Takutai Kāpiti.

Paekākāriki Adaptation Area

Shortlisted Pathway information for MCDA process

Presentation to CAP 6th March 2024

Information compiled by the Takutai Kāpiti Technical Advisory Group
(KCDC, GWRC, Mitchell Daysh, Jacobs)

Reminder of Adaptation Options and Actions for the Paekākāriki Adaptation Area (PAA)

OPTIONS

ENHANCE	ACCOMMODATE	PROTECT	RETREAT	AVOID
We maintain and improve what we are already doing	We live with the hazard	We keep the hazard away	We move away from the hazard	We don't move into the way of the hazard in the first place
				
ACTIONS				
• Enhance existing erosion protection structures • Enhance existing inundation protection • Enhance access and ramps • Dune and wetland enhancement/resilience • Emergency management • Environmental monitoring • Community education and risk awareness • Private owners' responsibility	• Relocatable buildings • Raising floor levels • Flood-proofing buildings • Flood proofing infrastructure	**Soft Engineering (Erosion)** • Renourishment • Dune reconstruction **Hard Engineering (Erosion)** • Sea walls (vertical, revetment, buried, interlocking) **Inundation controls** • Culvert outfalls • Stopbanks • Earth bunds • Pump stations	• Retreat • Re-establish the line with a setback protection structure	• Raising minimum floor levels of new builds • Reduce further intensification or development • Trigger-based or time limited land use consents • Zoning and setback controls

How to read the Adaptation Area Draft Pathways sheets

High Level Adaptation Option agreed February 2024 workshop

NB: Signals and triggers transition from one action to the next.

Refers to menu of Adaptation options (from February 2024 workshop).
NB: Some pathway options comprise of more than one adaptation action.

Number of dwellings at risk (*Range indicates the lower SSP2-4.5 and higher SSP5-8.5 scenario; no range if the same number of properties is affected for each scenario)*

Paekākāriki Adaptation Area Draft Pathways

Management Unit:	11A Paekākāriki Seawall (Erosion Unit)	Pathway:	1

RSLR 0.2 m (~ 2050) – 0 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 69-92 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 99-145 Properties at risk of erosion

Short term	Medium term	Long term
Status Quo[1] and Enhance[4]	**Protect – Sea wall[13]**	**Re-establish the line with protection structure[10]**
Planned works in the LTP for like-for-like replacement of the Paekākāriki sea wall, and increased community education and emergency management.	*New coordinated sea wall along the same alignment as the Paekākāriki sea wall.*	*A hybrid approach of retreat and hard engineering that involves retreating the minimum number of properties possible and re-establishing the shoreline landward of the existing shoreline with a new protection structure.*

Notes:

In the short term, works planned in the LTP to replace the Paekākāriki sea wall like-for-like will continue to go ahead, with an expected design life of 20 years. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, once the replacement sea wall is no longer effectively managing the risks of coastal erosion, a new replacement sea wall could be constructed along the same alignment.

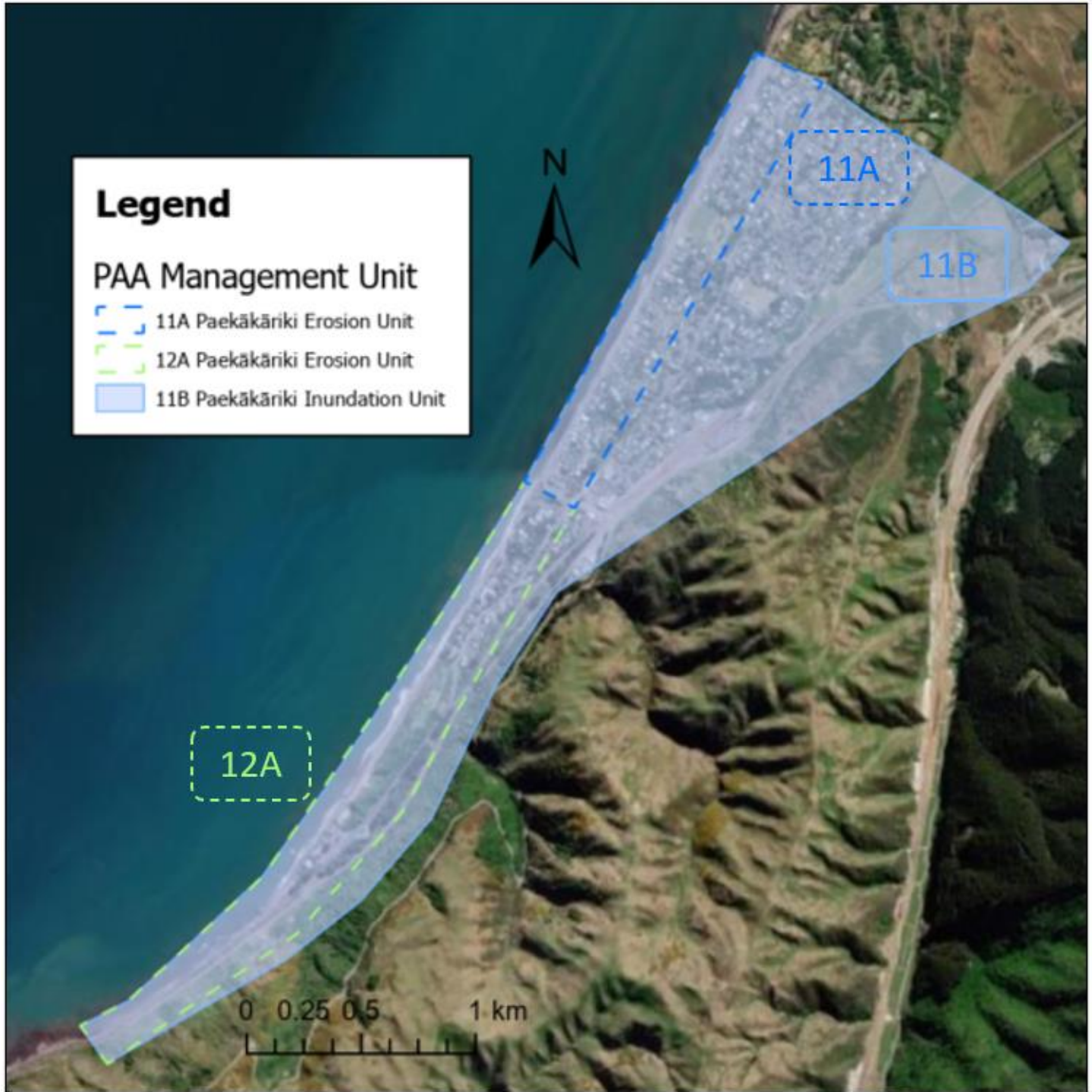
Over the long term, when the new sea wall can no longer effectively manage the erosion risks, retreat of the protection line is undertaken by retreating a small number of properties and establishing a new protection structure further landward than the current alignment.

