

An aerial photograph showing a coastal landscape. The top portion of the image is dominated by a large, irregularly shaped area with a mottled appearance of light blue, green, and brown, likely representing a wetland or marsh. A prominent, light-colored, linear feature, possibly a road or a canal, runs diagonally across this area. Below this area, a dark, straight road or path runs horizontally across the frame. At the bottom of the image, there are several rectangular plots of land, some of which appear to be agricultural fields with distinct patterns, possibly from irrigation or planting.

Section E
**SOUTH MARLBOROUGH
COASTAL MARINE &
TERRESTRIAL AREAS**

Coastal Terrestrial & Coastal Marine Areas of South Marlborough

As outlined in Section B, there are two Coastal Marine Areas identified within South Marlborough and seven Coastal Terrestrial Areas. These are identified in the tables below, mapped on the adjacent plan and described in this section, Section E. (Section D describes the 'Areas' in the Marlborough Sounds.)

For each of the Coastal Marine and Coastal Terrestrial Areas the specific collective characteristics of the Area's abiotic, biotic and experiential attributes are described first. Then, each specific Area is discussed and evaluated. Freshwater aspects are covered within the Terrestrial Areas. An evaluation table at the end of each Area subsection summarises the values and

Coastal Marine Areas	
H	Cloudy and Clifford Bays
I	Cape Campbell to Willawa Point

ratings at the Level 3 scale. Following this, any specific values within the Area are listed, mapped and rated at the Level 4 & 5 scale. Refer to diagram on page 27 for an explanation of the Levels.



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

Coastal Terrestrial Areas	
11	Wairau
12	Vernon
13	Awatere
14	Blind
15	Grassmere
16	Campbell
17	Wharanui



Weld Cone at Ward Beach (above)



Legend

-  Marlborough District Boundary
-  Coastal Environment Line

Coastal Terrestrial Areas

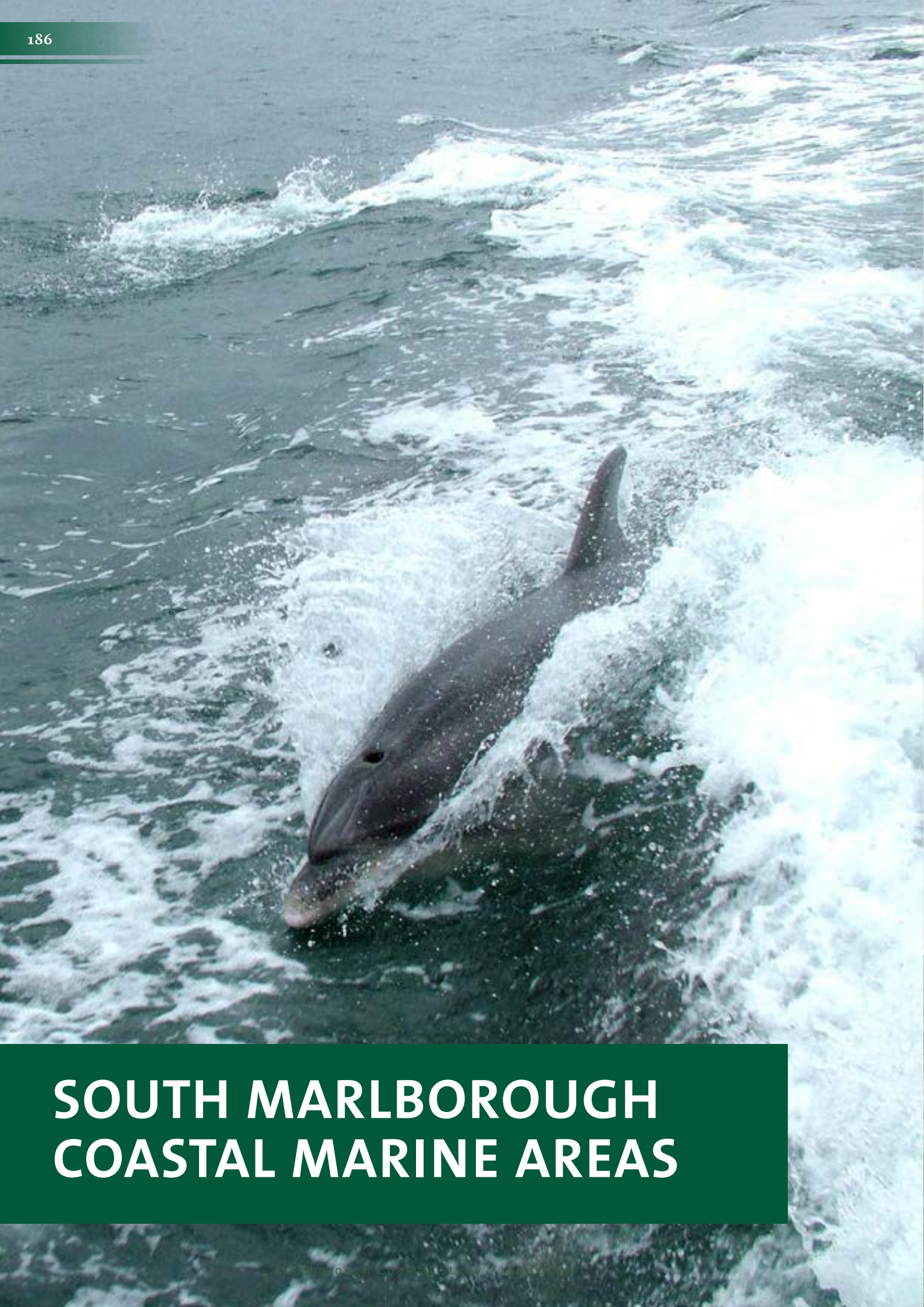
-  11 Wairau
-  12 Vernon
-  13 Awatere
-  14 Blind
-  15 Grassmere
-  16 Campbell
-  17 Wharanui

Coastal Marine Areas

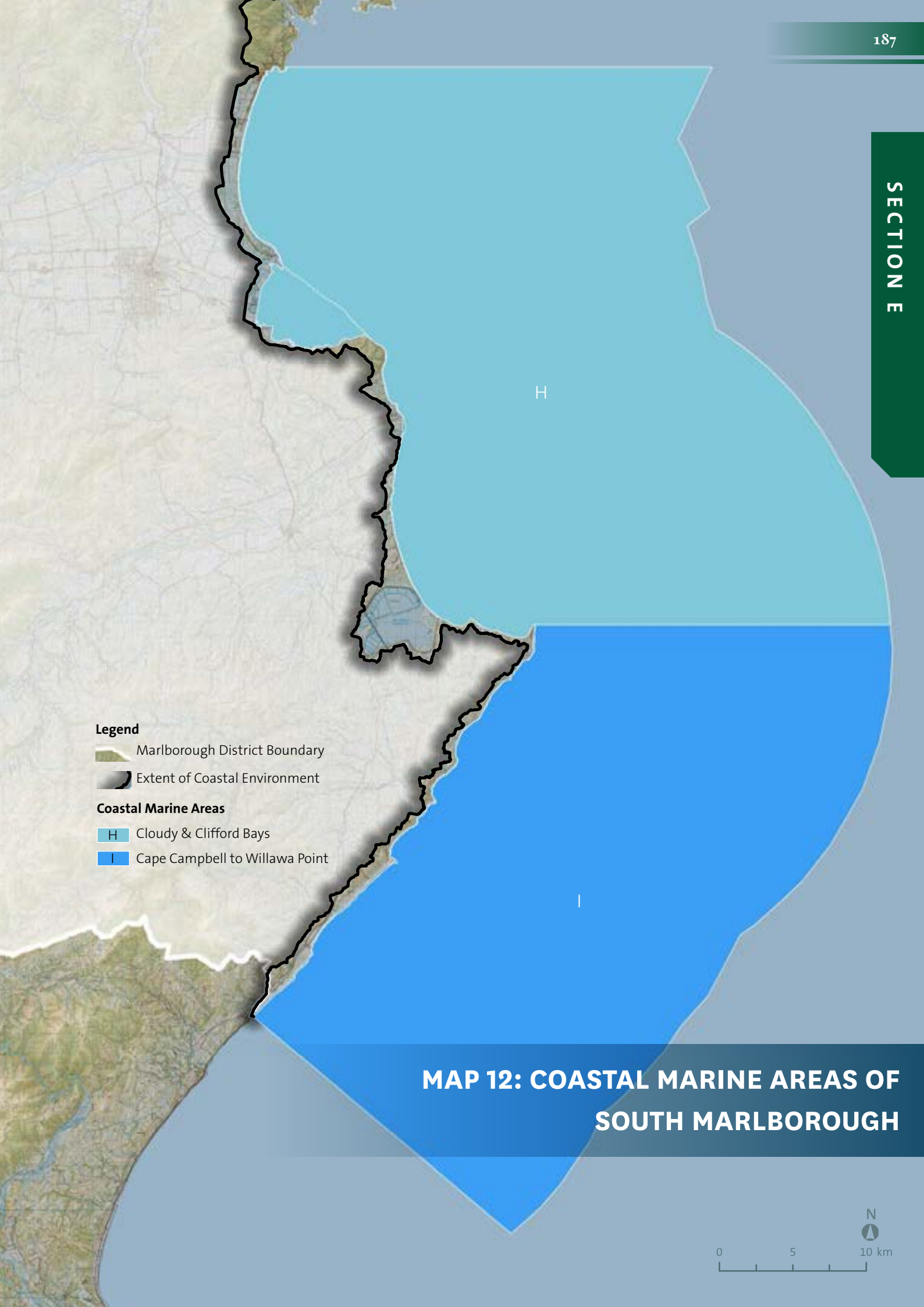
-  H Cloudy & Clifford Bays
-  I Cape Campbell to Willawa Point

