



SECTION D: WAIKATO'S WEST COAST MARINE AND TERRESTRIAL AREAS

Coastal Marine and Coastal Terrestrial Areas

The Study Team determined that within the West Waikato Region there are three Coastal Marine Areas and seven Coastal Terrestrial Areas. These are identified in the tables overleaf, illustrated on Map 21 and described in this section of the report. These Coastal Marine and Coastal Terrestrial Areas are essentially mapped at the Level 3 scale, as outlined within Section A of this report.

For each of the Coastal Marine and Coastal Terrestrial Areas the collective characteristics of the Areas' abiotic, biotic and experiential attributes are described first. Following this, an explanation around the size of the Area is given. A description of the adjacent Coastal Context follows which will provide relationships associated with the Areas' broader setting.

Further to this, each specific Area is discussed and evaluated. Freshwater aspects are covered within the Coastal Terrestrial Areas. An evaluation table at the end of each Area subsection summaries the values and ratings at the Level 3 scale for Coastal Marine and Coastal Terrestrial Areas. Finally, any specific values within the 'Area' are listed, mapped and rated at the Level 4 scale (or local/specific scale). Refer to Figure 2 for an explanation of the Levels. An overall evaluation map is provided at the end of this section, illustrating the ratings for the Level 3 and Level 4 areas (refer again to Figure 2)

An overall summary of all values is presented at the end of this Section.

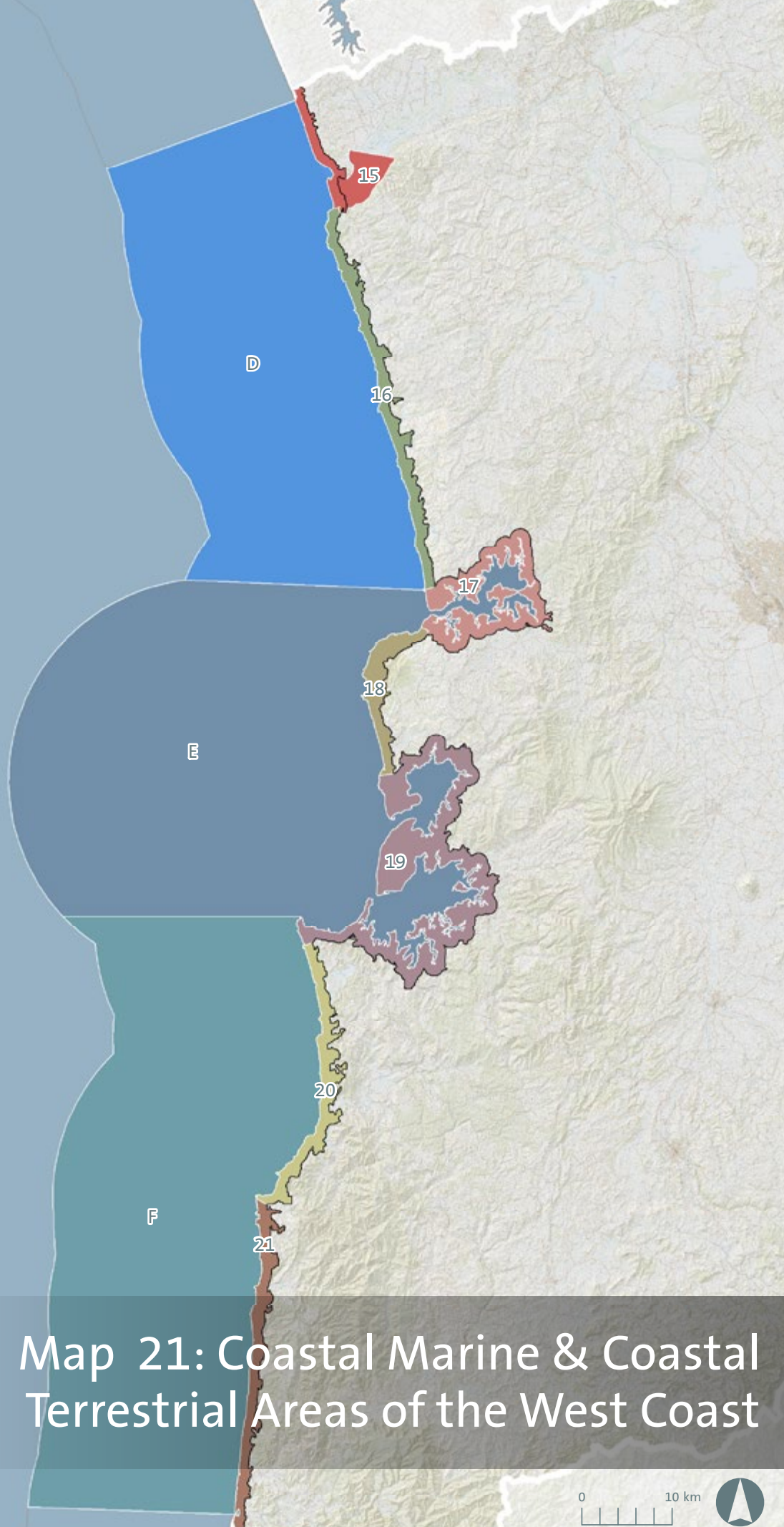




Coastal Marine Areas	
D	Waikato North
E	Whaingaroa, Aotea and Kawhia Harbours
F	North Taranaki Bight

Coastal Terrestrial Areas	
15	Port Waikato
16	Opura
17	Whaingaroa
18	Karioi
19	Aotea Kawhia
20	Marokopa
21	Awakino

Above: Surfer at Raglan



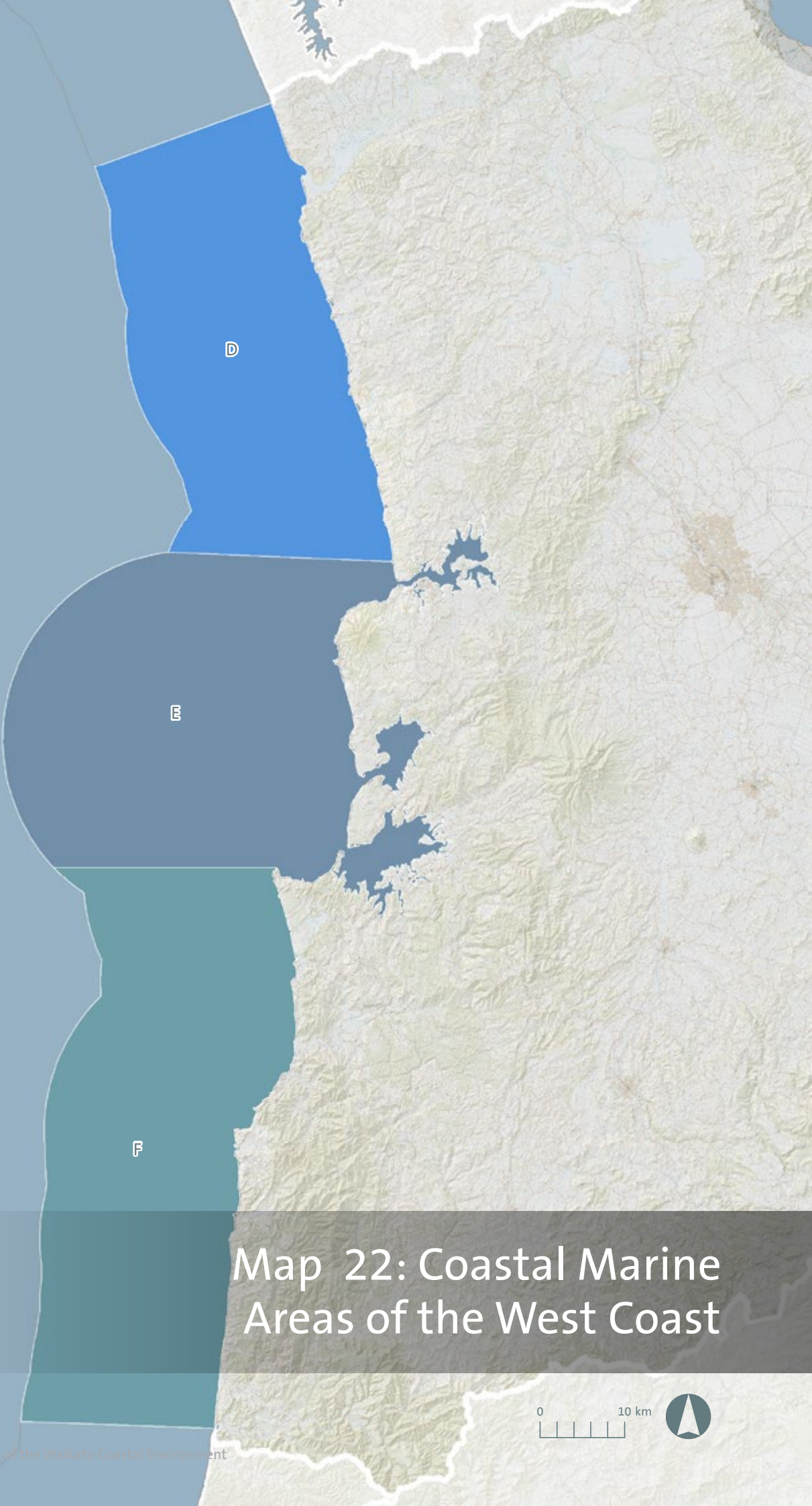
Map 21: Coastal Marine & Coastal Terrestrial Areas of the West Coast

Legend

— Extent of Coastal Environment

0 10 km





Map 22: Coastal Marine Areas of the West Coast

COASTAL MARINE AREAS

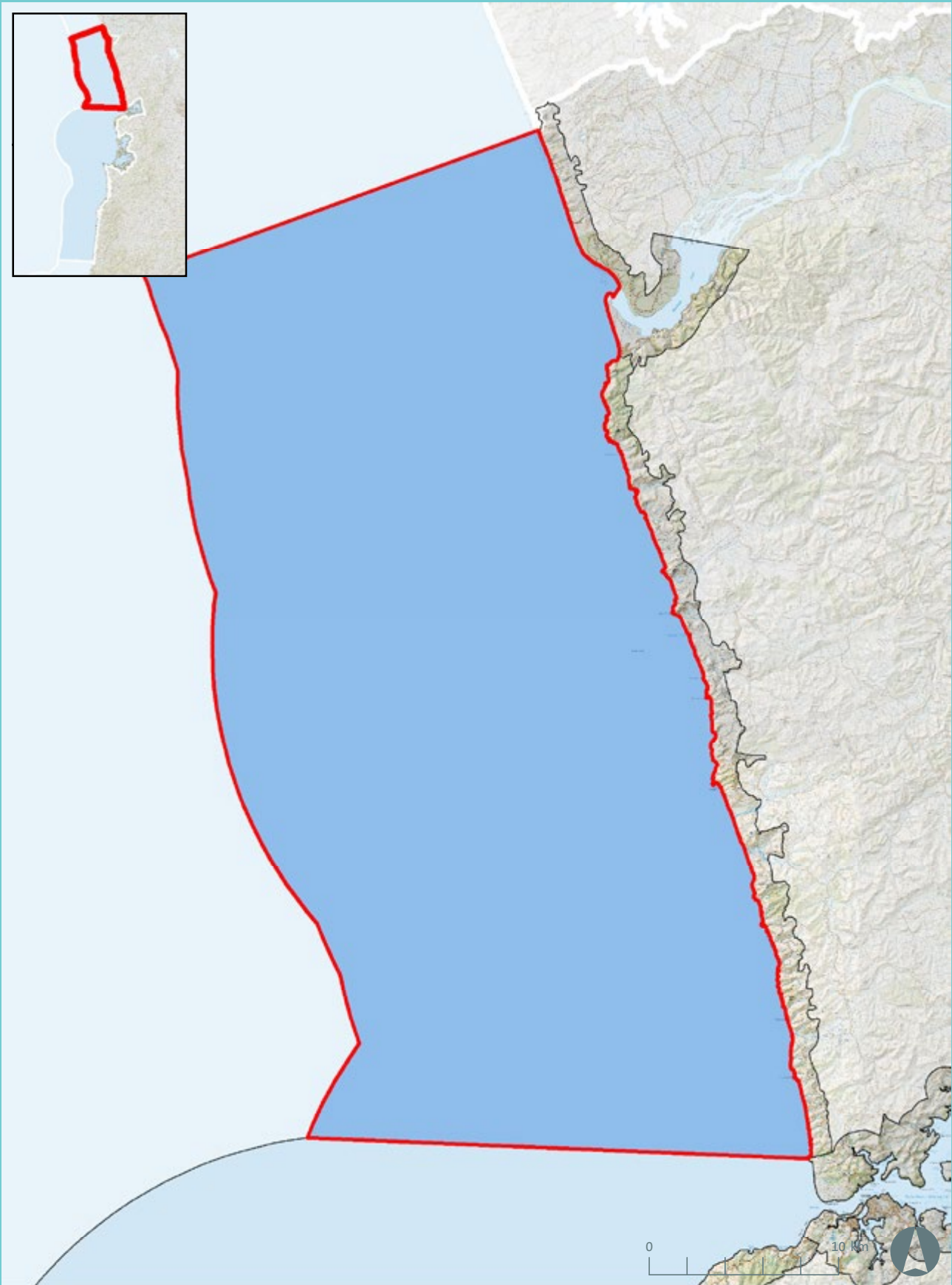
Coastal Marine Areas	
D	Waikato North
E	Whaingaroa, Aotea and Kawhia Harbours
F	North Taranaki Bight