Explanatory technical notes

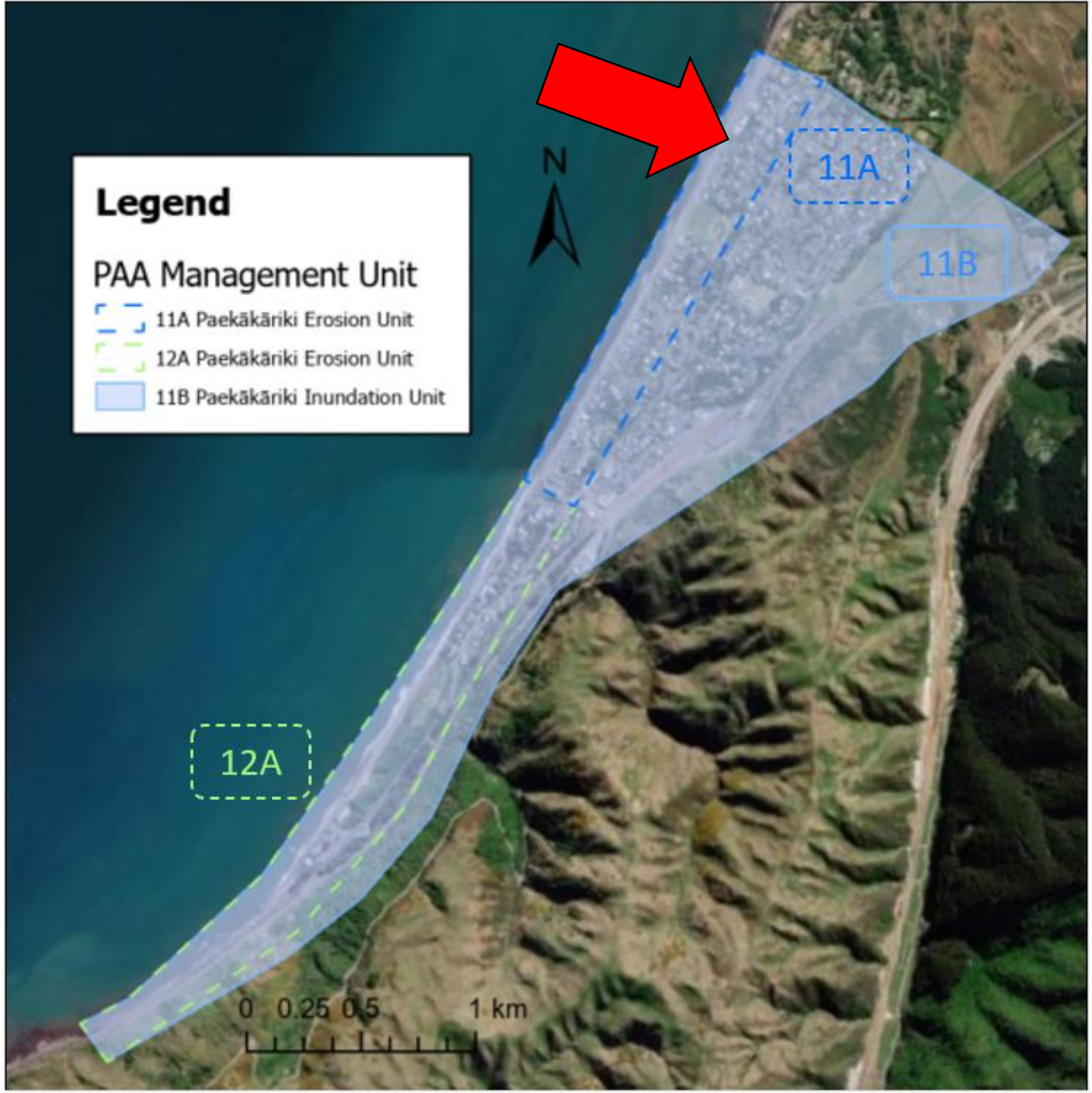
2130 predicted shoreline at SSP5 8.5 (33-66%) – with no adaptation actions

Legend

Paekākāriki Adaptation Area Management Units



Unit 11A: 11A Paekākāriki Seawall (Erosion Unit)



Management Unit:	**11A Paekākāriki Seawall (Erosion Unit)**	Pathway:	1

RSLR 0.2 m (~ 2050) – 0 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 69-92 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 99-145 Properties at risk of erosion

Short term

Status Quo[1] and Enhance[4]

Planned works in the LTP for like-for-like replacement of the Paekākāriki sea wall, and increased community education and emergency management.

Medium term

Protect – Sea wall[13]

New coordinated sea wall along the same alignment as the Paekākāriki sea wall.

Long term

Re-establish the line with protection structure[10]

A hybrid approach of retreat and hard engineering that involves retreating the minimum number of properties possible and re-establishing the shoreline landward of the existing shoreline with a new protection structure.

Notes:
In the short term, works planned in the LTP to replace the Paekākāriki sea wall like-for-like will continue to go ahead, with an expected design life of 20 years. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, once the replacement sea wall is no longer effectively managing the risks of coastal erosion, a new replacement sea wall could be constructed along the same alignment.

Over the long term, when the new sea wall can no longer effectively manage the erosion risks, retreat of the protection line is undertaken by retreating a small number of properties and re-establishing a new protection structure further landward than the current alignment.

