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Northern Adaptation Area: Draft Adaptation Pathways

Northern Adaptation Area is separated into four sub-areas:

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

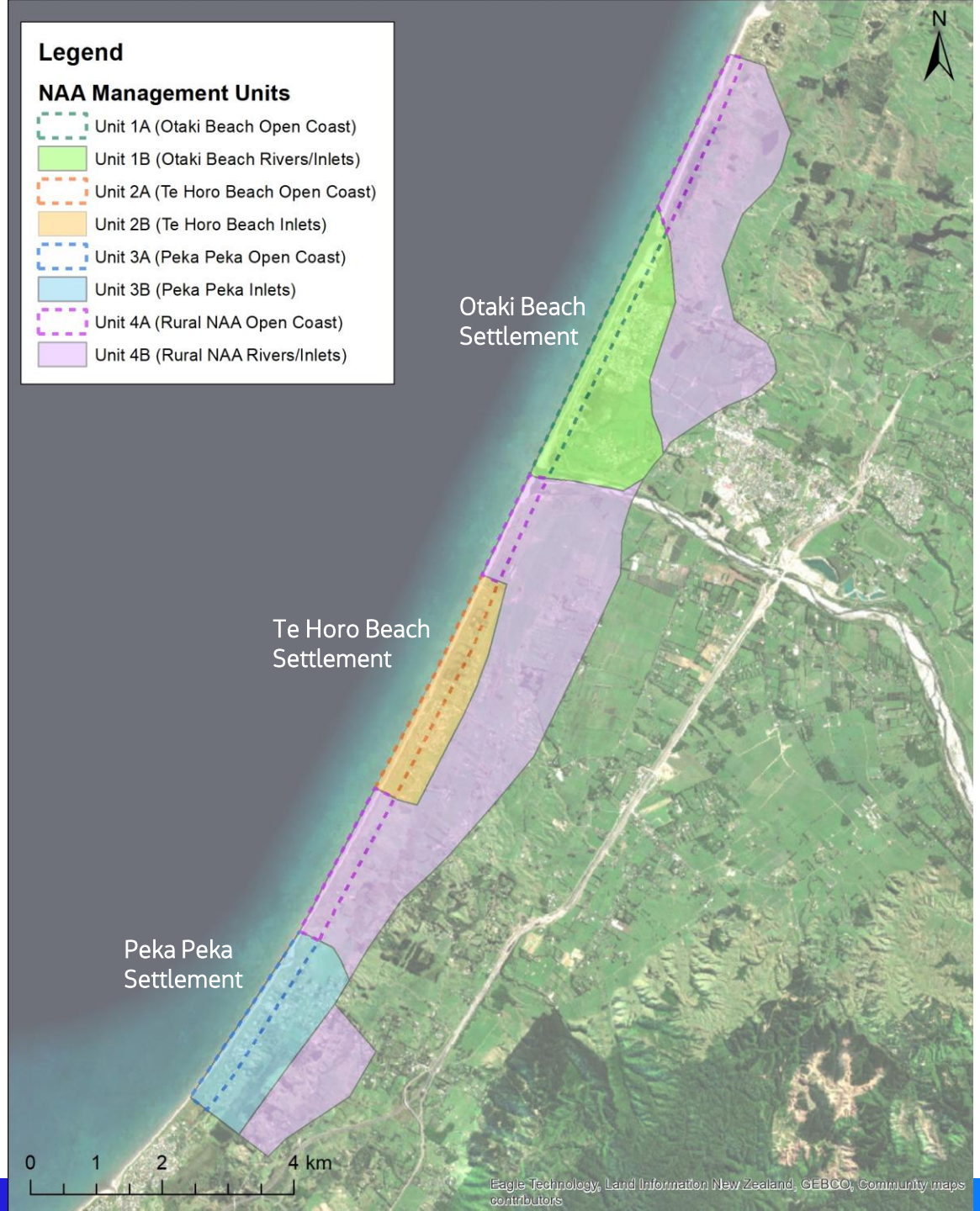
Each sub-area has been further split into two ‘management units’ based on the hazard source (e.g. erosion and inundation).

