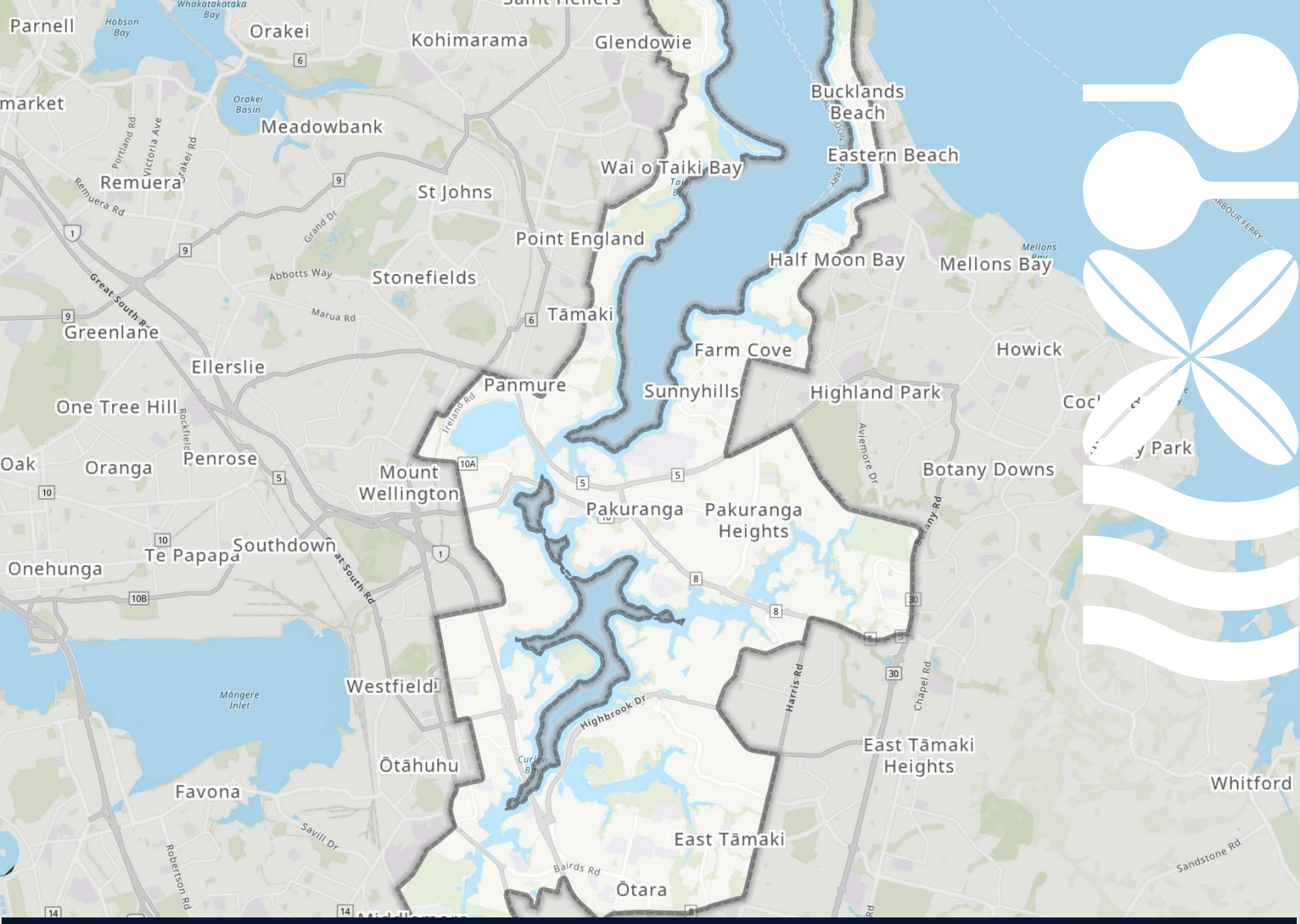

DRAFT for Engagement

Draft Shoreline Adaptation Strategies: Tāmaki Estuary

Shoreline Adaptation Plan

2024

October 2024

aucklandcouncil.govt.nz

Draft Shoreline Adaptation Strategies: Tāmaki Estuary

October 2024

Auckland Council

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Front Cover

Shoreline Adaptations Plan area overview map for Tāmaki Estuary. Map prepared for Auckland Council by Tonkin + Taylor 2023.

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Glossary

Annual Exceedance Probability (AEP)	• The probability of an event occurring in any given year. For example, the 1% AEP has a 1% chance of being met or exceeded in any given year.
AVD-46	• Auckland Vertical Datum – 1946 was the mean sea level established in 1946 and used to define the zero datum for land development.
Biodiversity focus area (BFA)	• An area of ecological significance prioritised by Auckland Council for conservation actions.
Coastal Marine Area	• The coastal marine area is defined as the area of sea from the line of Mean High Water Springs (MHWS) to 12 nautical miles off the coast.
Fetch	• The length of an area of the harbour, estuary or sea in which waves are generated by wind, measured in the direction of the wind.
Highest Astronomic Tide (HAT)	• The highest tidal level that can be predicted to occur under average meteorological conditions and any combination of astronomical conditions.
Mean High Water Springs (MHWS)	• The average of high levels of spring tide.
Significant Ecological Areas	• Identified areas of significant indigenous vegetation or significant habitats of indigenous fauna located either on land or in freshwater environments or in the coastal marine area.

1.0 The Shoreline Adaptation Plan programme

Tāmaki Makaurau, Auckland, is a coastal city, bounded to the east and west by the South Pacific Ocean and the Tasman Sea. The region has around 3,200 km of dynamic coastline and encompasses three major harbours: the Kaipara, Manukau and Waitematā. Due to its location, much of the city's urban development and supporting infrastructure is concentrated in coastal areas and exposed to coastal processes such as erosion and inundation. These natural processes are considered hazards when they impact on things or locations of value. Climate change related to greenhouse gas emissions is contributing to rising sea levels, which have a range of impacts including increasing the frequency and magnitude of coastal hazard events. In 2021, Auckland Council began developing a series of area-based Shoreline Adaptation Plans (SAPs) as the first step for the SAP programme in achieving a resilient future for Auckland's coasts.

1.1 Purpose and use of this document

The purpose of this document is as a consultation document.

This document does not represent a complete draft of a finalised Shoreline Adaptation Plan for Tāmaki Estuary. It has been prepared solely to enable the community engagement process for the development of the Tāmaki Estuary Shoreline Adaptation Plan (SAP) area.

The draft document provides a foundation to guide an understanding of the preliminary recommendations for adaptation strategies (across three timeframes) informed by the technical inputs of the Coastal Management Team within the Engineering, Assets & Technical Advisory department of Auckland Council.

1.2 Shoreline Adaptation Plan programme purpose and scope

SAPs are non-statutory, strategic documents that support the sustainable management of Auckland Council-owned coastal land and assets (including but not limited to, parks/reserves, public facilities, water infrastructure and transport infrastructure), over the next 100 years.

These plans consider the potential impacts of coastal erosion, coastal inundation, rainfall flooding, and climate-change (including sea-level rise). They seek to provide an adaptive planning approach that responds to the changing nature of Auckland's coastal environment, asset and infrastructure owners' requirements, and the needs and values of local iwi and local communities.

This 'first generation' (Series 1) of plans have been developed in response to the *Coastal hazards and climate change guidance* from the Ministry for the Environment[1]. SAP area plans provide a 'roadmap' for changing coastal management strategies over time (over three timeframes) which can be further developed to implement Dynamic Adaptive Policy Pathways. The SAP area plans' development

[1] Ministry for the Environment (2024). Coastal Hazards and Climate Change – Guidance for Local Government

process also ensures consultation and the initiation of an opportunity for collaboration with mana whenua and communities to develop and implement the strategies identified in the SAP area plans. While this 'series' of SAP reports applies specifically to Auckland Council-owned land and assets, the programme acknowledges the need for holistic 'systems' thinking both in relation to coastal management and adaptation. The draft reports represent the initial technical recommendations ahead of the development of the full SAP report for the Tāmaki Estuary area ahead of a second opportunity for community engagement and ongoing engagement with programme partners.

1.3 Auckland Council-owned land and assets

The Tāmaki River Inlet area comprises various Auckland Council-owned assets and land, such as several boat ramps, wharves, playgrounds, skate parks, public toilets, fitness facilities and approximately 140 Auckland Council or CCO-owned buildings. There are numerous park and reserve areas including many which support marine/water-based uses such as boating clubs.

The unit includes significant ecological and cultural parks and reserves such as Tahuna Torea Nature Reserve and Te Naupata Reserve. Several closed landfills are located within proximity to the coast, including at Seaside Park on Brady Road. Water infrastructure, important roading connections, State Highways (not Auckland Council-owned) and lifeline infrastructure traverse this SAP area.

Auckland Council land and assets are identified in each unit map at the commencement of each unit-based section of this report.

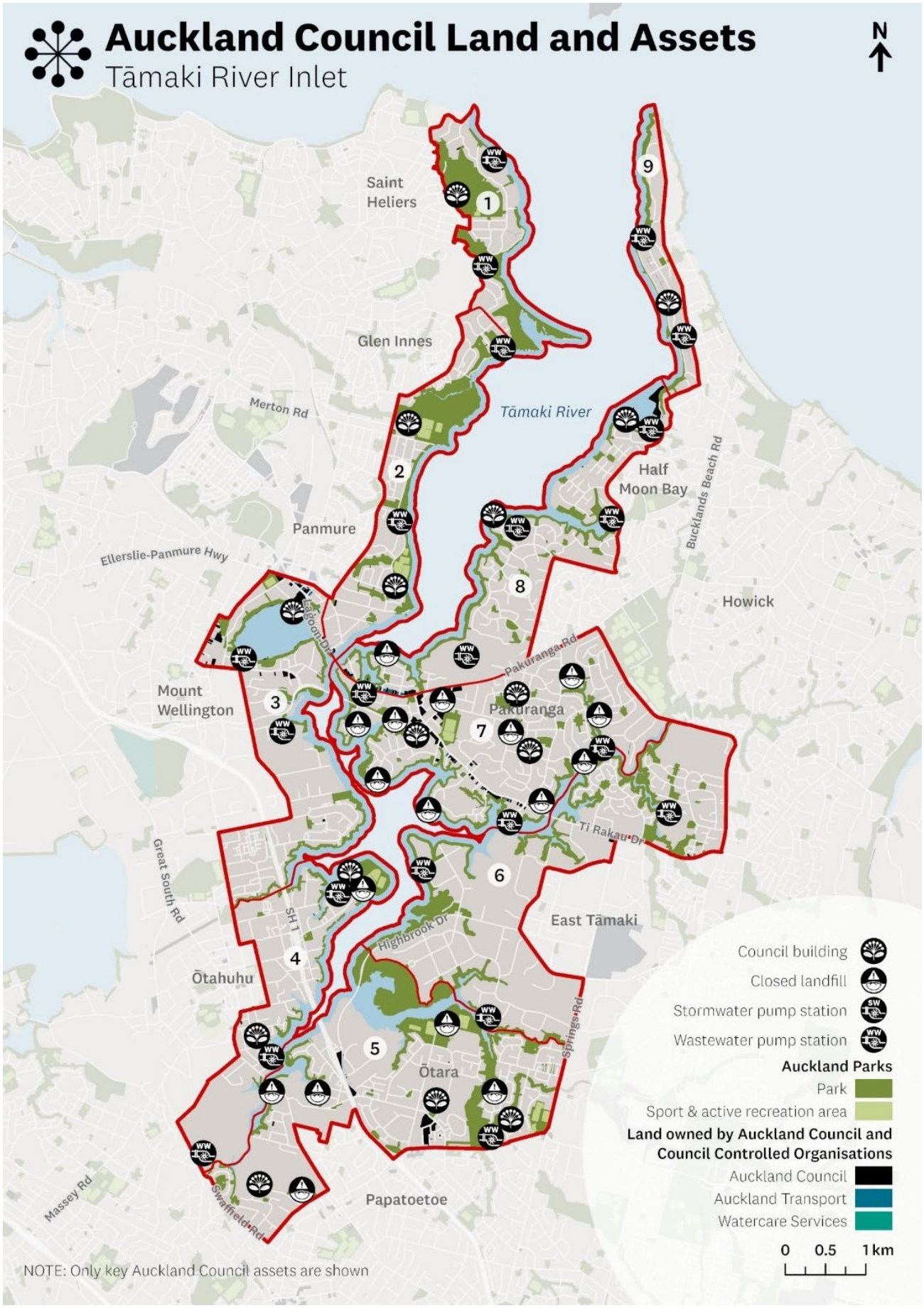


Figure 1-1: Auckland Council-owned land and assets in the Tāmaki Estuary

1.4 Limitations

The SAP Series 1 reports are strategic documents which set a high-level direction for shoreline management and the assets within those areas. It is important to note there are limitations to the scope of these plans:

- They are not developed with the intention of applying directly to privately-owned land and/or assets within the wider SAP area.
- As the focus is on Auckland Council-owned land and assets, they are developed with limited consideration of third-party land, assets, interests and values.
- Draft adaptation strategies are selected using technical knowledge and understanding of coastal management. Analysis is supported by the best available information as set out in this report and supporting reports.
- They do not consider site-specific options assessments for what may be delivered in implementing each of the adaptive strategies.
- They do not consider any site or parcel-specific legal mechanisms, covenants or requirements or identify specific conditions or actions associated with individual resource consents (such as consents for coastal structures or discharge consents associated with water infrastructure).

2.0 Tāmaki Estuary Context and overview

2.1 Tāmaki Estuary SAP area overview

Tāmaki Estuary extends around 17 km inland from its mouth at Tāmaki Strait, with several smaller tributaries radiating out from the main channel. The majority of the water flow is of marine origin, with only a small contribution from terrestrial catchments. As a result, the tidal inlet is substantially drained at low water.

The estuary comprises large areas of intertidal sand and mudflats along with fringing mangrove forest and features numerous habitats and ecosystems that are regionally important. Much of the catchment surrounding Tāmaki Estuary is developed and has a long history of commercial and industrial use. The pressures associated with these land uses have cumulatively had a negative impact on sediment quality, particularly in the estuary's muddier, sheltered upper reaches.

The coastal edge of the Tāmaki Estuary is predominantly urbanised. To support surrounding development, the shores include a number of boat ramps, jetties, wharves and coastal walkways. Many areas include hard protection structures in public or private ownership. There are extensive areas of pile and swing moorings located along the Tāmaki Estuary. The Half Moon Bay and Bucklands Beach Yacht Club Marinas and ferry terminal are located at Half Moon Bay, with boat building industry infrastructure further up the estuary.