Management Unit:	**11A Paekākāriki Seawall (Erosion Unit)**	Pathway:	2

RSLR 0.2 m (~ 2050) – 0 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 69-92 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 99-145 Properties at risk of erosion

Short term	Medium term	Long term
Status Quo[1] and Enhance[4]	**Protect – Sea wall[13]**	**Enhance Sea wall[2]**
Planned works in the LTP for like-for-like replacement of the Paekākāriki sea wall, and increased community education and emergency management.	*New coordinated sea wall along the same alignment as the Paekākāriki sea wall.*	*Add material to the new protection structure to increase resilience and design life.*

Notes:
In the short term, works planned in the LTP to replace the Paekākāriki sea wall like-for-like will continue to go ahead, with an expected design life of 20 years. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, once the replacement sea wall is no longer effectively managing the risks of coastal erosion, a new replacement sea wall could be constructed along the same alignment.

In the long term, the new sea wall will continue to be enhanced by adding material to the crest to increase elevation and prevent overtopping, as well as to the foundation of the structure to reduce the impacts of toe scour and undermining of the structure.

Management Unit:	**11A Paekākāriki Seawall (Erosion Unit)**	Pathway:	3

RSLR 0.2 m (~ 2050) – 0 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 69-92 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 99-145 Properties at risk of erosion

Short term

Status Quo[1] and Enhance[4]

Planned works in the LTP for like-for-like replacement of the Paekākāriki sea wall, and increased community education and emergency management.

Medium term

Re-establish the line with protection structure[10]

A hybrid approach of retreat and hard engineering that involves retreating the minimum number of properties possible and re-establishing the shoreline landward of the existing shoreline with a protection structure.

Long term

Enhance protection structure[2]

Add material to the protection structure to increase resilience and design life.

Notes:
In the short term, works planned in the LTP to replace the Paekākāriki sea wall like-for-like will continue to go ahead, with an expected design life of 20 years. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, when the replacement sea wall can no longer effectively manage the erosion risks, retreat of the protection line is undertaken by retreating a small number of properties and re-establishing a new protection structure further landward than the current alignment.

In the longer term, as the shoreline retreats back to the setback sea wall, the sea wall will continue to be enhanced in order to continue to manage the effects of erosion from the setback position.

Management Unit:	**11A Paekākāriki Seawall (Erosion Unit)**	Pathway:	4

RSLR 0.2 m (~ 2050) – 0 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 69-92 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 99-145 Properties at risk of erosion

Short term

Status Quo[1] and Enhance[4]

Planned works in the LTP for like-for-like replacement of the Paekākāriki sea wall, and increased community education and emergency management.

Medium term

Re-establish the line with protection structure[10] & Dune reconstruction[12]

A hybrid approach of retreat and hard engineering that involves retreating the minimum number of properties possible and re-establishing the shoreline landward of the existing shoreline with a protection structure. Dune reconstruction to be undertaken in front of the structure to provide additional protection.

Long term

Protect - Beach renourishment[11]

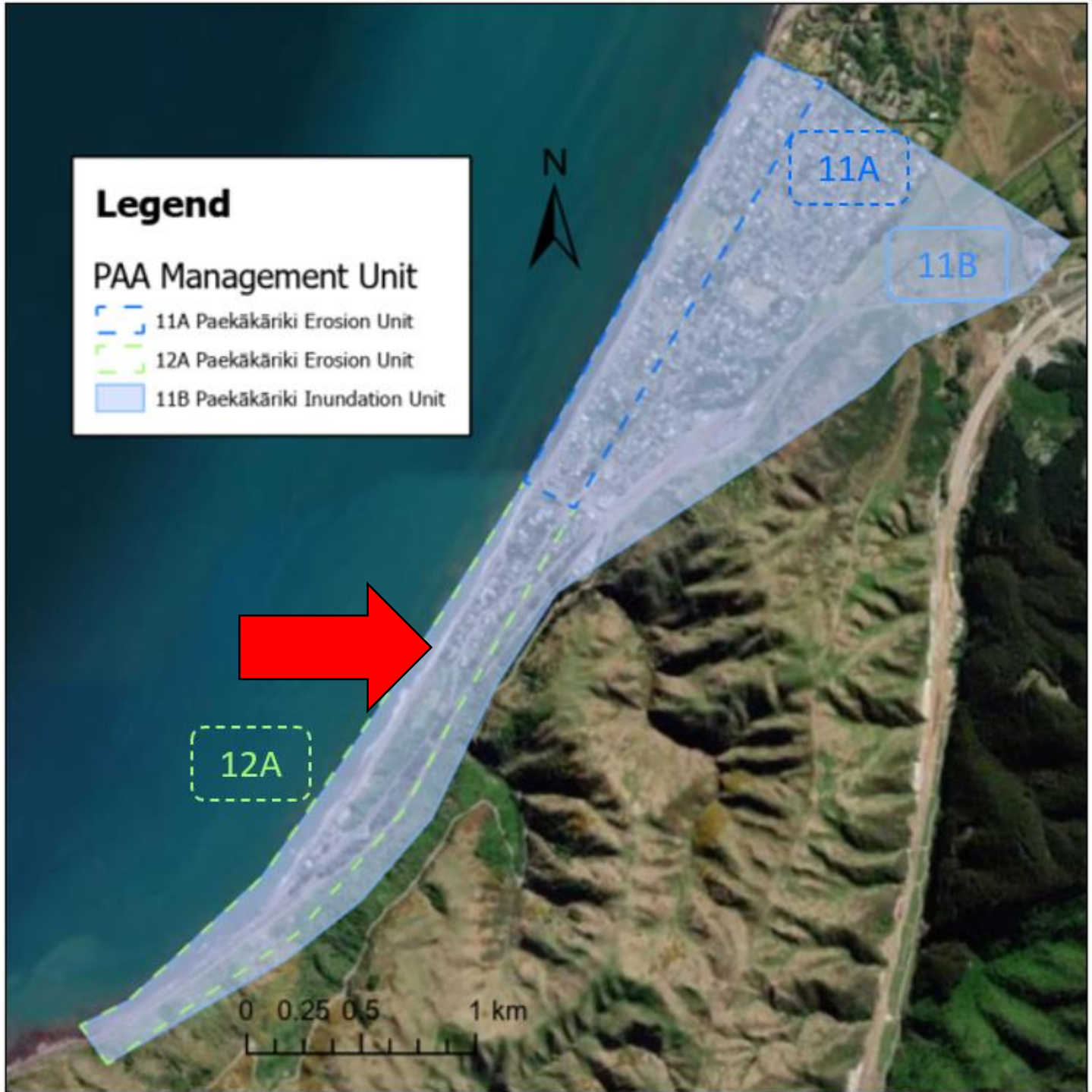
Adding sediment to the beach system, either onshore or in the nearshore to maintain the dune re-construction undertaken in the medium term.