Above: Aquaculture in the calm waters of the Aotea Harbour

Waikato North

COASTAL MARINE AREA D:



Collective Characteristics

Exposed, high energy open coastline with the most notable feature being the Waikato River mouth. Narrow black sand beaches and occasional dunes and areas with steep but stable cliffs. The Waikato River, however, is home to a diverse assemblage of freshwater and saltwater fish taking advantage of the rich resources of the Waikato River delta. This Coastal Marine Area retains high remote and isolation values due to its inaccessibility.

Below: High energy Waikato North Coastal Marine Area



Abiotic

The open coastline is a high energy environment with a narrow sandy beach north of Port Waikato and coastal cliffs south of Port Waikato. It is likely to be part of a littoral cell contiguous with adjacent areas because there are few physical features to control sediment transport. Within the larger system are smaller littoral cells defined by physical control features such as headlands, harbour mouths and river mouths that control the local wave climate and the longshore movement of sediment. These littoral cells and their control features impact directly on erosion and accretion dynamics at the coastal margin resulting in shoreline fluctuations that have temporal scales of hours/days to decades/centuries. Many of the long term patterns of shoreline fluctuation that have been observed are not well understood.

The coast line is typically comprised of a soft shore (sands and gravels) with fluctuating width depending on the conditions within the littoral cell and larger scale sediment dynamics in the West Coast unit. Where this exists, it is present as a thin veneer of sand over rock, small dunes, or extensive sand dune formations. This soft shore (position, depth, width) can be highly dynamic, especially near harbour entrances and river mouths where the high energy coastal environment influences tidal and sub-tidal channels, tidal currents, and swell waves. In circumstances when sediment supply becomes limited, beaches can rapidly erode and shorelines shift landward. Conversely, when sediment supply is available, beaches can accrete and shorelines shift seaward. Where this occurs adjacent to development, seawalls and other erosion protection measures have been installed with varying success and sometimes impacting on beach widths and levels.

Where there is no soft shore, the coastline consists of coastal cliffs comprised of soft sedimentary rock, hard sedimentary, or hard volcanic rock. The long term instability in this coastal cliff environment as influenced by a range of factors (climate, wave conditions, land use) contributes to sediment dynamics in the adjacent littoral cell.

Above: Exposed waters off Port Waikato



Biotic

The Waikato River, however, is home to a diverse assemblage of freshwater and saltwater fish taking advantage of the rich resources of the Waikato River delta. The delta is known for its whitebait fishery, and provides a habitat, nursery, and conduit for migrating freshwater species. The Delta is also home to a multitude of exotic and indigenous waterfowl, marshbirds, and shore using the various mudflat, sandflat, saltmarsh and wetland habitats for feeding and breeding. Along the open coast line, there are few permanent dunelands or intertidal areas offering food resources or breeding areas. The Delta is a recognised location for waterfowl hunters during duck hunting season with maimai dotting the islands and intertidal mudflats.

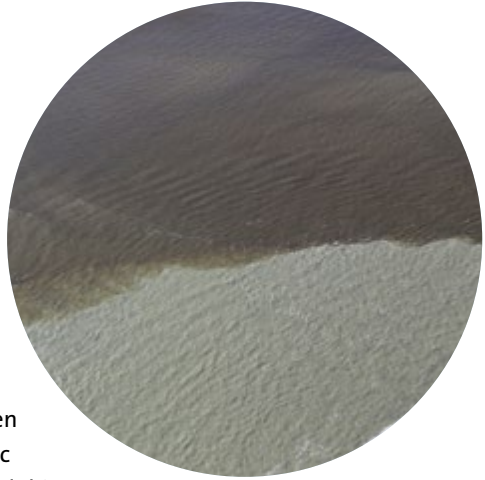
There is very limited or no biotic information relating to the open coastline. Given that modification of the marine environment is minimal, marine fish and benthic organism diversity and distribution can be expected to be unmodified. Maui's dolphin may occasionally use the coastal waters off the West Coast, but there is no information about the relative importance of each of the Coastal Marine Areas to Maui's dolphin. Like all West Coast Coastal Marine Areas, the coastal environment will provide a transit route for shorebirds and some locations likely provide occasional roosting and feeding areas. Commercial fishing is present in the waters off the coast.

The river mouth also offers temporary habitat for seals, dolphins, and sharks.

Experiential

Due to the restricted access to this Coastal Marine Area, experiential attributes are restricted to a small number of locations, notably around the Waikato River Mouth and Karioirahi. Due to this, remoteness and isolation values are high, as are aspects relating to the darkness of the night sky. The lack of modification of this coastal marine area is amplified due to the relatively low amount of modification (i.e. structures and buildings) on the land. Surfing occurs at Karioirahi and around Raglan (which is outlined within Coastal Marine Area E).

Overall the wildness and exposed nature of this coastal area further amplifies experiential values.



Above (top): The mixing of the waters of the Waikato River and the sea.

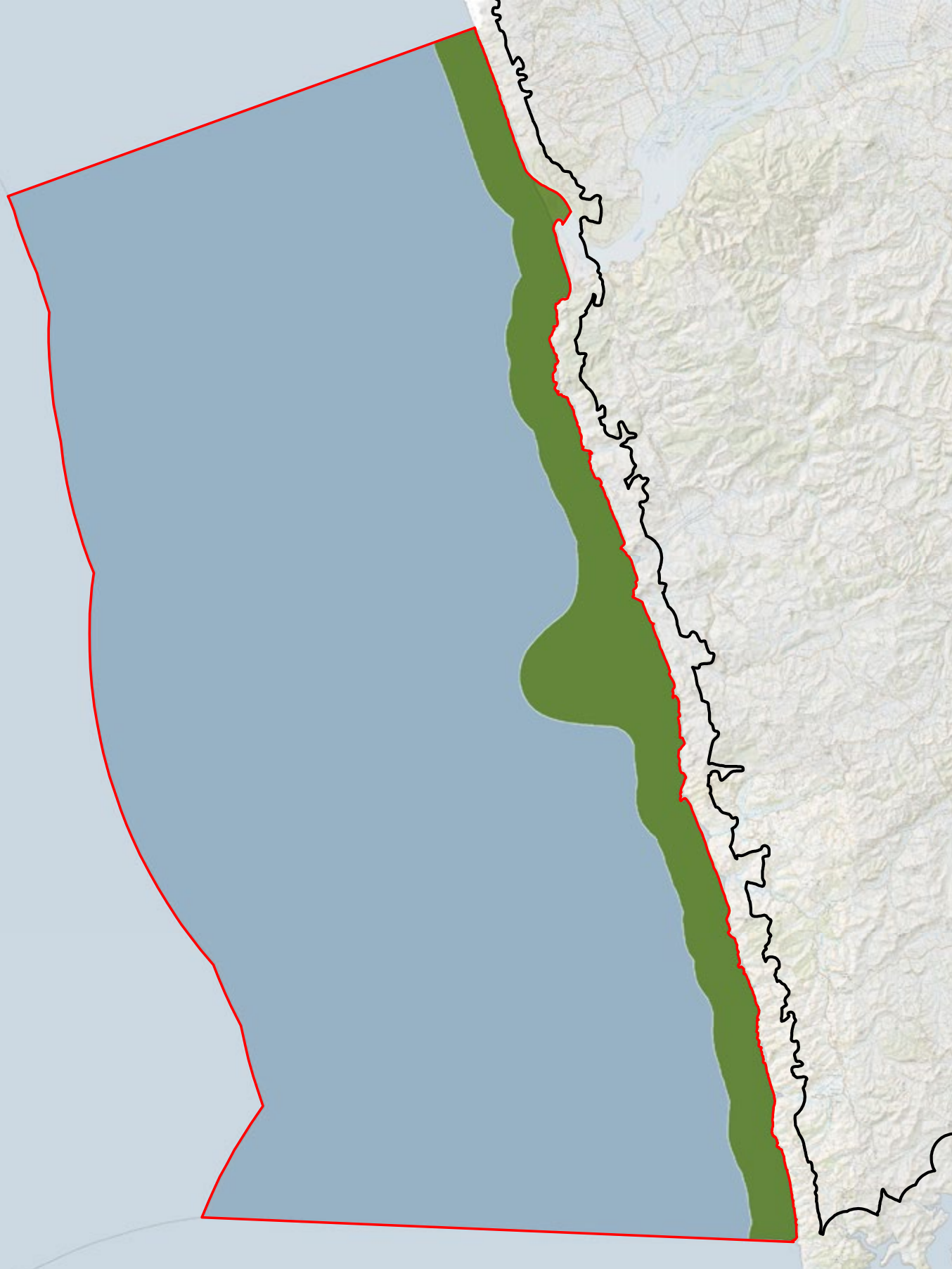
Above (bottom): Waikato River mouth

Rating at Level 3			
Degree of Natural Character	Natural Character Attributes		
	Abiotic	Biotic	Experiential
Very High	✓		
High		✓	✓
Moderate to High			
Moderate			
Moderate to Low			
Low			
Very Low			
Overall Natural Character Rating			High

Coastal Marine Area D: Waikato North Specific Characteristics at Level 4			
These are mapped with reference to Map 23			
Area	Rating	Key Values	Additional Comments
Coastal Waters	Very High	<ul style="list-style-type: none">Coastal waters and shoreline are expressive of highly dynamic open coastal ocean movement including sand drift.Shore break varies along the coast from sandy beach breaks to rocky reef.The wildness and remoteness of these waters amplifies the naturalness and experience of the natural biotic and abiotic elements.Biotic elements include the whitebait habitat at the Waikato River Mouth and marine life.	<ul style="list-style-type: none">Little modification occurs along coastal waters with beach access and boat ramp access gained at Port Waikato.The extension of the Very High area includes an offset of 2km from the shore line and inclusion of reefs and islands in close proximity to the shoreline.