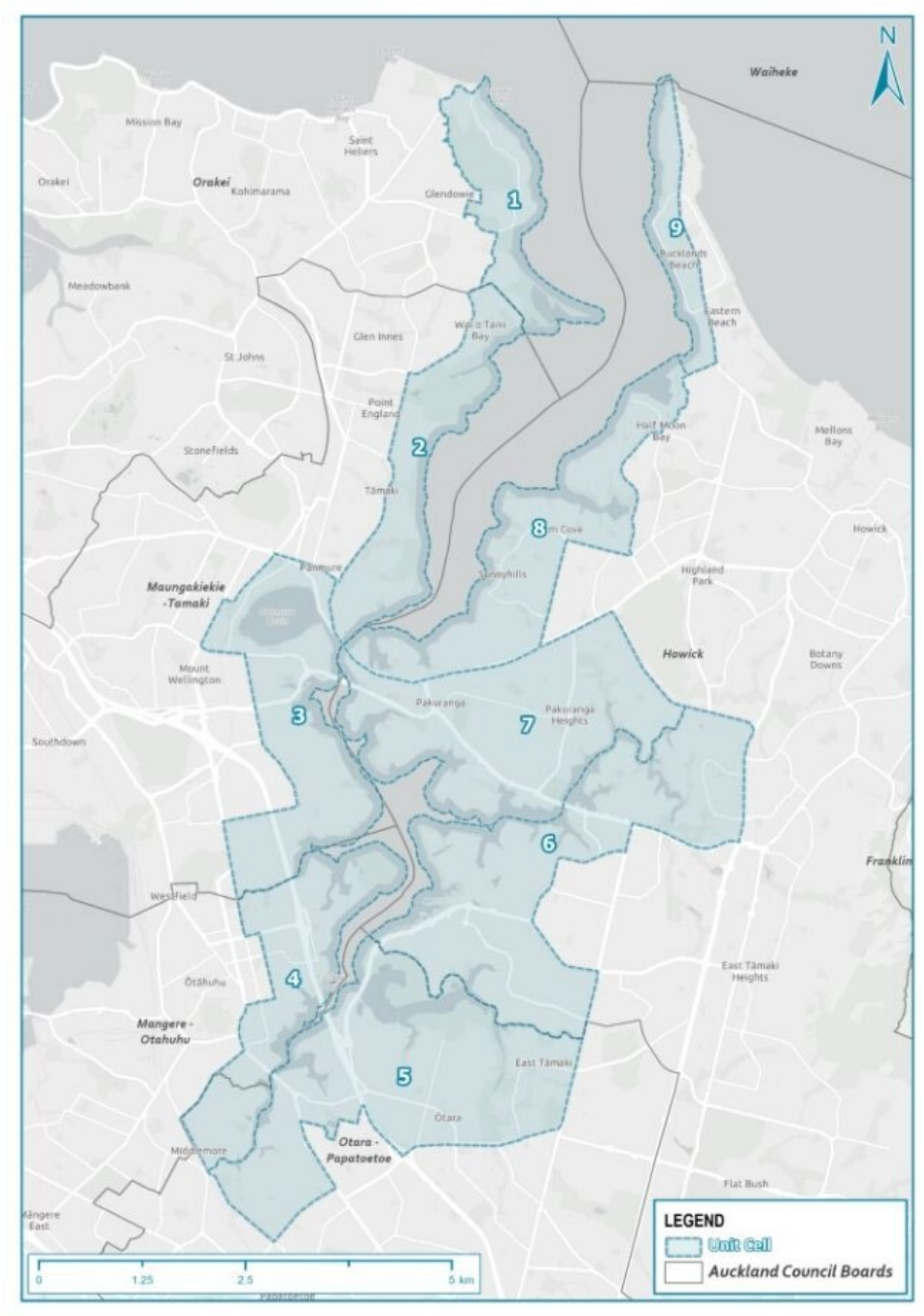


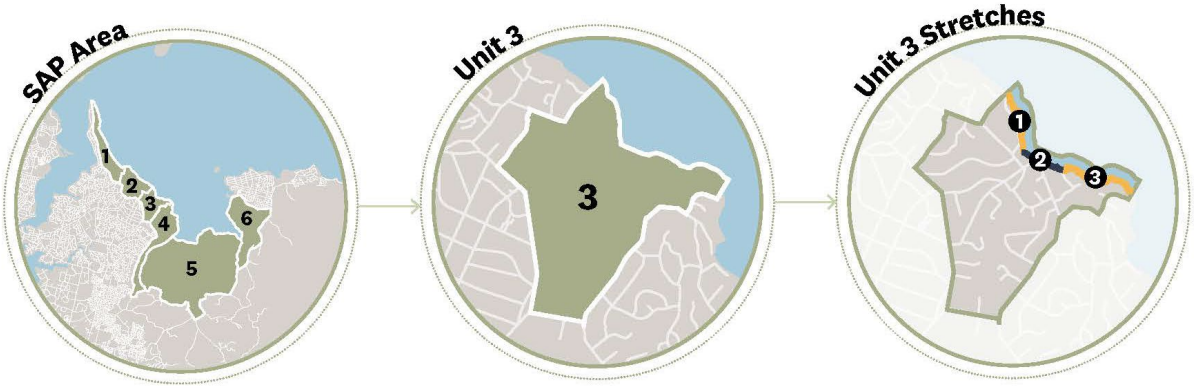
Figure 2-1: Unit areas for Tāmaki Estuary

2.2 Units and stretches

The Tāmaki Estuary SAP area is divided into 9 separate unit areas to enable a more detailed and comparative view of how risk from coastal hazards is attributed across the SAP area.

The landward extent of the unit areas is reflective of the potential coastal hazardscape (inundation and erosion) and the interaction with catchment flood hazards. These areas have then been mapped to a property boundary or geographics feature.

Within each unit, smaller coastal 'stretches' have been identified based on coastal processes, the presence of Auckland Council-owned land and asset location, public-land boundaries, and infrastructure considerations. A stretch is the smallest scale at which the SAP plans apply bespoke adaptation strategies.



	Unit	Stretches
Unit 1	Karaka bay Beach to Tahuna Torea Reserve	1: Karaka Bay 2: Karaka Bay to Andersons Beach Reserve 3: Andersons Beach Reserve 4: Andersons Beach Reserve to Roberta Reserve 5: Roberta Reserve 6: Roberta Reserve to Tahuna Torea Reserve
Unit 2	Wai-o-Taiki Bay to Panmure	7: Tahaki Road 8: Wai-o-Taiki & Point England Park 9: Point England Road 10: Point England Road to Kings Road 11: Kings Road to Lagoon Drive
Unit 3	Panmure to Ōtāhuhu	12: Lagoon Drive to Waipuna East Reserve 13: Waipuna East Reserve to Ian Shaw Park 14: Ian Shaw Park south 15: Flat Rock Reserve to Walters Foreshore Reserve

	Unit	Stretches
Unit 4	Ōtāhuhu to Highbrook park	16: Te Tō Waka Ōtāhuhu Portage to Seaside Park 17: Seaside Park 18: Seaside Park to Schroffs Beach Reserve 19: Schroffs Beach Reserve to The Grange Auckland Golf Course
Unit 5	Ōtara	21: Ngāti Ōtara Park 22: Ōtara Creek to Highbrook Drive Bridge 23: Highbrook Drive Bridge
Unit 6	Highbrook Park to Pakuranga	24: Highbrook Drive to Lady Fisher Place 25: Lady Fisher Place to Business Parade North Road 26: Nassipour Way to Stonedon Drive Esplanade Reserve 27: Stonedon Drive Esplanade Reserve to Pakuranga Country Club Golf Course
Unit 7	Pakuranga heights	28: Pakuranga Country Club Golf Course to Tiraumea Reserve 29: Tiraumea Reserve 30: Tiraumea Reserve to Lagoon Drive
Unit 8	Panmure Bridge to Halfmoon Bay	31: Lagoon Drive Bridge to Oleander Point Road 32: Fisher Parade Esplanade Reserve to Bramley Drive Reserve 33: Bramley Drive Reserve beach 34: Farm Cove 35: Farm Cove to Curacao Place Esplanade Reserve 36: Curacao Place Esplanade Reserve to Compass Point Reserve 37: Half Moon Bay Ferry Terminal
Unit 9	Halfmoon Bay to Te Naupata/ Musick Point	38: Half Moon Bay Marina to Te Akau Crescent 39: Little Bucklands Beach 40: Bucklands Beach 41: The Parade to Te Naupata / Musick Point 42: Te Naupata / Musick Point

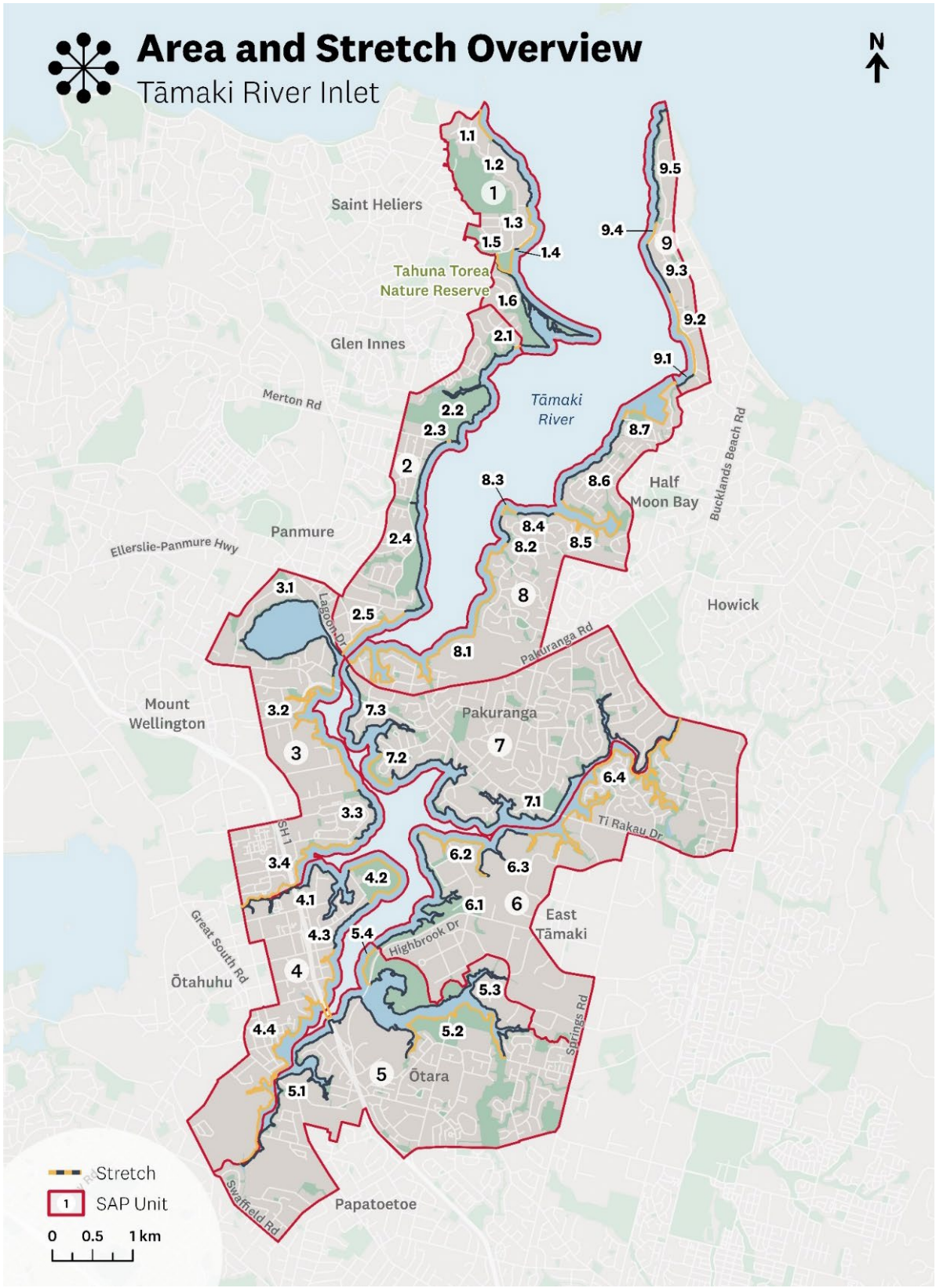


Figure 2-2: Units and stretches for the Tāmaki Estuary Shoreline Adaptation Plan

2.3 Natural hazards and climate change

This SAP report considers natural hazards relating to sea-level rise, catchment flooding, coastal inundation, coastal erosion and land instability. Other hazard types, including inland land instability, drought, tsunami and wildfires, are not within the scope of this assessment. Risks from low probability but high potential impact events, such as volcanic, tsunami, and earthquake events, are also not addressed through land-use planning. Instead, they are addressed through emergency management measures put in place by groups such as Auckland Emergency Management (Civil Defence).

Natural processes, such as coastal inundation and erosion, become hazards when they have the potential to negatively impact things of value. Tāmaki Makaurau / Auckland is frequently affected by natural hazard events and is likely to experience more frequent and severe events in the future due to climate change. Sea-level rise will increase the zone of exposure. For shoreline areas with assets and infrastructure, or cultural heritage sites near the coastal edge (including recreational and environmental areas), the impacts of coastal hazards can be significant.

For this work, the following timeframes are used to evaluate how the risk of coastal inundation, erosion and instability and sea-level rise adversely impacting the coast may change over time as a result of climate change, noting that projected conditions may occur sooner or later depending upon rates of climate change:

- Short-term, 2021-2050
- Medium-term, 2051-2080
- Long-term, 2081-2130.

2.3.1 Sea-level rise

Sea level influences how coastal processes interact with the landward edge, and can significantly impact the exposure of assets and facilities. As the climate changes and sea levels rise, this rise, combined with coastal storm surges (discussed further under coastal inundation below) will dictate the frequency and magnitude of future coastal inundation events. Over time, sea-level rise will alter the position of mean high-water spring levels and the land-sea interface.

The NZ SeaRise: *Te Tai Pari O Aotearoa Programme* (NZ SeaRise, 2024) has completed sea-level rise projections for the New Zealand coastline. This is based on Intergovernmental Panel on Climate Change (IPCC) Assessment Report 6 (AR6) projections and including climate-ocean responses, earth crustal, gravitational changes and vertical land movement (VLM) specific to New Zealand. The combination of projected sea-level rise and vertical land movement results in relative sea-level rise indicating more localised changes in sea level.

Ministry for the Environment guidance recommends using the high-end emission scenarios SSP5-8.5 for coastal planning (Ministry for the Environment, 2024). This is because the world has been on a high emissions trajectory over the past few decades, and the physical interactions at play that drive sea-level rise operate on very long timeframes (decadal to centuries). This means that there is a certain amount of sea-level rise that is ‘locked in’ for the future because of this long timeframe, but the timeline of this is uncertain. There is uncertainty on future emissions and planetary tipping

points, which would mean the 'expected' sea-level rise might happen on a faster timescale than is expected (Ministry for the Environment, 2024). Table 2-1 below sets out MfE's projections for the years in which absolute sea-level rise could be reached for a central location in New Zealand.

Table 2-1: Summary of approximate year when absolute sea-level rise (SLR) heights could be reached using the recommended projections for a central location in Aotearoa New Zealand (Source: Ministry for the Environment, 2024)

SLR (metres)	Year achieved for SSP5 -8.5 H+ (83rd percentile)	Year achieved for SSP5 -8.5 (median)	Year achieved for SSP3-7.0 (median)	Year achieved for SSP2-4.5 (median)	Year achieved for SSP1-2.6 (median)
0.2	2035	2040	2045	2045	2050
0.3	2050	2055	2060	2060	2070
0.4	2055	2065	2070	2080	2090
0.5	2065	2075	2080	2090	2110
0.6	2070	2080	2090	2100	2130
0.7	2080	2090	2100	2115	2150
0.8	2085	2100	2110	2130	2180
0.9	2090	2105	2115	2140	2200
1.0	2095	2115	2125	2155	>2200
1.2	2105	2130	2140	2185	>2200
1.4	2115	2145	2160	>2200	>2200
1.6	2130	2160	2175	>2200	>2200
1.8	2140	2180	2200	>2200	>2200
2.0	2150	2195	2200	>2200	>2200

2.3.2 Coastal inundation

Coastal inundation is the flooding of low-lying coastal land that is normally dry, due to elevated sea levels. Extreme high sea-water levels (commonly referred to as storm tides) are a result of storm surge. Storm surge occurs due to relatively low atmospheric pressure (the "inverted barometer" effect of 1 cm rise in sea level per 1 hPa fall in pressure) combined with water level set-up at the coast from onshore or alongshore winds. When king tides (the highest spring tides that occur over the year) occur, the risk of coastal inundation is greatest. In the future, present-day temporary coastal inundation extents (e.g. during storms) will become permanent inundation as what is presently dry land will become intertidal due to sea-level rise.