Notes:
In the short term, works planned in the LTP to replace the Paekākāriki sea wall like-for-like will continue to go ahead, with an expected design life of 20 years. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, when existing sea walls can no longer effectively manage the erosion risks, retreat of the protection line is undertaken by retreating a small number of properties and re-establishing a new protection structure further landward than the current alignment. In front of the protection structure, dune reconstruction could be undertaken to build additional natural resilience of the structure, and provide for other coastal values (e.g. ecological, landscape).

In the longer term, beach renourishment could be undertaken to continue to maintain the constructed dune and maintain the beach system, with the setback sea wall being the final line of defence.

Unit 12A: Paekākāriki (South of Seawall)



Management Unit:	**12A South of Paekākāriki Seawall (Erosion Unit)**	Pathway:	1

RSLR 0.2 m (~ 2050) – 48 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 53-57 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 67-80 Properties at risk of erosion

Short term

Status Quo[1] and Enhance[4]

Continue maintaining existing structures under the current management regime (i.e. reactive repair, private maintenance). Increased community education and emergency management.

Medium term

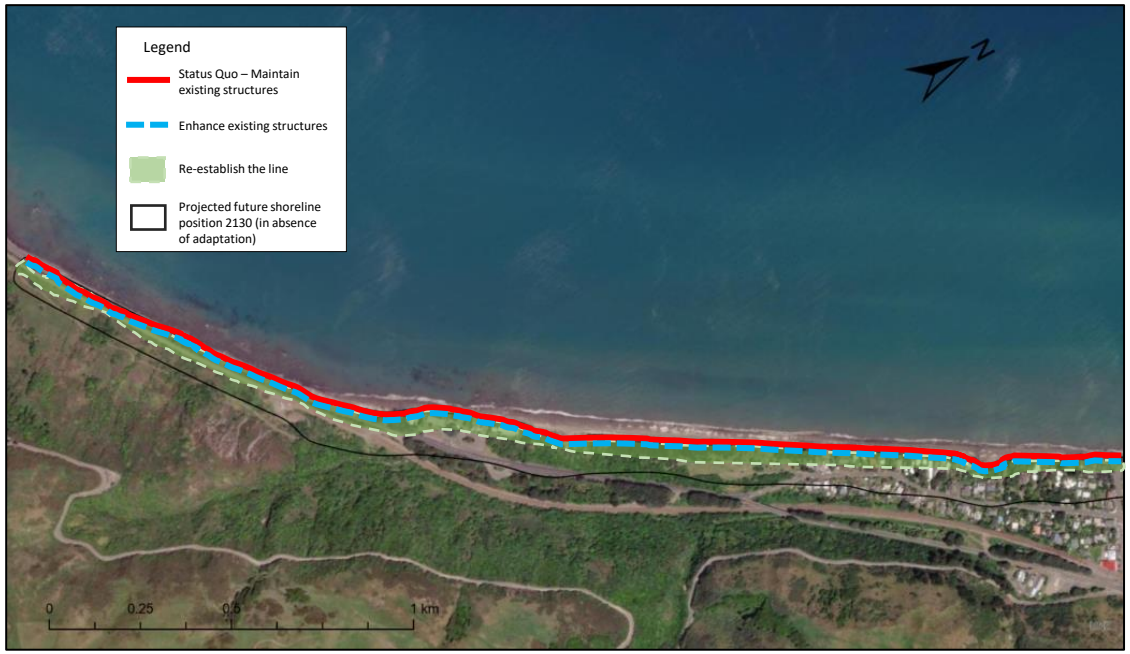
Enhance Package[2,4]

Private owners increase the resilience of their structures by added material to existing structures and increase community education and emergency management.

Long term

Re-establish the line with protection structure[10]

A hybrid approach of retreat and hard engineering that involves retreating the minimum number of properties possible and re-establishing the shoreline landward of the existing shoreline with a protection structure.



Notes:
In the short-term, private structures along the coastline will continue to be privately managed under the current management regime – which usually consists of reactive repair following large events. This current regime is a piecemeal approach to managing erosion. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

As sea level rises, enable private owners, through the planning framework, to increase the resilience of their own private seawalls by adding material to either the foundation of the structure to reduce impacts of toe scour and undermining, and/or the top of the structure to increase crest elevation and try to reduce overtopping. This would continue to be a piecemeal, uncoordinated approach to managing erosion.

Over the longer term, retreat of the protection line is undertaken by retreating a small number of properties and re-establishing a new protection structure further landward than the current alignment. This protection structure would be a coordinated design and construction approach.

Management Unit:	**12A South of Paekākāriki Seawall (Erosion Unit)**	Pathway:	2

RSLR 0.2 m (~ 2050) – 48 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 53-57 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 67-80 Properties at risk of erosion

Short term

Enhance Package[2,4]

Private owners increase the resilience of their structures by added material to existing structures and increase community education and emergency management.

Medium term

Protect – Sea wall[13]

New coordinated sea wall along current seawall alignment in front of the properties.

Long term

Re-establish the line with protection structure[10]

A hybrid approach of retreat and hard engineering that involves retreating the minimum number of properties possible and re-establishing the shoreline landward of the existing shoreline with a protection structure.

Notes:

In the short-term, enable private owners, through the planning framework, to increase the resilience of their own private sea walls by adding material to either the foundation of the structure to reduce impacts of toe scour and undermining, or the top of the structure to increase crest elevation and reduce overtopping. This would continue to be an uncoordinated approach to managing the erosion risk. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Once existing walls begin to fail and can no longer effectively manage the erosion risks, a new coordinated sea wall along the current alignment could be constructed.