Above: Exposed rocky shoreline along Crayfish Point (Otehe)



**Legend**

— Extent of Coastal Environment

□ Coastal Marine Area D

West Coast Coastal Natural Character Ratings: Level 4

□ High

■ Very High

Map 23

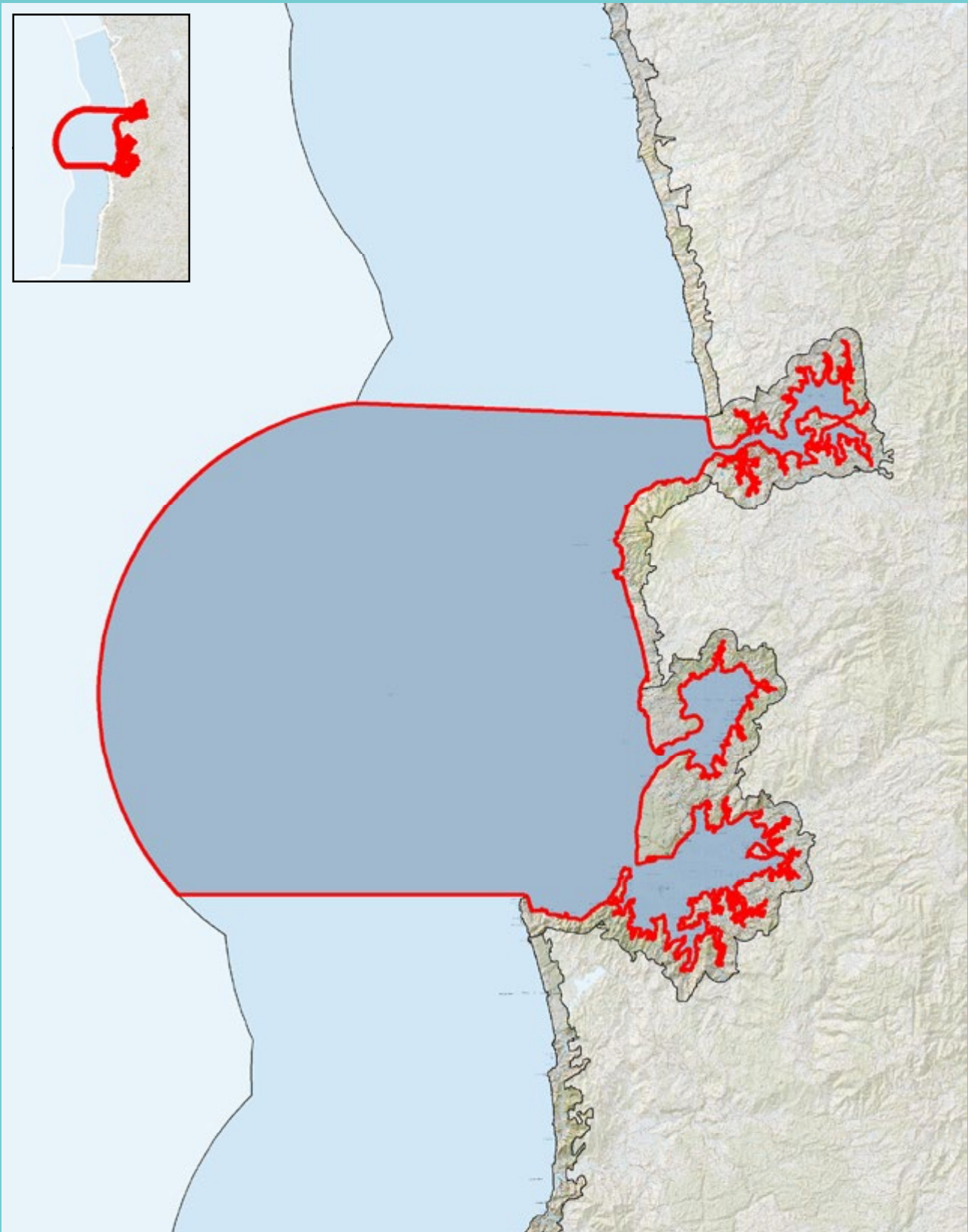
0 4 km



Natural Character Study of the Waikato Coastal Environment

Whaingaroa, Aotea and Kawhia Harbours

COASTAL MARINE AREA E:



Collective Characteristics

The coastal waters are influenced by the interplay of three harbours which nestle around Mt Karioi and Kawhia. The open coast comprises the volcanic shoreline of Mt Karioi with long black sandy beaches. The rocky shoreline creates exposed rock shelves and blowholes with dynamic and high energy wave action along the shore line. Manu Bay and Whale Bay provide a nationally significant surf break with the offshore waters including Karewa / Gannett Island, a wildlife sanctuary.

The harbour waters are shallow and with large areas of intertidal flats. Saltmarsh and mangrove habitats are scattered along the shoreline of the harbours with Aotea and Kawhia harbours supporting small shellfish farming.

Abiotic

Of the three Coastal Marine Areas, the Harbour Coastal Marine Area is the most physically diverse comprising both high energy open coastline and low energy harbours, with a dynamic interconnection between the two environments at the harbour mouths. The Coastal Marine Area extends from Te Hara Point at the northern end of the Raglan Harbour mouth dune system to Albatross Point south of Kawhia Harbour.

In contrast to the other Coastal Marine Areas, the Harbour Coastal Marine Area has several large physical control features. These include Albatross Point itself, each of the Harbour mouths, and Mt Karioi which protrudes from the coastline south of Raglan Harbour. Each Harbour mouth has mobile sand spit and/or dune systems of varying sizes and depths that contribute to variable discharge dynamics and fluctuating shorelines.

North of Raglan Harbour and on either side of the harbour mouth, the coastal margin consists of a narrow black sand/gravel beach adjacent to unstable coastal cliffs with evidence of earthflows or dunes that are variously stable or transgressive. South of Raglan, the coastal margin consists of steep but stable coastal cliffs where volcanic rock from Mt Karioi reaches the coast with a single small boulder beach in Whale Bay. Between Mt Karioi and Albatross Point is an open coast comprised of hard volcanic rocks or cemented dune sands. The volcanic rocks typically form stable coastal cliffs with no soft shore whereas the dune sands form stable cliffs with a toe and narrow black sand beach underlain with a rock platform. Rocky reefs, islets and outcrops are generally located adjacent to volcanic geology, particularly around Mt Karioi and south of Kawhia Harbour. The largest of these is Gannet Island, an eroded basaltic tuff remnant located 19 km west of Aotea Harbour. The physical environment of the island is harsh, waves often wash over the entire island, and it has no anthropomorphic modification. The only notable stream outlet is at Toreparu Stream, and most streams discharge over the coastal cliffs with no defined coastal stream mouth.

Anthropogenic modification of the Coastal Marine Area is low, with few vehicular access points and almost no development or structures at the coastal margin except at Arohaki Bay where erosion protection structures are located at the coastal margin in front of buildings. However, coastal processes are expected to be largely unmodified.

The harbours were created by the partial blocking by sand barriers of drowned river valleys as sea levels rose. Kawhia is the largest of three harbours with an area of 67.7 km² of which 74% is intertidal. Aotea Harbour is 31.9 km² to MHWS, of which 74% is intertidal and Raglan is 35km² of which 70% is intertidal. In contrast to the open coast, the harbours are low energy environments typically comprised of extensive soft sediment intertidal and subtidal

channels with sandy/muddy harbour beaches. The soft shore sediments are usually a veneer of varying depths over sedimentary rock shelves although in some locations the sand is only a thin layer or absent. The locations and extent of beaches, subtidal channels and intertidal areas are dynamic and can fluctuate dramatically over short timeframes, affecting the location of shorelines and coastal infrastructure.

The harbour mouths and adjacent beaches are enclosed by sand spits and extensive dune areas, including large areas of transgressive duneland at Aotea Harbour, but maintain a dynamic interconnection with the ocean beaches on either side of the Harbour mouths as a result of tidal currents, waves, and sediment transfer. In particular, the dunes between the Aotea and Kawhia Harbour mouths are mobile and constantly being reshaped.

Rates of sedimentation in the Harbours have historically been impacted by anthropomorphic land use change, so rates of harbour infill have increased since prior to human settlement. However, today sedimentation is considered to be relatively low and impacts on biotic factors are thought to be limited.

Each harbour has numerous waterways of various sizes discharging into them and many, if not most, river mouths have some degree of modification including channelization, reclamation, and drainage. In addition there are roads, culverts, bridges and their abutments, and coastal erosion protection structures that modify the coastal margin and have an effect on the location of channels and sediment transport. The harbours also have structures extending into the Coastal Marine Area including moorings, jetties/wharfs, and boat ramps. These modifications are more numerous in Raglan and Kawhia Harbours than in Aotea Harbour where there is comparatively less settlement and fewer coastal structures.

In Raglan Harbour there are inanga farms located on land adjoining the intertidal saltmarsh. In Aotea Harbour there is aquaculture located in the channel adjacent to the main settlement. In Kawhia Harbour there is aquaculture near Mangaora Inlet east of the settlement of Kawhia.

The scale of modification is generally small compared to the size of the harbours and coastal processes (sediment transport, water movement, tidal movement) appear to have a low degree of modification.

Biotic

There is very limited biotic information relating to the open coastline. Given that, except for fishing, modification of the marine environment is minimal, marine fish and benthic organism diversity and distribution can be expected to be unmodified. Like all West Coast Coastal Marine Areas, the open coast will provide a transit route for shorebirds with the harbours as a focal point. Most biotic information relates to the harbours, although offshore Gannet Island has been surveyed.

The biotic values of Raglan/Whaingaroa, Aotea, and Kawhia Harbours is a function of land use and waterway management in their surrounding catchments. Water quality from stream draining into the harbours has improved over the past 20 years resulting in low sedimentation rates, particularly for Whaingaroa Harbour. As a result, water quality is considered largely unchanged by anthropomorphic activity and the harbours have high ecological values, with Raglan/Whaingaroa considered to have the highest degree of modification.



Above: Gannet

Unlike the more modified East Coast intertidal areas, all three West Coast harbours have large intertidal areas that support extensive seagrass meadows (*Zostera* sp.). Seagrass is an important habitat for fish nurseries, shorebird feeding, and shellfish. The harbours and river deltas perform significant ecosystem services as nurseries for fish and other aquatic life, and provide a notable food resource for shorebirds with extensive shellfish beds (pipi, cockles, and wedge shells) and large populations of surface dwelling gastropods (e.g. mud snails).

Although survey data is sporadic, the harbours are known to provide habitat for snapper, kahawai, trevally, gurnard, dogfish, flounder, grey mullet, yellow-eyed mullet, eels, stingrays, and anchovy. The harbours also provide a conduit for native diadromous fish such as giant kokopu during their migrations to and from the sea.

All three harbours have been identified as nationally important sites for wintering indigenous and international migratory shorebirds, with top 10 rankings for a variety of shorebird species. Kawhia Harbour has the most southern west coast population of NZ dotterel. All three harbours have been identified as Areas of Significant Conservation Value by Waikato Regional Council.

Below: Kowhai Point, Kawhia Harbour

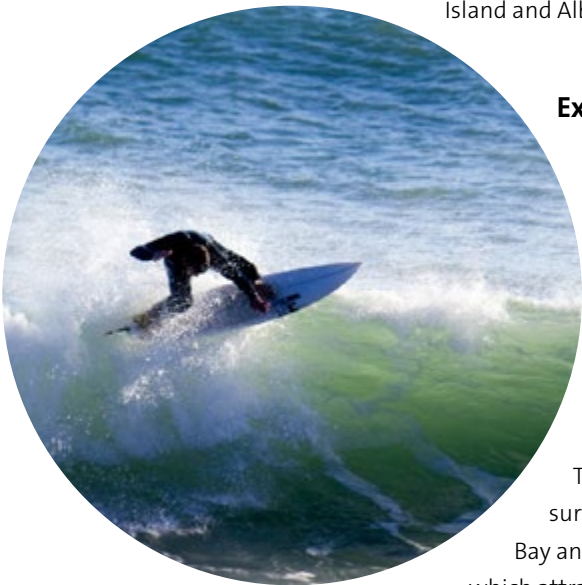


Kawhia Harbour has been described as the ‘seafood basket’ of Tainui and Aotea Harbour is an important food source for local communities. A taiapure was established over Aotea and Kawhia harbours in 2000, and includes 2 nautical miles (n.m.) around the entrances, a 1-n.m. coastal strip from Taranaki Point to Albatross Point, and 1 n.m. around Gannet Island.