MAP 11: COASTAL MARINE & COASTAL TERRESTRIAL AREAS OF SOUTH MARLBOROUGH









SOUTH MARLBOROUGH COASTAL MARINE AREAS



Legend

-  Marlborough District Boundary
-  Extent of Coastal Environment

Coastal Marine Areas

-  H Cloudy & Clifford Bays
-  I Cape Campbell to Willawa Point

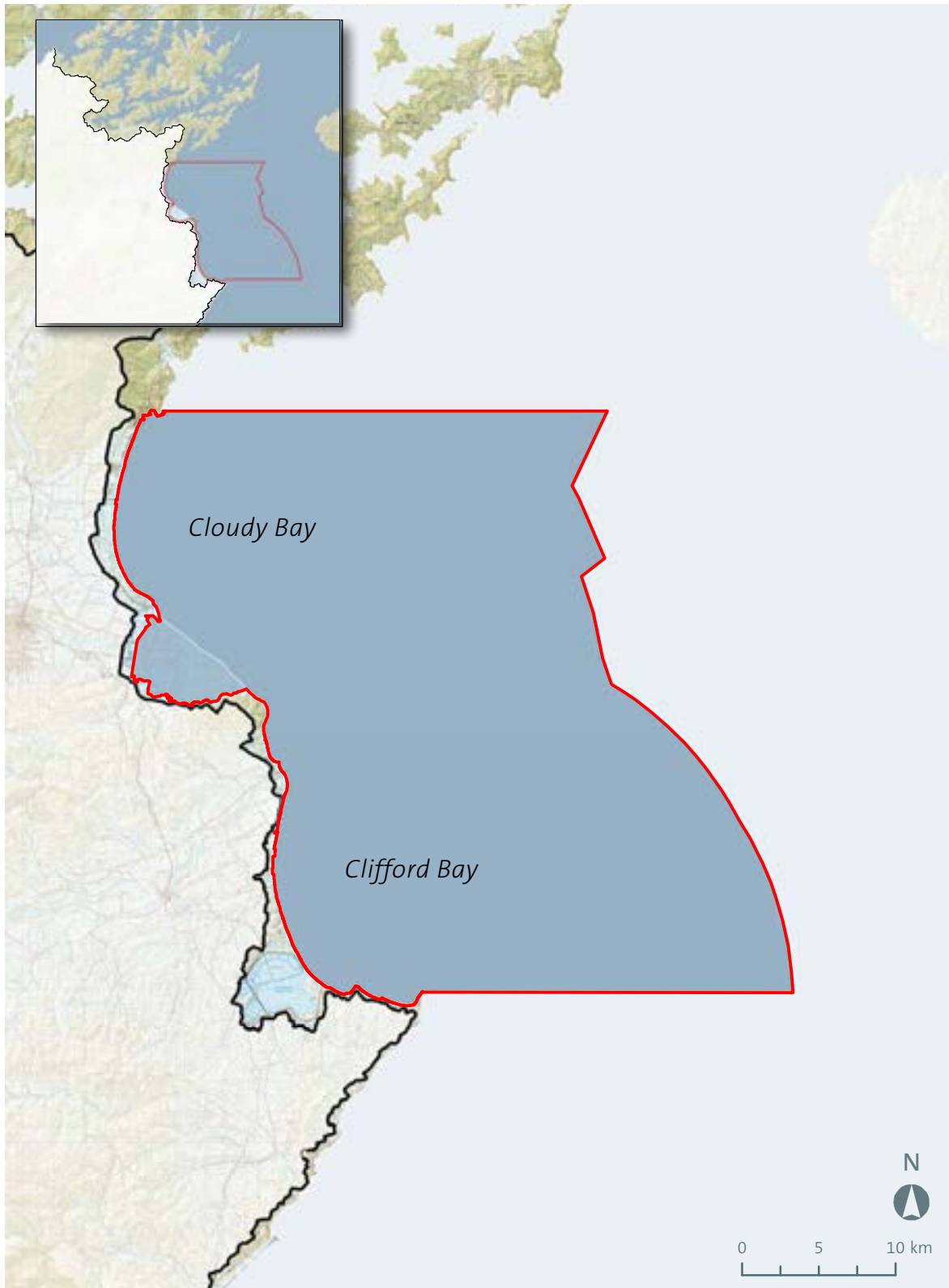
MAP 12: COASTAL MARINE AREAS OF SOUTH MARLBOROUGH



Coastal Marine Area H : **Cloudy** & **Clifford Bays**

Collective Characteristics

Very exposed; cold turbid waters; two large estuarine lagoons; extensive sand/gravel beaches; limited reef areas mainly near Cape Campbell; silty sand and gravels offshore; wide continental shelf; typical array of east coast South Island species, though generally low species diversity on the outer coast except near Cape Campbell; patchy *Macrocystis* beds.



Abiotic

A broadly curving outer coastline extends from Rarangi in the north to Cape Campbell in the south. The coast is dominated by two large open bays (Cloudy Bay and Clifford Bay) and the influence of the Wairau and Awatere Rivers. Two large estuarine systems are also present: Wairau Estuary (Vernon Lagoons) at the mouth of the Wairau River in Cloudy Bay and Lake Grassmere (a modified shallow brackish lagoon) in Clifford Bay. As Lake Grassmere is mostly cut off from the marine environment, this brackish lagoon is mapped and assessed as part of the biotic Coastal Terrestrial Area 15 - Grassmere.

The outer coast is exposed to winds from the south-east through to the north-east; large waves are not uncommon from these sectors. Although Cape Campbell provides some shelter from the south, much of the coast is exposed to southerly swells that wrap around the Cape. Tidal currents can be moderately strong mainly in the vicinity of Cape Campbell and White Bluffs.

Cold and at times nutrient-rich coastal waters originate from Cook Strait and the Southland current. Generally high turbidity and very poor water clarity occurs due to flooding from the Wairau and Awatere Rivers, softer rock types along the coast, sediment runoff, and large waves remobilising sediments closer to shore. Water quality otherwise tends to be good except near the discharge from the Blenheim Sewage Treatment Plant near the mouth of the Wairau River.

Water depths offshore are gently shelving and mostly less than 100m. Well offshore (>30km) the continental slope drops steeply into the depths of the Cook Strait Canyon

Mixed sand and gravel dominates the outer coast beaches and immediate subtidal zone. A cobble shore at the foot of White Bluffs separates the two large bays. Scattered mudstone reefs and outcrops fringe the southern shores of Clifford Bay, flanked by more extensive offshore reefs at Cape Campbell and to a lesser extent Mussel Point. Mudstone platform reefs are incised with channels and indented with shallow pools. Reefs at Cape Campbell are backed by 60m high limestone bluffs and extend offshore and subtidally for several hundred metres. Bowler and Shepherdess Reefs are located 2km off Cape Campbell.

Offshore areas are mostly silty sand, grading into gravels beyond. Closer inshore, sandy silt forms a relatively thin mobile layer which in places, due to the

effects of wave action, periodically covers or uncovers the siltstone bedrock beneath. An area of gravels extends off from White Bluffs.

Trawling occurs throughout much of this area, especially in inner and outer Cloudy Bay, offshore Clifford Bay and in the depths of Cook Strait. Relatively little trawling occurs in inner Clifford Bay. There is currently no aquaculture in this area, though a large (>400ha) mussel farm has been approved south of the Awatere River.

The Wairau Estuary is a distinctive feature of this coastline – a 2,300ha system of interlinked channels, broad shallow lagoons (mostly <1.5m at low tide), small islands and expansive intertidal flats separated from the outer coast by a large boulder bank. Mud and silt dominate the bottom of the lagoons. Habitat loss around the western and southern margins of the lagoons has occurred due to historical stop-banking and drainage. River works (especially the construction of the Wairau diversion) have significantly altered hydrological processes in the estuary. The Blenheim Sewage Treatment Plant is located on the western edge of the lagoons and discharges treated effluent near the mouth of the Wairau River.

Lake Grassmere is located more or less centrally in Clifford Bay. This large shallow brackish lagoon no longer has a natural connection to the sea and has been greatly modified physically and biologically by the operation of the salt works, grazing around its margins and the railway line which cuts across it.

Biotic

Intertidal sand/gravel beaches support a relatively low diversity and abundance of marine life. Subtidally, various surf clams (e.g. trough shells, triangle shell, *Dosinia spp.*, deepwater tuatua, frilled venus shell) inhabit the nearshore sediments. Further offshore, the more stable sand, silt and gravel habitats are home to a suite of shellfish and mobile invertebrates typical of much of the east coast of the South Island.

Greatest coastal biodiversity occurs at and in the lee of Cape Campbell. The intertidal platforms/reefs are habitat to an array of species representative of moderate-high wave swept conditions, including various limpets, chitons, topshells, mussels and barnacles. Numerous seaweeds are also present, mainly at low water, in the channels and in pools. ►

Conspicuous algae species include bull kelp, flapjack and *Gigartina spp* at low water and *Glossophora kunthii*, *Cystophora sp.* and *Ulva sp.* in the pools. Coralline turf is also present in pools and over parts of the intertidal reef.

The adjoining subtidal reefs support moderately diverse animal and plant communities, especially encrusting species such as sponges, ascidians and bryozoans. Of particular note is the presence of a newly recorded bryozoan species *Parkermavella n.sp.* and another bryozoan, *Bagula cuspidata*, which has only been recorded elsewhere from Spirits Bay in Northland. Rocklobster are also abundant in the vicinity of Cape Campbell and giant kelp (*Macrocystis pyrifera*) forms widespread but patchy and variable beds in the lee of the Cape.

A distinctive feature of the Wairau Estuary is the extensive glasswort (*Sarcocornia quinqueflora*) and sea blite (*Suaeda noavae-zelandiae*) salt marsh beds that dominate the mid-high shore around the western side of the lagoons. These range from dense virtually monospecific stands of glasswort to mosaics with other species such as rushes, sedges, estuarine herbs and grasses around the fringes. Green algal mats, horse's mane (*Ruppia polycarpa*) and eel grass occur in places where there is permanent standing water. Coastal shrub-lands are significantly reduced due to the effects of drainage, stop-banking and grazing.

Benthic macrofauna diversity within the Wairau/ Vernon Lagoons is very low compared to most other estuaries. Despite this, the lagoons have a diverse avifauna with almost 90 recorded species – the majority being native and more than a quarter endangered, vulnerable or rare. At least 22 marine fish species have also been recorded from the area.

Natural communities in Lake Grassmere are extensively modified. Remnant areas of salt marsh and herb field occur on the southern and south-eastern shores. Various migrating wading birds visit the area including some rare species.

A large sub-population of Hector's dolphins inhabits Clifford and Cloudy Bays out to a depth of about 100m. Dusky dolphins pass through these waters during their seasonal migrations between the Kaikoura coast and Marlborough/Tasman. Humpback whales also migrate through on their northward winter migration

and sperm whales forage within the depths of the Cook Strait canyon. A variety of seabirds – albatross, shearwaters, fairy prion, gannet, gulls, terns and spotted shag – are regularly seen in the bays.

Experiential

The broad, sweeping embayments of Cloudy and Clifford Bay are separated by the dominant headland of the White Bluffs. Access to both bays is available via numerous areas, notably, Rarangi and Wairau Bar Road for Cloudy Bay and via numerous roads close to the mouth of the Awatere River and north of Lake Grassmere for Clifford Bay. These two bays are iconic of the region, due to their sweeping sandy form and entry point of two of the region's largest rivers, the Wairau and Awatere.



Above: Sooty Shearwater



A variety of seabirds, including albatross are regularly seen in the bays



Lake Grassmere (foreground) and the sweeping embayment of Clifford Bay. The headland of White Bluffs and the Northern extent of the Richmond Ranges can be seen at the background

Level 3: Overall Area Rating for Cloudy & Clifford Coastal Marine Area

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			Very High

Coastal Marine Area H : Cloudy & Clifford Bays

Levels 4 & 5: Specific Parts within Coastal Marine Area H: Cloudy & Clifford Bays Holding High or Very High Natural Character

Sub Area	Rating	Key Values	Additional Comments
Cloudy and Clifford Bays (excluding Wairau Lagoons and Lake Grassmere).	Very High	<p>Largely unmodified and mostly exposed east coast South Island coastal environment extending over tens of kilometres from Rarangi to Cape Campbell.</p> <p>Extensive sand/gravel shores.</p> <p>Cape Campbell reef systems and patchy offshore <i>Macrocystis</i> beds.</p> <p>Adjoins Coastal Marine Areas G and I.</p> <p>High remote values</p>	<p>Certain offshore areas are commercially trawled; those grounds closer to shore are expected to be reasonably resilient to the effects of trawling.</p> <p>Effects of the Blenheim sewage discharge on the outer coast are considered minor.</p> <p>A large marine farm approved south of the Awarere River mouth, which will alter seabed values at the site once it becomes operational, is excluded.</p>
Wairau Lagoons	High	<p>Large tidal lagoons and extensive salt marsh beds.</p> <p>Diverse avifauna.</p> <p>An ecologically significant marine site.</p> <p>Despite modifications, this large estuarine complex retains many of its natural qualities.</p> <p>High remote values</p>	<p>The estuary has been modified through historical stop-banking and alterations to river flows.</p> <p>The Blenheim sewage outfall discharges into the mouth of the Wairau River on the outgoing tide</p>