Over the longer term, retreat of the protection line is undertaken by retreating a small number of properties and re-establishing a new protection structure further landward than the current alignment. This protection structure would be a coordinated approach.

Management Unit:	**12A South of Paekākāriki Seawall (Erosion Unit)**	Pathway:	3

RSLR 0.2 m (~ 2050) – 48 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 53-57 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 67-80 Properties at risk of erosion

Short term

Enhance Package[2,4]

Private owners increase the resilience of their structures by added material to existing structures and increase community education and emergency management.

Medium term

Re-establish the line with protection structure[10]

A hybrid approach of retreat and hard engineering that involves retreating the minimum number of properties possible and re-establishing the shoreline landward of the existing shoreline with a protection structure.

Long term

Enhance Sea wall[2]

Enhance and maintain the setback sea wall as the shoreline retreats back to that position.

Notes:
In the short-term, enable private owners, through the planning framework, to increase the resilience of their own private sea walls by adding material to either the foundation of the structure to reduce impacts of toe scour and undermining, or the top of the structure to increase crest elevation and reduce overtopping. This would continue to be an uncoordinated approach to managing the erosion risk. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, retreat of the protection line is undertaken by retreating a small number of properties and re-establishing a new protection structure further landward than the current alignment. This protection structure would be a coordinated approach.

Over the long term, as the shoreline retreats back to the setback sea wall, the structure could be enhanced in order to continue to manage the effects of erosion from the setback position.

Management Unit:	**12A South of Paekākāriki Seawall (Erosion Unit)**	Pathway:	4

RSLR 0.2 m (~ 2050) – 48 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 53-57 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 67-80 Properties at risk of erosion

Short term

Enhance Package[2,4]

Private owners increase the resilience of their structures by added material to existing structures and increase community education and emergency management.

Medium term

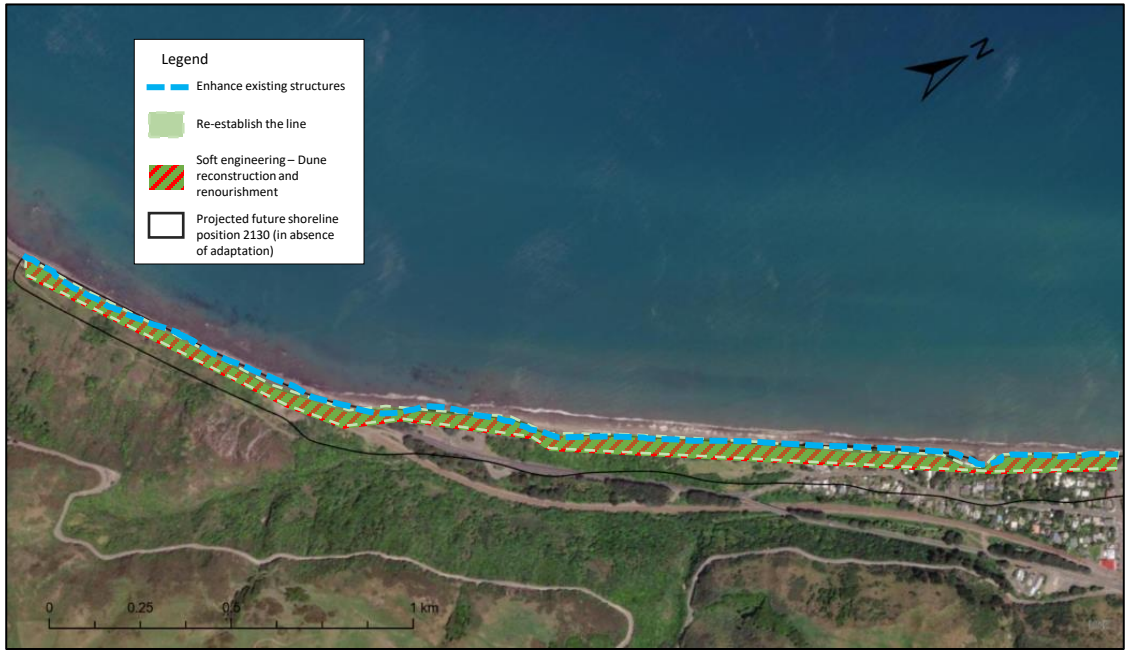
Re-establish the line with protection structure[10] & Dune reconstruction[12]

A hybrid approach of retreat and hard engineering that involves retreating the minimum number of properties possible and re-establishing the shoreline landward of the existing shoreline with a protection structure. Dune reconstruction to be undertaken in front of the seawall to provide additional protection.

Long term

Protect – Beach renourishment[10]

Adding sediment to the beach system, either onshore or in the nearshore to maintain the dune re-construction undertaken in the medium term.



Notes:

In the short-term, enable private owners, through the planning framework, to increase the resilience of their own private sea walls by adding material to either the foundation of the structure to reduce impacts of toe scour and undermining, or the top of the structure to increase crest elevation and reduce overtopping. This would continue to be an uncoordinated approach to managing the erosion risk. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, when existing structures can no longer effectively manage the erosion risks, retreat of the protection line is undertaken by retreating a small number of properties and re-establishing a new protection structure further landward than the current alignment. Infront of the protection structure, dune reconstruction could be undertaken to build additional nature resilience of the wall, and provide for other coastal values (e.g. ecological, landscape).

Over the long term, beach renourishment could be undertaken to continue to maintain the constructed dune and maintain the beach system, with the setback sea wall being the final line of defence.

Management Unit:	**12A South of Paekākāriki Seawall (Erosion Unit)**	Pathway:	5

RSLR 0.2 m (~ 2050) – 48 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 53-57 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 67-80 Properties at risk of erosion

Short term	Medium term	Long term
Protect – Sea wall[13]	**Enhance Sea wall[2]**	**Enhance Sea wall[2]**
New coordinated sea wall along the same alignment as the current protection structures. →	*Add material to the sea wall to increase resilience and design life.* →	*Add material to the sea wall to increase resilience and design life.*

Notes:
In the short-term, the current structure private structures could be removed and replaced with a new sea wall. This seawall would involve a coordinated design and construction approach.