Below: Surfer at Raglan

Right: Aotea Harbour

Gannet Island terrestrial flora is limited to two lichens, a moss and a green alga. There are no vascular plant species, principally because there is no permanent freshwater, no soil, harsh effects of salt water, salt spray and guano, and vegetation removal by birds. However, Gannet Island is a breeding ground for gannet and New Zealand fur seals, both Gannet Island and Albatross Point are fur seal haul out sites.



Experiential

The sheltered waters of the three harbours offer very contrasting experiences to those on offer along the exposed coastline. The benign and calm waters of the harbours allow for numerous kinds of water-based activities, including swimming and boating and access is gained around the three main areas of settlement, being Raglan, Aotea and Kawhia. There is a lack of modification on the water’s surface within the harbours, principally due to the low concentration of population.

The open coastline, notably around Raglan offers premium surfing, with nationally significant surf breaks at Manu Bay, Whale Bay and Indicators. The surf at Raglan is internationally recognised which attracts hundreds of people year round. Due to this, the natural elements, patterns and process of this Coastal Terrestrial Area are considered high. the presence of wildlife and the wildness associated with the water amplifies the natural elements.

Gannet Island is administered as a Wildlife Management Reserve by the Department of Conservation.

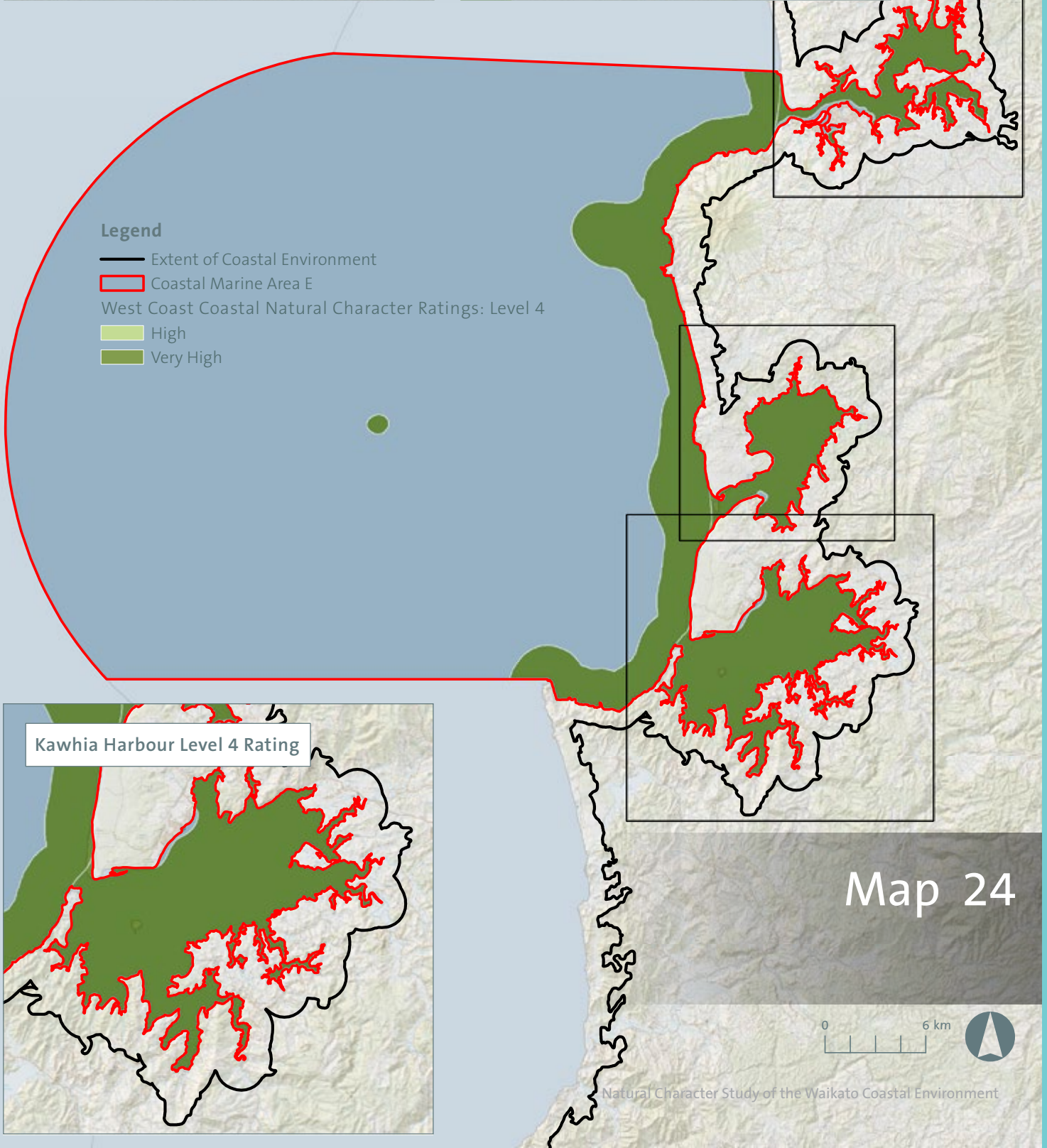
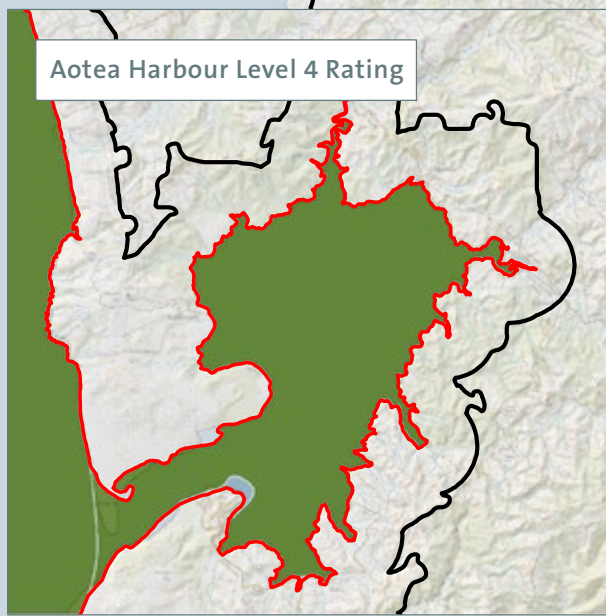
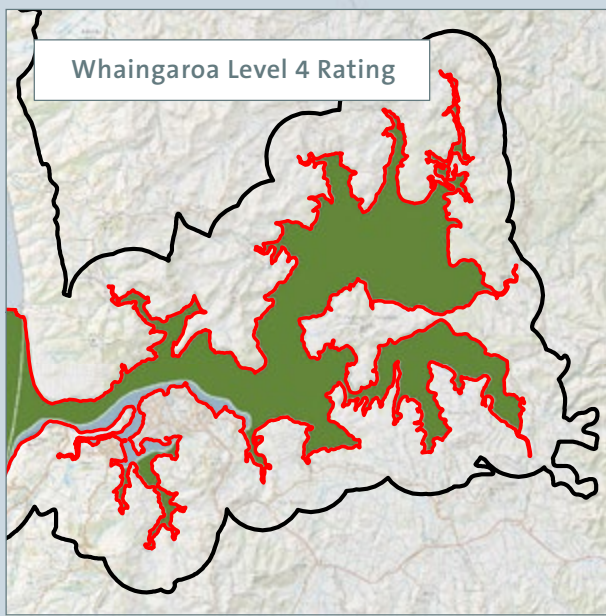
Rating at Level 3			
Degree of Natural Character	Natural Character Attributes		
	Abiotic	Biotic	Experiential
Very High			
High	✓		
Moderate to High		✓	✓
Moderate			
Moderate to Low			
Low			
Very Low			
Overall Natural Character Rating			Moderate to High



Coastal Marine Area D: Whaingaroa, Aotea and Kawhia Harbours Specific Characteristics at Level 4

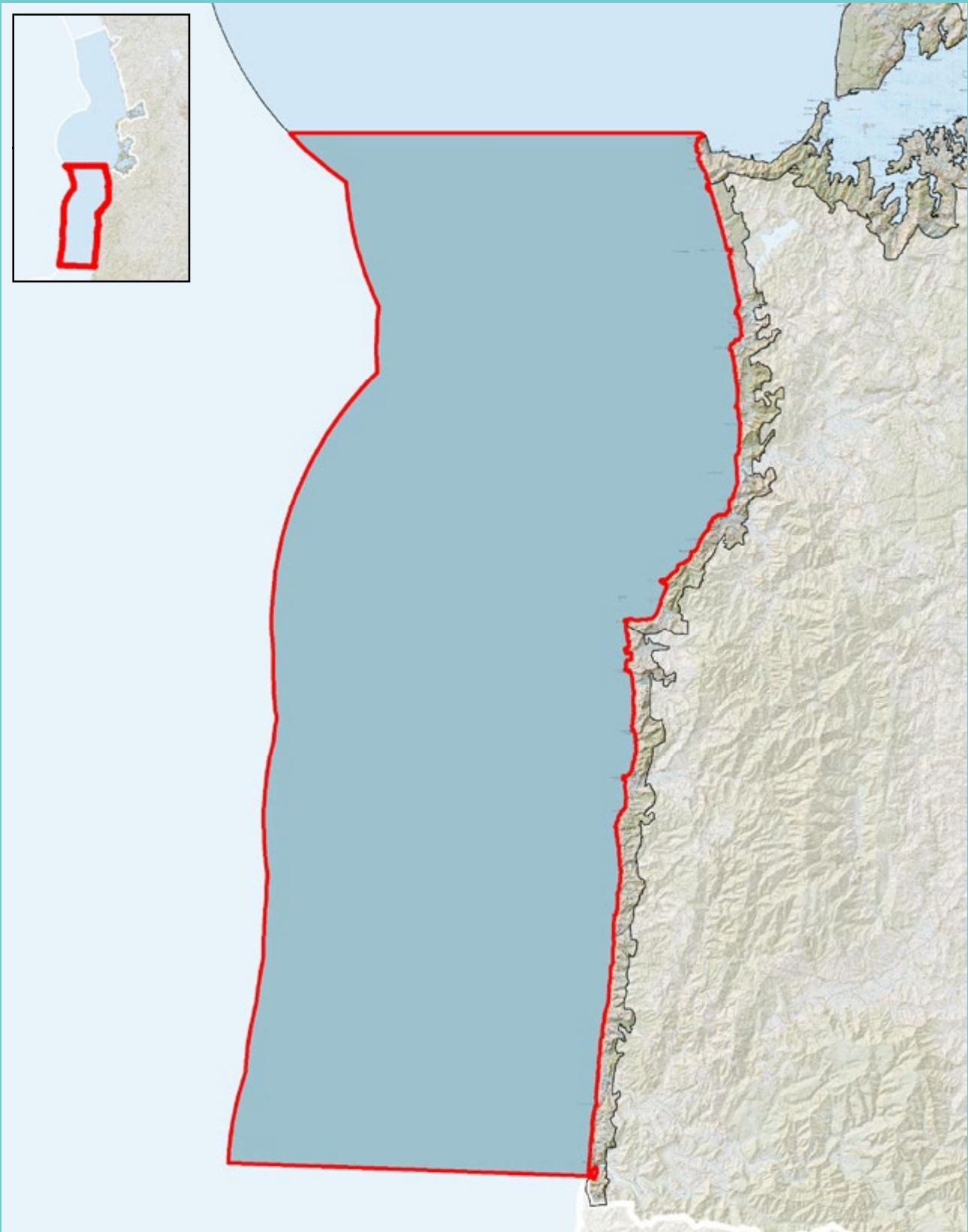
These are mapped with reference to **Map 24**