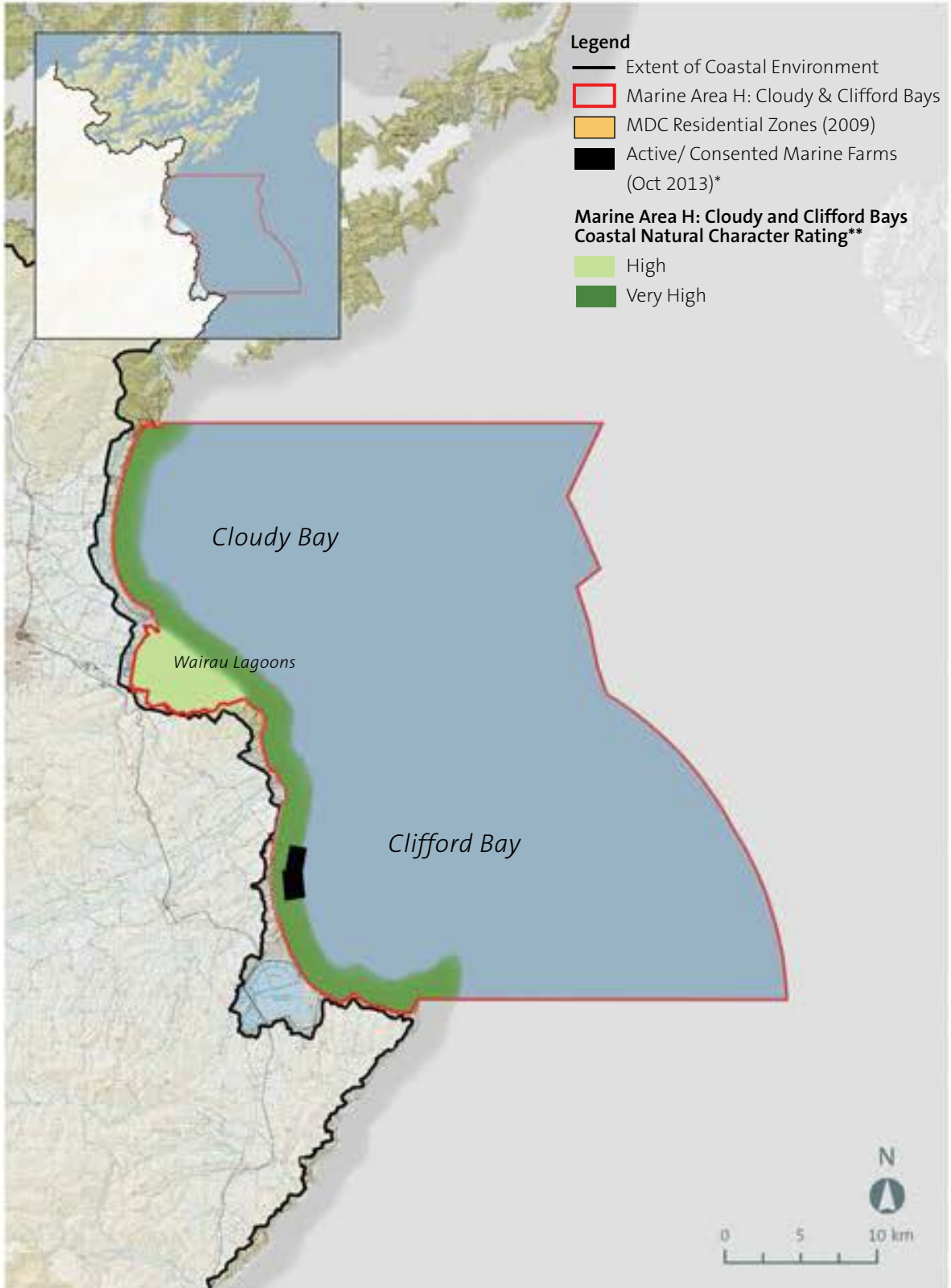
Refer also to Section F of this report for:

Outstanding Coastal Natural Character Area 14: Wairau Lagoons,

Outstanding Coastal Natural Character Area 15: Cape Campbell.



The Wairau Lagoons



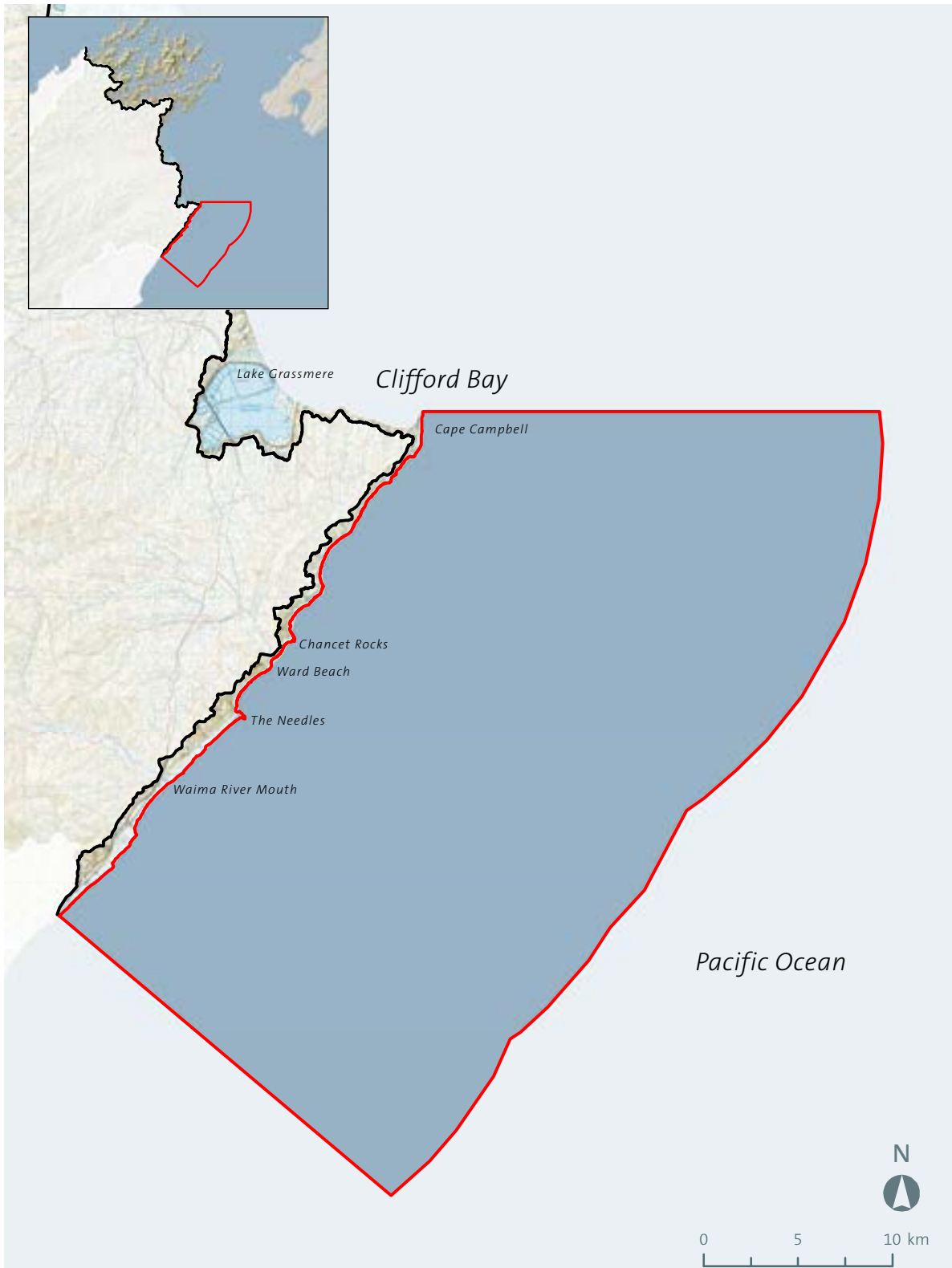
* Data represents active and consented marine farms as of October 2013. Marine farms mapped may not be operational.

**Refer to page 23 and Appendix 6 for limitations on the offshore extent of biotic & abiotic assessments. Marine maps illustrate abiotic and biotic values only. Experiential values have been taken into consideration in the text and would represent a separate overlay on this map.

Coastal Marine Area I : Cape Campbell to Willawa Point

Collective Characteristics

Very exposed; cold turbid waters; extensive sand/gravel beaches especially in the south; areas of mudstone and limestone reef in the north; silty sand and gravels offshore; wide continental shelf; typical array of east coast South Island coastal species, though generally low species diversity except over reef areas; limited understanding of marine life further offshore; large offshore *Macrocystis* beds.



Abiotic

The coast stretching south from Cape Campbell is relatively “straight” and is very exposed to southerly and easterly storms. Large waves from onshore winds and oceanic swells are common. High turbidity and poor water clarity are also notable features as a result of flooding (mainly from the Clarence and Waima Rivers), sediment runoff, softer rock types and the effects of wave action. Water quality is otherwise very good. Sea temperatures tend to be low due to the influence of the Southland Current.

The continental shelf is broad, dropping to 100m depth within about 6km of shore. The Flaxbourne Basin (150 to >170m depth) extends to within 10km of shore. Elsewhere these depths, which also mark the edge of the continental slope, are not reached until over 24km from shore.

The coast is dominated by sand/gravel beaches of variable size intermingled with rocky headlands, platforms, outcrops and reefs, onshore and offshore. Broad and deeply incised mudstone reefs (particularly in the vicinity of Cape Campbell) and limestone outcrops distinguish the northern sector, and expansive sand/gravel beaches the southern sector. The coast is mostly backed by sand dunes and low coastal hills.

Subtidal sediments are not documented apart from near Cape Campbell where silty sand extends offshore for several kilometres grading into sandy mud beyond.

There is no aquaculture in this area. Moderate levels of bottom trawling occur offshore.

Biotic

The sand/gravel beaches support a relatively low diversity and abundance of marine life.

Intertidal platform/reef communities are typical of very exposed wave-swept conditions. Moderate numbers and diversity of plants and animals occur with greatest diversity within channels, pools and partially sheltered areas. Conspicuous algae include bull kelp, flapjack and *Gigartina spp* at low water and within the channels, and *Glossophora kunthii*, *Cystophora sp.* and *Ulva sp.* in the pools. Coralline turf is also common. Various limpets, chitons, topshells, mussels and barnacles are present.

Large offshore beds of giant kelp (*Macrocystis pyrifera*) occur between Cape Campbell and Ward Beach. This coast is one of three locations nationally where the

mottled brotulid (an endemic fish) has been found.

Little else is known about the subtidal marine environment along this coast. Marine communities on the subtidal reefs are expected to be similar to those in southern Clifford Bay, though the influence of sand scour and wave action may be more pronounced south of Cape Campbell. The more stable offshore sediments are likely to support animal communities similar to comparable habitats along much of the South Island's east coast.

Pods of Hector's dolphins are present along this coast. Dusky dolphins pass through during their seasonal migrations between the Kaikoura coast and the top of the South Island. Humpback whales also migrate past on their northward winter migration. A similar array of seabirds to that found in neighbouring Clifford and Cloudy Bays is expected.

Experiential

Access to this rugged coastline is limited to only a few locations, including Ward Beach and a small number of points south of the Waima River. The remainder of the land is not accessible. Walks along the sandy shoreline to the impressive limestone outcrops of the Needles and Chancet Rocks are backed by steep terrain where views towards the horizon are gained. Other than farm related activity on the land, this coastline is unmodified, with no aquaculture or jetties/ wharves.

The area, once visited, is extremely memorable and camping facilities (by agreement from the landowner) are available at Ward Beach.



Subtidal rocky reef at Cape Campbell

Coastal Marine Area I : Cape Campbell to Willawa Point



Blue Cod



Bottlenose dolphin.