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



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	We adapt where we are and learn to live with the hazard	We protect ourselves from the hazard	We move to safer ground	We avoid developing in places we know will be at risk in the future
					
ACTIONS	• Enhance existing inundation protection • Dune resilience 'package' (planting, managing access, sand trap fencing) • Education and emergency management	• Floodproof buildings and infrastructure • Adaptable and relocatable buildings • Elevate floor levels of buildings	Soft Engineering • Renourishment • Beach scraping/ dune reconstruction Hard Engineering • Sea walls • Stopbanks • Culverts and floodgates • Detached breakwaters • Pumpstations	• Retreat	• Zoning and setback controls • Trigger-based or time limited land use controls • Building design • Reducing further intensification or development

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 use rights. For re-development, this is dependent on the "turn-over" of building stock.**

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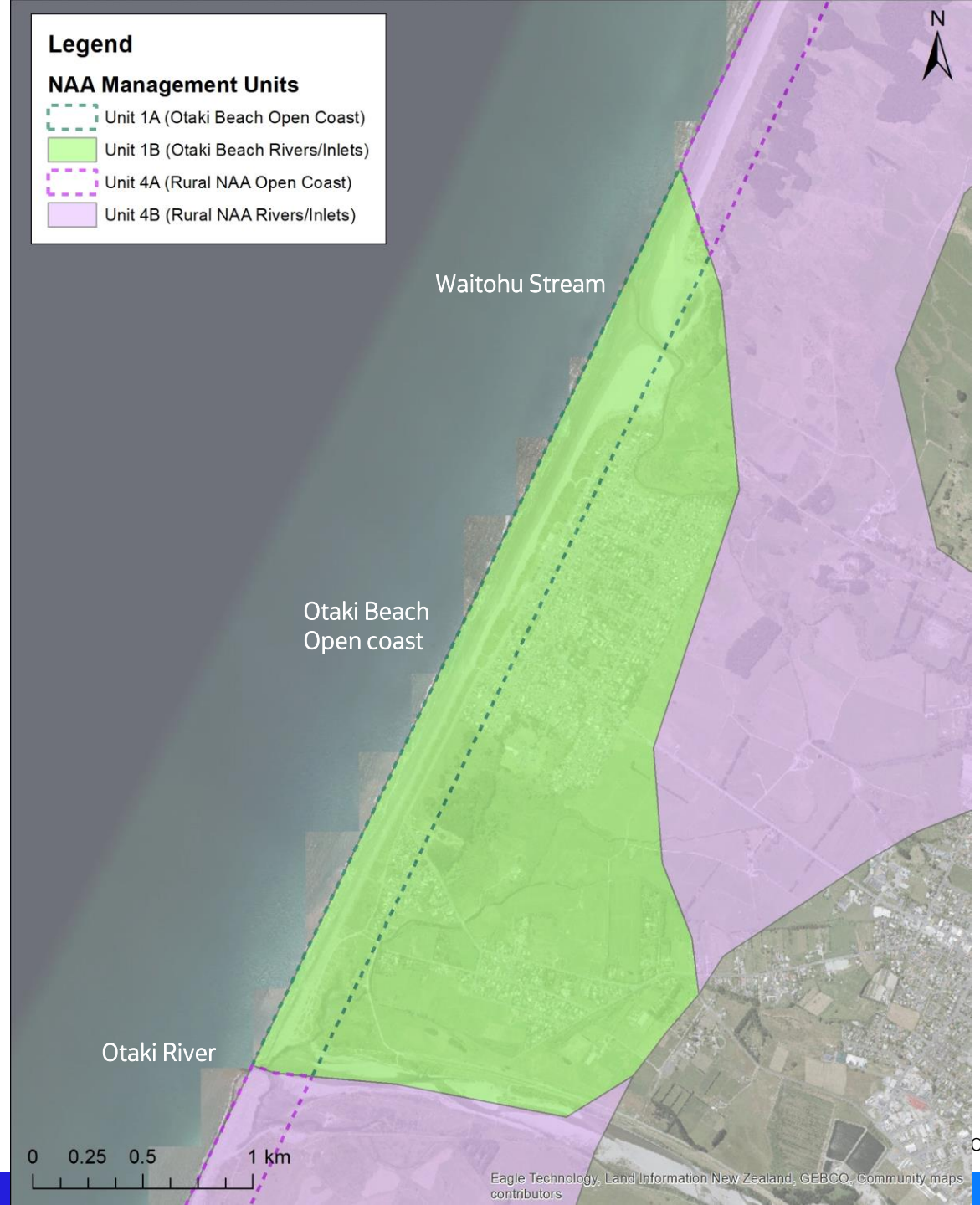
Draft Adaptation Pathways for each Management Unit