Area	Rating	Key Values	Additional Comments
Whaingaroa Harbour	Very High	<ul style="list-style-type: none">Coastal edge of the dune feature at harbour mouth highly expressive of natural abiotic processes and sand movement at the harbour mouth. Intertidal waters expressive of constant change to channels. Unmodified coastal margins with significant erosion control around the settlement, private boat access and jetties.	<ul style="list-style-type: none">Modification is apparent mostly along the southern harbour margins around the settlement of Raglan and its lower harbour reaches. Includes reclamation and erosion control measures, wharf, jetties, groins and bridges.
Aotea Harbour	Very High	<ul style="list-style-type: none">Coastal dune feature at harbour mouth highly expressive of natural abiotic processes and sand movement at the harbour mouth. Intertidal waters expressive of constant change to channels.	<ul style="list-style-type: none">Modification is apparent mostly along the southern harbour margins around the settlement of Aotea. Includes reclamation and erosion control measures.
Kawhia Harbour	Very High	<ul style="list-style-type: none">Coastal dune feature at harbour mouth highly expressive of natural abiotic processes and sand movement at the harbour mouth. Intertidal waters expressive of coastal margins and estuarine habitats.	<ul style="list-style-type: none">Modification is apparent mostly along the settlement of Kawhia. Includes reclamation and erosion control measures. Includes jetties, seawall, erosion control and reclamation.
Open coastline	Very High	<ul style="list-style-type: none">Coastal waters and shoreline are expressive of highly dynamic opencoastal ocean movement including sand drift.Shore break varies along the coast from sandy beach breaks to rocky reef.The wildness and remoteness of these waters amplifies the naturalness and experience of the natural biotic and abiotic elements.Includes Gannet Island waters and the abundant marine life surrounding the island	<ul style="list-style-type: none">No modification is apparent to the open coastal waters.Commercial and recreational fishing is apparent around Whaingaroa and Kawhia Harbours. Gannet Island provides a popular diving location in good conditions.The extension of the Very High area includes an offset of 2km from the shore line and inclusion of reefs and islands in close proximity to the shoreline.



North Taranaki Bight

COASTAL MARINE AREA F:



Collective Characteristics

Exposed, high energy open coastline with numerous small watercourses draining into the sea. Narrow black sand beaches and occasional dunes and areas with steep but stable cliffs. This Coastal Marine Area retains high remote and isolation values due to its relative inaccessibility.

Abiotic

The North Taranaki Bight Coastal Marine Area encompasses the high energy open coastline extending from the southern regional boundary dunes at the Mokau River north to Albatross Point. Very similar to Waikato North Coastal Marine Area, the North Taranaki Bight Coastal Marine Area has few large physical control features. However, there are small headlands that may delineate local littoral cells including Tirua and Tapirimoko Points at either end of Nukuhakari Bay, and Taungaururoa, Te Mauku and Ngarupupu Points north of Waikawau River. Tirua Point is the most prominent physical relief longitudinally, dividing the Coastal Marine Area into two halves, each with different characteristics corresponding to the underlying geology.

The northern half is comprised of a variable coastline with hard greywacke rocky reefs both at the coastline and further offshore (e.g. Motunau Rocks). The rocky reefs either extend directly from the base of stable coastal cliffs as a shelf or are buried beneath the soft shore beach. There are extensive lengths of black sand beaches adjacent to coastal cliffs or

Below: Active coastal waters at Opito Point



historic stabilised dunes. There is one large sand spit at Marokopa River and a smaller sand spit at Wainui Stream, but otherwise most streams discharge over the coastal cliffs with no defined river mouth. There is little evidence of earthflows and the only active erosion is small areas of transgressive dunes.

From Tirua Point south, the underlying geology is weak sandstone and limestone which emerges beneath the soft shore as a flat rocky shelf that extends offshore with few rocky reefs or islets. There are less extensive lengths of beach and in some areas the beach is a narrow strip forming a veneer over the rock shelf. The coastal margin is adjacent to stable coastal cliffs with no evidence of earthflows and few transgressive dunes. As for Tirua Point north, there are only two notable sand spits at Awakino and Mokau Rivers, and most streams discharge over the coastal cliffs.

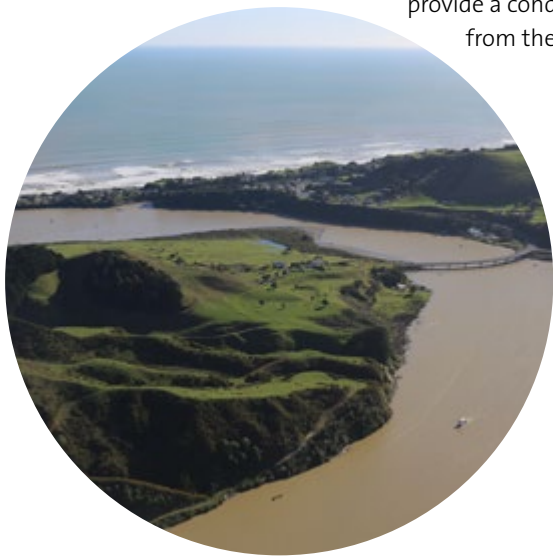
Anthropogenic modification of the Coastal Marine Area is generally low and coastal processes are expected to be unmodified. There are two exceptions to this. The first is the submarine pipeline running perpendicular to the coast at Taharoa with a mooring buoy at the surface, servicing the Taharoa iron sand mining operation. The second is the coastline between Awakino and Mokau, where coastal development includes vehicular beach access points, sea walls and other erosion protection measures, and buildings at the coastal margin.

Biotic

There is limited/ no biotic information relating to the open coastline, except in relation to the Tirua Point haul out site for New Zealand fur seals. Given that modification of the marine environment is minimal, except for commercial and recreational fishing activities, marine fish and benthic organism diversity and distribution can be expected to be largely unmodified. Maui’s dolphin may occasionally use the coastal waters off the West Coast, but there is no information about the relative importance of each of the Coastal Marine Areas to Maui’s dolphin. Like all West Coast Coastal Marine Areas, the coastal environment will provide a transit route for shorebirds and some locations likely provide occasional roosting and feeding areas.

Most biotic information relates to the Marokopa and Mokau River mouths which are identified by Waikato Regional Council as ASCVs and recognised for their whitebait fisheries. Marokopa Estuary is known for its kahawai, flounder and eel fisheries, while the Mokau and Awakino Estuaries are home to at least 15 marine fish species. It is likely that all these rivers provide a conduit for native diadramous fish species during their migrations to and from the sea.

Below: Mokau River



Experiential

The open coastline is largely unmodified due to its exposure to the high energy coastal waters. This part of the Waikato West Coast is highly remote with limited access at Marokopa and Awakino, with the remainder of the coast in private ownership.

Recreational use of the coastal waters is limited due to travel distance to the nearest boat ramp or monitored beach. Offshore shipping movements are apparent on a transient basis. Overall however the experience of remoteness of the natural abiotic and biotic elements of the open coast is high.

Disruption to the unmodified coastal waters is apparent offshore from Taharoa Sand Mine with a sand depositing bouy and pipeline extending 2km offshore. The visual presence reinforces the modification to the coastal waters and shoreline of the mining landuse.

Rating at Level 3			
Degree of Natural Character	Natural Character Attributes		
	Abiotic	Biotic	Experiential
Very High			
High	✓	✓	✓
Moderate to High			
Moderate			
Moderate to Low			
Low			
Very Low			
	Overall Natural Character Rating		High

Below: Rocky coastline south of Albatross Point



Natural Character Study of the Waikato Coastal Environment

Coastal Marine Area F: North Taranaki Bight Specific Characteristics at Level 4			
These are mapped with reference to Map 25			
Area	Rating	Key Values	Additional Comments
Exposed coastline	Very High	<ul style="list-style-type: none">Highly remote from recreational human activity.No modification to the open coastal waters and shoreline excluding Taharoa Sand Mine.Biotic environment largely unmodified with supporting habitats for abundant marine life. The estuaries provide habitats for some 15 marine species and whitebait.Shoreline varies from wide coastal sand beaches to steep shorelines and rocky outcrops and reefs.	<ul style="list-style-type: none">Limited access from the shore and the exposure of the west coast limits the recreational use of the waters.Offshore shipping routes are visible on a transient basis.The gap in the mapped area adjacent represents the location of the Taharoa Sand Barge and Pipeline.

Below: North Taranaki Coastline - looking south toward Awakino



Natural Character of the Taranaki Coastal Environment

Legend

— Extent of Coastal Environment

▭ Coastal Marine Area F

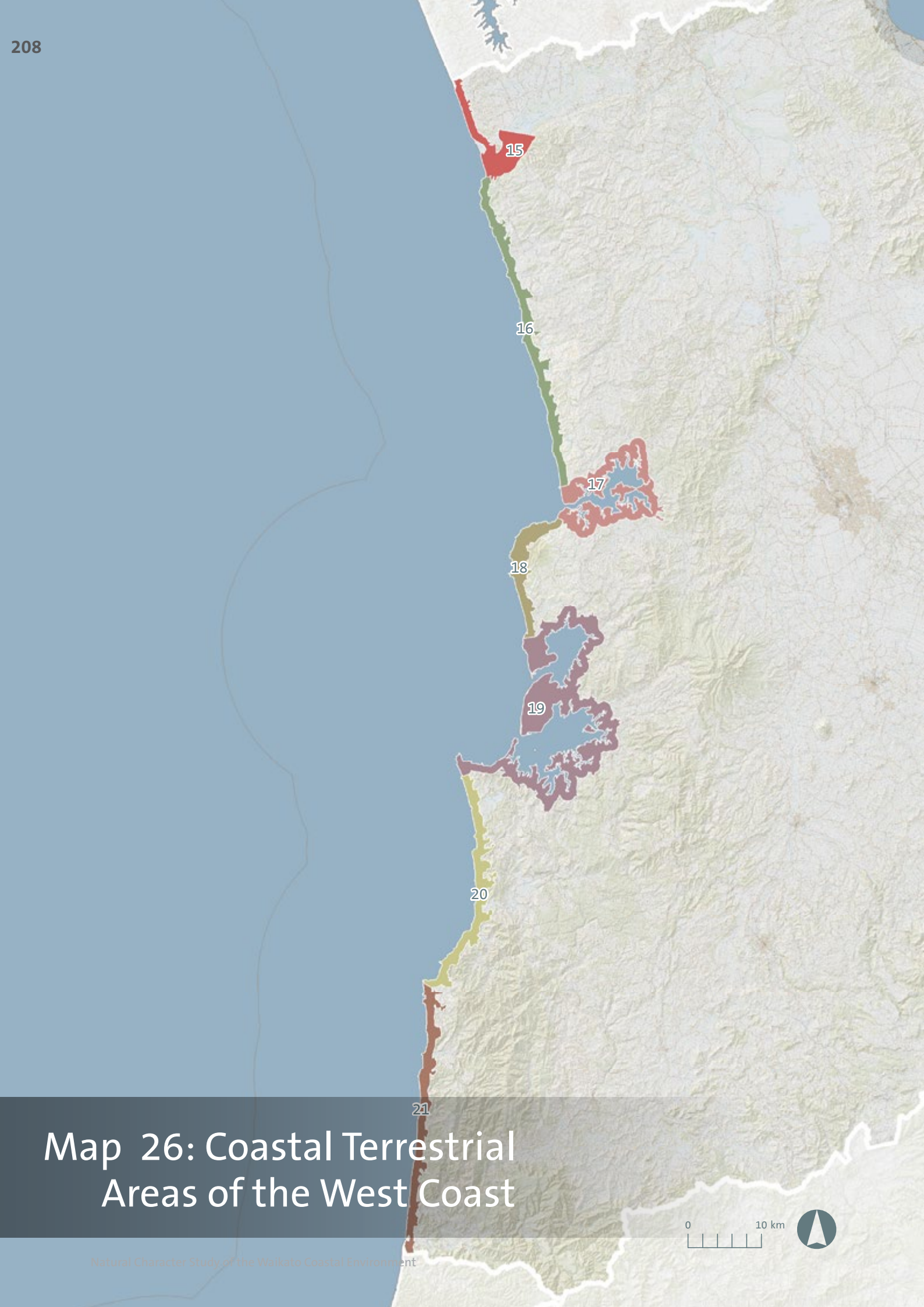
West Coast Coastal Natural Character Ratings: Level 4