Level 3: Overall Area Rating for Cape Campbell to Willawa Point Coastal Marine Area

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			Very High

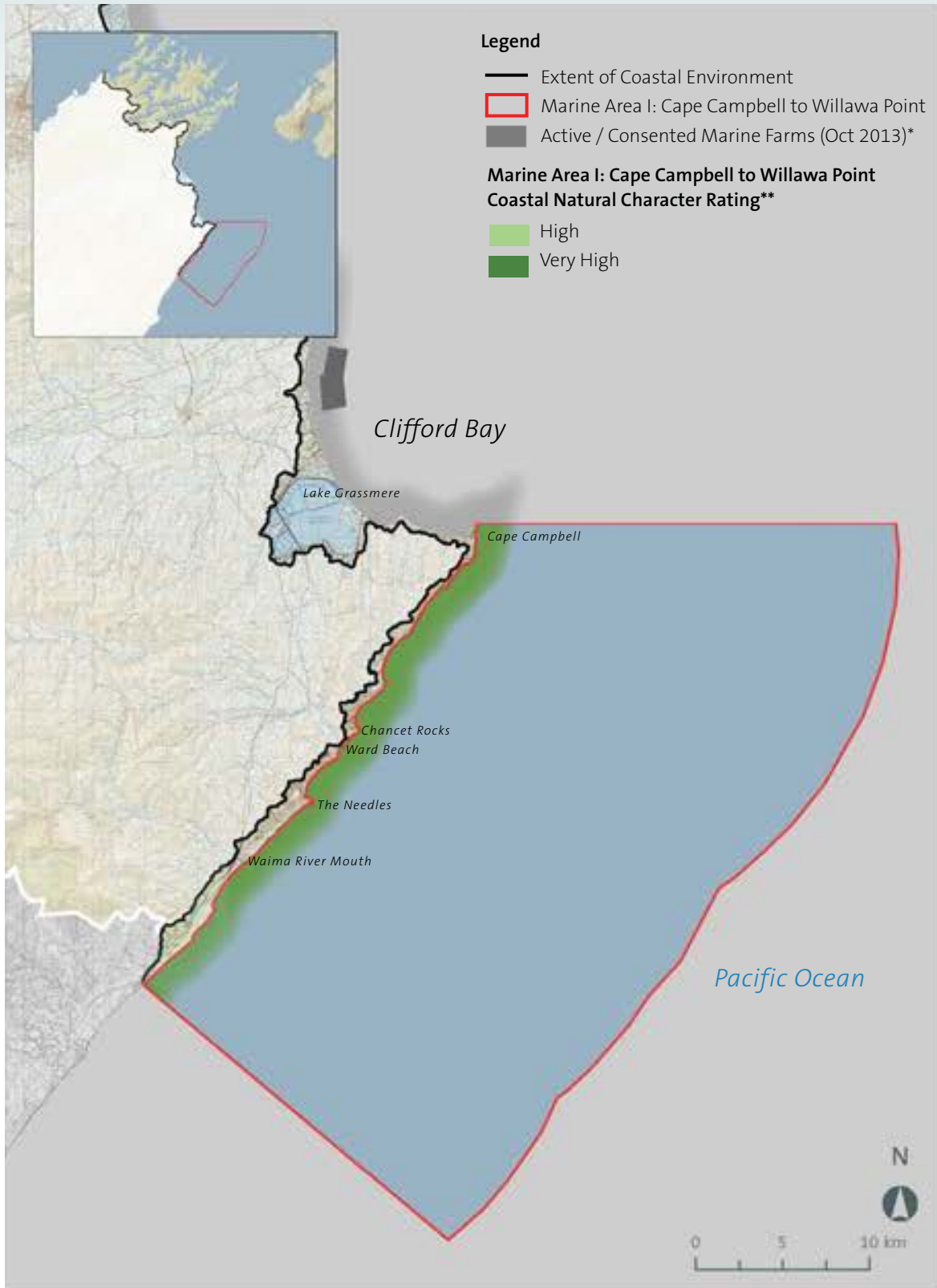
Levels 4 & 5: Specific Parts within Coastal Marine Area I: Cape Campbell to Willawa Point Holding High or Very High Natural Character

Sub Area	Rating	Key Values	Additional Comments
Cape Campbell to Willawa Point	Very High	<p>Largely unmodified and very exposed east coast South Island coastal environment extending south from Cape Campbell.</p> <p>Prominent reef areas in the north (including Cape Campbell) giving way to extensive sand/gravel shores in the south.</p> <p>Large offshore Macrocystis beds.</p> <p>Adjoins Coastal Marine Area H at Cape Campbell.</p> <p>High remote values</p>	<p>Certain offshore areas are commercially trawled; inshore areas are expected to be reasonably resilient to the effects of trawling.</p>

Refer also to Section F of this report for:

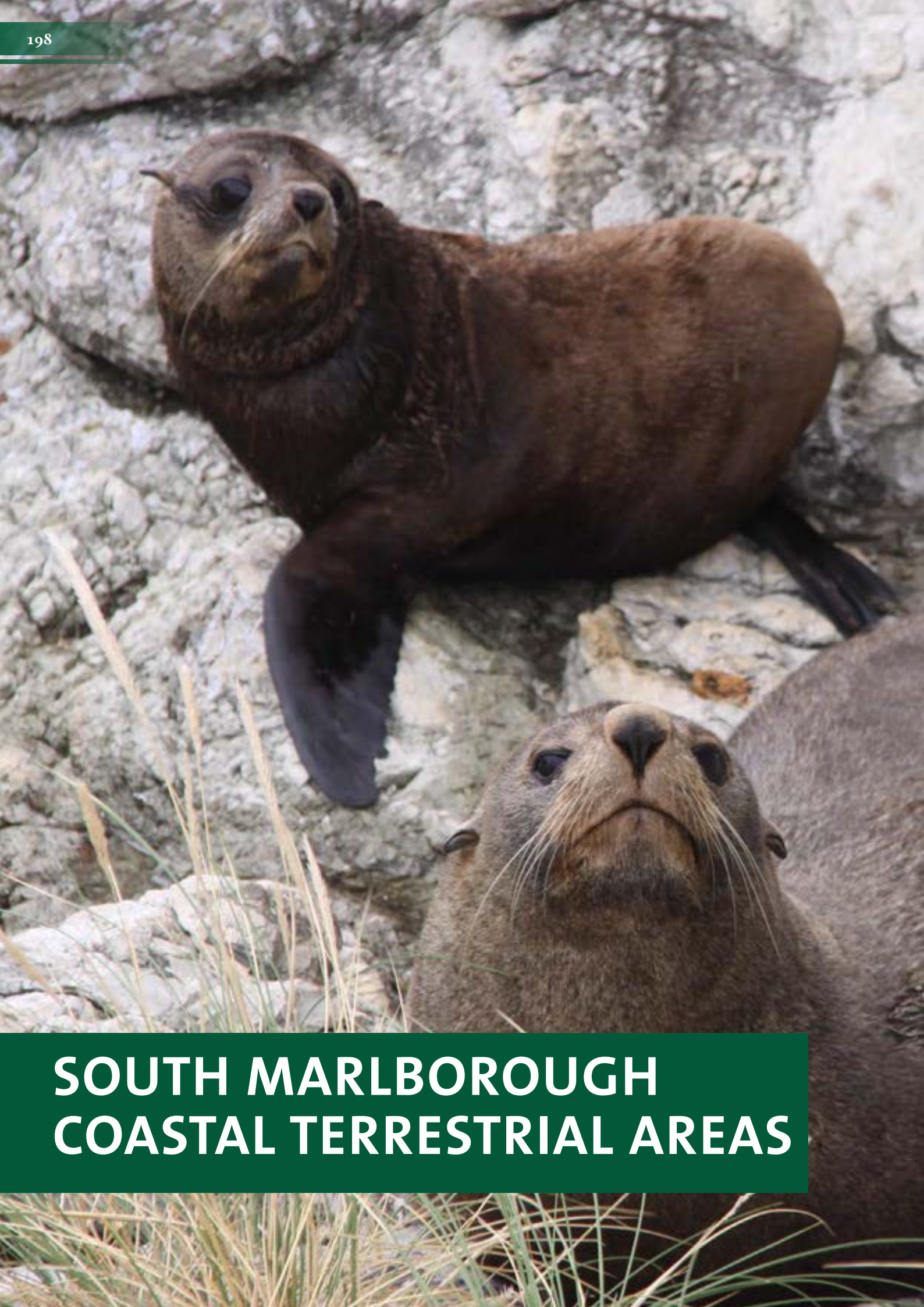
Outstanding Coastal Natural Character Area 15: Cape Campbell,

Outstanding Coastal Natural Character Area 16: Chancet Rocks & The Needles





* Data represents active and consented marine farms as of October 2013. Marine farms mapped may not be operational.

**Refer to page 23 and Appendix 6 for limitations on the offshore extent of biotic & abiotic assessments. Marine maps illustrate abiotic and biotic values only. Experiential values have been taken into consideration in the text and would represent a separate overlay on this map.

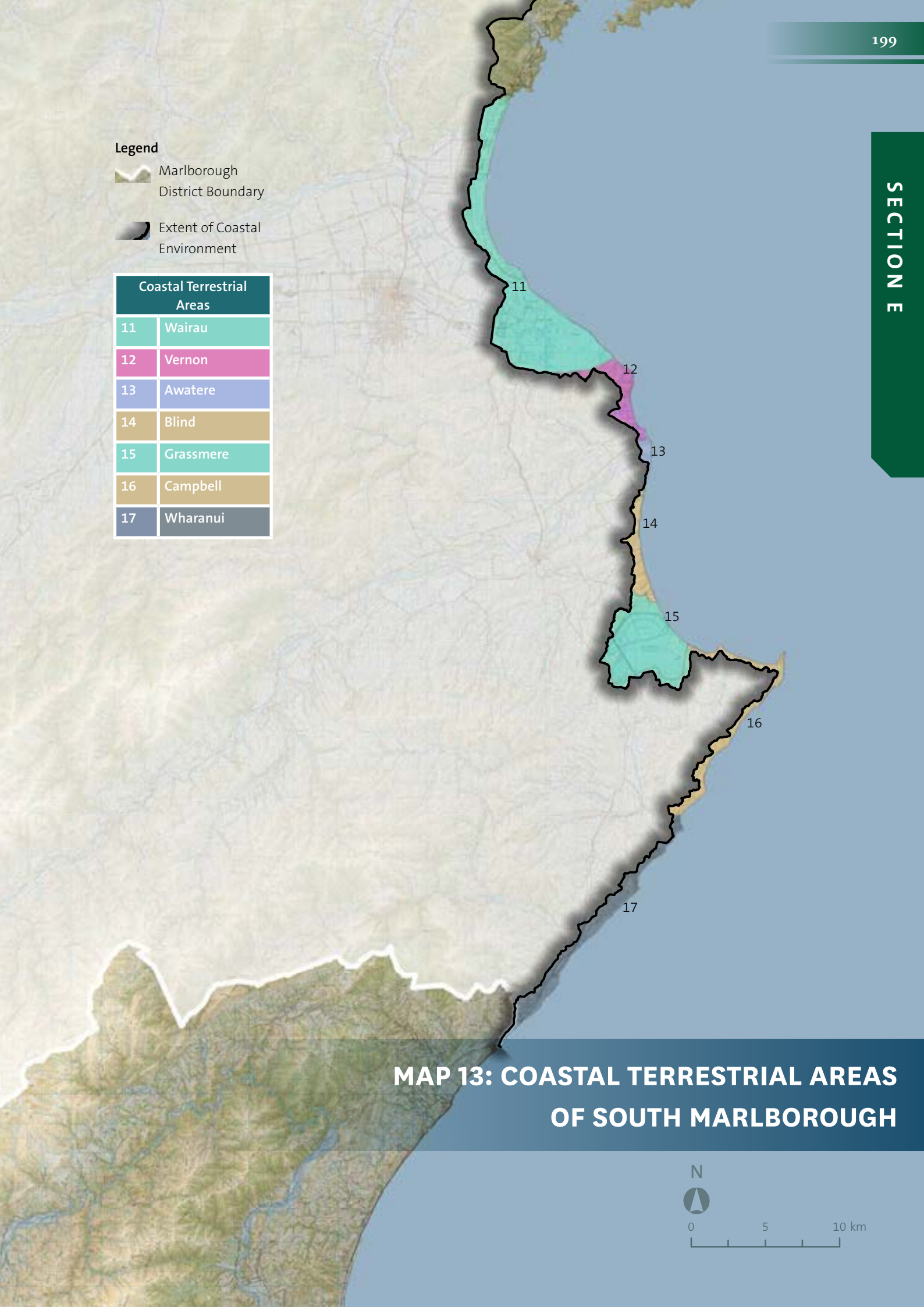


**SOUTH MARLBOROUGH
COASTAL TERRESTRIAL AREAS**

Legend

-  Marlborough District Boundary
-  Extent of Coastal Environment

Coastal Terrestrial Areas	
11	Wairau
12	Vernon
13	Awatere
14	Blind
15	Grassmere
16	Campbell
17	Wharanui