Management Units – Otaki Beach

	Coastal Erosion		Coastal Inundation	
SLR Scenario	SSP2-4.5	SSP5-8.5	SSP2-4.5	SSP5-8.5
Element	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
Otaki Dunes (High Natural Character)	M	M	M	M
Te Horo Dunes (High Natural Character)	L	M	L	L
Part of CTA2: Waikanae and Paraparaumu (Coastal Terrestrial Area)	M	H	M	H
Peka Peka Dunes (High Natural Character)	M	H	M	M



Sub-area 1: Otaki Beach Settlement

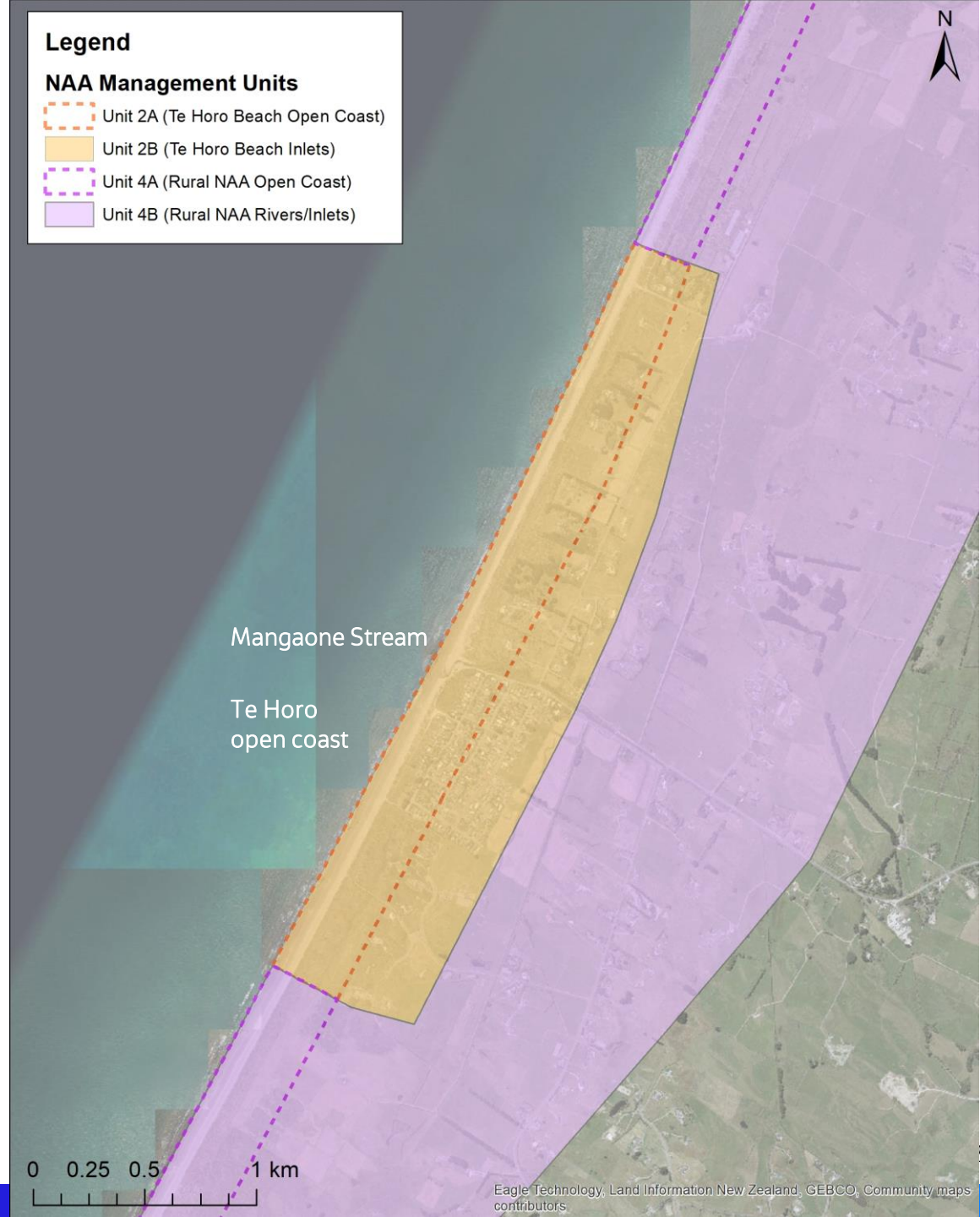
Starter for Discussion

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 SSP2-4.5)	**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** (Infrastructure & Properties)
	3 (best under SSP2-4.5)	**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** (Infrastructure & Properties)
	5 (best under SSP2-4.5)	**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** (Infrastructure & Properties)
Management Unit 1B: Inlets/Rivers inundation	7 (best under SSP2-4-5)	**Status Quo** (maintenance of current structures)	→	**Status Quo** (continue maintenance of current structures)	→	**Enhance** (strengthen existing structures)
	8 (best under SSP2-4-5)	**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 (SSP5-8.5 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)