▭ High

▭ Very High

Map 25





Map 26: Coastal Terrestrial
Areas of the West Coast

COASTAL TERRESTRIAL AREAS

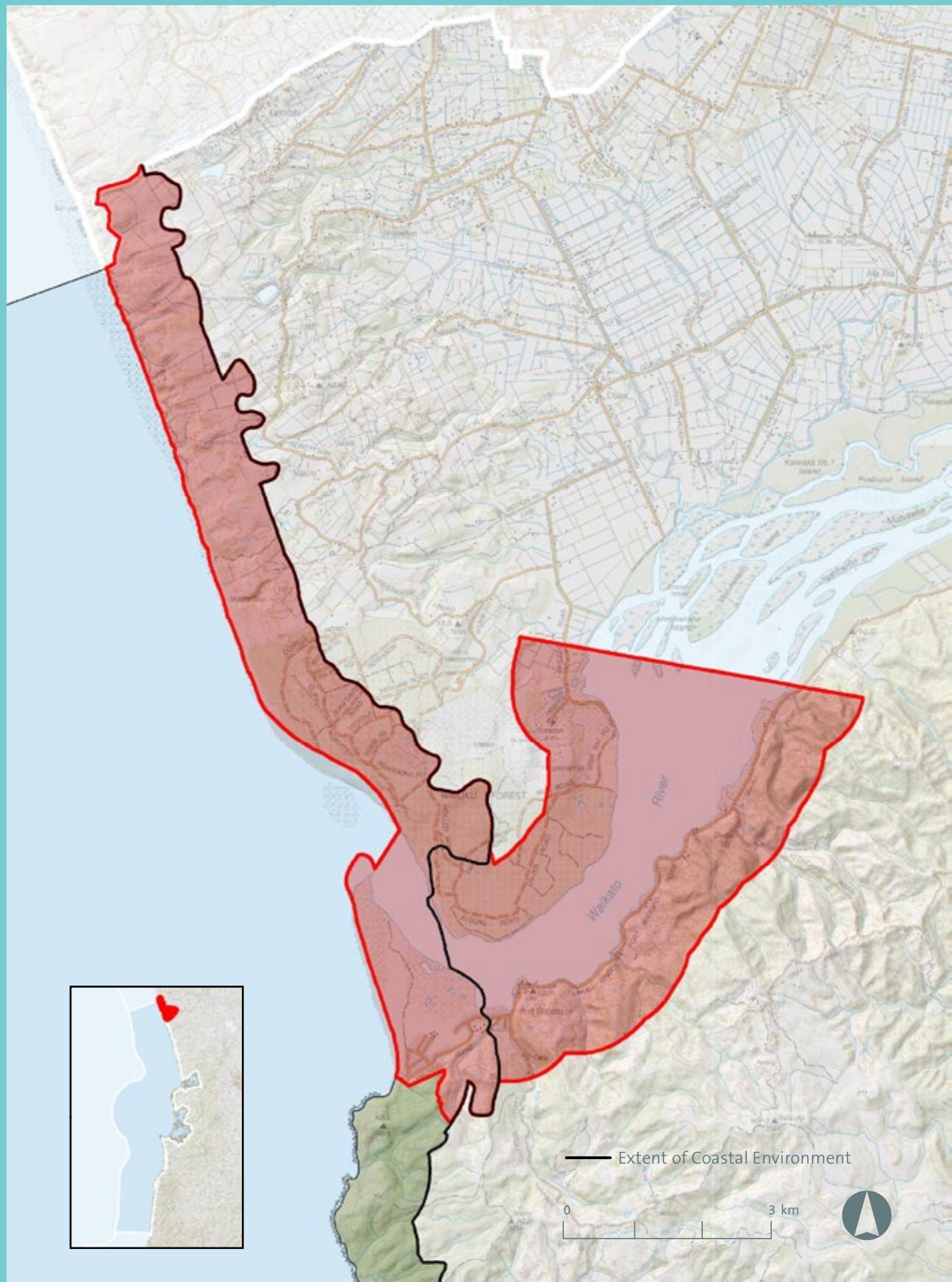
Coastal Terrestrial Areas	
15	Port Waikato
16	Opura
17	Whaingaroa
18	Karioi
19	Aotea Kawhia
20	Marokopa
21	Awakino

Below: Coastal stream west of Te Akau



Port Waikato

COASTAL TERRESTRIAL AREA 15:



Coastal Characteristics, Coastal Environment Extent and Coastal Context Area

This Coastal Terrestrial Area extends from the northern part of the region's West Coast southwards to Port Waikato, and includes the Waikato River mouth and Okariha Sand Spit. The landform is gently undulating and consistent in character and form with the remaining part of this coastline that extends further north (Awhitu Peninsula, which falls in Auckland Council).

Typically, the beach profile ends abruptly with a steep coastal cliff of variable height which represents the actively eroding face of very large old dunes that are tens of metres high. At the top of the dune face is a characteristically sharp edge with a flatter undulating terrain falling away to the east, a result of the very strong and erosive westerly wind that has historically pushed the dunes for long distances inland. In a few places the wind erosion is so severe that it shears off the vegetation completely, exposing the sand. These undulating dune contours are intersected by small streams discharging the coast and forming small gullies.

Settlement of the northern coastal cliffs is centred around Karioitahi Beach with the next settlement being Port Waikato and Sunset Beach. Access to the northern coastal cliffs is limited to Karioitahi Beach and the predominant land use is agricultural grazing for dairy, sheep and drystock farming.

Sand mining operations extend along the northern edge of the Waikato River mouth and are encompassed in productive forestry. Further south along the Waikato River the Coastal Marine Area extends into the river wetlands and islands which contain numerous 'maimai' for duck hunting and stands for whitebaiting activities.

The coastal edge through this Coastal Terrestrial Area is backdropped by productive farming along the northern end, forestry and mining through the centre and native forestry at the south.

Below: Crumpled landscape south of Karioitahi Surf Club



Abiotic

The Port Waikato Coastal Terrestrial Area is characterised by a narrow beach backed by steep bluffs that typically rise from 120m to 190m above sea level. The cliff faces are subject to extensive erosion with predominantly pasture forming the vegetation cover along cliff tops and plateau. Where valleys meet the coast the pasture extends to the coastal edged.

Sand country is common along this coastal unit and is apparent with migrating sand dunes, sand sheets and blowouts along the cliff faces and tops. Pockets of narrow dunes extend along the foot of the coastal cliffs with modification associated with vehicle access tracks.

Ephemeral streams, prevailing winds and high energy waves subject this area of the coast to considerable erosion. To the immediate north of the Waikato River mouth the sand dunes are steep and modified through productive forestry use accompanied with sand mining operations.

The Okariha sand spit, to the south of the Waikato River Mouth, forms part of the mobile dune sands of the Karioitahi Group. The native vegetation cover provides a critical role in dune repair and erosion control. Sunset Beach forms a section of the 3km spit on the southern mouth of the Waikato River. The southern extent of the beach comprises Quaternary sandstone cliffs of the Awhitu Group which is underlain by siltstone, sandstone and conglomerate of the Apotu Group¹⁰.

The Port Waikato spit's form is subject to natural processes of a river mouth system and the influences of human activity. Between 1877 and 2002 the sand dunes have grown at an approxiamate rate of 2m per year (Tonkin and Taylor 2007). However at Sunset Beach the dunes and foreshore have begun retreating near the settlement area¹¹. The accretion and erosion is part of a wider interconnected system that extends from Taranaki to North Cape with prevailing westerly winds and high engery waves driving andestic volcanic based sands in a northerly direction along the west coast.

10. Edbrooke, SW., 2001: Geology of the Auckland Area, Scale 1:250 000. Institute of Geological and Nuclear Sciences, Geological Map 3

11. Sunset Beach Erosion Project, Oharuha, Te Puaha-o-Waikato, Waikato District Council, SFA 14/076, December 2014, GHD.

Below: Crumpled landscape of Karioitahi



Biotic

Land cover analysis: The total land area of the Port Waikato Coastal Terrestrial Area is 1,796ha. Almost 48% of the land cover is rural production land with a further 22% being plantation forestry and 3% being a sand mine. Of the remainder, 15% is estuarine open water, lake/pond, and sand/gravel, and 2% is urban area. Only 8% is indigenous vegetation comprising forest, wetland or manuka/kanuka scrubland. There is a very small area (<1%) of gorse/broom.

The biotic environment is strongly influenced by abiotic environment processes both historically and today. The narrow high energy beach environment actively erodes the dunelands, which terminate in a steep and mobile dune face. The dune cliffs typically terminate in a sharp edge at the crest, beyond which the land falls away at a more gentle gradient where the dune ridges have been sheared off and flattened in a landward direction by the severe and erosive force of the prevailing Westerly wind. Bare sand occurs where severe winds and salt spray have completely removed vegetation leaving exposed sand.

The entire Coastal Terrestrial Area would originally have been completely covered in indigenous coastal forest and shrubland in variable stages of succession depending on historic volcanic activity, and coastal and fluvial dynamics. This fluid dune environment may have had pockets of more mature coastal forest, particularly with increasing distance from the coast and in sheltered gullies, but is likely to have had variable species assemblages depending on forest stature, canopy development and intactness, and land stability. Long shore sediment movement would have dictated coastal dune erosion, in turn dictating the maturity of coastal vegetation. It is likely that coastal vegetation was dominated by short stature transitional communities, interspersed with small areas of more mature shrubland, along with areas of exposed sand.

At the southern end of the Coastal Terrestrial Area, the Waikato River provides an dominant fluvial process, generating a flat floodplain and shifting sequences of mudflats, islands, saltmarshes, and wetlands. These highly dynamic coastal and fluvial processes would historically have resulted in vegetation communities dominated by transitional rather than climax assemblages, with coastal forest only existing in sheltered inland gullies. Most vegetation is likely to have been short stature shrublands and scrublands, herbfields, sedge or rushlands, with stature increasing with distance inland.

Today, coastal vegetation is very limited and typically found only on the coastal dune face and providing variable cover in pasture, depending on the land management regime. The vegetation is highly modified by vegetation clearance and grazing with only less palatable species present or those capable of surviving on the mobile coastal cliff environment. Weed infestation, sand mining, and plantation forestry also affect the vegetation present at the Port Waikato and river mouth dunes, and there are areas of sand/mud flats on the landward side of the Waikato River barrier dune. Pasture is the dominant land cover and indigenous vegetation is typically associated only with the seaward dune margins. Waikato Regional Council identifies the Port Waikato dunes and river mouth as key ecological sites¹², but no other sites are identified in the Coastal Terrestrial Area. Part of Port Waikato dunes have recreation reserve status and part of the Waikato Heads dunes are within a conservation area, but no other areas have legal protection.

The streams discharging to the coast are generally first-order streams with very small catchments. Because of the sand substrate, most are likely to be ephemeral or intermittent, with pools persisting in deeper gullies. Where gullies have incised more deeply to bedrock, streams may be perennial and provide a more stable aquatic habitat. Although artificial barriers to fish

12. Waikato Regional Key Ecological Site, GIS Layer : Biosec, Under the administration of Waikato Regional Council

passage are likely to be infrequent, most streams will have natural barriers presented by the topographically challenging coastal cliff, providing perched channels or waterfalls that preclude access for non-climbing species. Fish access to many coastal streams may also be prevented entirely if low summer flows soak into the beach at low tide, providing very limited connectivity.