A coastal inundation event with 1% Annual Exceedance Probability (AEP) (1% probability of occurring in any given year) has been considered in the short term, with no sea-level rise. In the medium term, 0.5 m of sea-level rise will increase the depth and extent of coastal inundation. The frequency of coastal inundation events is predicted to increase over time. In the long-term, 1.0 m of sea-level rise

will further increase the depth and extent of coastal inundation. Some areas that were not previously exposed, may now be exposed to coastal inundation. These maps are available through Auckland Council's Geomaps tool online.

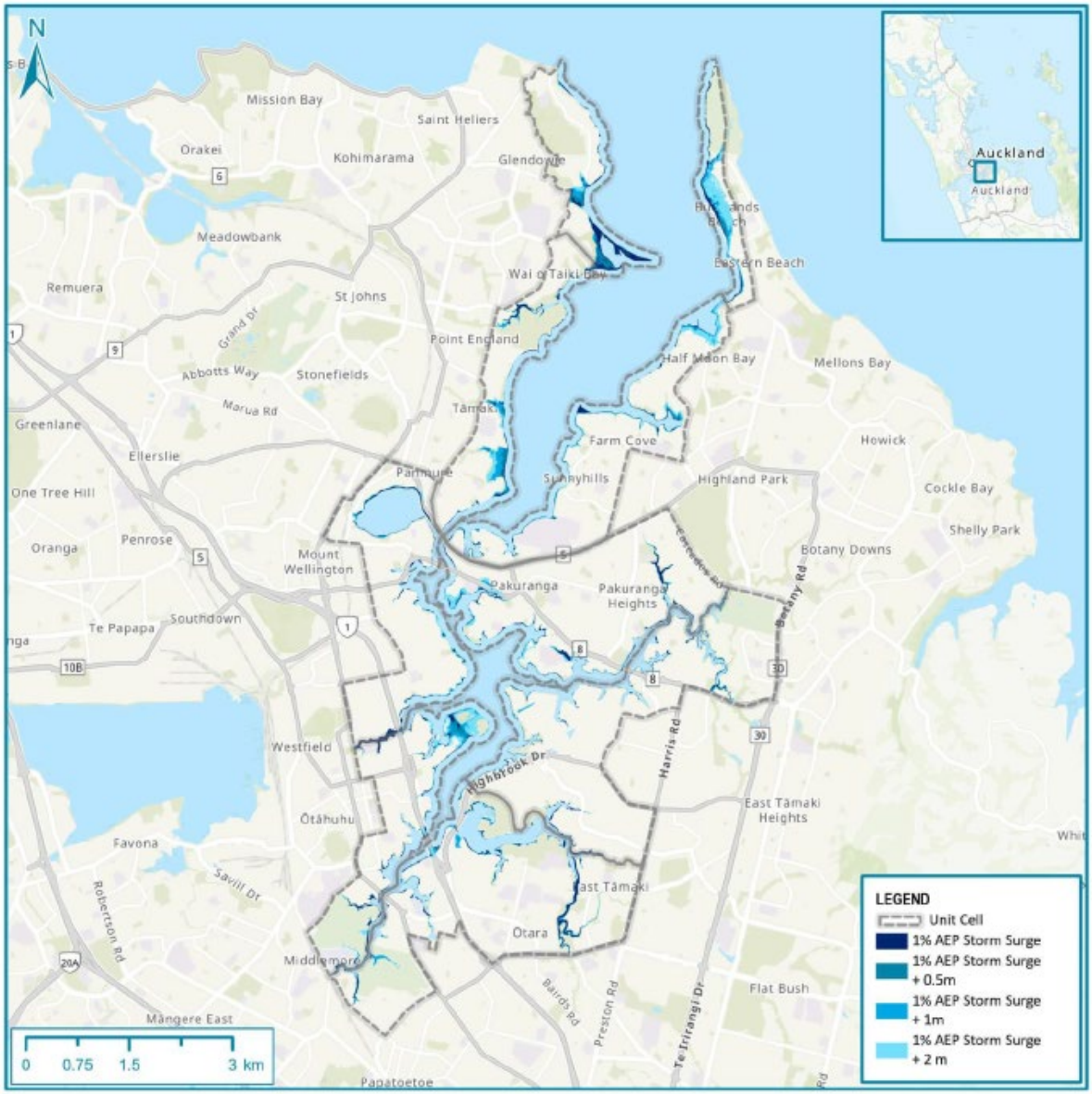


Figure 2-3: Coastal inundation areas for Tāmaki Estuary (prepared by T+T for Auckland Council 2023) based on Auckland Council coastal inundation mapping (Carpenter, N., Roberts, R., & Klinac, P. (2020). Auckland's exposure to coastal inundation by storm-tides and waves.)

2.3.3 Coastal erosion

Coastal erosion is the process by which natural forces remove material from the land causing the coastline to move inland over time. It is a complex process caused by factors such as wave energy, changes to sediment availability and land use, and sea-level rise. Although some types of shorelines (e.g. beaches) may undergo short-term periods or episodes of erosion and then recover (i.e. build out again), other types of shorelines (e.g. cliffs) continuously erode with no cycle of recovery. Coastal instability is the movement of land (typically as a landslide) resulting from the loss of support caused by coastal erosion.

Areas Susceptible to Coastal Instability and Erosion (ASCIE) have been mapped using IPCC Assessment Report 5 (AR5) climate change scenarios (RCP emission trajectories), and LiDAR data. In the short-term (2050), RCP4.5 has been used, whereas the medium-term (2080) and long-term (2130), have used the RCP8.5 emission scenario. The ASCIEs are shown as a line, representing the distance (in metres) landward of the current coastline that is predicted to be susceptible to coastal instability and erosion, for a given time. These maps are available through Auckland Council's Geomaps tool online.

Areas with higher exposure to erosive forces are more at risk to coastal instability and erosion, where waves interact directly with cliff faces (e.g. no beach) or where cliffs are steep with little vegetation cover. As sea-level rise occurs, waves will interact with a larger portion of the cliff and slope instability and erosion along the coast are expected to increase. Evaluation of projected shorelines in this report utilises Auckland Council Technical Report 2020/021 *Predicting Auckland's exposure to coastal instability and erosion* (Roberts, 2020), as well as site-specific understanding based on recent observations. If observational trends change, this assessment of cliff erosion would require updating.

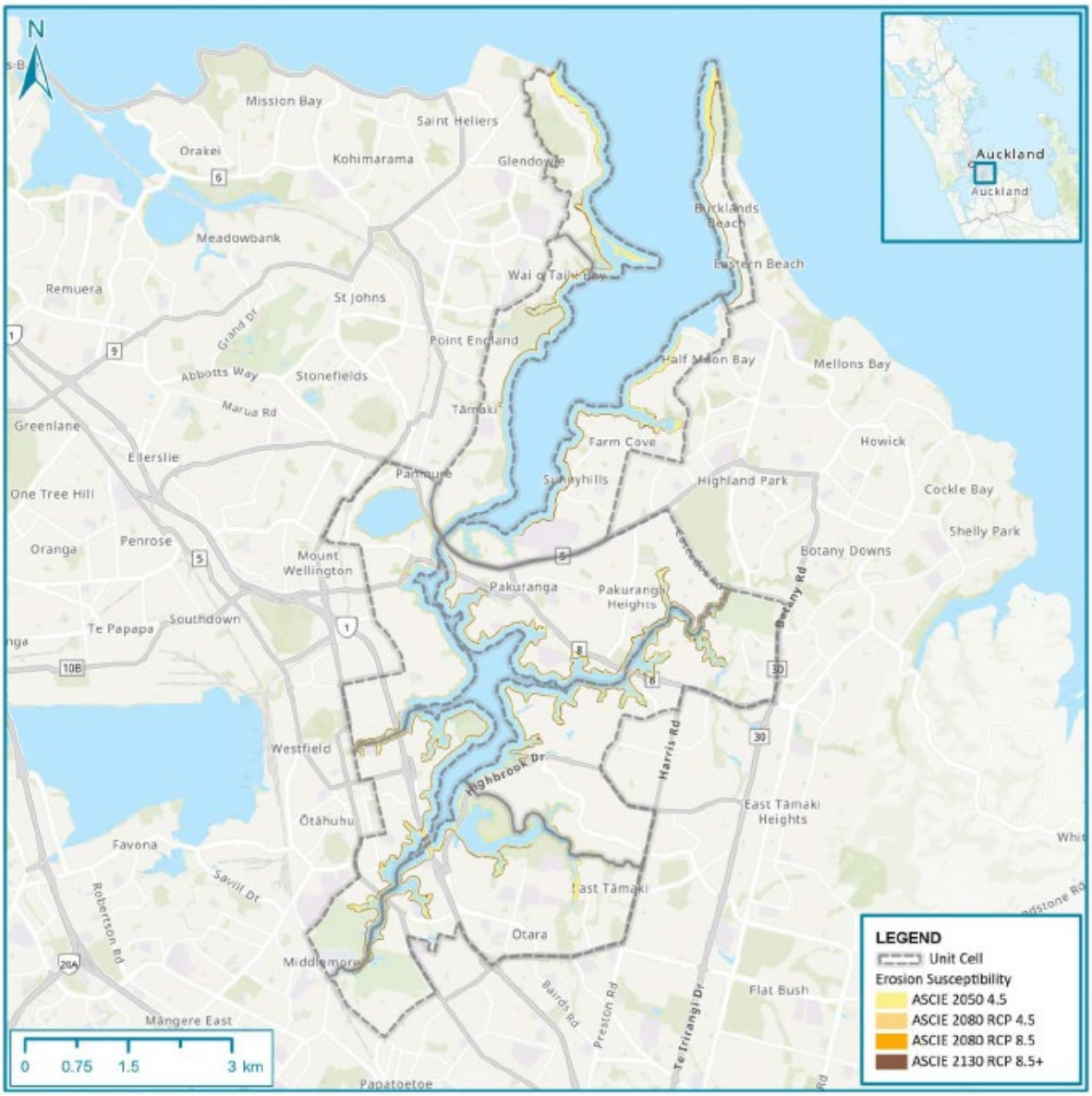


Figure 2-4: Coastal instability and erosion susceptibility for Tāmaki Estuary prepared by T+T for Auckland Council (2023) based on Roberts, R., N. Carpenter and P Klinac (2020). Predicting Auckland's exposure to coastal instability and erosion, Auckland Council, technical report TR2020/021

2.3.4 Catchment flooding

Flooding, as a result of extreme rainfall when the drainage capacity of the natural and/or built environment systems cannot cope, is a natural occurrence and is Auckland's most commonly occurring natural hazard. The flooding event with the highest probabilistic risk is a 1 % AEP event (1% probability of occurring in any given year), because an event of such intensity is likely to result in more severe consequences than flooding events that are more common but of lesser intensity. The Tāmaki Estuary SAP area is intersected by a number of separate catchments draining to the coast.

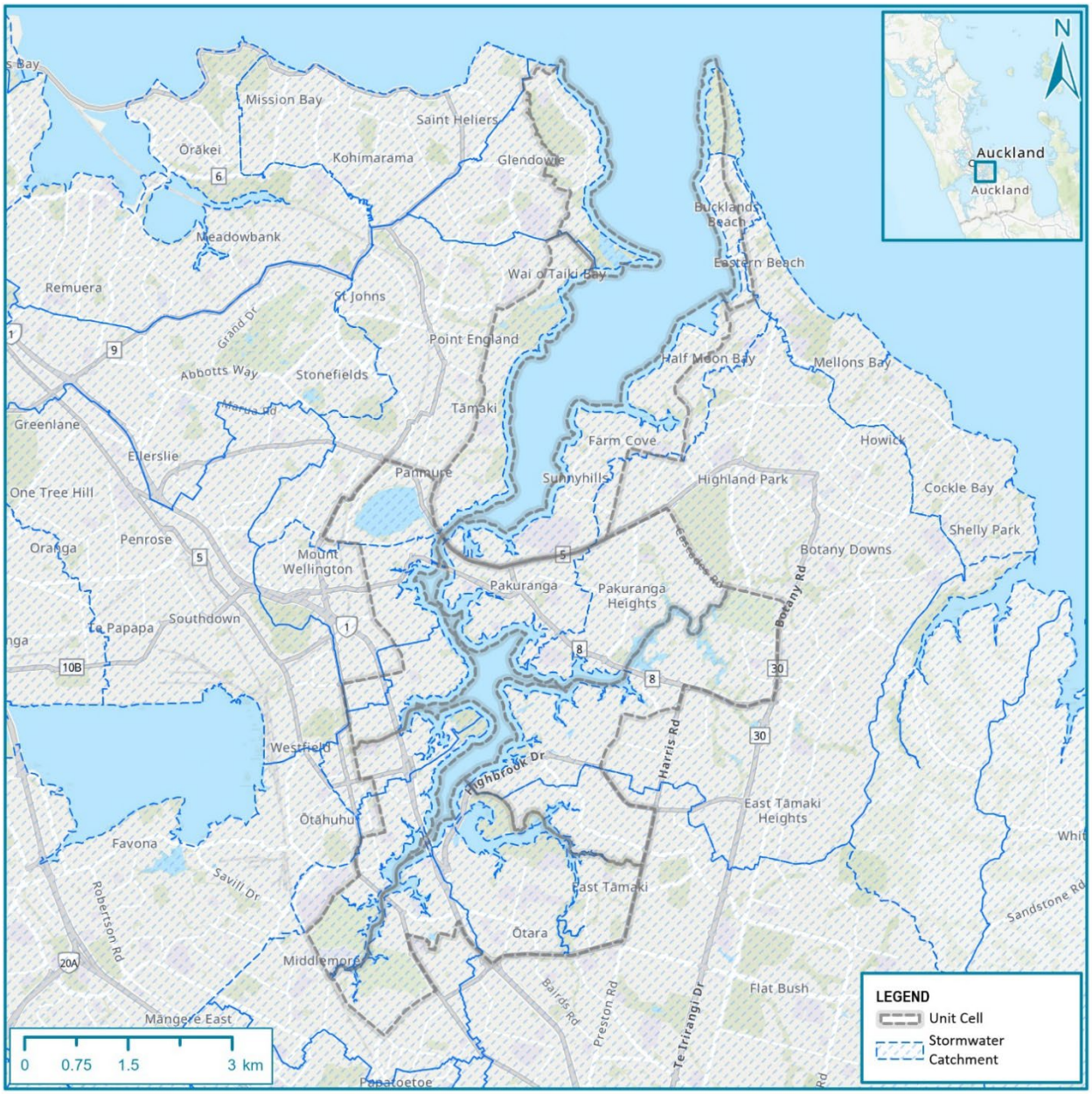


Figure 2-5 Catchments located within the Tāmaki Estuary SAP area, prepared by T+T for Auckland Council

Auckland Council's web-based portal GeoMaps (Natural hazard theme) models the spatial extent of potential flooding. The maps, developed at catchment scale, indicate areas – flood plains, flood prone areas, flood sensitive areas, and overland flow paths - which may be affected by a rainfall event that has a 1% AEP, assuming maximum probable development in the catchment (as per the AUP:OP) and future climate change.

The map at Figure 2-6 illustrates that flooding hazards are focused in lower-lying areas of units 2 to 5 where streams and overland flow paths within the catchment drain to the coast. Overland flow paths and floodplains cross throughout the SAP area. Further details can be accessed through Auckland Council's Flood Viewer.

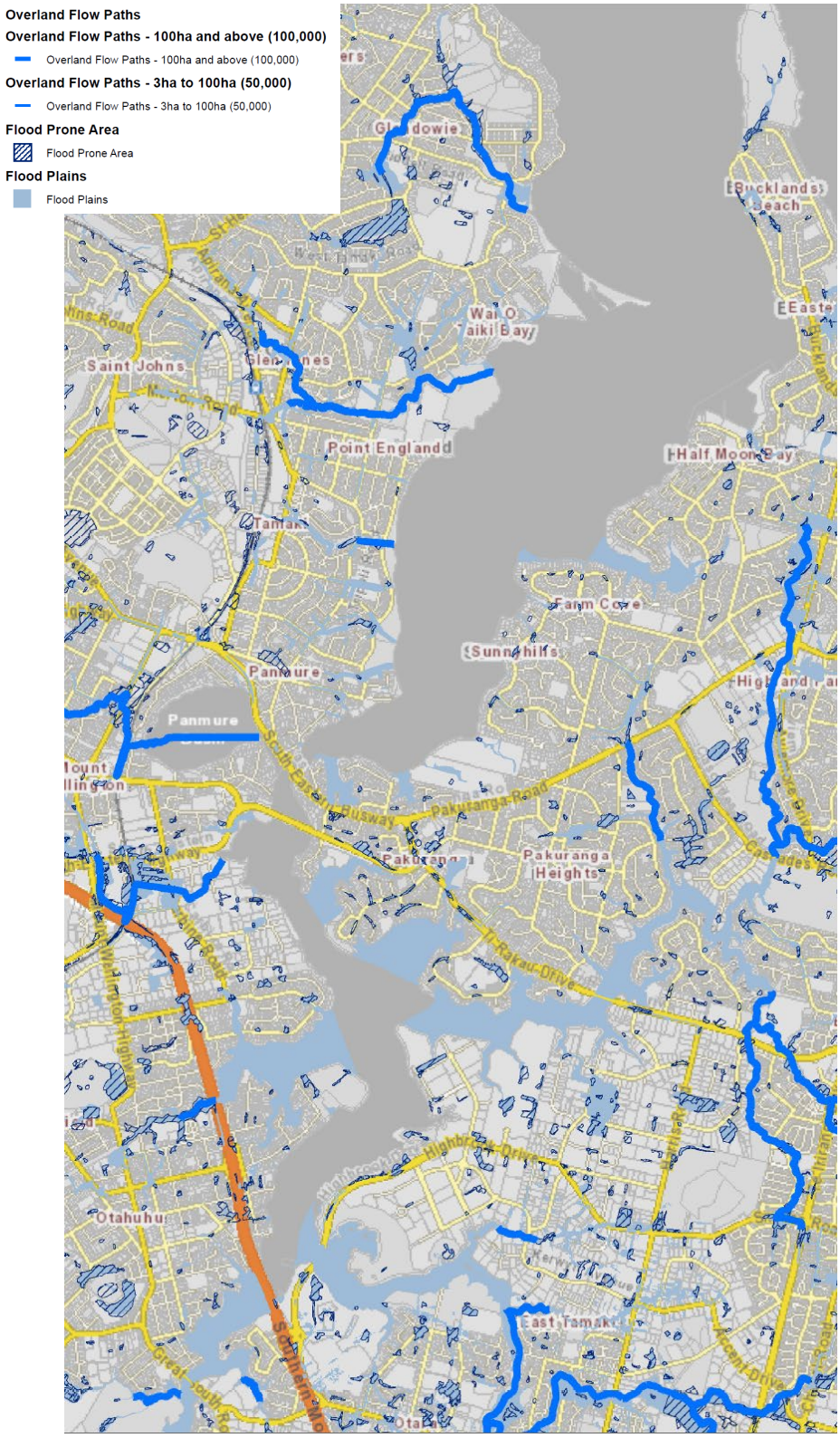


Figure 2-6 1% AEP Flood Plain, overland flow paths and flood prone areas for Tāmaki Estuary, Source: Auckland Council Geomaps.

2.3.5 Other natural hazards

In addition to coastal inundation, coastal instability, coastal erosion, and flooding, Auckland is affected by a number of natural hazards that occur less frequently. Wildfire, volcanic activity, tsunami, earthquakes, severe wind (such as cyclones), and tornadoes are other notable but less frequently occurring natural hazards that may impact Auckland. This report does not specifically consider risks from any of these aforementioned hazards in the development of these draft adaptation strategies.

2.4 Adaptation strategies and timeframes

Adaptation strategies are then assigned to each coastal 'stretch' over three timeframes:

- Short term (0-20 years)
- Mid-term (20-60 years)
- Long term (60-100 years).

The timeframes consider an assumed change in sea-level rise in relation to the coastal hazards present and consider the spatial extent of this based on Auckland Council's best available information. This translates to the consideration of the sea-level rise scenarios over the timeframes as follows:

- For the short term a 1% Annual Exceedance Probability (AEP) (1% probability of occurring in any given year) coastal inundation event has been considered in the short term.
- In the medium term, 0.5 m of sea-level rise is considered and the impact of this on the 1% Annual Exceedance Probability (AEP) event.
- In the long-term, 1.0 m of sea-level rise is considered. And the impact of this on the 1% Annual Exceedance Probability (AEP) event.

The adaptation strategies are described below and are applicable to all Auckland Council-owned land and assets and may respond to more than one hazard risk, e.g. coastal erosion, coastal inundation and catchment flood risks may all be relevant considerations in some coastal areas.

SAP area plans provide a 'roadmap' for changing coastal management strategies over time (over three timeframes) further engagement and focus for each SAP area will be required to identify 'signals, triggers and thresholds' to replace timebound assumptions and ensure plans are responsive to a changing environment.

Strategy name	Summary	What does this mean?
Hold the line	The coastal edge is fixed at a certain location.	• Defence of the coastal edge may be through nature-based options (e.g. beach nourishment) or engineered hard structures (e.g. sea walls). • Nature-based options are the preferred method where possible, but in most cases, engineered hard structures would be required. • An identified use or service is maintained within its existing location, e.g. a road is maintained in a fixed location or parks' land uses are maintained in an existing location. • This approach could result in losing some intertidal areas or beach space due to preventing landward realignment of the coast in response to sea-level rise.
Limited intervention	Maintaining and managing existing assets, uses and land.	• Repair and maintenance of existing protection structures, apply a best practice approach to the consideration of coastal hazards and catchment flooding. assuming an adaptive approach for asset design. • Works may support localised realignment of individual assets. Maintain uses or assets within a general area, not in a fixed location. • Does not support a fixed coastline.
Adaptation priority area	Further adaptation planning is required to manage risks to Auckland Council-owned land and assets.	• Further engagement with multiple partners, communities and stakeholders will be required to ensure risk from coastal hazards can be managed and other values maintained. • Assets and land uses may be relocated or realigned from hazard areas to reduce risk to assets/activities and maintain identified values (ecological, cultural, recreational etc). assets may be designed to accommodate hazard impacts and localised protection and risk mitigations may be implemented for some land uses or asset types. • Relocation is planned and undertaken proactively over time. • Planning to protect, retreat, relocate, accommodate risk or avoid risks is responsive to community, cultural and ecological opportunities needs and aspirations. • Supports opportunity for nature-based solutions, and maintenance of coastal values.
No active intervention	Natural processes are allowed to continue. Pro-active management of risk to Auckland Council land and assets is not identified, unless specified.	• Includes no investment in the provision or maintenance of any hazard protection structures associated with coastal hazards and flood protection (does not apply to the management of land stability or subsidence or other hazard risk management). • This strategy is identified for areas of the coastline where Auckland Council-owned land and assets are not identified as exposed/vulnerable to coastal hazard and catchment flooding risk. • Does not preclude the management of risk if required.

2.5 Next steps

The draft strategies and supporting notes included in this document are designed to inform the community and enable feedback through the engagement process. Following engagement close, all feedback will be reviewed and analysed.

Unit and stretch-specific feedback on the adaptation strategies will be considered alongside feedback and advice from asset owners, mana whenua and technical experts. This information will be used to support a review of the draft strategies alongside use of a decision-making framework to confirm selection of the final strategies.

The final Shoreline Adaptation Plan will include guidance notes to support implementation and may refer to key values, features and required considerations. These notes may also reference feedback received through this engagement process.

Unit 1
Tāmaki River Inlet

Unit 1: Karaka Bay Beach to Tahuna Torea Reserve

Unit 1, located within the Ōrākei Local Board area, extends along the outer reaches of the western shoreline at the mouth of Tāmaki River from West Tāmaki Point, the headland to the north of Karaka Bay, to Tahaki Road on the southern side of Tahuna Torea Nature Reserve. The central section of the unit is bordered on the west by Roberta Reserve and Riddell Road.

This unit has a diverse coastal geomorphology including the steep bounding cliffs of West Tāmaki Point and Glendowie, the embayed beach of Karaka and the Sandspit that forms part of Tahuna Torea Nature Reserve. As a result, the shoreline is significantly exposed to coastal erosion and instability and coastal inundation hazards.

The 6 stretches within this unit cover this diverse geomorphology (Figure 2-7).

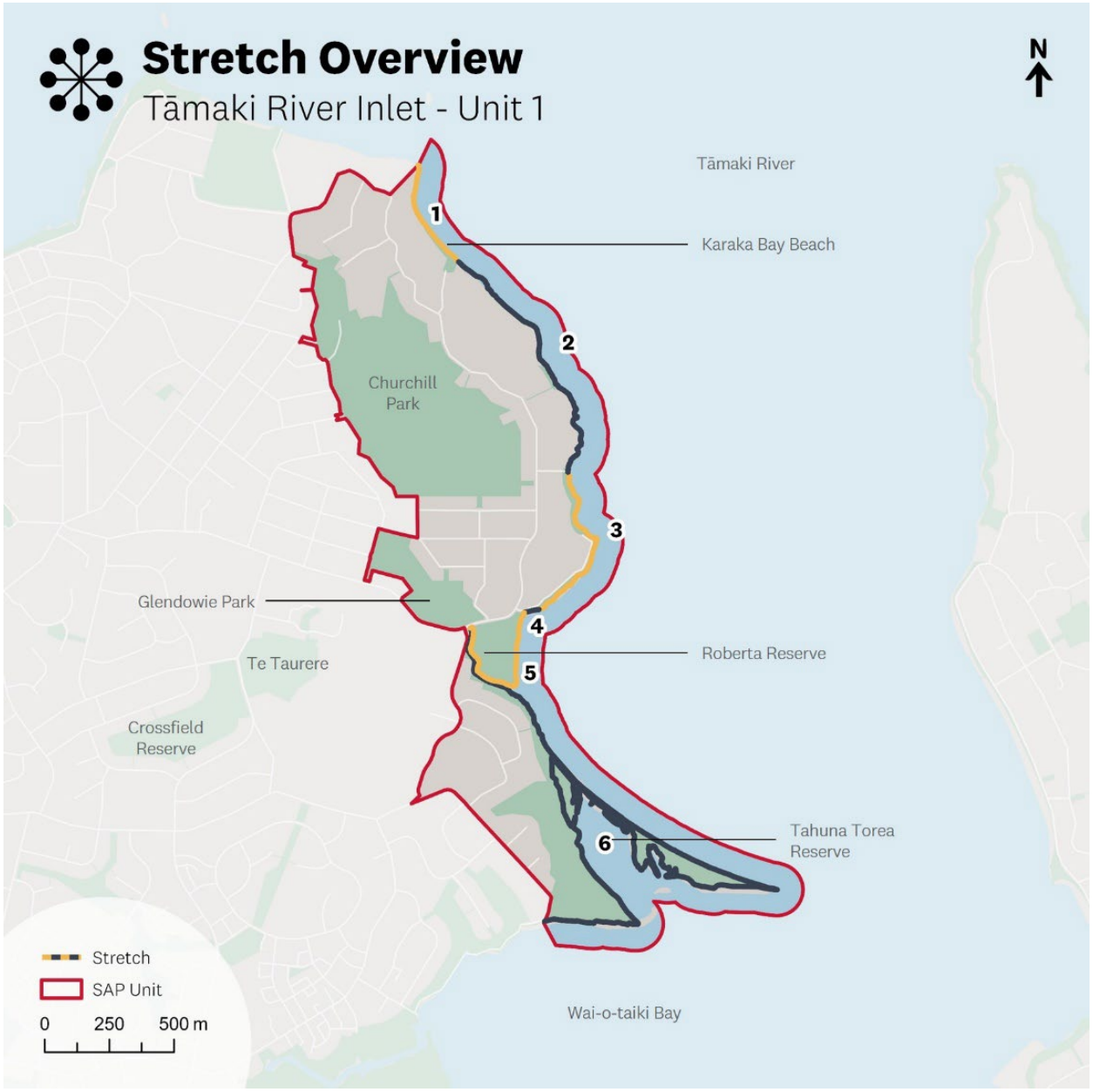


Figure 2-7: Stretches 1 to 6 along the western shoreline at entrance to Tāmaki River.

Draft adaptation strategies for stretches 1 to 6

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
1: Karaka Bay Begins at the entrance of Tāmaki River Inlet at the northern end of Karaka Bay and continues down the length of Karaka Bay.	LI	APA	APA	**Limited intervention** signals ongoing maintenance of existing assets and continuing to provide pedestrian access to and along the coast. Note: Access to private properties is across the reserve (no road access). **Adaptation priority** signals that risk from coastal hazards to park uses and infrastructure (including wastewater), will increase in the future and further adaptation planning will be required.
2: Karaka Bay to Andersons Beach Reserve Begins at the southern end of Karaka Bay and continues further into Tāmaki River Inlet, ending adjacent to Clouston Street.	NAI	NAI	NAI	**No active intervention** is reflective of the limited assets and natural coastal processes in this area. However, within this stretch targeted **limited intervention** may be undertaken to manage the wastewater pump station and maintain safe access via existing steps across all timeframes to Riddell Road Beach. No active intervention does not preclude the maintenance of shared paths and highly valued ecological areas.
3: Andersons Beach Reserve Commences at the northern end of Andersons Beach Reserve and continues into Tāmaki River Inlet, culminating at the southern end of Andersons Beach Reserve.	LI	LI	LI	**Limited intervention** signals maintaining the existing retaining seawall at Anderson's Beach. Localised realignment and reconfiguration of the roadside parking along Glendowie Road may be required over time.
4: Andersons Beach Reserve to Roberta Reserve Commences at the northern end of Andersons Beach Reserve and continues into Tāmaki River Inlet, culminating at the southern end of Andersons Beach Reserve.	LI	APA	APA	**Limited intervention** signals management of risk to assets and maintenance of existing defences. **Adaption priority** in the mid to long term is reflective of increasing coastal hazard risks and of the range of park uses and suite of assets located within this coastal stretch. Further engagement with asset owners and infrastructure providers will be required.

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
5: Roberta Reserve Begins at the northern border of Roberta Reserve and continues into Tāmaki River Inlet, before veering inland to encompass a stream that flows into Roberta Reserve.	LI	APA	APA	**Limited intervention** for ongoing maintenance of existing defences in order to support access to and along the coast. **Adaptation priority area** is identified in the mid-long term due to increasing coastal inundation risk, noting that protection structures may continue to be utilised.
6: Roberta Reserve to Tahuna Torea Reserve Begins at the inland culmination of a small stream, it then extends back to the Tāmaki River Inlet and continues to the southwestern border of Tahuna Torea Nature Reserve.	LI	LI	APA	**Limited intervention** supports the ongoing maintenance of this coastline through the use of nature-based interventions (e.g. supporting mangroves, beach enhancement and planting). Continued provision of walkways for access is supported but requires localised realignment over time. There is a high coastal inundation risk in future that will require active monitoring, and prioritising preservation of the ecology, recreational and cultural values. Depending on the impacts of rising sea levels, **adaptation priority** may be required in the long term.

Unit 2
Tāmaki River Inlet

Unit 2: Wai-o-Taiki Bay to Panmure

Unit 2, located within the Maungakiekie-Tāmaki local board area, covers approximately 5 km of the western shoreline along the middle reaches of Tāmaki River from Wai-o-Taiki Bay in the north towards Lagoon Drive, Panmure in the south.