Management Units – Te Horo Beach

	Coastal Erosion		Coastal Inundation	
SLR Scenario	SSP2-4.5	SSP5-8.5	SSP2-4.5	SSP5-8.5
Element	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
Otaki Dunes (High Natural Character)	M	M	M	M
Te Horo Dunes (High Natural Character)	L	M	L	L
Part of CTA2: Waikanae and Paraparaumu (Coastal Terrestrial Area)	M	H	M	H
Peka Peka Dunes (High Natural Character)	M	H	M	M



Sub-area 2: Te Horo Beach Settlement

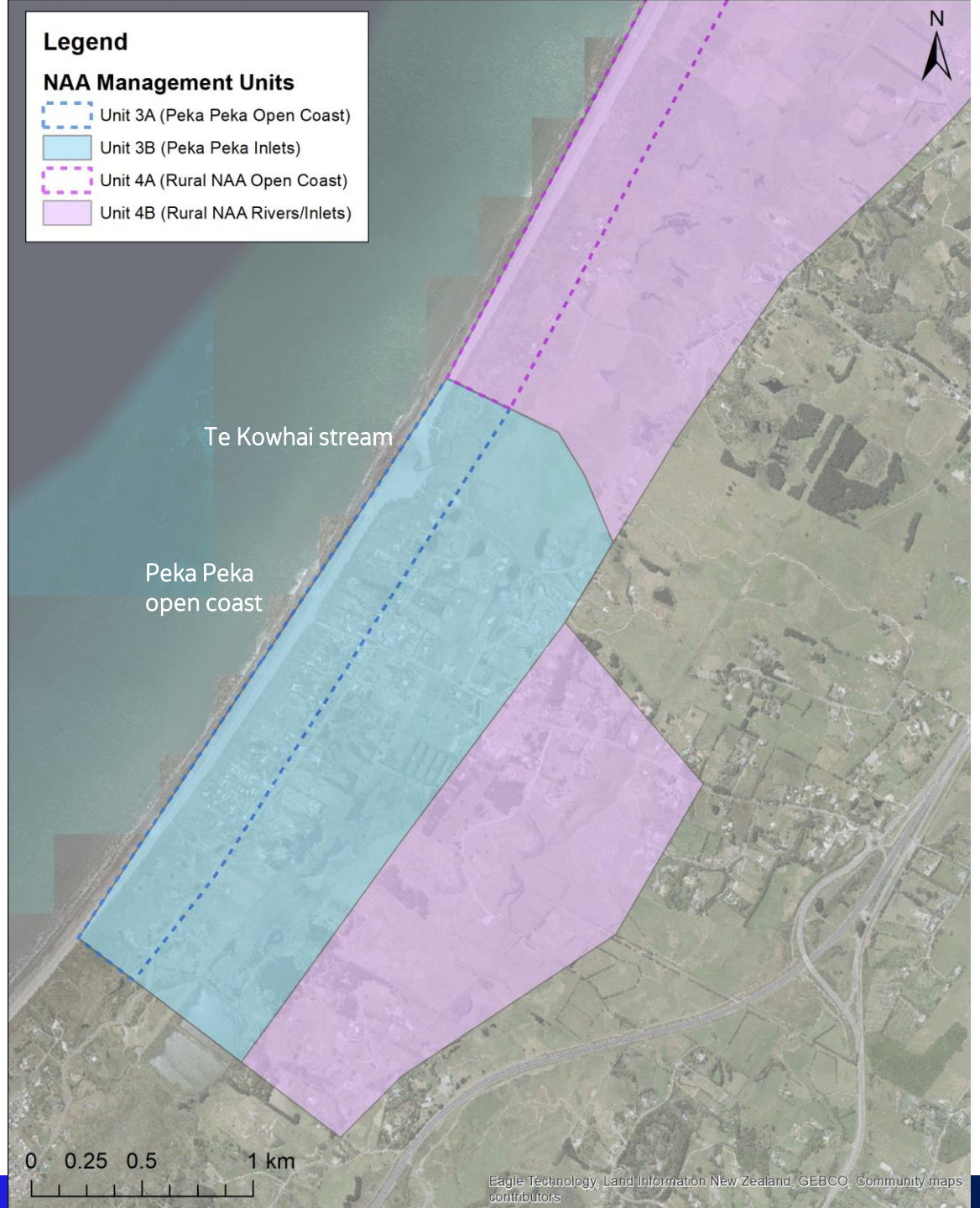
Starter for Discussion

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 SSP2-4.5)	**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 SSP2-4.5)	**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 SSP2-4.5)	**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 2B: Inlets/Rivers inundation	**7** (best under SSP2-4-5)	**Status Quo** (maintenance of current structures)	→	**Status Quo** (continue maintenance of current structures)	→	**Enhance** (strengthen existing structures)
	8 (best under SSP2-4-5)	**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** (Properties)
	10 (Either scenario)	**Enhance** (strengthen existing structures)	→	**Enhance** (strengthen existing stopbanks)	→	
	11 (SSP5-8.5 only)	**Enhance** (strengthen existing structures)	→	**Accommodate** (proactively raise floors/flood proof houses) **Or Additional Hard Protection** (stopbanks, floodgates, pump stations) **Or Retreat** (Properties)	→	**Accommodate** (proactively raise floors/flood proof houses) **Or Additional Hard Protection** (stopbanks, floodgates, pump stations) **Or Retreat** (Properties)

Management Units – Peka Peka Beach

	Coastal Erosion		Coastal Inundation	
SLR Scenario	SSP2-4.5	SSP5-8.5	SSP2-4.5	SSP5-8.5
Element	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
Otaki Dunes (High Natural Character)	M	M	M	M
Te Horo Dunes (High Natural Character)	L	M	L	L
Part of CTA2: Waikanae and Paraparaumu (Coastal Terrestrial Area)	M	H	M	H
Peka Peka Dunes (High Natural Character)	M	H	M	M