MAP 13: COASTAL TERRESTRIAL AREAS OF SOUTH MARLBOROUGH

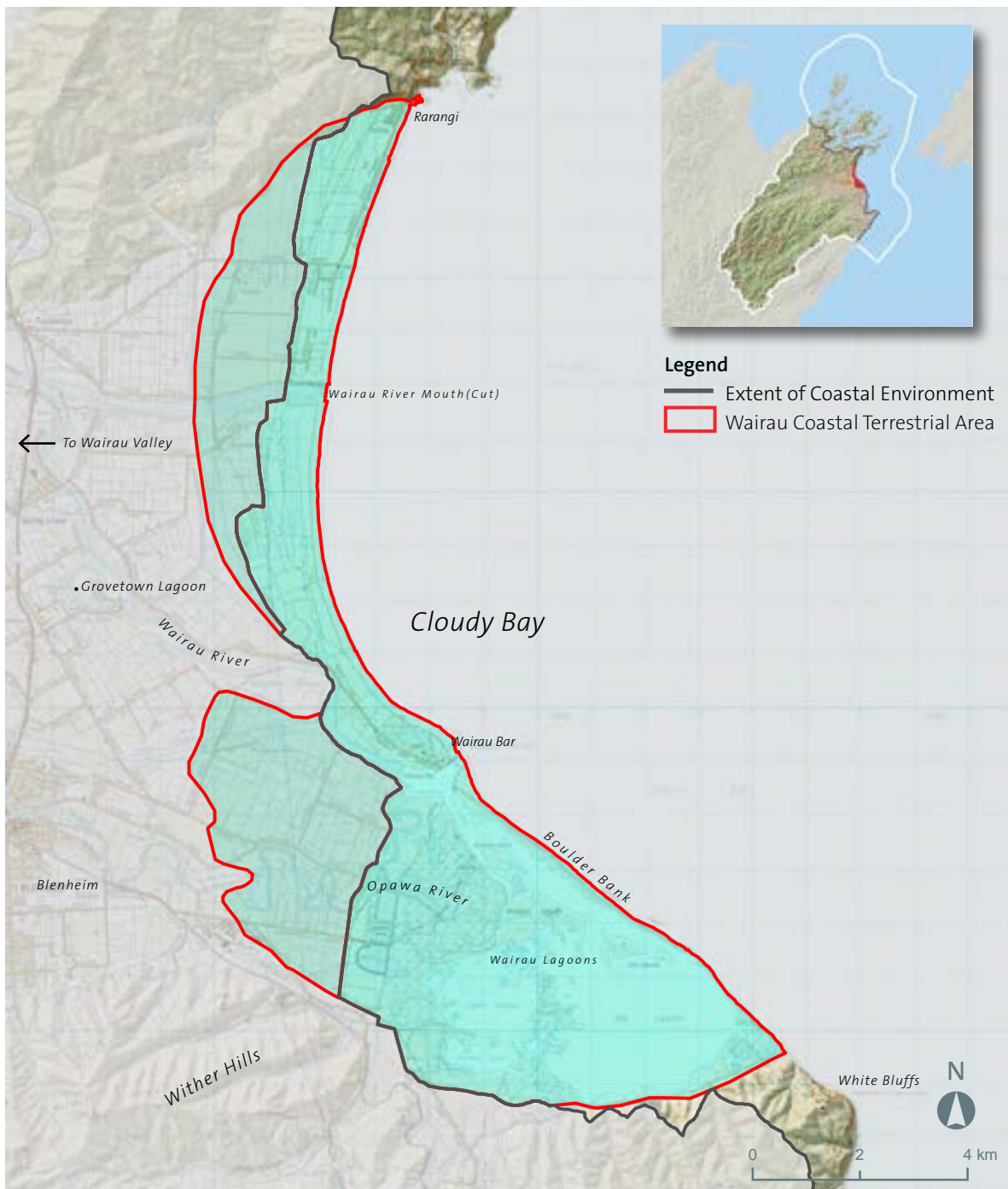


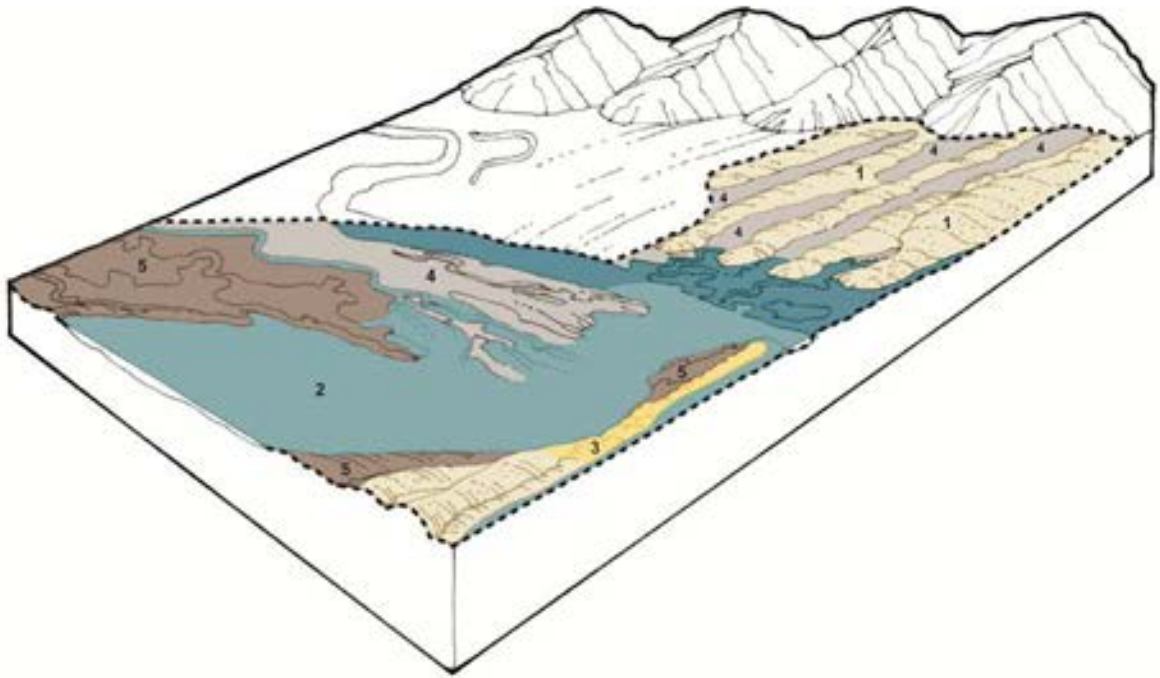
Coastal Terrestrial Area 11 : Wairau

Collective Characteristics

Pingao, sand tussock, harakeke, glasswort, saltmarsh ribbonwood, fernbird, black shag, beach ridges, large estuarine river mouth ecosystems.

This Coastal Terrestrial Area includes part of the Plains – Coastal fringe Land Type 12 (Refer to Appendix 5). It encompasses undulating to rolling marine gravel beach ridges and associated inter-ridge wetlands, a large river mouth lagoon–estuary, a prograding bird’s foot delta, fringing wetlands and islands, a narrow spit-like gravel boulder bank, and minor sand dune remnants. Much of this landscape is intensively used (intensive grazing, rural residential, viticulture) and highly modified, with the balance providing extensive wildlife habitat. The elevation range is less than 10 m and the climate is hot, dry and windy. ▶





Wairau Coastal Landform Components

*** Coastal Environment

- 1. Gravel Beach Ridge and Bars
- 2. Lagoon, Estuary, wetlands

3. Beach Sand Dune Complex

4. Deltaic deposits and backswamps

5. Sand Plain

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
1	Gravel beach ridges and bars	Holocene and Recent beach gravel and dune sands	0–10	Shore convolvulus sandfield Haretail - knobby clubrush - spinifex grassland ⁽¹⁾ Matagouri - <i>Melicytus</i> "Waipapa" - knobby clubrush - haretail shrubland ⁽¹⁾ Matagouri stonefield ⁽¹⁾ Tauhinu - matagouri - knobby clubrush - haretail rush-shrubland ⁽¹⁾ <i>Muehlenbeckia ephedroides</i> - matagouri shrub-stonefield ⁽¹⁾ <i>Pimelea prostrata</i> - <i>Raoulia australis</i> herb-sandfield ⁽¹⁾ <i>Coprosma crassifolia</i> scrub and shrubland ⁽¹⁾ <i>Melicytus</i> "Waipapa" - pohuehue - matagouri shrubland ⁽¹⁾ Kanuka (± manuka) forest and treeland ⁽¹⁾	Shore convolvulus sandfield Knobby clubrush - spinifex grassland Matagouri - <i>Melicytus</i> "Waipapa" - knobby clubrush shrubland Matagouri stonefield Tauhinu - matagouri - knobby clubrush rush-shrubland <i>Muehlenbeckia ephedroides</i> - matagouri - <i>Coprosma propinqua</i> shrub-stonefield <i>Pimelea prostrata</i> - <i>Raoulia australis</i> herb-sandfield <i>Coprosma crassifolia</i> scrub and shrubland <i>Melicytus</i> "Waipapa" - pohuehue - matagouri vine-shrubland Kanuka (± manuka) forest and treeland Ngaio-akiraho-akeake forest ⁽⁴⁾ Totara-kanuka-manuka forest ¹ and treeland