Over the medium and long term, this sea wall would continue to be enhanced in its current alignment. This could be done by adding material to the foundation of the wall to reduce the impacts of toe scour undermining the structure; and by increasing the height of the wall to reduce overtopping.

Management Unit:	**12A South of Paekākāriki Seawall (Erosion Unit)**	Pathway:	6

RSLR 0.2 m (~ 2050) – 48 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 53-57 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 67-80 Properties at risk of erosion

Short term

Status Quo[1] and Enhance[4]

Continue maintaining existing structures under the current management regime (i.e. reactive repair, private maintenance). Increased community education and emergency management.

Medium term

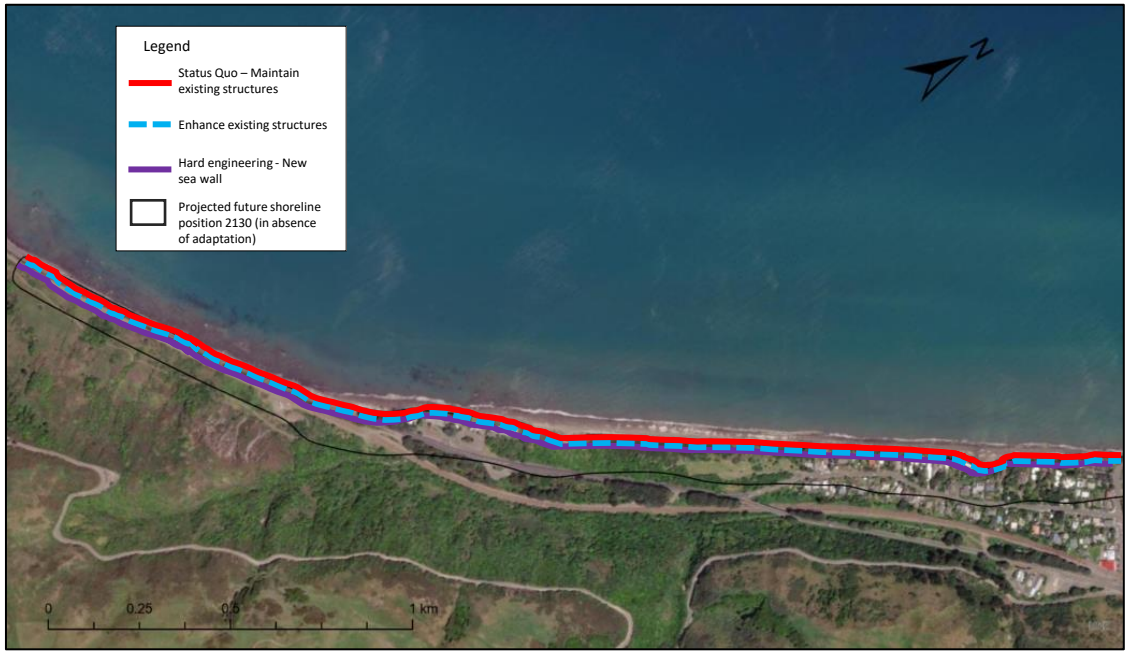
Enhance package[2,4]

Private owners increase the resilience of their structures by added material to existing structures and increase community education and emergency management.

Long term

Protect – Sea wall[13]

New coordinated sea wall along the same alignment as the current protection structures.



Notes:

In the short-term, private structures along the coastline will continue to be privately managed under the current management regime – which usually consists of reactive repair following large events. This current regime is a piecemeal approach to managing erosion. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

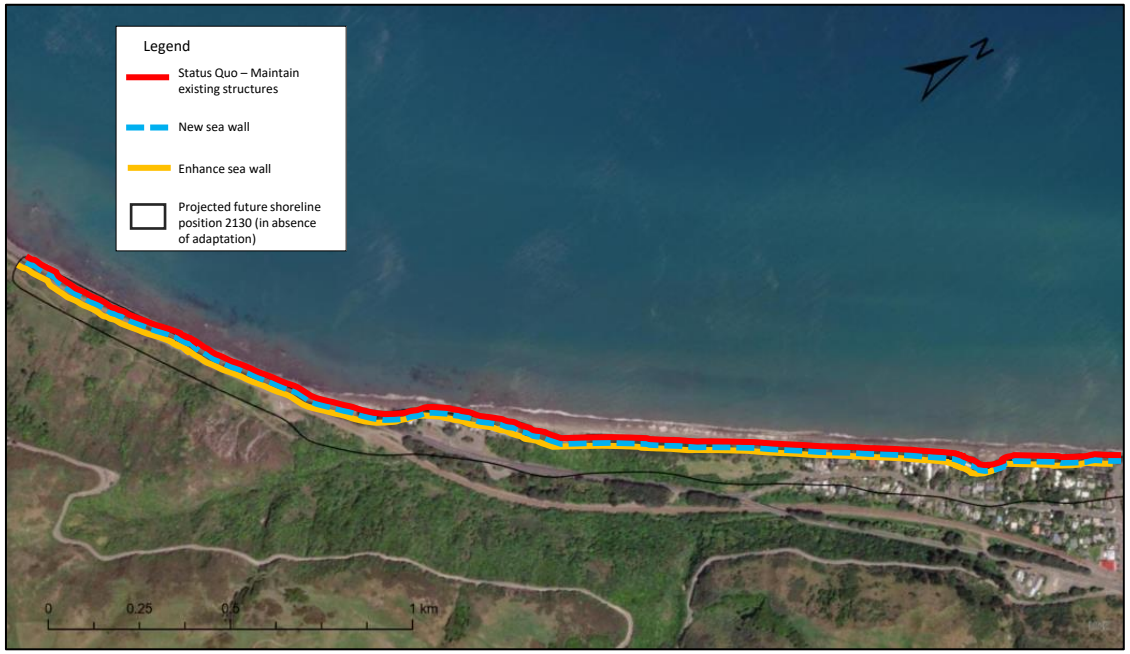
As sea level rises, enable private owners, through the planning framework, to increase the resilience of their own private seawalls by adding material to either the foundation of the structure to reduce impacts of toe scour and undermining, and/or the top of the structure to increase crest elevation and try to reduce overtopping. This would continue to be a piecemeal, uncoordinated approach to managing erosion.