Sub-area 3: Peka Peka Settlement

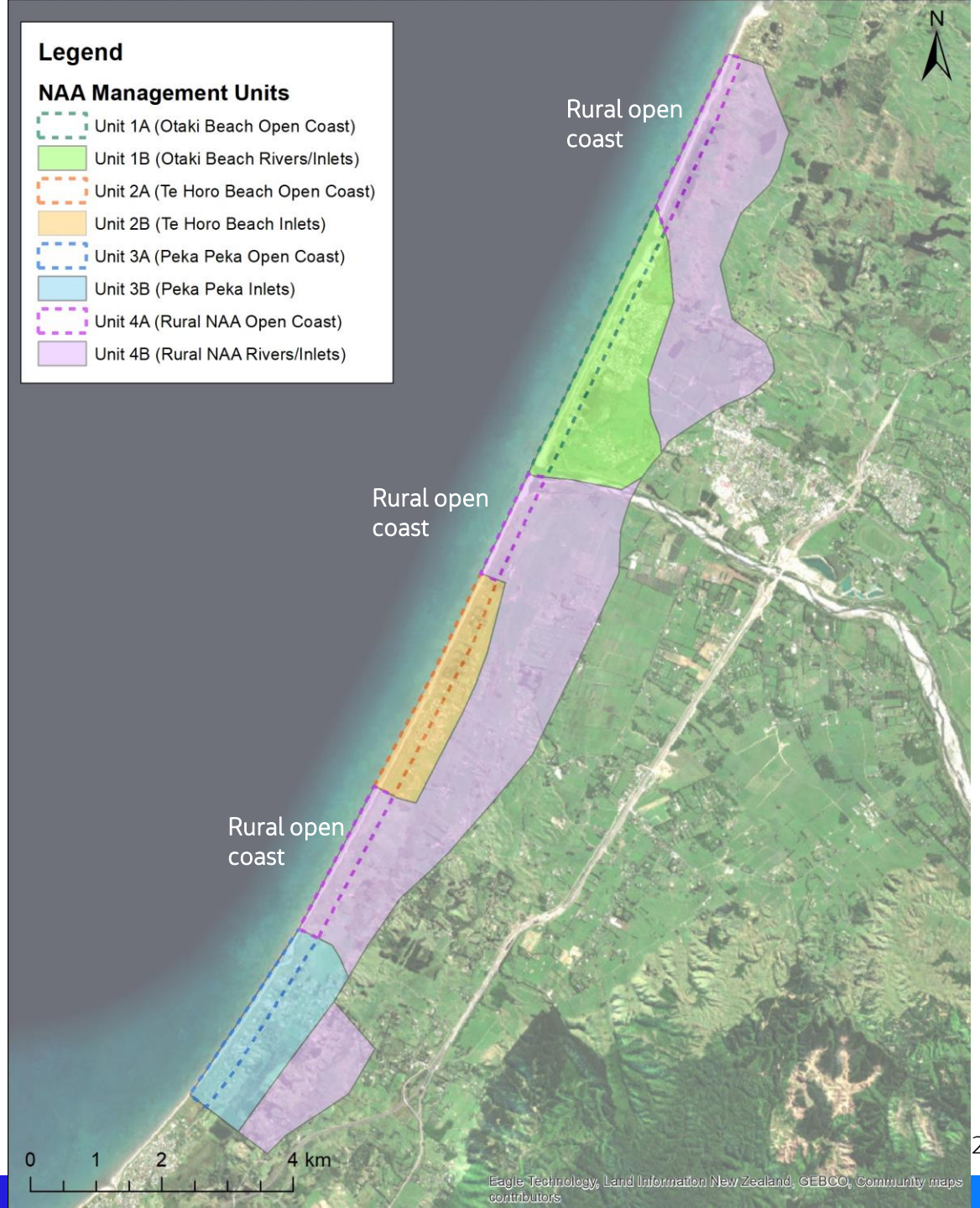
Starter for Discussion

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 SSP2-4.5)	**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 SSP2-4.5)	**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 SSP2-4.5)	**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 SSP2-4-5)	**Status Quo** (maintenance of current structures)	→	**Status Quo** (continue maintenance of current structures)	→	**Enhance** (strengthen existing structures)
	8 (best under SSP2-4-5)	**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** (Properties)
	10 (Either scenario)	**Enhance** (strengthen existing structures)	→	**Enhance** (strengthen existing stopbanks)	→	
	11 (SSP5-8.5 only)	**Enhance** (strengthen existing structures)	→	**Accommodate** (proactively raise floors/flood proof houses) **Or Additional Hard Protection** (stopbanks, floodgates, pump stations) **Or Retreat** (Properties)	→	**Accommodate** (proactively raise floors/flood proof houses) **Or Additional Hard Protection** (stopbanks, floodgates, pump stations) **Or Retreat** (Properties)

Management Units – Rural NAA

	Coastal Erosion		Coastal Inundation	
SLR Scenario	SSP2-4.5	SSP5-8.5	SSP2-4.5	SSP5-8.5
Element	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
Otaki Dunes (High Natural Character)	M	M	M	M
Te Horo Dunes (High Natural Character)	L	M	L	L
Part of CTA2: Waikanae and Paraparaumu (Coastal Terrestrial Area)	M	H	M	H