The streams themselves are likely to be affected by the lack of riparian cover, with their small size making them particularly vulnerable to temperature impacts. They will also be impacted by livestock access, erosion, sedimentation, enrichment, and a lack of suitable instream habitat (e.g. woody debris and aquatic plants).

The Waikato River, however, is home to a diverse assemblage of freshwater and saltwater fish taking advantage of the rich resources of the Waikato River delta. The delta is known for its whitebait fishery, and provides a habitat, nursery, and conduit for migrating freshwater species. The Delta is also home to a multitude of exotic and indigenous waterfowl, marshbirds, and shore using the various mudflat, sandflat, saltmarsh and wetland habitats for feeding and breeding. Along the open coast line, there are few permanent dunelands or intertidal areas offering food resources or breeding areas. However the Port Waikato dunes provide nesting and roosting areas, and the area is on the flightpath for migratory shorebirds. Variable oystercatchers winter at Port Waikato, New Zealand dotterels are permanently resident and Caspian terns breed there. The lower Waikato River and estuary has been identified as a wetland that meet the criteria for international importance.

The delta is a recognised location for waterfowl hunters during duck hunting season with maimai dotting the islands and intertidal mudflats.

The river mouth also offers temporary habitat for seals, dolphins, and sharks.

*Below: Port Waikato and
Sunset Beach*



Experiential

Largely in private ownership, access to the coastal edge is limited to Karioitahi Beach to the north and Port Waikato and Sunset Beach to the south of the Waikato River Mouth. Access tracks along the coastal dunes and base of the coastal cliffs are evident from Karioitahi Beach creating some activity and signs of modification. This area of the coast is remote and dramatic in its form with the natural processes of the coast dominating the coastal experience.

Human modification is apparent through development of dwellings and accommodation around Karioitahi Beach and productive farming. Whilst dramatic in its remoteness and experience of the coastal processes these modifications are apparent and recognisable.

Further south modification of the coastal edge increases with productive forestry and sand mining to the north of the Waikato River Mouth. Screened from view by productive forestry, the mining is apparent when viewed from the air and well known to the community of Port Waikato.

The settlement of Port Waikato and Sunset Beach provide the southern most access to the coastal edge for this Coastal Terrestrial Area. The Okariha sand spit is dynamic and retains its natural formations along with a web of vehicle and pedestrian access tracks throughout. The rocky headland at the southern end of this Coastal Terrestrial Area provides a dramatic and dynamic example of the coastal processes, with regenerating native bush cover extending down its slopes to meet the beach.



Above: Sunset Beach (top) and mining at Maoro (Waiuku Forest) north bank of the Waikato River

Rating at Level 3			
Degree of Natural Character	Natural Character Attributes		
	Abiotic	Biotic	Experiential
Very High			
High			
Moderate to High	✓		
Moderate			✓
Moderate to Low		✓	
Low			
Very Low			
	Overall Natural Character Rating		Moderate

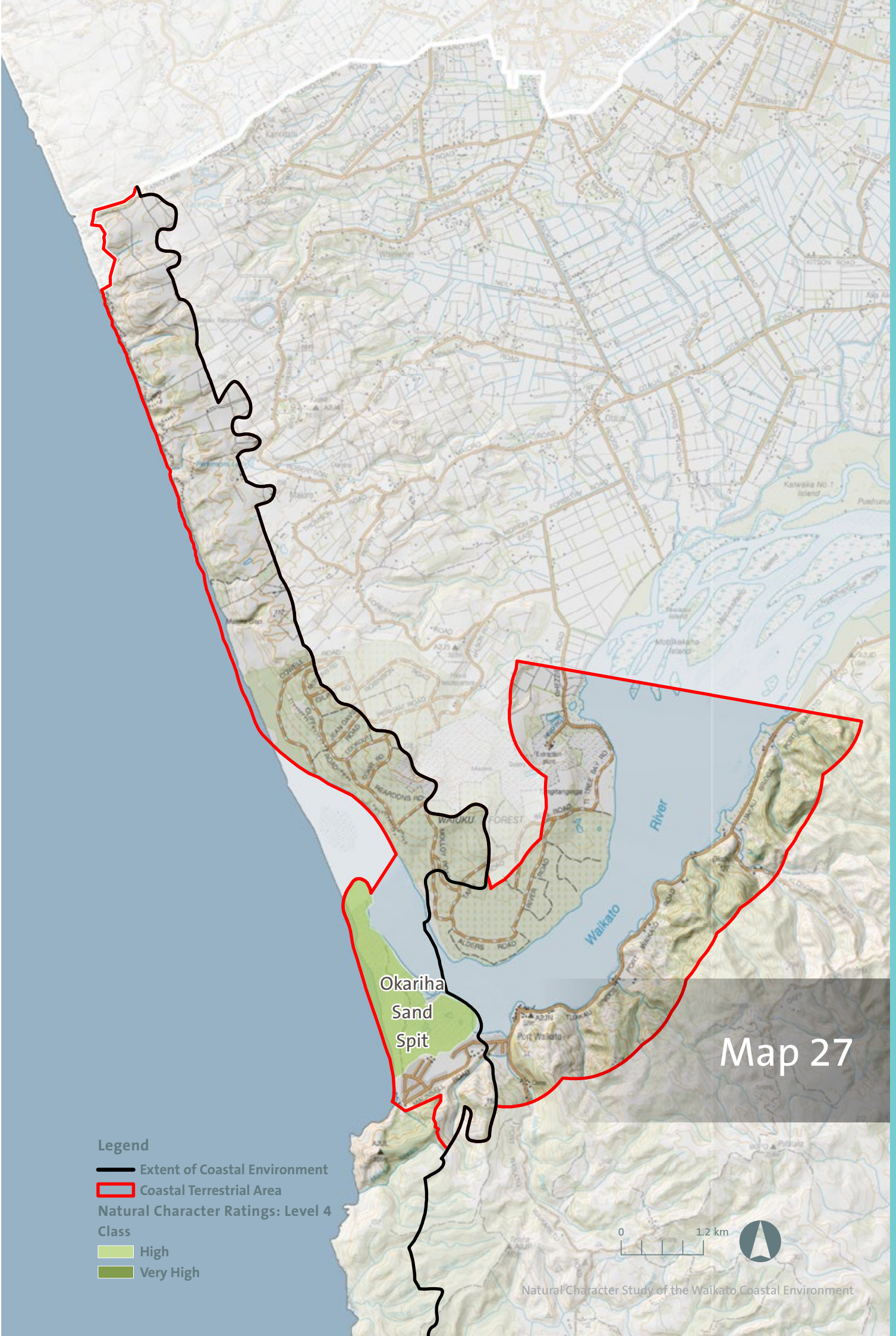
Coastal Terrestrial Area 15: Port Waikato Specific Characteristics at Level 4

These are mapped with reference to **Map 27**

Area	Rating	Key Values	Additional Comments
Okariha Sand Spit	High	<ul style="list-style-type: none">Dynamic dune system with dominant dune patterns uniquely influenced by fluvial and coastal processes. These processes remain unmodified. Largest example of river mouth dune system along the Waikato West coast.Native dune species are prevalent mixed with exotic weed species.Highly dynamic and dominant coastal processes with a large dune system that extends in a full sequence from the coastline to the river edge.A strong sense of the natural systems of the river are apparent through the intertidal movements and sand accretion and erosion at the distal end of the sand spit.	<ul style="list-style-type: none">Dunes remain intact with minor patterns of modification from vehicle and pedestrian movement throughout.Forms an integral part of the coastal dune and cliff faces of the northern extent of the Waikato and Waikato River system.

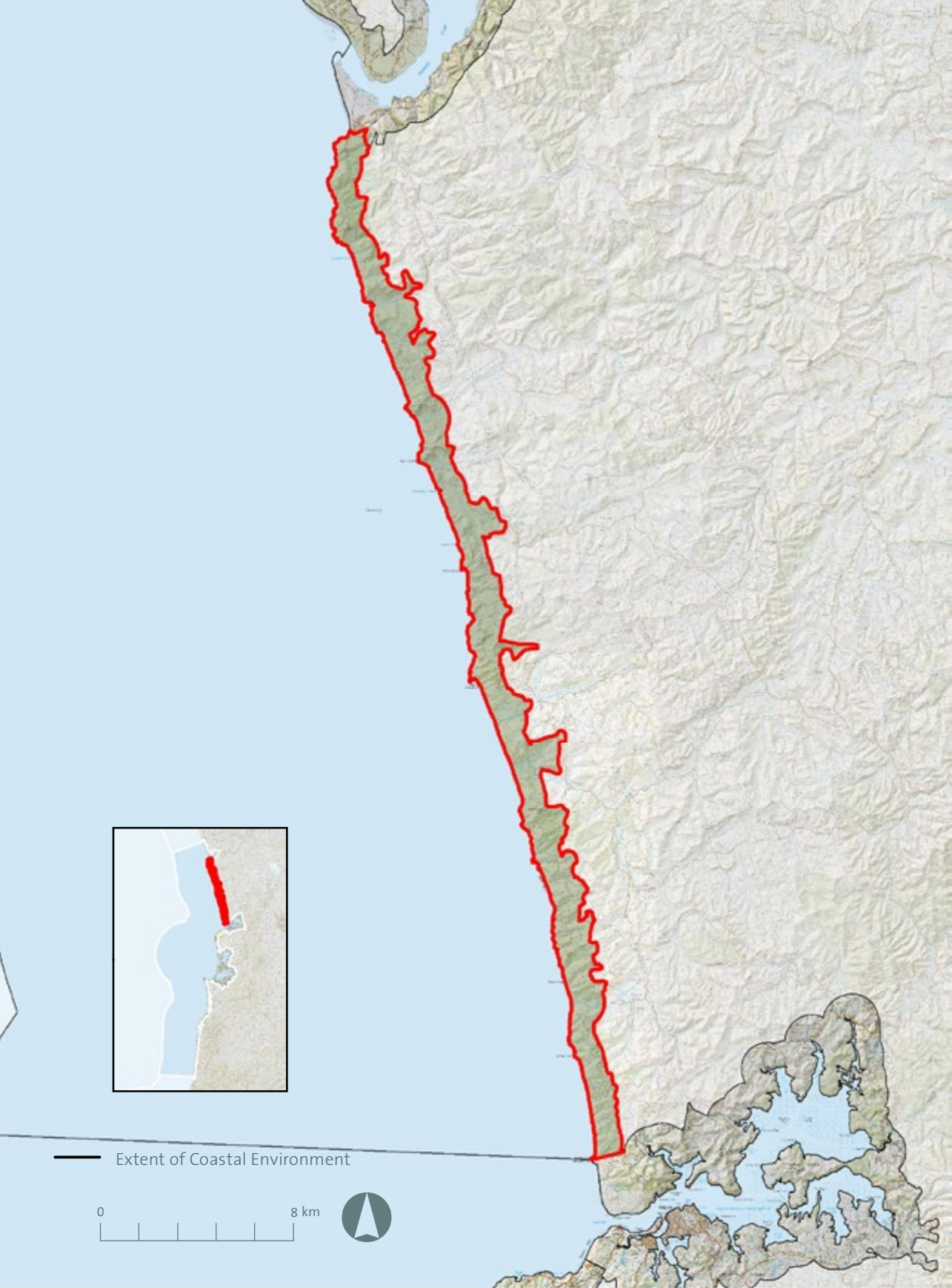
Below: Sand dunes of Okariha Sand Spit and Waikato River Mouth





Opura

COASTAL TERRESTRIAL AREA 16:



Coastal Characteristics, Coastal Environment Extent and Coastal Context Area

This Coastal Terrestrial Area extends along the exposed predominantly linear coastline between the Waikato River Mouth and Raglan Harbour (Whaingaroa). This Coastal Terrestrial Area is principally undulating, where coastal, fluvial and tectonic processes have eroded the coastal edge to form a series of cliffs. Black sands dominate the beach and where watercourses interact with the coastal environment, the land becomes flatter and dune-like. In some areas dunes and sand sheets are located on upper terraces and elevated well above the coastal edge.