Coastal Terrestrial Area 11 : Wairau

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
2	Saline lagoon and estuary fringe wetlands, bird's foot delta, and islands	Holocene and Recent fluvial and lagoonal deposits	0-2	<p>Glasswort herbfield(1) Glasswort – Puccinellia stricta herbfield(1) Glasswort – exotic grass herb-grassland(1) Sea rush rushland(1)</p> <p>Three square sedgeland(1) Bolboschoenus caldwellii sedgeland(1) Bolboschoenus caldwellii – three square sedgeland(1)</p> <p>Saltmarsh ribbonwood – sea rush shrubland(1) Saltmarsh ribbonwood shrubland(1) Saltmarsh ribbonwood – tall fescue grass-shrubland(1) Saltmarsh ribbonwood – oioi rush-shrubland(1)</p> <p>Mimulus repens herb-siltfield(1) Selliera radicans – glasswort – tall fescue herbfield(1) Samolus – Selliera – glasswort herbfield(1)</p>	<p>Glasswort herbfield Glasswort - Puccinellia stricta herbfield(1) Sea rush rushland Three square sedgeland(1) Bolboschoenus caldwellii - clubrush sedgeland Bolboschoenus caldwellii - three square sedgeland Saltmarsh ribbonwood - sea rush shrubland Saltmarsh ribbonwood shrubland Saltmarsh ribbonwood - oioi rush-shrubland</p> <p>Carex litorosa tussockland⁵ Mimulus repens herb-siltfield Selliera radicans - glasswort herbfield</p> <p>Samolus - Selliera - glasswort herbfield(1)</p>
3	Beach sand dune complexes	Holocene and Recent dune sand	0-5	<p><i>Carex pumila</i> sandfield⁽¹⁾ Spinifex - sand tussock grassland⁽²⁾ Spinifex grassland⁽¹⁾ Marram - spinifex grassland^(1,2)</p>	<p><i>Carex pumila</i> sandfield Spinifex grassland Pingao - spinifex - sand tussock grass-sedgeland Sand coprosma shrubland</p>
4	Deltaic deposits and backswamps	Holocene and Recent alluvium and organic deposits	0-5	<p>Oioi-saltmarsh ribbonwood shrub-rushland⁽¹⁾ Raupo reedland in wetland swales⁽¹⁾ Harakeke ±cabbage tree flaxland in wetland swales⁽¹⁾ Manuka forest on wetland margins⁽¹⁾ Mixed sedge-rush-grassland in wetland swales⁽¹⁾</p>	<p>Oioi-saltmarsh ribbonwood shrub-rushland Raupo reedland in wetland swales Harakeke flaxland in wetland swales Cabbage tree - harakeke flax-treeland <i>Cyperus ustulatus</i> sedgeland in wetland swales⁽⁵⁾ Manuka forest and scrub on wetland margins <i>Carex secta</i> sedgeland in wetland swales Kahikatea - cabbage tree - kaikomako forest</p>

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
5	Sand plains	Holocene and Recent sands and lagoonal deposits	0–2	Knobby clubrush - harestalk sedge-grassland(1) Pohuehue vineland(1) Matagouri shrubland(1) Matagouri - knobby clubrush rush-shrubland(1)	Knobby clubrush - danthonia-grassland(1) Silver tussock tussockland Pohuehue vineland Matagouri shrubland Matagouri - Melicytus “Waipapa” - knobby clubrush rush-shrubland Tauhinu - matagouri - knobby clubrush rush-shrubland Muehlenbeckia ephedroides - matagouri shrub-stonefield Coprosma crassifolia scrub and shrubland Melicytus “Waipapa” - pohuehue - matagouri shrubland Kanuka (± manuka) forest and treeland Ngaio forest(4) Totara-matai-titoki-kanuka forest(1,7) Kowhai - narrow-leaved lacebark - lowland ribbonwood - kaikomako forest and treeland

Refer to Appendix 1 (Coastal Terrestrial Area - Biotic - South Marlborough) for references

The coastal context includes the flat and highly modified Wairau plains, which are dominated by vineyards. The main settlement of Blenheim is located some eight kilometres from the coast with numerous small and large industrial buildings located within the town’s immediate surrounds. The Opawa River’s sinuous form is a popular recreational area for many who reside in and visit the area, which drains into the Wairau Lagoons. The expansive Wairau Valley is framed by the dry Wither Hills to the south and the wetter Richmond Range to the north.

Abiotic

Holocene and Recent depositional landforms from gravel and fine grained silts dominate this Coastal Terrestrial Area at the confluence of a major river system and a dynamic coastline. Undulating to rolling marine gravel beach ridges and associated inter-ridge wetlands, buried by fine grained fresh water fluvial deposits on their western margins occupy the area bounded by the Wairau River, the sea and the steep hill country of the Marlborough Sounds block in the North to Rarangi. The river mouth lagoon–estuary, bird’s foot delta, and fringing wetlands and islands are some of the country’s best examples and provide extensive wildlife habitat. These unique environments have formed behind a narrow spit-like gravel boulder bank,

with hooked ridges on its’ inner margin, protruding north westwards from White Bluffs. Minor sand dune remnants cap the Boulder Bank in places. The climate is hot, dry and windy, being exposed to desiccating north-westerly winds down the Wairau Valley especially in summer, and cold southerly winds off the ocean. Elevation ranges from sea level to 10 m and rainfall from 600 to 700 mm per year.

Biotic

Summary analysis: Total area of the Wairau Coastal Terrestrial Area is 6,786ha of which 1% is in native shrubland, 1% in exotic treeland, 1% in exotic scrub, 40% in pasture, 16% in vines/orchards and 15% in herbaceous aquatic vegetation. This biotic environment forms part of the Department of Conservation’s Blenheim Ecological District.

Originally there would have been a coastal forest of ngaio, akiraho and akeake, probably also containing taupata, behind a shore fringe of pingao, sand tussock and spinifex. Behind that again would have been forest and treeland of totara, matai and kanuka where it was drier, and manuka, kahikatea, rimu, narrow-leaved lacebark, swamp maire and cabbage tree in damper sites. The freshwater wetlands would have had extensive areas of harakeke and raupo. Estuarine areas

Coastal Terrestrial Area 11 : Wairau

would have had extensive glasswort herbfields, with smaller amounts of sea rush, oioi, saltmarsh ribbonwood, sedges, low herbs and *Carex litorosa* tussocks. Matagouri and *Melicytus* “Waipapa” probably occurred in exposed stonefields near the shore. The entire Coastal Terrestrial Area would have been bustling with a wealth of fauna: especially wetland birds, fish and invertebrates, but also land birds (including moa) and reptiles (tuatara, skinks and geckos).

There is a high diversity of habitats and native species, due to the complexity and dynamism of the Coastal Terrestrial Area. The full spectrum from drylands to permanent wetlands is present. Despite extensive modification of the vegetation and drainage patterns, natural ecosystem processes are still strong, and this coastal area is ecologically outstanding at a national level.



The beach ridges and bars have little remaining native vegetation, but there is some kanuka forest and treeland on northern ridges and swamp margins, and a few isolated trees of kahikatea, narrow-leaved lacebark and swamp maire. There are also shrublands containing matagouri, tauhinu, knobby clubrush, *Melicytus* “Waipapa”, *Coprosma crassifolia* and *C. propinqua*, and extensive harakeke and raupo with cabbage trees in wet hollows. Along the sandy shore are pingao, sand tussock, knobby clubrush and spinifex, competing with marram grass. Also in the sand are *Pimelea prostrata* and coastal mat daisy (*Raoulia* “hookeri coast”). *Muehlenbeckia ephedroides* occurs with matagouri in localised stonefields.

The saline lagoon, estuary, fringe wetlands and islands have extensive glasswort herbfields, mingled with and fringed by various combinations of sea rush rushland, oioi rushland, saltmarsh ribbonwood shrubland, three

square sedgeland, *Bolboschoenus caldwellii* sedgeland and herbfields with *Samolus repens*, *Selliera radicans* and *Mimulus repens*. The whole wetland ecosystem is of national importance for wading birds (including migratory species), waterfowl and other wetland birds and is equally outstanding for freshwater and estuarine fauna.

The beach sand dune complexes have some pingao, spinifex and knobby clubrush, competing with marram grass and haretail. Also there are areas of *Carex pumila* in sand, danthonia in grassland, and shrubs of matagouri, coastal shrub daisy and pohuehue.

The deltaic deposits and backswamps have combinations of oioi intermingled with saltmarsh ribbonwood, raupo and harakeke in wetland swales and pockets of manuka forest on wetland margins. ►



Above: Female Spinifex at Rarangi

Previous: Wairau River Cut (foreground) and Lagoons (background)

Coastal Terrestrial Area 11 : Wairau



Above: White fronted terns



Above: This large Coastal Terrestrial Area contains a diversity of freshwater and brackish habitat types with the Wairau lagoons (2,300h.a.), Wairau, Wairau Diversion and Opawa Rivers the largest features

On the sand plains are areas containing knobby clubrush, silver tussock, haretail, danthonia, matagouri and pohuehue in various combinations.

The following notable plant species are found: *Mazus novaezeelandiae* ssp. *impolitus* -t, porcupine shrub -r, *Muehlenbeckia ephedroides* -r, sand tussock -r, pingao -r, sea holly -r, coastal mat daisy -r, *Mimulus repens* -r, swamp nettle -r, swamp maire, narrow-leaved lacebark, *Melicytus* "Waipapa".

In terms of animals, South Island fernbird -r, Australasian bittern -t, black-billed gull -t, red-billed gull -t, black-fronted tern -t, Caspian tern -t, banded dotterel -t, banded rail -r, marsh crake -r, spotless crake

-r, black shag -r, little shag, kotuku -t, royal spoonbill -r, pukeko, scaup, common gecko, Marlborough mini gecko, spotted skink -r, common skink, inanga -r, dwarf galaxias -r, giant kokopu -r, banded kokopu, koaro -r, lamprey -r, black flounder, common bully, upland bully, longfin eel -r, shortfin eel, koura, freshwater mussel and two endemic moths - Cloudy Bay mat daisy jumper -t,ee and Cloudy Bay stone moth -t,ee - are all present.

For freshwater, this large Coastal Terrestrial Area contains a diversity of freshwater and brackish habitat types with the Wairau lagoons (2,300h.a.), Wairau, Wairau Diversion and Opawa Rivers the largest features. While substantially biophysically modified by river diversions, training works, wetland

drainage and treated sewerage discharge, the lower river and lagoon environments support a diversity of freshwater and brackish vegetation, fish, invertebrates and avifauna. The lagoons support the most diverse number of bird species in Marlborough and this is recognised as nationally significant (e.g. see Cromarty and Scott 2003). Lower river and lagoon avifauna include black fronted tern, black-billed gull, Caspian terns, migrant waders, shags, pied stilt, oyster catcher, banded dotterel, paradise shelduck, royal spoonbill, kotuku, black swan, ducks and geese to name just a few. The Wairau lagoons are an important overwintering ground for many native migratory species and important feeding grounds for northern hemisphere waders such as godwits, knots and turnstones. Fernbirds occur in the wetland shrublands within the lagoons.

In the north of the Coastal Terrestrial Area, the Rarangi Coastal wetland complex supports indigenous wetland vegetation in the dune slack wetlands system with swamp nettle (*Urtica linearifolia*) recorded from riparian zones. Inanga, common bully, upland bully, longfin eel and shortfin eel are recorded with inanga spawning potentially present too. Bittern and other waterfowl have been recorded.

The Grovetown Lagoon is a modified oxbow within tidal influence is a part of a community restoration project. The uncommon native submerged macrophyte *Potamogeton orchreatus* is also present. Food gathering, waterfowl hunting, canoeing occur.

- Inanga, giant kokopu, common bully, upland bully,

black flounder, longfin and shortfin eel and brown trout are present along with koura and freshwater mussels. Grey duck, Australasian shoveler, New Zealand scaup, paradise shelduck, black swan, shag, kotuku, pukeko, white-faced heron and spotless crane are recorded. This is a paradise shelduck and black swan moulting area.

Experiential

The flat and expansive nature of the coastal Wairau plains incorporates the undulating gravel beach ridges and bars, saline lagoons [Upper, Chandlers and Big Lagoons], estuary fringe-wetlands, coastal beach sand dunes and associated interdune back swamps and sand plains north of the White Bluffs. Although modified around the edges and receiving increased nutrient and modified sedimentation and circulation patterns from the adjacent Opawa and Wairau Rivers, the lagoons are still largely natural. The lagoons are also a popular waterfowl hunting site. There are customary and recreational fisheries for whitebait, mullet, flounder, kahawai, trout, salmon and eels. Canoe/kayaking, and boating also occurs. ▶

t = threatened nationally

r = at risk nationally

e = endemic to South Marlborough

ee = endemic to Wairau Coastal Terrestrial Area



Above: King Shag



Variable Oyster catcher

Coastal Terrestrial Area 11 : Wairau

Other modification to the area includes the sewage treatment ponds and freezing works oxidation ponds, the bach community at Rarangi and the landuse. The second Wairau river 'mouth' is an artificial diversion channel that branches from the main river south of Tuamarina. This diversion was constructed to alleviate potential flooding issues should the Wairau experience dramatic rainfall.