Peka Peka Dunes (High Natural Character)	M	H	M	M



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 SSP2-4.5)	**Status Quo** (continue current dune maintenance)	→	**Status Quo** (continue current dune maintenance)	→	**Enhance** (Increase Dune Resilience)
	2 (best under SSP2-4.5))	**Status Quo** (continue current dune maintenance)	→	**Enhance** (Increase Dune Resilience)	→	
	3 (best under SSP5-8.5)	**Status Quo** (continue current dune maintenance)	→	**Enhance** (Increase Dune Resilience)	→	**Soft Engineering Protection** (dune reconstruction, renourishment, scraping)
	4 (best under SSP2-4.5)	**Enhance** (Increase Dune Resilience)	→	**Enhance** (Increase Dune Resilience)	→	**Enhance** (Increase Dune Resilience)
	5 (best under SSP5-8.5)	**Enhance** (Increase Dune Resilience)	→	**Enhance** (Increase Dune Resilience)	→	**Soft Engineering Protection** (dune reconstruction, renourishment, scraping)
	6 (SSP5-8.5 only)	**Enhance** (Increase Dune Resilience)	→	**Soft Engineering Protection** (dune reconstruction, renourishment, scraping)	→	
Management Unit 1B: Inlets/Rivers inundation	**7** (best under SSP2-4-5)	**Status Quo** (maintenance of current structures)	→	**Status Quo** (continue maintenance of current structures)	→	**Enhance** (strengthen existing structures)
	8 (best under SSP2-4-5)	**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 (SSP5-8.5 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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