Most of the land is grazed with the northern and steeper areas of the Coastal Terrestrial Area reverting to native bush cover. Pockets of native vegetation are found along the steeper coastal escarpments and in poorer soils and sand dune areas. The remainder of the area is dominated by agricultural grazing as close to the coastal edge as possible. There are only two areas main of indigenous bush, such as immediately south of Port Waikato.

Public access is virtually impossible with no public access gained through private land. The beach access is limited due to the rocky coastline and steep cliff faces and sandy beaches are located around stream and gully floors that meet the coast.

Key coastal characteristics include: Relatively straight, narrow stretch of coastline, black sand on beaches, steep coastal cliffs along the majority of the coastline, back dunes, flatter land associated with the mouths of watercourses where sand accumulation has occurred, grazing.

Beyond the coastal environment the land continues to gently rise in elevation, creating a crumpled and hilly pastoral area. Settlement is restricted to small farmsteads and access predominantly is gained via private tracks.

Below: The rocky shores of Nihonui and Tetehe



Abiotic

Substantial sand dunes with high iron content have formed around the Kawhia and Aotea Harbours. David Kear’s ‘Geology of Ironsand Resources of New Zealand’ (NZ Dept of Scientific & Industrial Research 1979) says, “*The ironsand deposits extend from south Kaipara and Muriwai, north of Auckland, for over 300 miles southwards to the Whangaehu River, south of Wanganui. Soluble iron in concentrates exceed 50% in most locations. It is currently mined at Taharoa and Waikato North Head.*”

This coastline contains significant geological sites and features including the coastal cliffs of Port Waikato between Huriwai River and Waikawau Stream, Waiwiri Beach and Ngatutura Point. (Waikato District Plan - Franklin Section Part 5, Conservation of Natural Features October 2013)

Geopreservation Sites include: Huriwai-Waikawau Coastal Section Jurassic/Oligocene unconformity (C3), Waiwiri Beach unconformity and Basal Waitemata group sediments (C3), Kaawa Creek – Ngatutura Bay section (B3) and Ngatutura Point dissected eruptive centre (C3).

Key features of this coastal landscape include the sand sheets and dune incursions that extend inland and up the coastal escarpments. Pockets of native bush cover that extends toward the coastal edges reflect components of the the pre human occupation coastal landscape.

Below: Eroded cliffs close to Otehe (Crayfish Point)

Right: Sand tussock with sea primrose perched precariously on eroded soil at the base of a coastal cliff



Biotic

Land cover analysis: The total land area of the Opura Coastal Terrestrial Area is 5,779ha. Almost 80% of the land cover is rural production land, and there is very little plantation forest. There is almost 15% indigenous vegetation cover, with most being manuka/kanuka or forest, and very small areas of flaxland or estuarine vegetation. Of the remainder, almost 3% is sand or landslide, almost 2% is gorse/broom or other scrub, less than 1% is estuarine open water, lake/pond, or river, and sand/gravel, and there is no urban area.

Like the coast north of the Waikato River, the beach is narrow and high energy, actively eroding the coastal cliffs of mixed sedimentary rock and lava formations. However, beyond the cliffs the underlying rock strata are from older more stable land units rather than dunes, although dunes are present on cliff tops that are elevated tens to hundreds of metres above the sea. On this more stable land, the entire Coastal Terrestrial Area would originally have been completely covered in mature indigenous coastal forest, with vegetation sheared off by salt spray and wind.

Today, indigenous coastal vegetation is limited and typically found only on the narrow coastal cliffs and in the isolated patches of regenerating forest. The largest forest patch is Te Tehe Bush south of Port Waikato, and this is also the only forest remnant that extends to the coast, although cover at the coastal fringe is fragmented. The other patches are notably smaller and located some distance from the coast, although one is re-establishing a connection via regeneration through gorse. Where land is reverting, gorse is providing a nursery crop and regeneration is beginning to occur. Waikato Regional Council identifies Te Tehe Bush and Te Kotuku bush fragments northwest of Te Akau as a key ecological sites in the Coastal Terrestrial Area, but none have legal protection.



The streams discharging to the coast are generally first- or second-order perennial streams, along with eight larger waterways with catchments extending beyond the coastal zone. Depending on their location relative to underlying strata, the catchments either have wide flat floodplains close to sea level in which farm drainage networks have replaced extensive swamps, or steeper incised catchments dominated by gullies elevated well above sea level and discharging to the coast via waterfalls. In some gullies, raupo-dominated wetlands persist, some covering relatively large areas, and isolated kahikatea specimens point to the swamp forest that would once have existed. Farm tracks and road culverts may present some barriers to fish passage, but where streams are not modified by farm drainage system, most offer a relatively natural habitat although waterfalls will preclude access even for climbing species. The streams at lower elevations contribute greater ecological

value at the coastline, and Waikato Regional Council identifies the Kaawa

Stream coastal dunes, Waikorea Stream wetlands (also incorporating Waimai and Matira Stream habitats) as a key ecological site¹³, but none have legal protection.

The low elevation streams are likely to be affected by the lack of riparian cover and channelisation, and all streams will be impacted by livestock access, erosion, sedimentation, enrichment, and a lack of suitable instream habitat (e.g. woody debris and aquatic plants). Along the open coastline, the few dunelands or intertidal areas offering food resources or breeding areas for shorebirds are generally associated with stream outlets, but the area is on the flightpath for migratory shorebirds.

13. Waikato Regional Key Ecological Site, GIS Layer : Biosec, Under the administration of Waikato Regional Council

Experiential

Inaccessible to the public the majority of this Coastal Terrestrial Area forms a remote part of the West Coast. No public roads extend to the coast with some farm tracks extending along the coast with sporadic access to the coastal edge.

Human modification is apparent through activities mainly associated with productive farming. The northern end of the area includes native vegetation cover and a rocky shoreline that is dynamic and dominated by natural processes and patterns. Whilst further south the coastal environment is largely farmed to the immediate coastal edge where possible. The large iron sand sheets that extend up into the coastal plateau and stream mouths are highly expressive of the coastal processes that occur in this high energy coastal environment.

There is a strong sense of remoteness along this coast with the natural processes dominating the experience. The natural patterns are evident at many scales with evidence of coastal erosion at large and small scales. The natural elements including biotic cover is limited to the northern and southern end of the coast and the immediate coastal edge where farming activities have been avoided. These areas provide a strong sense of naturalness or perceived naturalness for the user.

Below: Otehe (Crayfish Point)



Rating at Level 3			
Degree of Natural Character	Natural Character Attributes		
	Abiotic	Biotic	Experiential
Very High			
High			
Moderate to High			
Moderate	✓		
Moderate to Low		✓	✓
Low			
Very Low			
	Overall Natural Character Rating		Moderate

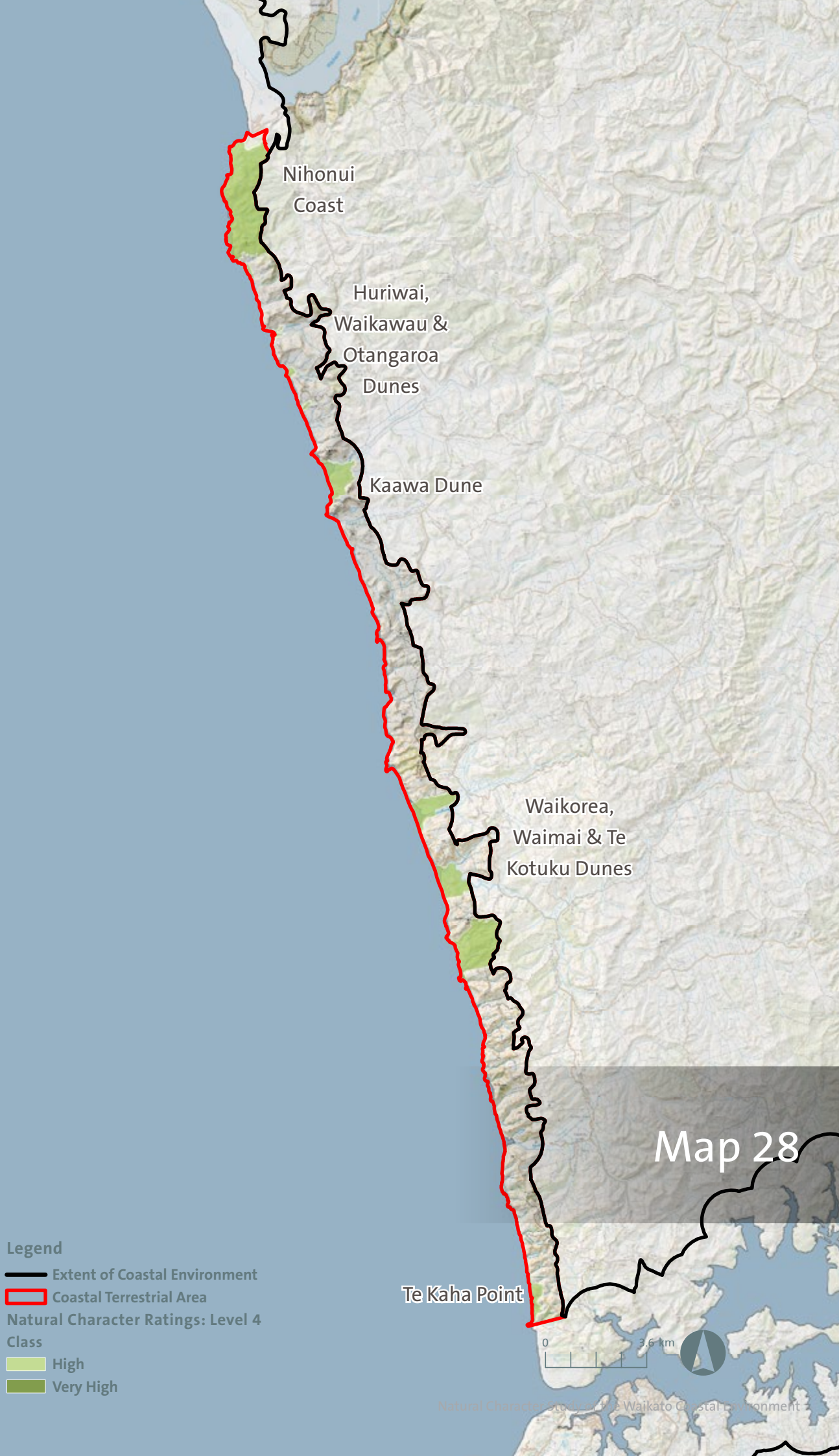
Below: Waikaretu Beach



Coastal Terrestrial Area 16: Opura Specific Characteristics at Level 4			
These are mapped with reference to Map 28			
Area	Rating	Key Values	Additional Comments
Nihonui Coast	High	<ul style="list-style-type: none">Regenerating coastal vegetation sequencing to coastal edge with some areas of grassland. Abiotic processes dominate the coastal cliffs with exposed sedimentation layers evident and no modification along the coastal edge.	<ul style="list-style-type: none">Regenerating coastal bush vegetation interspersed with some modification including access tracks.
Huriwai, Waikawau, Otangaroa, Kaawa, Waikorea, Waimai, Kotuku and Te Kaha Point Dunes	High	<ul style="list-style-type: none">Dynamic dune incursion system extending up the stream valley systems. Coastal processes are dominant with exposed iron sand sheets atop plateau with exposed coastal cliffs. Low lying dunes are evident on valley floor with streams and rear dune wetland systems remaining intact. Remote with private access gained only via farmland to the areas.	<ul style="list-style-type: none">Little modification on the dune system largely as a result of dominant coastal processes. Erosion and tectonic processes evident and dominant along the coastal edge.

Below: Waikawau Dune





Whaingaroa

COASTAL TERRESTRIAL AREA 17:

