	SSP5 8.5
		2130	2130	2130	2130
Built Environment					
Properties - Whole Adaptation Area		L	L	M	E
Properties - Otaki Beach		M	H	H	E
Properties - Te Horo Beach		M	H	M	M
Properties - Peka Peka		L	M	M	M
Water Supply Infrastructure		M	H	L	L
Wastewater Infrastructure		M	H	L	H
Stormwater Infrastructure		M	H	M	H
Roads and Bridges		L	H	H	E
Electrical Transmission and supply infrastructure		M	H	L	M
Natural gas supply mains		No Exposure		L	M
Ecological					
Dunes		L	H	M	H
Ecological Sites		L	H	M	E
Wetlands		L	L	M	H
Significant Bird Habitat		L	L	H	H
Key Indigenous Trees		L	L	L	L
Human					
Displacement		L	M	M	H
Inequities		M	M	H	E
Health		M	M	E	E
Daily Routines		L	M	M	M
Natural Character					
CTA1: Ōtaki (Coastal Terrestrial Area)		M	M	M	M
Ōtaki Dunes (High Natural Character)		M	M	M	M
Te Horo Dunes (High Natural Character)		L	M	L	L
Part of CTA2: Waikanae and Paraparumu (Coastal Terrestrial Area)		M	H	M	H
Peka Peka Dunes (High Natural Character)		M	H	M	M

Legend

NAA Management Units

- Unit 1A (Otaki Beach Open Coast)
- Unit 1B (Otaki Beach Rivers/Inlets)
- Unit 2A (Te Horo Beach Open Coast)
- Unit 2B (Te Horo Beach Inlets)
- Unit 3A (Peka Peka Open Coast)
- Unit 3B (Peka Peka Inlets)
- Unit 4A (Rural NAA Open Coast)
- Unit 4B (Rural NAA Rivers/Inlets)



Sub-area 4: Rural NAA

Starter for Discussion

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



Management Unit	Draft Pathway	Short term (0 -30 years)	→	Medium term (30 -50 years)	→	Long term (50 -100 years)
Management Unit 1A: Open Coast Erosion/Inundation	1 (best under SSP24.5)	Status Quo (continue current dune maintenance)	→	Status Quo (continue current dune maintenance)	→	Enhance (Increase Dune Resilience)
	2 (best under SSP24.5)	Status Quo (continue current dune maintenance)	→	Enhance (Increase Dune Resilience)	→	
	3 (best under SSP58.5)	Status Quo (continue current dune maintenance)	→	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	4 (best under SSP24.5)	Enhance (Increase Dune Resilience)	→	Enhance (Increase Dune Resilience)	→	Enhance (Increase Dune Resilience)
	5 (best under SSP58.5)	Enhance (Increase Dune Resilience)	→	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)
	6 (SSP58.5 only)	Enhance (Increase Dune Resilience)	→	Soft Engineering Protection (dune reconstruction, renourishment, scraping)	→	
Management Unit 1B: Inlets/Rivers inundation	7 (best under SSP24-5)	Status Quo (maintenance of current structures)	→	Status Quo (continue maintenance of current structures)	→	Enhance (strengthen existing structures)
	8 (best under SSP24-5)	Status Quo (maintenance of current structures)	→	Enhance (strengthen existing structures)	→	
	9 (Either scenario)	Status Quo (maintenance of current structures)	→	Enhance (strengthen existing stopbanks)	→	Accommodate (proactively raise floors/flood proof houses) Or Additional Hard Protection (stopbanks, floodgates, pump stations) Or Retreat (Infrastructure & Properties)
	10 (Either scenario)	Enhance (strengthen existing structures)	→	Enhance (strengthen existing stopbanks)	→	
	11 (SSP58.5 only)	Enhance (strengthen existing structures)	→	Accommodate (proactively raise floors/flood proof houses) Or Additional Hard Protection (stopbanks, floodgates, pump stations) Or Retreat (Infrastructure & Properties)	→	Accommodate (proactively raise floors/flood proof houses) Or Additional Hard Protection (stopbanks, floodgates, pump stations) Or Retreat (Infrastructure & Properties)

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