Over the long-term, once existing walls begin to fail and can no longer effectively manage the erosion risks, a coordinated new sea wall along the current alignment could be constructed.

Management Unit:	**12A South of Paekākāriki Seawall (Erosion Unit)**	Pathway:	7

RSLR 0.2 m (~ 2050) – 48 Properties at risk of erosion
RSLR 0.35 – 0.45 m (~ 2070) – 53-57 Properties at risk of erosion
RSLR 0.85 – 1.25 m (~ 2130) – 67-80 Properties at risk of erosion

Short term	Medium term	Long term
Status Quo[1] and Enhance[4]	**Protect – Sea wall[13]**	**Enhance Sea wall[2]**
Continue maintaining existing structures under the current management regime (i.e. reactive repair, private maintenance). Increased community education and emergency management.	*New coordinated sea wall along the same alignment as the current protection structures.*	*Add material to the sea wall to increase resilience and design life.*

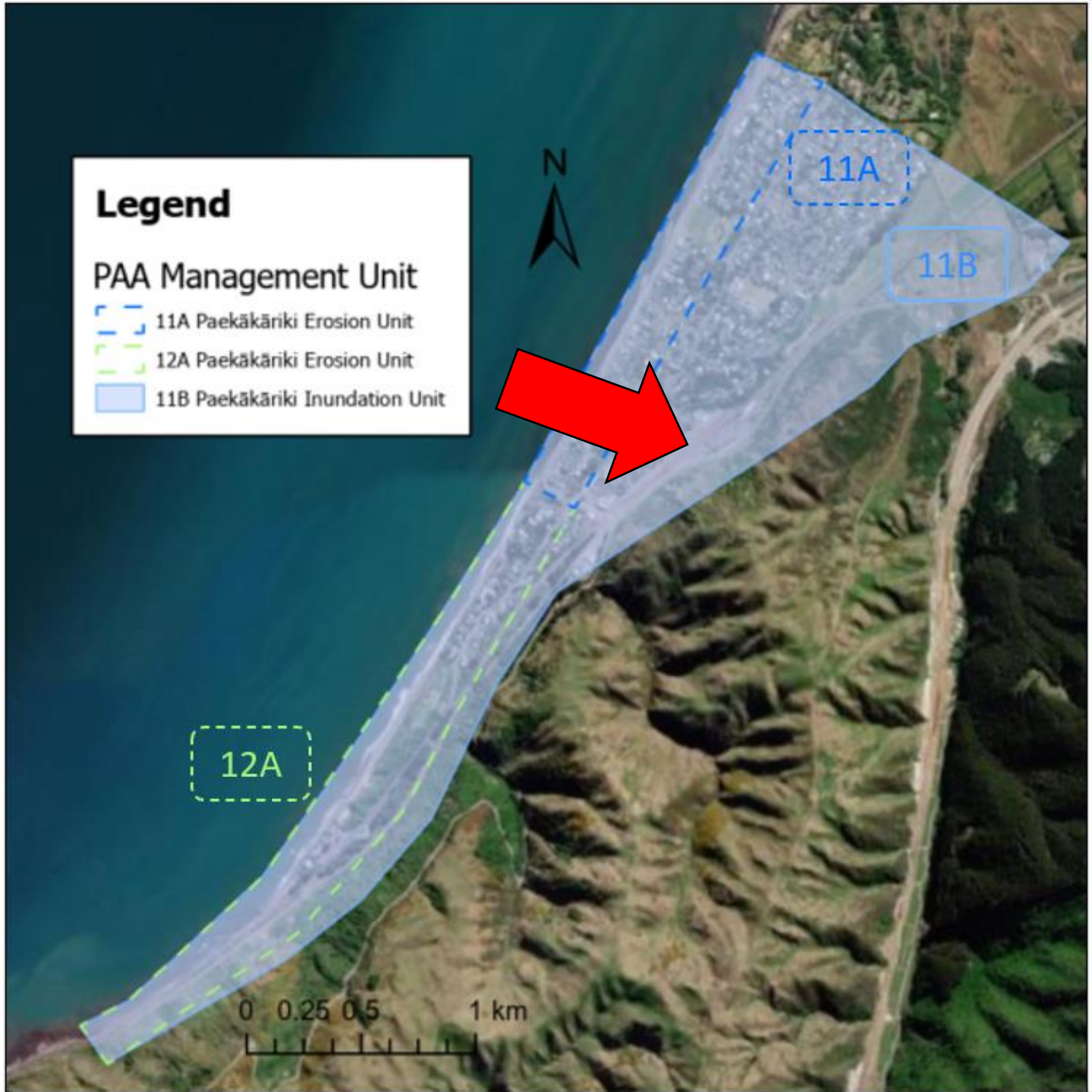


Notes:
In the short-term, private structures along the coastline will continue to be privately managed under the current management regime – which usually consists of reactive repair following large events. This current regime is a piecemeal approach to managing erosion. Increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, once the existing sea wall is no longer effectively managing the risks of coastal erosion, a new replacement sea wall could be constructed along the same alignment.

In the long term, the replacement sea wall will continue to be enhanced by adding material to the crest to increase elevation and prevent overtopping, as well as to the foundation of the structure to reduce the impacts of toe scour and undermining of the structure.

Unit 11B: Paekākāriki Inundation Unit



Paekākāriki Adaptation Area Draft Pathways

Management Unit:	**11B Paekākāriki Inundation Unit**	Pathway:	1

RSLR 0.2 m (~ 2050) – 35 Properties at risk of Inundation
RSLR 0.35 – 0.45 m (~ 2070) – 36 Properties at risk of Inundation
RSLR 0.85 – 1.25 m (~ 2130) – 45-53 Properties at risk of Inundation

Short term	Medium term	Long term
Status Quo[1] and Enhance[4]	**Enhance Package[3,4]**	**Additional Hard Protection[14]**
Maintain existing management infrastructure, increase community education and emergency management.	*Enhance existing inundation protection and increase community education and emergency management.*	*Installation of earth bunds/stopbanks to prevent sea water entering the settlement.*

Notes:
Over the short term, continue to maintain existing flood management infrastructure (stormwater network), and increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, undertake upgrades and maintenance of existing infrastructure to manage the short-medium term flood risk for the area. This is likely to include installing flap-valves on existing outfalls to prevent backflow inland to isolated pockets of flooding during in storm events.