The main Tāmaki River channel meanders through the middle reaches of the wider estuary system and is aligned closer to the western shoreline at Point England and Panmure Point. There are wide (300-500 m) intertidal flats in Wai-o-taiki Bay and between Point England and Panmure Point. Due to the inner harbour location and protection afforded by Tahuna Torea, the western shoreline in this unit is predominantly a low wave-energy setting. Omaru Creek discharges into Tāmaki River at the southern end of Wai-o-taiki Bay and there are two small streams that discharge at the northern end of the embayment.

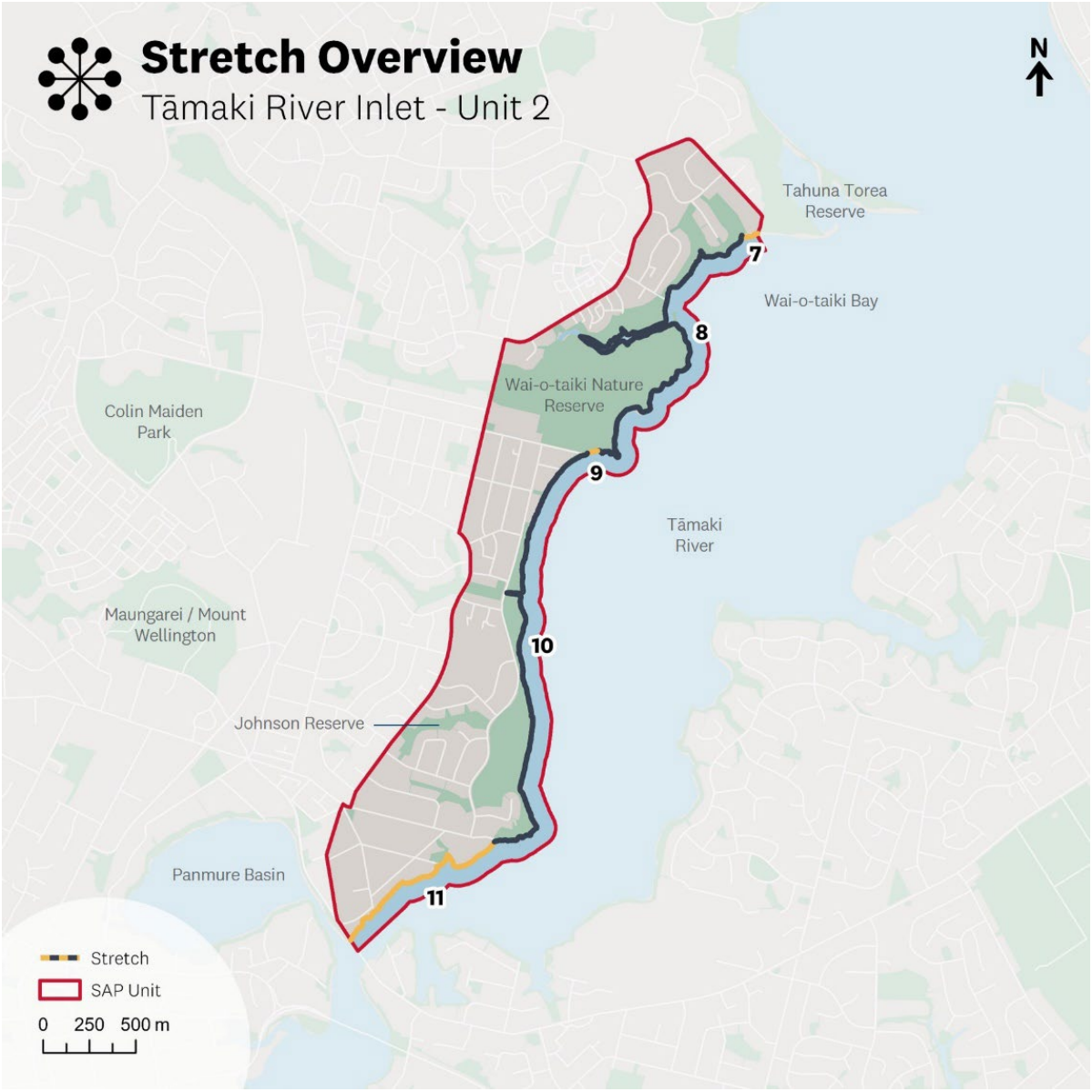


Figure 2-8: Stretches 7 to 11 along the western shoreline at entrance to Tāmaki estuary.

Draft adaptation strategies for stretches 7 to 11

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
7: Tahaki Road Begins at the southwestern border of Tāhuna Tōrea Nature Reserve and continues to the end adjacent to Tahaki Road and the stream valley.	LI	LI	LI	**Limited Intervention** supports continued maintenance of the existing sea wall which protects the turning circle at the end of Tahaki Road. Inundation risk associated with sea-level rise in the long term may require the future management of uses in this area.
8: Wai-o-Taiki & Point England Park Begins at the end of Tahaki Road and continues into Tāmaki River Inlet (along the Omaru Creek) until the southernmost end of Point England Park. The stretch contains Wai-o-Taiki Nature Reserve.	LI	LI	LI	**Limited intervention** signals to maintain this coastline's natural character while managing risk to the coastal pathways, through landward design and location. Limited intervention also provides for the continued maintenance of existing coastal defences.
9: Point England Road Encompasses a small section of Point England Park and Tāmaki River Inlet.	LI	LI	LI	**Limited intervention** provides for continued maintenance of access to the coast within this stretch.
10: Point England Road to Kings Road Begins at the southern end of Point England Park and extends into Tāmaki River Inlet until Kings Road.	HTL	LI	APA	**Hold the line** in the short-term reflects the existing armoured coastline within this stretch. **Limited intervention** in the mid-term confirms the maintenance of existing defences, as well as design and location of assets to respond to coastal hazard risks. **Adaptation priority area** is required in the long term due to the increasing coastal hazard risks with sea-level rise. It also signals that while coastal defences may continue to be maintained, inundation risk and sea-level rise will present challenges for managing risk to all uses within this coastal stretch, including shared paths, recreational / sports fields, wastewater infrastructure (e.g. pump stations) and leased uses on Auckland Council land.

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
11: Kings Road to Lagoon Drive Begins adjacent to Kings Road and extends down Tāmaki River Inlet until Lagoon Drive bridge	NAI	NAI	NAI	**No active intervention** reflects the limited Auckland Council assets within this stretch. This does not preclude the management of risk to Auckland Council assets if required, nor does no active intervention preclude advocacy for the management of risk in relation to ecological, historic heritage and cultural values.


Unit 3
Tāmaki River Inlet
N
Ellerslie Panmure Hwy
Pilkington Rd
Queens Rd
Bill McKinlay Park
x 3
x 2
x 3
Panmure Basin
Mount Wellington War Memorial Park
The Y Lagoon Pool and Leisure Centre
x 6
Waipuna Boating Club
Pakuranga Rd
Pakuranga Hwy
Carbine Rd
Mutukaroa / Hamlins Hill Regional Park
1
Gabador Pl
Ian Shaw Park
x 2
Riverside Community Centre
Panama Rd
Panama Rd
Flatrock Reserve
Camp Rd
Seaside Park
Tāmaki River
Unit boundary
Informal recreation park
Sport & active recreation zone
Mooring management zone
State Highway 1
Playground
Boat ramp
Jetty/wharf
Lesiure buildings
Community buildings
Pump station
0
500m
1km

Unit 3: Panmure to Ōtāhuhu

This unit extends along the western shoreline of the mid-reaches of Tāmaki River, from Panmure Bridge to the northern shoreline of Ōtāhuhu Creek in the south and includes Panmure Lagoon. Land use is largely residential around Panmure Basin. Significant transport infrastructure in this unit includes the south-eastern highway and Pakuranga highway. South of Pakuranga highway bridge, the Bowden Foreshore Reserve is backed by industrial zoned land with several marine-based commercial businesses with associated private infrastructure. Unit 3 is within the Maungakiekie-Tāmaki Local Board area.

The main channel of Tāmaki River narrows through the middle reaches and is confined between Mount Wellington in the west and Pakuranga in the east, before the river widens out to a sheltered tidal basin that branches out to the creeks in the upper reaches. Panmure Basin is a highly sheltered coastal environment being a nearly entirely enclosed area, connected to Tāmaki River by a narrow entrance channel.

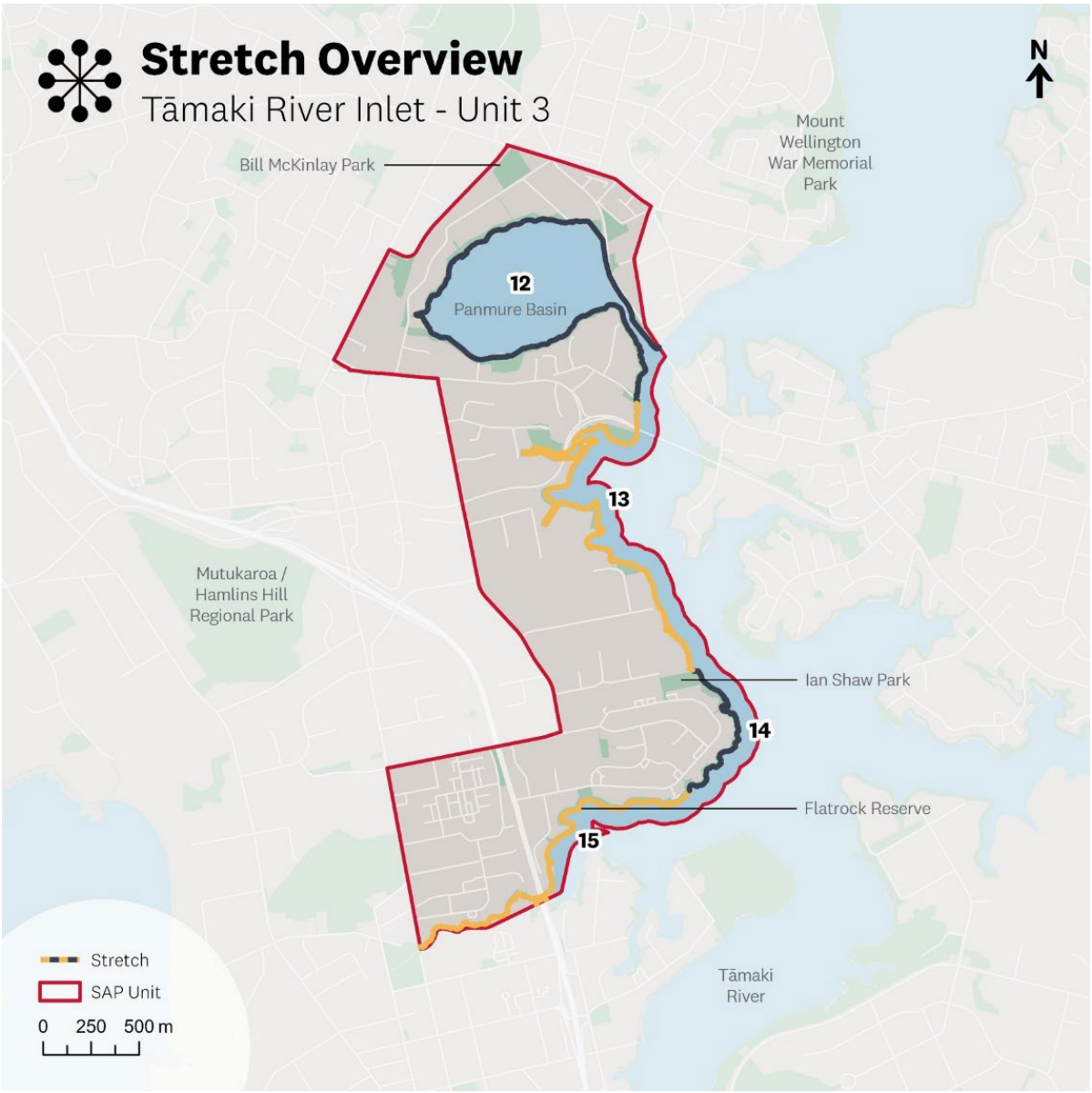


Figure 2-9: Stretches 12 to 15 along the Panmure to Ōtāhuhu shoreline

Draft adaptation strategies for stretches 12 to 15

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
12: Lagoon Drive to Waipuna East Reserve Begins at Lagoon Drive bridge and encompasses Panmure Basin, culminating at Waipuna East Reserve, which borders Tāmaki River Inlet. McCullough Walkway / Panmure Basin Path surrounds the perimeter of Panmure Basin, along with residential buildings.	LI	LI	APA	**Limited intervention** in the short to medium term signals the intent to continue to maintain the existing sea walls, maintain important transport connections, infrastructure and highly valued park uses in coastal areas (**hold the line** approaches for some assets may be required). Where existing defences are not presently managed, risk through nature-based methods is preferred or the management of risks through location and design of uses and assets. **Adaptation priority** responds to the increasing long-term inundation risk to low-lying areas.
13: Waipuna East Reserve to Ian Shaw Park Commencing at Waipuna East Reserve and extending down Tāmaki River Inlet until the northern border of Ian Shaw Park. Pakuranga Highway passes through this stretch.	LI	LI	LI	**Limited intervention** is specifically related to the management of risk to park uses and any associated or new assets, reflecting the limited Auckland Council assets currently located here, and to support a natural coastal edge. Maintaining a natural coastal edge is identified as an opportunity in this stretch and the use of protection structures is discouraged.
14: Ian Shaw Park south Begins at the northern border of Ian Shaw Park and extends south, culminating adjacent to Ataahua Lane.	LI	APA	APA	**Limited intervention** signals the intent to continue to manage risk to existing assets, including boat access and parking areas. **Adaptation priority area** is identified over time to signal increasing coastal hazard risks and the need for consideration of how risk is managed for critical infrastructure and community facilities (leases), providing for proactive engagement with local communities, local iwi, asset owners and infrastructure providers.

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
15: Flat Rock Reserve to Walters Foreshore Reserve Commences within Flat Rock Reserve, south of Ataahua Lane and culminates at the westernmost edge of Walters Foreshore Reserve and the unit's end. Note: This stretch is traversed by the NZTA highway.	**NAI**	**NAI**	**NAI**	**No active intervention** is identified reflective of the natural coastal edge for this stretch. Noting that areas of Flat Rock Reserve are highly used and limited assets are located within these areas. The Walters foreshore is less accessible and is generally unmaintained with limited assets present. No active intervention does not preclude management of risk to assets or linear infrastructure as required nor does it preclude advocacy for the management of risk to cultural and environmental outcomes, noting this stretch includes the important portage Te To Waka Ōtāhuhu.

Unit 4
Tāmaki River Inlet

Unit 4: Ōtāhuhu to Highbrook Park

This unit extends along the south-western sub-arms of Tāmaki River around Ōtāhuhu Peninsula, covering the southern shoreline of Ōtāhuhu Creek and western shoreline of Middlemore Creek, including the small headland on which Seaside Park is located. This unit is within the Māngere-Ōtāhuhu Local Board area.

Ōtāhuhu Creek and Middlemore Creek are southwestern arms of the Tāmaki River system approximately 12 km from the mouth of the Tāmaki River. The main river channel narrows in the upper reaches between Ōtāhuhu Peninsula headland and Waiouru Point, with the main channel approximately 230 m east of Ōtāhuhu. Further south, the main channel meanders close to the western shoreline of Ōtāhuhu before branching into two smaller inlets towards the south-west (Middlemore Creek) and towards the south east (Ōtara Creek).

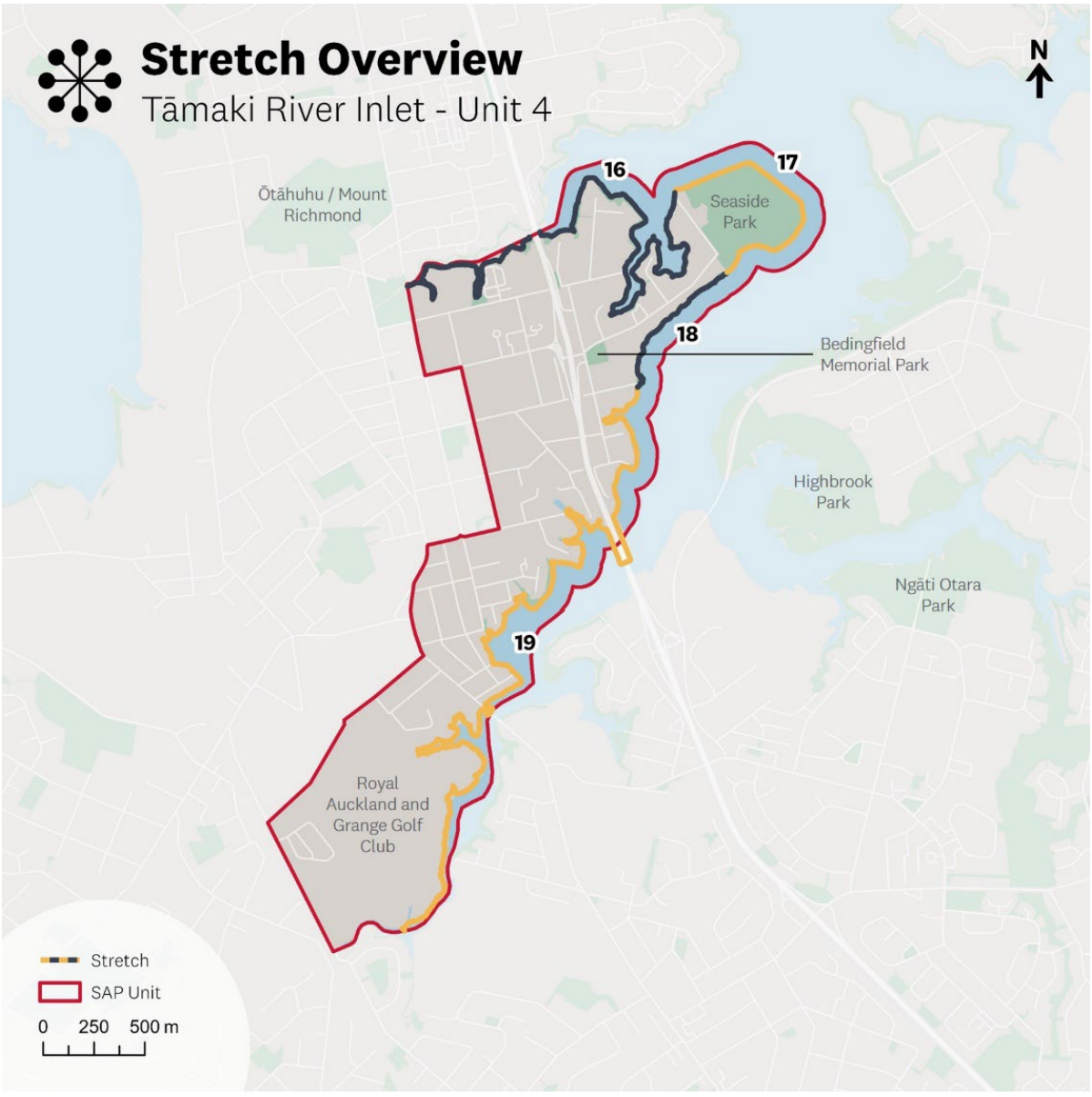


Figure 2-10: Stretches 16 to 19 along the Ōtāhuhu shoreline

Draft adaptation strategies for stretches 16 to 19

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
16: Te Tō Waka Ōtāhuhu Portage to Seaside Park Begins at Te To Waka Ōtāhuhu portage, just west of Ōtāhuhu Intermediate School and ends at the northern border of Seaside Park.	NAI	NAI	NAI	**No active intervention** is identified reflective of the natural coastal edge for this stretch, the limited access to coastal areas and presence of Auckland Council assets along this stretch. No active intervention does not preclude management of risk to assets or linear infrastructure as required nor does it preclude advocacy for the management of risk to cultural and environmental outcomes, noting this stretch includes the important portage Te To Waka Ōtāhuhu.
17: Seaside Park Commencing at Brady Road and including the park east, culminating at the end of the park landholding.	HTL	HTL	LI	Seaside Park is underlain by an Auckland Council-managed closed landfill, and contains highly valued cultural, recreational and ecological areas of park land and sport facilities. **Hold the line** is identified reflective of the land uses and existing protection structures. In the long term, **limited intervention** is identified to signal the need for the further management of risk through design and location of assets and uses within the park area (parks and water assets) which may need to respond to increasing coastal inundation and sea-level rise.
18: Seaside Park to Schroffs Beach Reserve Begins at the southern border of Seaside Park and culminates at Shroffs Beach Reserve including the Avenue Road end.	LI	LI	LI	**Limited intervention** provides for the management of risk to land and assets, and maintenance of the harbour access point. A nature-based approach is preferred to managing the coastal edge, noting aspirations for further connections along this coastal stretch.
19: Schroffs Beach Reserve to The Grange Auckland Golf Course Commencing at Avenue Road end and including the coast south, culminating near the Middlemore hospital/golf club area.	NAI	NAI	NAI	**No active intervention** is reflective of limited Auckland Council assets along this stretch located within coastal hazard areas. No active intervention does not preclude the management of risk and maintenance of connections to the coast where currently provided within limited reserve areas. No active intervention also does not preclude the management of risk to water assets located within or traversing this stretch; or the maintenance of key roading connections (Great South Road) which traverse this inlet of the Tāmaki Estuary.

Unit 5
Tāmaki River Inlet

Unit 5: Ōtara

This unit includes the eastern shore of Middlemore Creek and the Ōtara Creek shoreline within the Ōtara-Papatoetoe Local Board area, and the area of Highbrook immediately north of the Ōtara Creek entrance.

The shoreline in this unit is predominantly a very low energy, sheltered estuarine environment in the upper reaches of Tāmaki River where the main channel diverges with Middlemore Creek branching to the southwest and Ōtara Creek branching towards the southeast. The shallow inlets are typical of depositional zones in the upper reaches of tidal inlets infilled with fine muddy sediment and dense mangrove habitat.

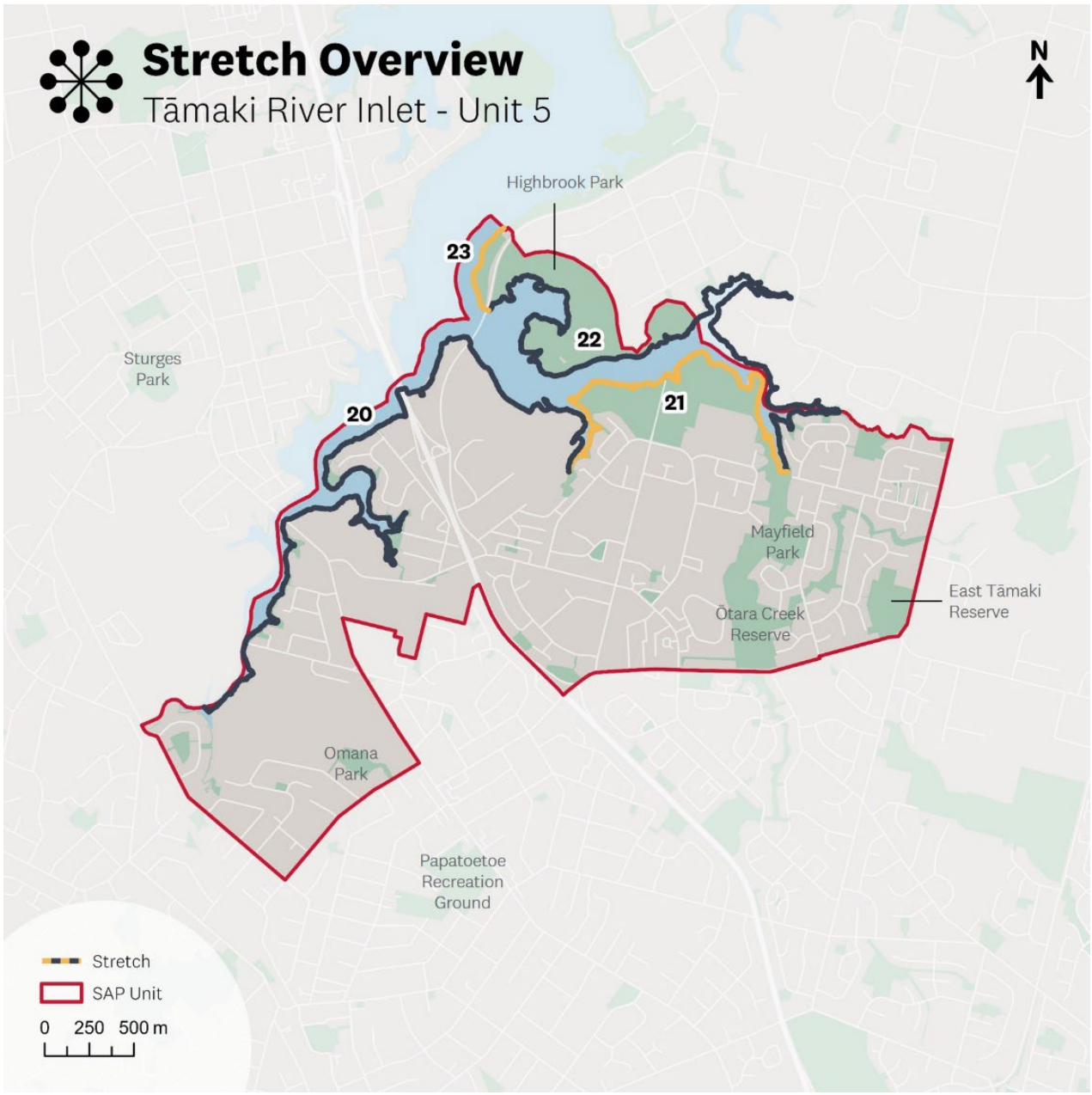


Figure 2-11: Stretches 20 to 23 along the Ōtara shoreline

Draft adaptation strategies for stretches 20 to 23.

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
20: Grange Golf Course to Ngāti Ōtara Park Begins at the northwestern border of Grange Golf Course and extends around Tāmaki Estuary, culminating near Ngati Ōtara Park. (Note: The weir located within the coastal marine area, within the estuary to the north of this stretch is not an Auckland Council asset).	LI	LI	LI	**Limited intervention** identifies the need to manage risk to Auckland Council assets and associated landholdings, including water assets, closed landfills and coastal pathways. Limited intervention also supports the maintenance of a natural coastal edge in this stretch. Management of risk to park assets should be through design and landward location of assets to manage risk from coastal hazards. Managing risk to maintain roading connections (Great North Road) may require an asset-specific **hold the line** approach. Note: Strategies are not intended to apply to third party land or infrastructure.
21: Ngāti Ōtara Park Begins adjacent to the coastal western boundary of Ngāti Ōtara Park and encompasses the entirety of Ngāti Ōtara Park.	LI	LI	LI	**Limited intervention** signals the need for consideration of risk to assets and park uses through design and location of assets. The closed landfill located within this stretch (Ngāti Ōtara Park) is subject to the Closed Landfill Asset Management Plan.
22: Ōtara Creek to Highbrook Drive Bridge Begins near the entrance to Ōtara Creek, at the eastern side of the park, and culminates at the Highbrook Drive Bridge.	NAI	NAI	NAI	**No active intervention** is identified due to Auckland Council assets in this area being generally located beyond coastal hazard areas. No active intervention does not preclude the management of risk to assets, in particular linear infrastructure, if required. Noting also the location of the Pukewairiki (Waiouru) tuff ring is identified as an Outstanding Natural Feature within this stretch.
23: Highbrook Drive Bridge Begins at the Highbrook Drive bridge and continues along Tāmaki River inlet for a brief section of coast. The stretch continues adjacent to Highbrook Drive and Highbrook Park.	LI	LI	LI	**Limited intervention** provides for the continued management of risk to key roading connections and highly uses/valued connections through this area. Limited intervention signals the preference for design and location of assets to manage risk, noting that the coastline is not fixed.


Unit 6
Tāmaki River Inlet
N
Lloyd Elsmore Park
Cascades Rd
Ti Rakau Park
Ti Rakau Dr
Frank Nobilo Esplanade Reserve
Pakuranga Golf Club
Burswood Park
Golflands Park
Tāmaki River
Pakuranga Creek
Burswood Esplanade Reserve
Cryers Rd
Highbrook Park
Highbrook Dr
Greenmount Reserve
Harris Rd
Allens Rd
Springs Rd
Te Irirangi Dr
Chapel Rd
Ngāti Ōtara Park
Hampton Park
E Tāmaki Rd
Barry Curtis Park
Ormiston Rd
Preston Road Reserve
Rongomai Park
Unit boundary
Informal recreation park
Sport & active recreation zone
Mooring management zone
Playground
Fitness
Boat ramp
Jetty / wharf
Pump station
0
500m
1km

Unit 6: Highbrook Park to Pakuranga

This unit includes a narrow sub-arm of the Ōtara Creek shoreline within the Howick Local Board area and the eastern shoreline along the upper part of Tāmaki River between Highbrook and Waiouru Point, extending along the southern shoreline of Pakuranga Creek that branches towards the east.

The upper Tāmaki River is generally a sheltered, low wave-energy environment. Within this unit, the most exposed section is the Highbrook shoreline, to the south of Waiouru Point. This stretch faces the main Tāmaki River channel and is located on the outer bend of the main river channel. The river is generally 400-500 m wide in this area constricting to approximately 360 m at this point between Highbrook and Seaside Park.

The Pakuranga Creek shoreline is highly indented and typical of sheltered estuarine environments, with shallow inlets typical of depositional zones in upper reaches of tidal inlets, infilled with fine muddy sediment and dense mangrove habitat.