There are numerous roads and footpaths that allow access through the area, and fishing is popular at the mouth of the Wairau River. There are also a number of recognised geological sites, including the lagoons, which hold high cultural and historical significance.

Level 3: Overall Area Rating for Wairau Coastal Terrestrial Area

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 - High

Levels 4 & 5: Specific Parts within Coastal Terrestrial Area 11: Wairau Holding High or Very High Natural Character

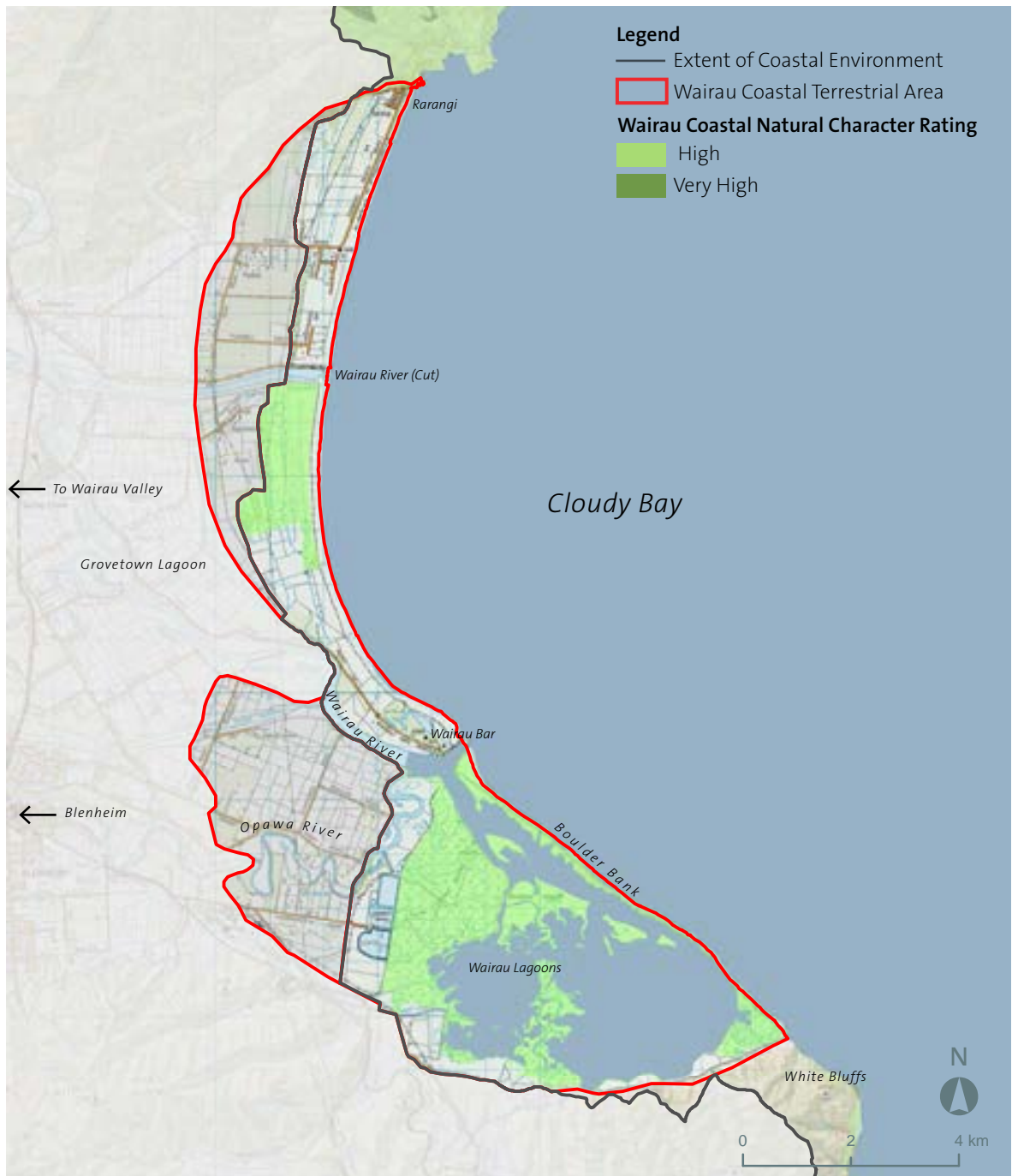
Sub Area	Rating	Key Values	Additional Comments
Wairau Lagoons and boulder bank	High	<p>The river mouth lagoon–estuary, bird's foot delta, and fringing wetlands and islands are some of the country's best examples and provide extensive wildlife habitat.</p> <p>The whole wetland ecosystem is of national importance for wading birds (including migratory species), waterfowl and other wetland birds and is equally outstanding for freshwater and estuarine fauna.</p> <p>Boulder Bank/ Wairau Bar is a nationally important landform</p> <p>Open and expansive nature of the lagoons retains high levels of perceived naturalness</p>	<p>The estuary has been modified through historical stop-banking and alterations to river flows.</p> <p>The Blenheim sewage outfall discharges into the mouth of the Wairau River on the outgoing tide</p>

Levels 4 & 5: Specific Parts within Coastal Terrestrial Area 11: Wairau Holding High or Very High Natural Character

Sub Area	Rating	Key Values	Additional Comments
Rarangi-Wairau Bar beach ridge system	High	Nationally important landform: a sequence of beach ridges and swales created by tectonic uplift events. Remnant native vegetation: forest, treeland, dry shrubland and wetland	Areas of housing and land use modifications have eroded the legibility of some of these ridge systems.

Refer also to Section F of this report for:

Outstanding Coastal Natural Character Area 14: Wairau Lagoons



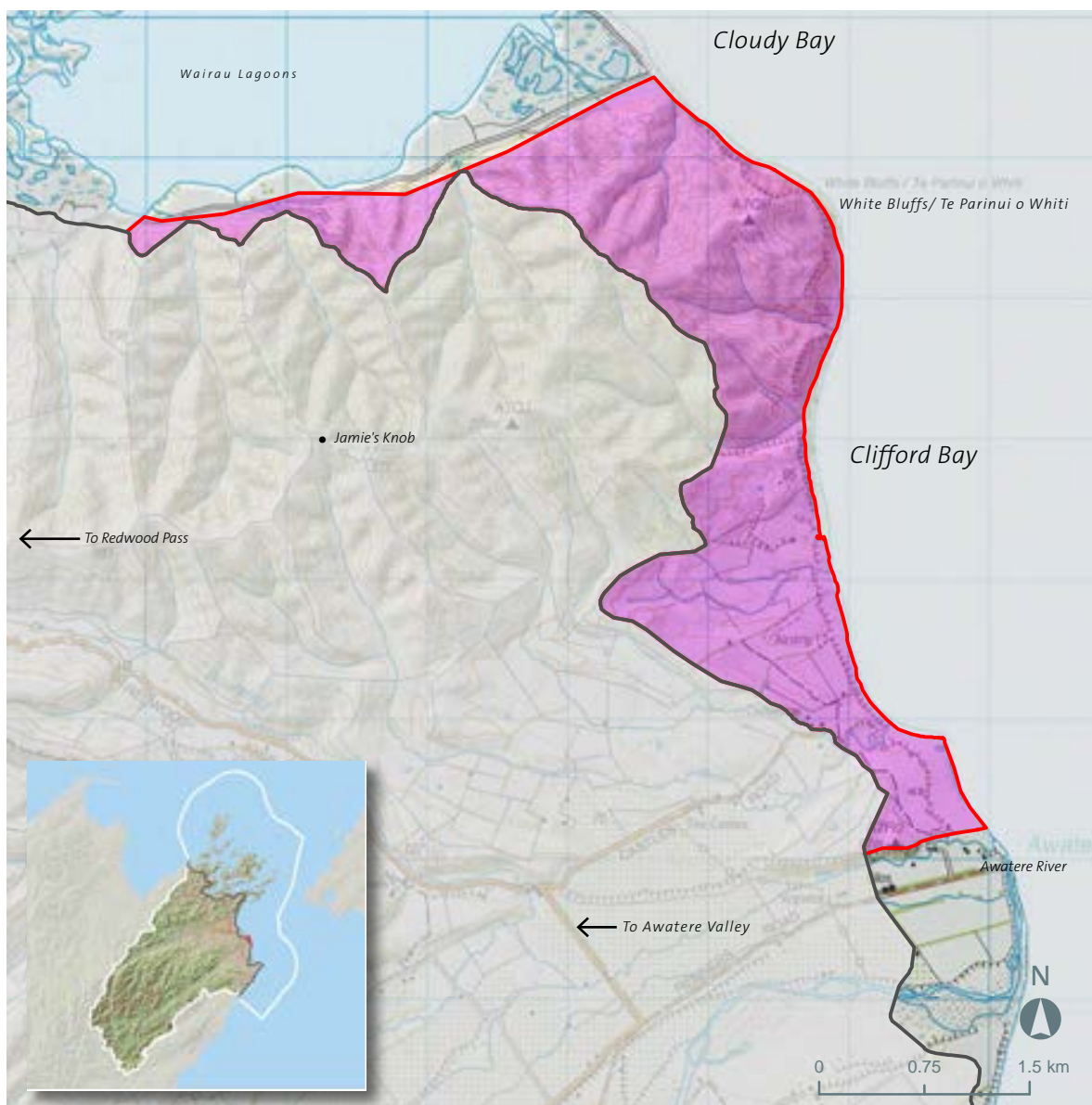
Coastal Terrestrial Area 12 : Vernon

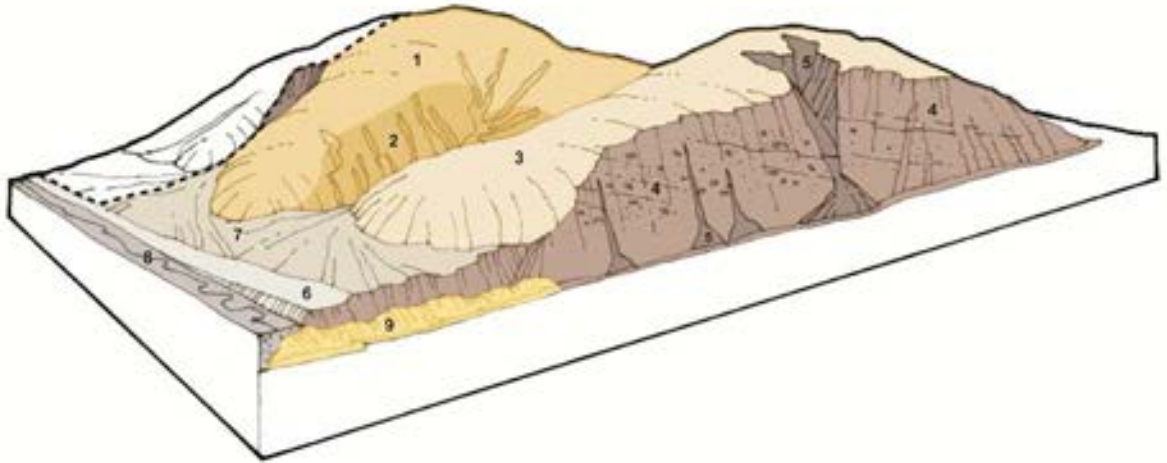
Collective Characteristics and Coastal Context

Silver tussock, matagouri, kanuka, Carmichaelia muritai, kahu, sea cliff ecosystems with slot gorges

This Coastal Terrestrial Area includes the Loess – Mantled, dry, weakly consolidated, conglomerate land type 18 (Refer to Appendix 5). It encompasses strongly rolling to moderately steep to steep, dissected hill country and the associated marginal high terraces, underlain by loess-mantled, weakly consolidated conglomerate or late Pleistocene and Holocene gravels. Steep gullies and extensive tunnel gully erosion is a feature. This dissected hill country block terminates in the regionally significant White Bluff sea cliff overlooking Cloudy Bay. Storm beach ridges and active gravel beaches front the sea cliffs and seaward escarpments. The climate is hot, dry and windy, streams are ephemeral and surface water resources are limited.