Over the longer term, feasibility of increased hard protection schemes including sections of stopbanks/bunds around Waikakariki Stream would be investigated, and if feasible could be installed to manage coastal water entering the settlement via low lying waterways and the stormwater network.

Paekākāriki Adaptation Area Draft Pathways

Management Unit:	**11B Paekākāriki Inundation Unit**	Pathway:	2

RSLR 0.2 m (~ 2050) – 35 Properties at risk of Inundation
RSLR 0.35 – 0.45 m (~ 2070) – 36 Properties at risk of Inundation
RSLR 0.85 – 1.25 m (~ 2130) – 45-53 Properties at risk of Inundation

Short term	Medium term	Long term
Status Quo[1] and Enhance[4]	**Enhance Package[3,4]**	**Accommodate Package[6,8]**
Maintain existing management infrastructure, increase community education and emergency management.	*Enhance existing inundation protection and increase community education and emergency management.*	*Pro-actively raise floors of homes which could be flooded, and/or flood proof homes and infrastructure.*

Notes:
Over the short term, continue to maintain existing flood management infrastructure (stormwater network), and increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, undertake upgrades and maintenance of existing infrastructure to manage the short-medium term flood risk for the area. This is likely to include installing flap-valves on existing outfalls to prevent backflow inland to isolated pockets of flooding during in storm events.

Over the longer term, dwellings where the flood risk is not being effectively managed through the broader flood protection scheme would be proactively raised so floor levels were above projected water levels in large storms to avoid being flooded, or they would be flood-proofed by sealing the buildings. Although dwellings would be protected, access to properties and services may still be impacted.

Paekākāriki Adaptation Area Draft Pathways

Management Unit:	**11B Paekākāriki Inundation Unit**	Pathway:	3

RSLR 0.2 m (~ 2050) – 35 Properties at risk of Inundation
RSLR 0.35 – 0.45 m (~ 2070) – 36 Properties at risk of Inundation
RSLR 0.85 – 1.25 m (~ 2130) – 45-53 Properties at risk of Inundation

Short term	Medium term	Long term
Status Quo[1] and Enhance[4]	**Additional Hard Protection[14]**	**Enhance New Inundation Protection[3]**
Maintain existing management infrastructure, increase community education and emergency management. →	*Installation of earth bunds/stopbanks to prevent sea water entering the settlement.* →	*Enhance existing flood protection infrastructure.*

Notes:
Over the short term, continue to maintain existing flood management infrastructure (stormwater network), and increase community education and awareness about longer term hazards. Also increase community preparedness and emergency management.

Over the medium term, feasibility of increased hard protection schemes including sections of stopbanks/bunds around Waikakariki Stream would be investigated, and if feasible could be installed to manage coastal water entering the settlement via low lying waterways and the stormwater network.

Over the longer term, undertake upgrades and maintenance of flood protection infrastructure to manage the increasing flood risk for the area.

Management Unit:	**11B Paekākāriki Inundation Unit**	Pathway:	4

RSLR 0.2 m (~ 2050) – 35 Properties at risk of Inundation
RSLR 0.35 – 0.45 m (~ 2070) – 36 Properties at risk of Inundation
RSLR 0.85 – 1.25 m (~ 2130) – 45-53 Properties at risk of Inundation

Short term

Enhance Package[3,4]

Enhance existing inundation protection and increase community education and emergency management.

Medium term

Additional Hard Protection[14]

Installation of earth bunds/stopbanks to prevent sea water entering the settlement.

Long term

Enhance New Inundation Protection[3]

Enhance existing flood protection infrastructure.

Notes:
In the short term, undertake upgrades and maintenance of existing infrastructure (stormwater network) to manage the short-medium term flood risk for the area. This could include installing flap-valves on existing outfalls to prevent backflow inland to isolated pockets of flooding during in storm events.

Over the medium term, feasibility of increased hard protection schemes including sections of stopbanks/bunds around Waikakariki Stream would be investigated, and if feasible could be installed to manage coastal water entering the settlement via low lying waterways and the stormwater network.

Over the longer term, undertake upgrades and maintenance of flood protection infrastructure to manage the increasing flood risk for the area.

Paekākāriki Adaptation Area Draft Pathways

Management Unit:	**11B Paekākāriki Inundation Unit**	Pathway:	5

RSLR 0.2 m (~ 2050) – 35 Properties at risk of Inundation
RSLR 0.35 – 0.45 m (~ 2070) – 36 Properties at risk of Inundation
RSLR 0.85 – 1.25 m (~ 2130) – 45-53 Properties at risk of Inundation

Short term	Medium term	Long term
Enhance Package[3,4]	**Accommodate Package[6,8]**	**Additional Hard Protection[14]**
Enhance existing inundation protection and increase community education and emergency management. →	*Pro-actively raise floors of homes which could be flooded, and/or flood proof homes and infrastructure.* →	*Installation of earth bunds/stopbanks to prevent sea water entering the settlement.*

Notes:
In the short term, undertake upgrades and maintenance of existing infrastructure (stormwater network) to manage the short-medium term flood risk for the area. This could include installing flap-valves on existing outfalls to prevent backflow in storm events.

Over the medium term, dwellings where the flood risk is not being effectively managed through the broader flood protection scheme would be proactively raised so floor levels were above projected water levels in large storms to avoid being flooded, or they would be flood-proofed by sealing the buildings. Although dwellings would be protected, access to properties and services may still be impacted.

Over the longer term, feasibility of increased hard protection schemes including sections of stopbanks/bunds around Waikakariki Stream would be investigated, and if feasible could be installed to manage coastal water entering the settlement via low lying waterways and the stormwater network.