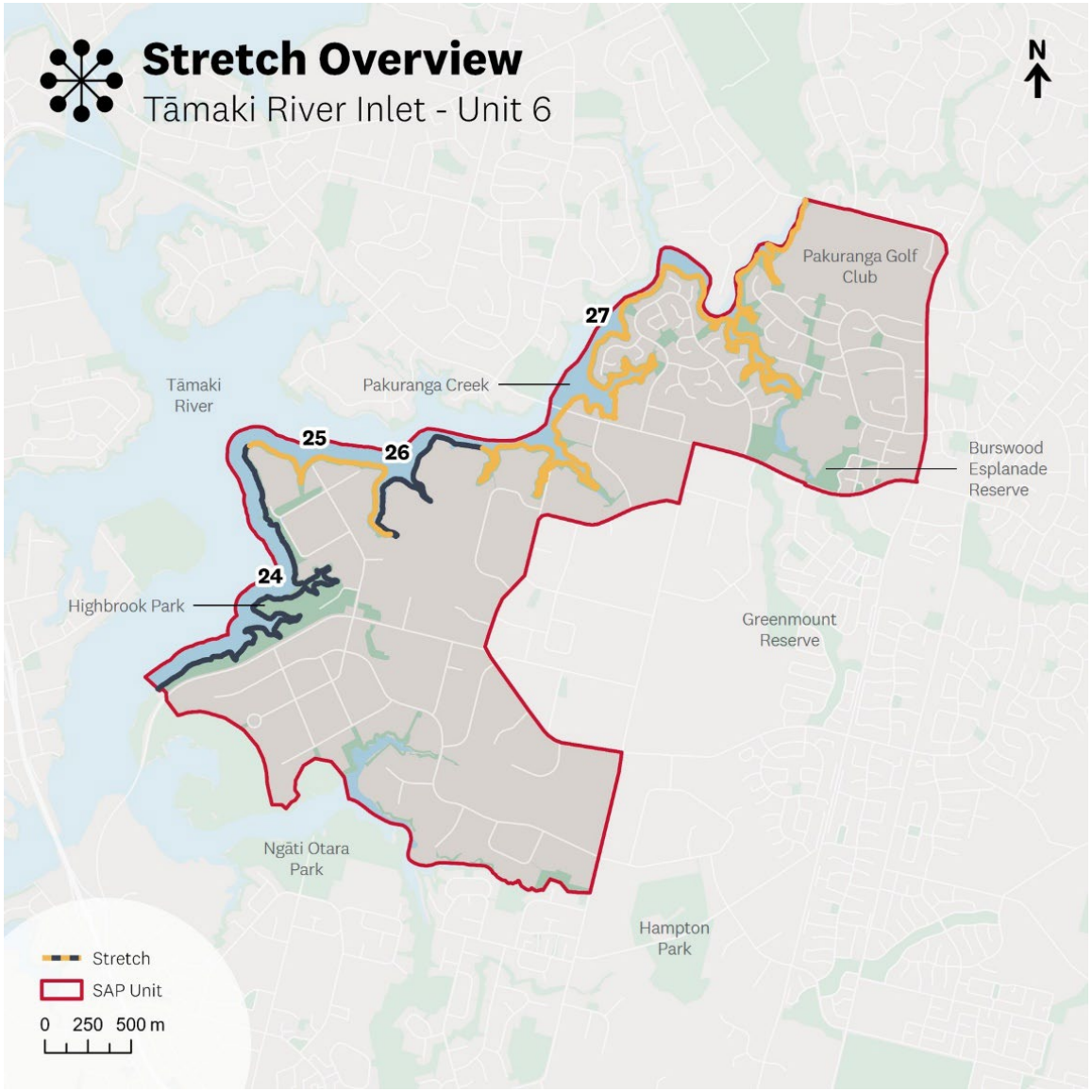


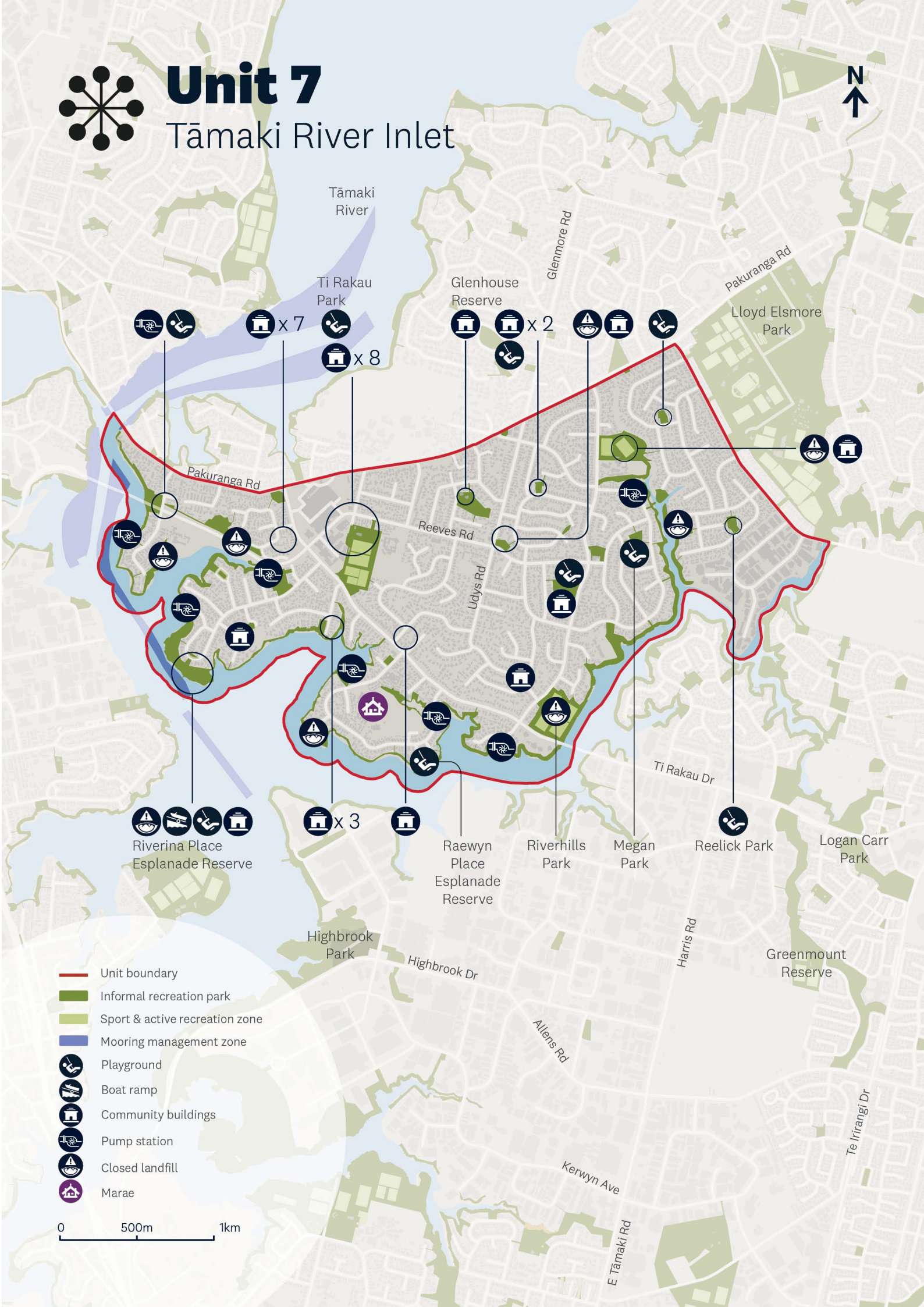
Figure 2-12: Stretches 24 to 27 along Pakuranga Creek shoreline

Draft adaptation strategies for stretches 24 to 27

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
24: Highbrook Drive to Lady Fisher Place Begins adjacent to Highbrook Drive and Highbrook Park and extends along Tāmaki River Inlet, culminating near Lady Fisher Place.	LI	LI	LI	**Limited intervention** is identified to signal the management of risk to important harbour connection points along with key roading and water infrastructure. Realignment and design are anticipated to enable the maintenance of uses within this stretch.
25: Lady Fisher Place to Business Parade North Road Begins in the commercial / industrial zone near Business Parade North alongside Tāmaki River Inlet and ends adjacent to Business Parade North Road. Highbrook Park and Highbrook Path are located in this stretch.	LI	LI	LI	**Limited intervention** is identified reflective of the value of the Highbrook walkways/ shared path connections along this stretch of coast. Management of risk through proactive realignment and design is anticipated to be required to manage risks in the long term.
26: Nassipour Way to Stonedon Drive Esplanade Reserve Beginning adjacent to Nassipour Way and extending to the western border of Stonedon Drive Esplanade Reserve.	NAI	NAI	NAI	**No active intervention** is identified in response to the limited land and assets located within coastal hazard areas within this stretch. No active intervention supports the maintenance of a natural coastal edge.
27: Stonedon Drive Esplanade Reserve to Pakuranga Country Club Golf Course Commences at the western border of Stonedon Drive Esplanade Reserve and encompasses a reasonable portion of the Tāmaki Inlet coast before culminating near Cascades Road, adjacent to Pakuranga Country Club Golf Course.	LI	LI	LI	**Limited intervention** is identified reflective of the value of the Highbrook walkways / shared path connections along this stretch of coast. Management of risk through proactive realignment and design is anticipated to be required to manage risks in the long term. While no coastal protection structures are identified within this stretch, mangroves currently provide nature-based protection along this coastline. Note: This stretch also includes cultural sites and adaptation responses will need to respond to and consider relevant cultural, ecological and amenity values.

Unit 7

Tāmaki River Inlet



Unit 7: Pakuranga Heights

This unit covers the eastern shoreline along the mid reaches of Tāmaki River from Panmure Bridge extending south around the indented shoreline of Pakuranga and includes the northern shoreline of Pakuranga Creek.

The main channel of Tāmaki River narrows through the middle reaches between Pakuranga and Panmure, before widening out to a sheltered tidal basin from which the Pakuranga Creek branches to the east. There are two smaller mangrove-infilled embayments to the north of Pakuranga Creek.

The Pakuranga Creek shoreline is highly indented and the sheltered shallow inlets in the upper reaches are typical of estuarine depositional zones infilled with fine muddy sediment and dense mangrove habitat.

Figure 2-13: Stretches 28 to 30 along the Pakuranga Heights shoreline

Draft adaptation strategies for stretches 28 to 30

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
28: Pakuranga Country Club Golf Course to Tiraumea Reserve Begins near the northern border of Pakuranga Country Club Golf Course, before extending along a significant portion of Tāmaki River Inlet and culminating at the boundary of Tiraumea Reserve.	NAI	LI	LI	This stretch includes extensive Auckland Council esplanade reserve areas, noting that the coastal edge is primarily in a natural state, and assets are located landward of active coastal areas, and this is reflected in the identification of **no active intervention** in the short term. **Limited intervention** in the mid to long term is identified as the predominant strategy supporting the retention of a natural coastal edge and the preference for management of risk through landward relocation and design of assets. This stretch is traversed by water networks and highly valued roading connections which may be required to be functionally retained in place and risk-managed through design and localised protection. Specific management for closed landfills located within this stretch will be informed by the Closed Landfill Asset Management Plan. Strategies do not apply to non-Auckland Council owned land/assets and areas of this stretch are identified as in private ownership.
29: Tiraumea Reserve Encompasses Tiraumea Reserve.	LI	LI	LI	**Limited intervention** reflects the use of this reserve area for community and water-based uses including access to the coast. Management of risk to connections and assets providing access to the coast, walkways/shared paths and water infrastructure, through design and location of assets is signalled.
30: Tiraumea Reserve to Lagoon Drive Commences north of Tiraumea Reserve / beginning of Pandora Place Esplanade Reserve and continues along the Tāmaki River inlet coast before culminating at the southern end of Lagoon Drive bridge. The stretch contains Paul Place Reserve and Millen Avenue Esplanade Reserve.	NAI	LI	LI	**No active intervention** as assets are generally set back from the coastal edge supporting the opportunity to retain a natural coastal line. In the mid to long term, further active management of risk, and the need to consider cultural, heritage and social values (where present within Auckland Council landholdings) and land-use management options in the mid to long term to support cultural, social and environmental outcomes is identified through selection of **limited intervention**. This stretch is traversed by water networks and highly-valued roading connections which may be required to be functionally retained in place and risk-managed through design and localised protection.


Unit 8
Tāmaki River Inlet
N
Half Moon Bay
Wai-o-taiki Bay
Wai-o-taiki Nature Reserve
Half Moon Bay Ferry Terminal
x 2
x 2
Point England Reserve
Point England Rd
Nimrod Park
Wakaaranga Creek Reserve
Farm Cove Reserve
Prince Regent Dr
Ōhuiarangi / Pigeon Mountain
Bucklands Beach Rd
Pilkington Rd
Bramley Drive Reserve Beach
Ōhuiarangi Wetland
Wakaaranga Creek Reserve
Tāmaki River
Tripoli
Butley Dr
Caithness Park
Pakuranga Rd
Glenmore Rd
The BoulevardPark
Browns Avenue Playground
Blue Gum Park
Lloyd Elsmore Park
Gossamer Dr
Udys Rd
Cascades Rd
Ti Rakau Park
Riverhills Park
Ti Rakau Dr
Unit boundary
Informal recreation park
Sport & active recreation zone
Mooring management zone
Playground
Boat ramp
Fitness
Leisure buildings
Pump station
Closed landfill
Community buildings
0
500m
1km

Unit 8: Panmure Bridge to Half Moon Bay

This unit covers approximately 8 km of the eastern shoreline through the middle reaches of Tāmaki River between Half Moon Bay and Panmure Bridge, including Wakaaranga Creek and the cliffs south of Half Moon Bay Marina. Unit 8 is within the Howick Local Board area.

The middle reaches of Tāmaki River shoreline are generally well sheltered from waves. At high tide there is long fetch of 12 km to the northeast however, wave energy is reduced by the sheltering effects of Te Naupata / Musick Point and Motukorea / Browns Island along with shallow water depths around Tahuna Torea. The main Tāmaki River channel is aligned close to the cliffs flanking the embayment at Half Moon Bay then flows in a large sweeping meander towards the Point England shoreline in the west. The width of intertidal flats increases in relation to the channel alignment, from 300 m fronting the vegetated sea cliffs south of Half Moon Bay to over 1 km wide at Wakaaranga Creek mouth.

The Rotary walkway is a significant community asset that extends along 5 km of shoreline from Pakuranga bridge to Wakaaranga Creek.

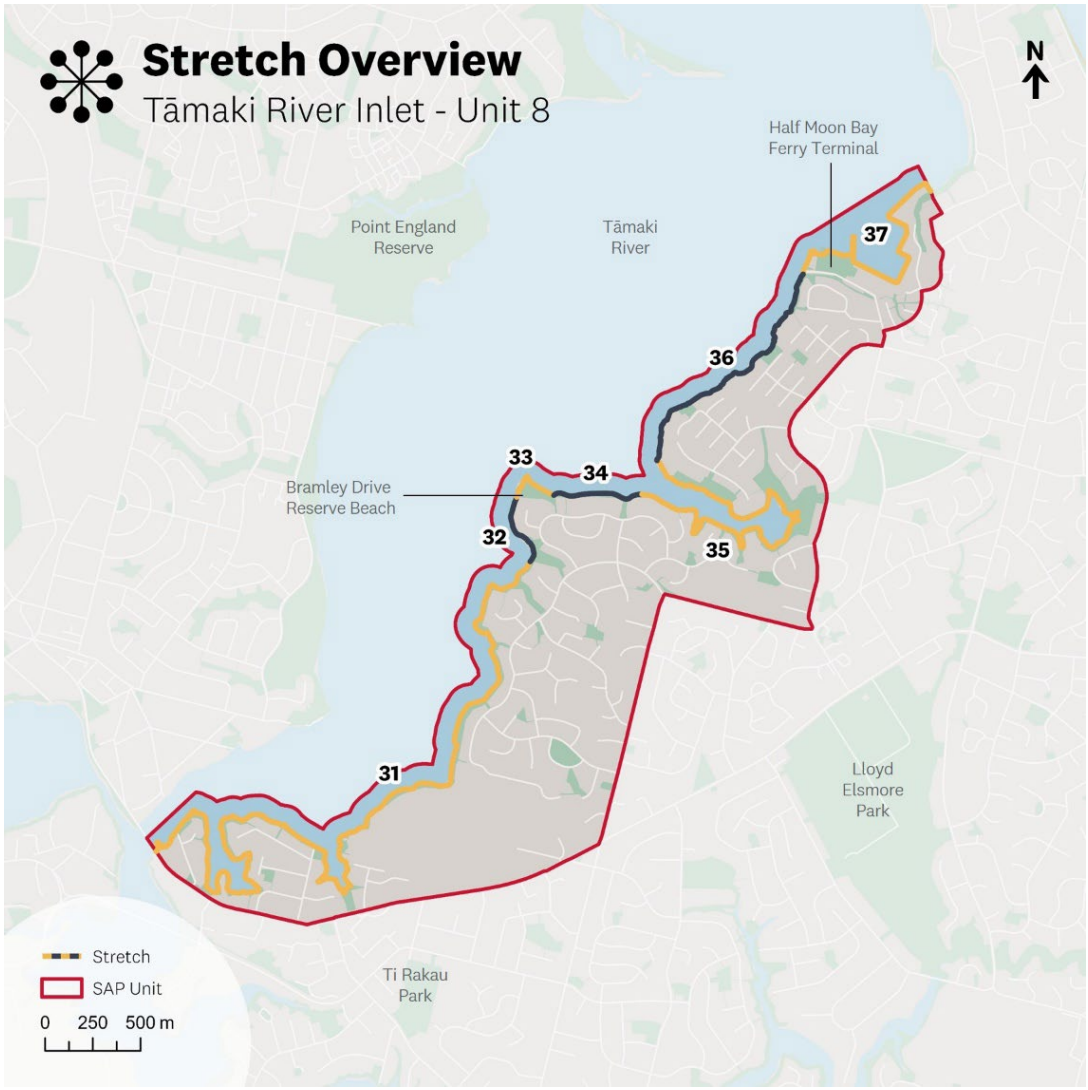


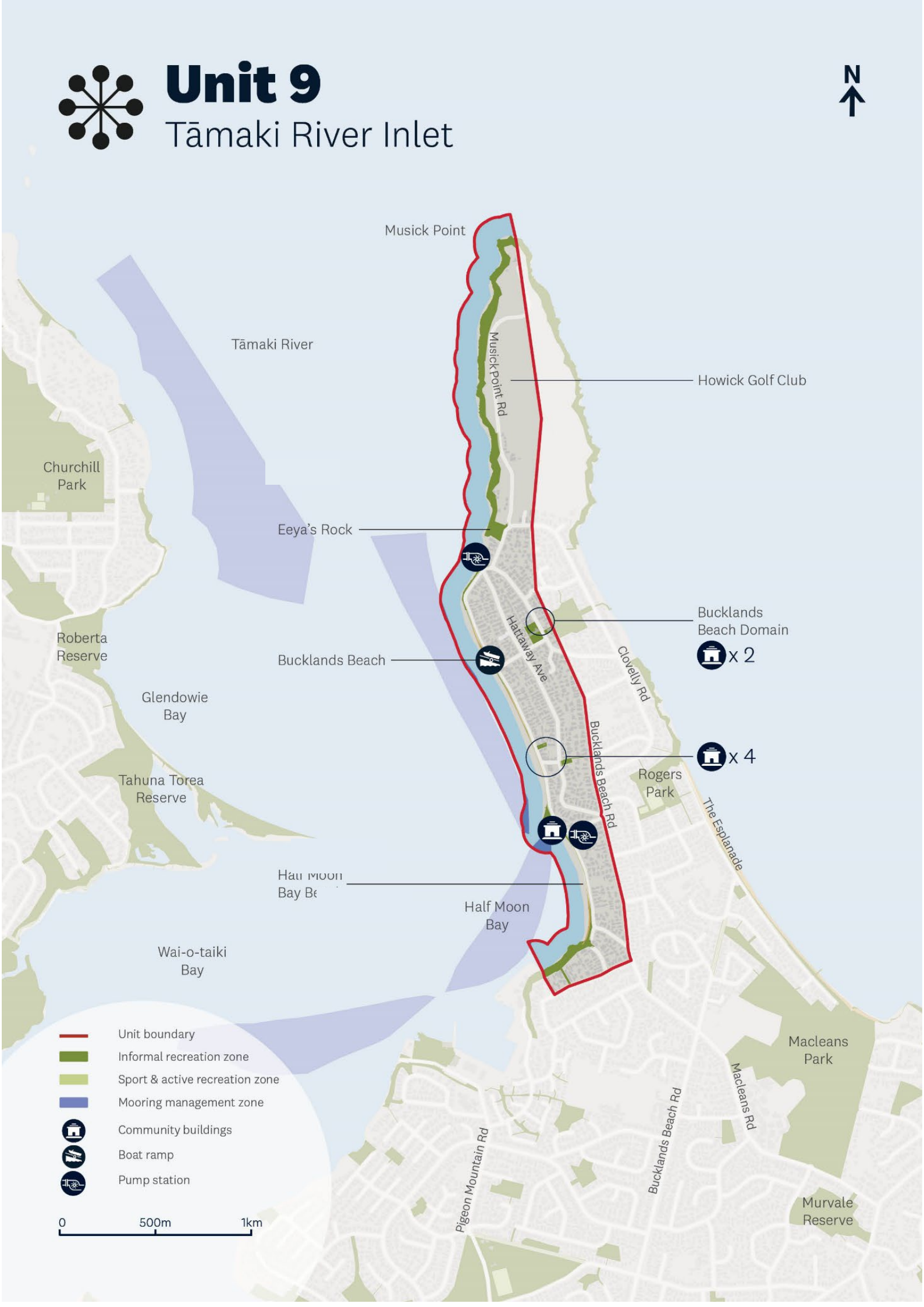
Figure 2-14: Stretches 31 to 37 along the Pakuranga to Half Moon Bay shoreline

Draft adaptation strategies for stretches 31 to 37

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
31: Lagoon Drive Bridge to Oleander Point Road Commences to the northeast of Lagoon Drive bridge, near Pakuranga Rotary Path and Dayspring Way Esplanade Reserve. It then extends along the Tāmaki River Inlet coast, before culminating near Oleander Point Road.	LI	LI	APA	The Rotary River shared path is located along this stretch of coastline, with coastal defences for erosion located in several areas. **Limited intervention** signals the intent to manage risk to this highly valued path through location and design and the continued support of existing defences, while providing for natural coastal management such as mangroves, which provide a nature-based solution for some areas, protecting some sections of this coast from coastal erosion. **Adaptation priority** in the long term signals that sea-level rise and coastal inundation will continue to impact the pathway connections and other assets within coastal areas; consideration of adaptive options will require further engagement. Note: Closed landfills located in this stretch are subject to the Closed Landfill Assets Management Plan.
32: Fisher Parade Esplanade Reserve to Bramley Drive Reserve Begins adjacent to Pakuranga Rotary Path and Fisher Parade Esplanade Reserve.	HTL	LI	APA	**Hold the line** in the short term reflects the location of coastal defence structures which provide protection to the highly valued shared path. **Adaptation priority** is required in the long term as future sea-level rise and coastal inundation will require consideration of future use and location of activities along this stretch.
33: Bramley Drive Reserve Beach Begins at the south-western extent of the reserve and extends around a small headland.	HTL	APA	APA	**Hold the line** indicates ongoing maintenance activities to reduce erosion impacts in the short term. **Adaptation priority area** is selected for the mid-long term as the impacts of coastal hazards and sea-level rise will require planning for future uses including resilient design and location of assets including the car park, toilet block, sailing club building, shared path and playground.
34: Farm Cove Adjacent to the Pakuranga Rotary Path and Pakuranga Farm Cove cycling network.	HTL	LI	LI	**Hold the line** indicates the management of erosion in the short term through active protection and maintenance of the coastline in its current location. **Limited intervention** signals that in the mid-long term, sea-level rise may require further design and location of assets to maintain pathways and connections.

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
35: Farm Cove to Curacao Place Esplanade Reserve Begins adjacent to Bramley Drive Reserve, near Farm Cove and extends around the coast of Tāmaki River inlet until the northwestern border of Curacao Place Esplanade Reserve.	LI	LI	APA	**Limited intervention** signals that management of risk to the shared path in the short-medium term is through design and location of the connection and the coastal edge is not fixed. **Adaptation priority area** in the long term indicates that sea-level rise and coastal hazard impacts will require further consideration in relation to management of pathway connections and other assets and respond to identified ecological values within this area. Note: Ōhuiarangi / Pigeon Mountain is co-managed land through the Tūpuna Maunga Authority, and is largely located beyond identified coastal hazard susceptibility areas.
36: Curacao Place Esplanade Reserve to Compass Point Reserve Begins slightly north of Curacao Place Esplanade Reserve and extends along the Tāmaki River inlet until Compass Point Reserve near the Half Moon Bay Passenger Ferry Terminal.	LI	LI	APA	**Limited intervention** in the short and mid-term is reflective of the ability to manage risk to existing assets and uses through design and location. Transitioning to **adaptation priority** in the long term signals the need to consider how valued paths and accessways can be supported, in a manner responsive to the surrounding environment, with increasing inundation risk with sea-level rise.
37: Half Moon Bay Ferry Terminal Begins at the Half Moon Bay Ferry Terminal and extends to the boundary of the North Pier within the Half Moon Bay Marina.	HTL	HTL	HTL	This stretch includes critical transport connections for ferry operations across Auckland and the Hauraki Gulf islands. The modified and armoured nature of this coastal stretch and values in supporting marine transport connections identifies the need for **hold the line** across all timeframes.

Unit 9
Tāmaki River Inlet



Unit 9: Half Moon Bay to Te Naupata / Musick Point

Unit 9 extends from the north of Half Moon Bay at Takutai Avenue Esplanade Reserve, north to the end of the unit and SAP area at Te Naupata / Musick Point. The unit includes Little Bucklands Beach and Bucklands Beach. Unit 9 is within the Howick Local Board area.

Little Bucklands Beach is situated in the embayment formed between the East Coast Bays cliffs adjacent to Half Moon Bay Marina to the south and Granger Point to the north. Granger Point is an outcrop of hard, interbedded sandstone and siltstone which separates Little Bucklands Beach from Bucklands Beach.

Bucklands Beach is situated on the edge of a deep channel with strong tidal flows but is within a relatively low wave-energy environment. Local topography provides sheltering from the northeast. The beach is exposed to waves generated in south-westerly to northerly wind conditions, however, Tahuna Torea spit restricts wave formation across this fetch.

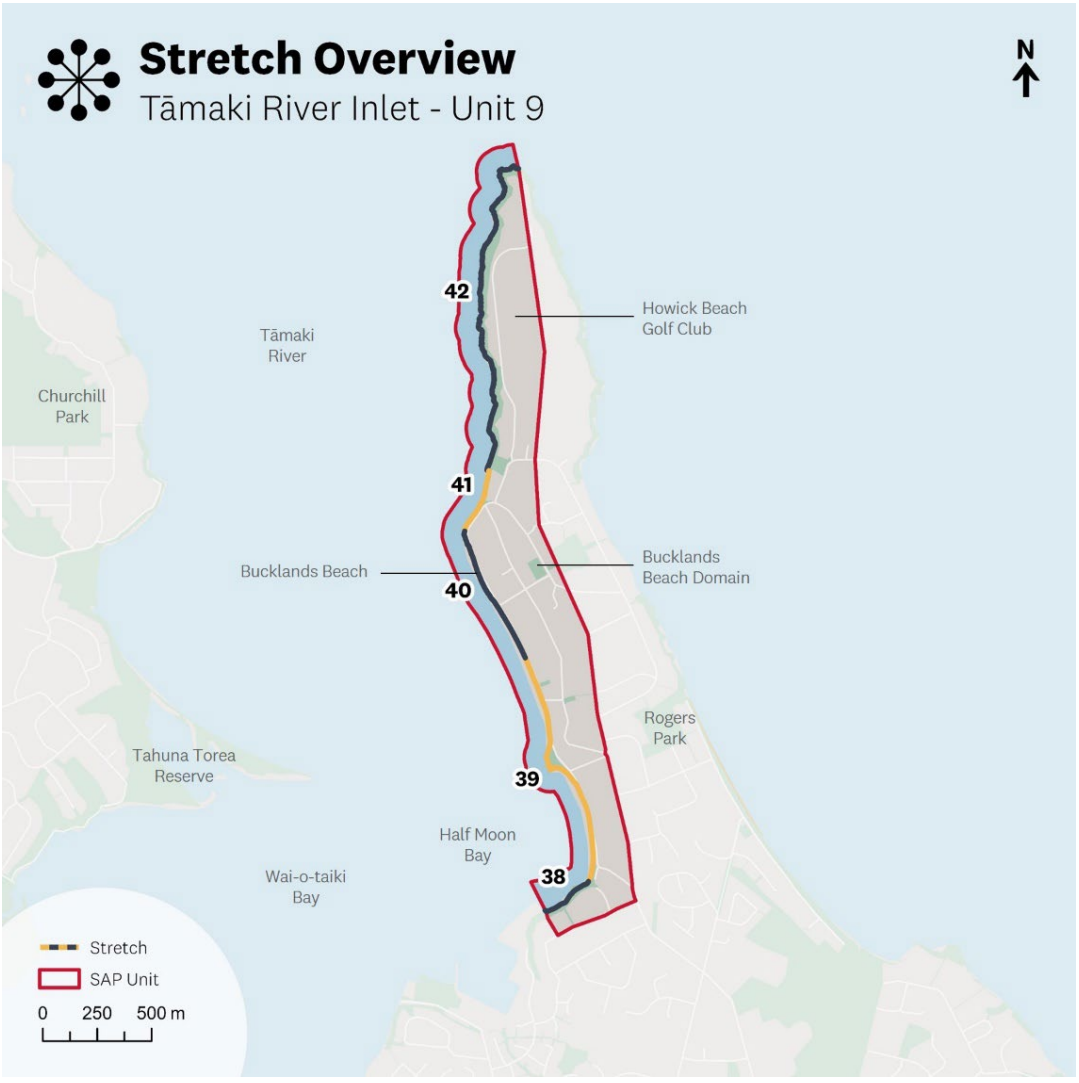


Figure 2-15: Stretches 38 to 42 from Little Bucklands Beach to Te Naupata / Musick Point

Draft adaptation strategies for stretches 38 to 42

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
38: Half Moon Bay Marina to Te Akau Crescent Begins at the boundary of the North Pier at Half Moon Bay Marina and extends north to Takutai Avenue Reserve.	LI	LI	LI	An Auckland Council boardwalk has been constructed to provide shared path connections along the coast. This boardwalk connection will require ongoing maintenance and consideration of future resilient design to accommodate future sea-level rise. As access along this section of the coast is provided through a structure within the coastal marine area, the coast is anticipated to be maintained in a natural state and further protection structures associated with Auckland Council landholdings are not anticipated.
39: Little Bucklands Beach Begins at the northern end of Takutai Avenue Reserve and extends along Tāmaki River Inlet, adjacent to The Parade. The stretch encompasses Little Bucklands Beach and Bucklands Beach Reserve.	HTL	LI	APA	**Hold the line** in the short term may be implemented through a combination of measures, including in the southern areas of the Little Buckland Beach where there is an opportunity for a wider beach buffer to allow a more natural approach. This may be maintained in the mid-term with a need for further consideration of the design and location of assets and uses to respond to increasing inundation risk. **Adaptation priority area** in the long term to consider how risk can be managed and coastal values maintained for this coastal stretch.
40: Bucklands Beach Begins in the Bucklands Beach area, adjacent to The Parade, and extends north to The Parade.	HTL	APA	APA	**Hold the line** signals the continued maintenance of the coastline in a fixed location, noting that intermittent coastal flooding will continue to occur during storm events. In the mid to long term, with increasing coastal inundation risk, it is anticipated this section of coast will require a change in approach in the medium term to **adaptation priority area** to consider how uses, assets and values can be maintained and risk managed.

Stretch	Terms (years)			Explanatory notes
	Short (0-20)	Medium (20-60)	Long (60-100+)	
41: The Parade to Te Naupata / Musick Point Begins at the northern end of The Parade and extends down a brief length of Tāmaki River Inlet entrance, culminating at the southern boundary of Te Naupata Reserve near Musick Point Road.	HTL	APA	APA	**Hold the line** signals the continued maintenance of the coastline in the short term. Increasing exposure to coastal inundation exposure in the medium to long term, and the combined challenge of managing catchment flood risk, signals a need for further **adaptation planning**. With rising sea levels, some realignment and relocation of roads, walkways, car parks, toilet blocks, coastal defences, and water infrastructure will be required.
42: Te Naupata / Musick Point Begins at the southern boundary of Te Naupata Reserve near Musick Point Road and ends at the northern end of Musick Point Road, near Te Waiarohia Pā Reserve. The stretch encompasses predominantly parkland and Howick Golf Course.	LI	LI	LI	Te Naupata Reserve area is a site of significance to Mana whenua. Ecological values, historic heritage features and outstanding natural features are identified within this stretch. Further engagement with mana whenua, community, key asset owners, and key stakeholders will be required to define management intentions. **Limited intervention** as a holding strategy across all timeframes is identified to reflect the need for management of risk and the further development of implementation guidance for management of risk to Auckland Council land and assets located within this stretch.

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