The coastal context includes the undulating, farmed hill country that extends inland to include the Redwood and Dashwood passes. This land essentially divides the Wairau Valley to the north from the Awatere Valley to the south. Numerous watercourses, many ephemeral, dissect this grassy landscape and due to the geology, extensive erosion is common. SH1 and the railway extend parallel to the coast some 9km inland and weave through the dry Dashwood and Weld Passes. Further towards the coast, the Redwood Pass extends through these hills connecting many small rural farmsteads. Gradual retirement of some farmland into restored native bush is evident throughout this area.





Vernon Coastal Landform Components

- Coastal Environment
- 1. Upper Side Slopes
- 2. Mid and Lower Side Slopes
- 3. Broad Spurs
- 4. Coastal Cliffs
- 5. Slotted Gorges
- 6. Terraces
- 7. Fans
- 8. Meander Flood Plains
- 9. Storm Beach Ridges

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
1	Loess-mantled 'soft' rock steep to moderately steep upper side slopes	Loess over weakly consolidated conglomerate and sandstone	0–280	Silver tussock tussockland Kanuka forest and tall scrub ⁽¹⁾ Kanuka shrubland ⁽¹⁾	Kanuka-manuka - akiraho forest ^(1,4,6) Black beech - matai-titoki forest ⁽⁷⁾
2	Loess-mantled 'soft' rock strongly rolling to moderately steep mid and lower hill slopes (often with extensive tunnel gully erosion)	Loess over weakly consolidated conglomerate and sandstone	0–280	Silver tussock tussockland Matagouri scrub Kanuka - akiraho forest ⁽¹⁾ Kanuka shrubland ⁽²⁾ Manuka scrub ⁽¹⁾	Kanuka forest Manuka forest Akiraho - kanuka-manuka forest Coastal broadleaved forest (mapou, mahoe, ngaio, akiraho, akeake, kohuhu, five-finger, lancewood) ⁽⁷⁾ Black beech - matai-titoki forest ^(2,7)
3	Broad strongly rolling spur crests and summits	Thin loess over weakly consolidated conglomerate and sandstone	50–280	Silver tussock tussockland Kanuka forest and tall scrub ⁽¹⁾ Kanuka shrubland ⁽¹⁾	Totara forest ^(1,4,6) Black beech - matai-titoki forest ^(2,7) Akiraho - kanuka forest ^(2,7) Coastal broadleaved forest (mapou, mahoe, ngaio, akiraho, akeake, five-finger, lancewood) ⁽⁷⁾
4	Very steep to precipitous coastal cliffs and bluffs often with narrow active beaches	Weakly consolidated conglomerate and mudstone	0-200	Rockland (mostly bare but with sparse patches of gorse, karamu, tutu, tauhinu, <i>Hebe stricta</i> , manuka, kanuka, coastal tree broom and arikaho where there are ledges, fissures and less steep faces) ⁽¹⁾	Karamu, tutu, tauhinu, <i>Hebe stricta</i> , <i>Hebe parviflora</i> , manuka, kanuka, arikaho, tutu, akeake, coastal tree broom, wharariki forest, scrub and rockland ⁽¹⁾

Coastal Terrestrial Area 12 : Vernon

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
5	Steep deeply incised slotted gorges that flow to the sea	Weakly consolidated conglomerate and mudstone	0-60	Ngaio-mahoe forest(1) Mahoe-mixed broadleaved forest(1) Mixed tall shrubland(1)	Ngaio-mahoe forest Mixed broadleaved forest (mapou, mahoe, ngaio, akiraho, akeake, kohuhu, five-finger, lancewood)(7)
6	Terraces - minor component	Late pleistocene and Holocene gravels, variable loess cover	5-100	Ngaio treeland(1) Kanuka shrubland(2) Mixed low forest and scrub (ngaio, kanuka, manuka, akiraho, <i>Hebe parviflora</i>)(1) Tauhinu - silver tussock shrub-tussockland(1) Silver tussock tussockland(1)	Ngaio-akiraho forest Mixed broadleaved forest(4) (akiraho, kanuka, ngaio, akeake, mapou, lancewood, <i>Hebe parviflora</i>) forest(1,4) Kanuka forest and treeland(7) Matai-totara forest(2,7) Kowhai - lowland ribbonwood - narrow-leaved lacebark - kaikomako forest and treeland(7) <i>Coprosma crassifolia</i> - <i>Coprosma propinqua</i> mixed shrubland and scrub(7) Silver tussock-danthonia grass- tussockland(7)
7	Fans - minor component	Late pleistocene and Holocene fan deposits	5-100	Tauhinu - silver tussock shrub-tussockland(1) Silver tussock tussockland (1) Kanuka shrubland(2)	Tauhinu scrub(7) Tutu forest Silver tussock tussockland(7) Akiraho-kanuka forest(7) <i>Coprosma crassifolia</i> - <i>Coprosma propinqua</i> mixed shrubland and scrub(7) Coastal broadleaved forest (mapou, mahoe, ngaio, kanuka, kohuhu, kaikomako) (7)
8	Minor meander floodplains – minor component	Recent alluvium and swamp deposits	5-50	Harakeke flaxland Raupo reedland Saltmarsh ribbonwood shrubland Mahoe-ngaio coastal forest Cabbage tree - harakeke flax treeland	Harakeke flaxland(7) Raupo reedland Saltmarsh ribbonwood shrubland Mahoe-ngaio coastal forest Cabbage tree - harakeke flax-treeland <i>Carex geminata</i> sedgeland(7) <i>Cyperus ustulatus</i> sedgeland Kahikatea forest and treeland

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
9	Storm beach ridges and active gravel beaches	Recent gravel beach deposits	0–5	Shore convolvulus sandfield Exotic grass- <i>Carex pumila</i> sedge-grassland Silver tussock - exotic grass tussockland Matagouri - <i>Melicytus</i> "Waipapa" - knobby clubrush rush-shrubland <i>Muehlenbeckia ephedroides</i> - matagouri-gorse shrub-stonefield <i>Melicytus</i> "Waipapa" - pohuehue - matagouri-gorse shrubland Gorse-ngaio shrubland	Shore convolvulus sandfield <i>Carex pumila</i> sedgeland Silver tussock tussockland ⁽⁷⁾ Matagouri - <i>Melicytus</i> "Waipapa" - knobby clubrush rush-shrubland Tauhinu - matagouri - knobby clubrush rush-shrubland <i>Muehlenbeckia ephedroides</i> - matagouri shrub-stonefield <i>Coprosma crassifolia</i> scrub and shrubland <i>Melicytus</i> "Waipapa" - pohuehue - matagouri shrubland Ngaio shrubland

Refer to Appendix 1 (Coastal Terrestrial Area - Biotic - South Marlborough) for references

Abiotic

The Vernon Coastal Terrestrial Area comprises predominately strongly rolling to moderately steep to steep, dissected hill country and the associated marginal high terraces. They are underlain by loess-mantled, weakly consolidated conglomerate or late Pleistocene and Holocene gravels. Steep deeply incised slotted gorges and gullies are common and extensive tunnel gully erosion is a feature, especially on mid and lower hill slopes with a sunny aspect. Streams are ephemeral and surface water resources are limited. This dissected hill country block terminates in the regionally significant White Bluff sea cliff overlooking Cloudy Bay. The hill country is bounded to the north by the Vernon Fault along which the 'abandoned Wairau sea cliffs' are preserved, and incorporates the seaward section of the nationally significant Awatere Fault trace. The associated marginal high terraces, minor fans and floodplains lie to the south of the Awatere Fault and extend to the Boundary Stream catchment. Storm beach ridges and active gravel beaches front the sea cliffs and seaward escarpments. The climate is hot, dry and windy, being exposed to desiccating north-westerly winds blowing down the Wairau and Awatere Valleys, especially in summer, and cold southerly winds off the Pacific Ocean. Elevation ranges from sea level to 280 m and rainfall from 600 to 800 mm per year.

Biotic

Summary analysis: Total area of Vernon Coastal Terrestrial Area is 651ha of which 36% is in native shrubland, 54% in pasture and 5% in vineyards/ orchards/ perennial crops. This biotic environment forms part of the Department of Conservation's Wither Hills Ecological District.

Originally there would have been coastal forest of ngaio, akiraho and akeake, possibly also containing totara and taupata, behind which would have been forest of totara, matai, black beech and kanuka. Lowland ribbonwood, narrow-leaved lacebark, kowhai and titoki may have occurred in the forest on terraces. Gullies probably had broadleaved species such as five-finger, mahoe, ngaio, akeake, kohuhu, mapou, lancewood, akiraho and titoki. There may have been a shore fringe of pingao, sand tussock and spinifex in places, with some matagouri. Actively eroding fans and



Above: *Carmichaelia muritai*, coastal tree broom

Coastal Terrestrial Area 12 : Vernon

riparian sites probably had matagouri, silver tussock, coastal shrub daisy, prostrate kowhai, tree hebe (*Hebe parviflora*), *Carmichaelia muritai* and *Melicytus* "Waipapa". Fauna would have included forest birds, coastal birds, reptiles (tuatara, skinks and geckos) and dryland invertebrates.

This Coastal Terrestrial Area is hot, dry and erosion-prone. It therefore has limited diversity of native vegetation and native fauna, but the considerable range of micro-sites confers some habitat diversity.

The coastal cliffs are mostly bare, due to constant erosion, but there are sparse patches of vegetation containing gorse, karamu, tutu, tauhinu, *Hebe stricta*, *Carmichaelia australis*, manuka, kanuka and akiraho. In the slot gorges in the cliffs are reclusive forests of ngaio, mahoe, akiraho, mapou, akiraho, akeake, kohuhu, five-finger and lancewood.

Hill slopes have remnant vegetation that includes silver tussock, matagouri, prostrate kowhai, *Coprosma crassifolia*, *C. propinqua*, manuka, kanuka and akiraho in various combinations. Kanuka attains forest height in places. On terraces and fans is a scattering of similar vegetation, with the addition of ngaio and tree hebe.

The following notable plant species are found: *Carmichaelia muritai* -t,e; coastal mat daisy -r, *Craspedia* "Marfells" -r,e; *Melicytus* "Waipapa", prostrate kowhai.

In terms of animals, kahu, pipit -r, red-billed gull -t, black shag -r, kingfisher, common gecko and common skink are all present.

For freshwater, this small Coastal Terrestrial Area immediately to the south of the Wairau lagoons encompasses several small catchments intersecting the coast. These streams are deeply incised through the mudstone and can be ephemeral in their lower reaches.

Experiential

The dramatic White Bluffs can be seen from the Wairau plain; however there is no access to this coastal area. Modification is limited to light grazing and the occasional farm track and farmstead. The White Bluffs form a visually strategic point along the Marlborough coast, acting as the headland that divides Cloudy Bay to the north from Clifford Bay to the south and are particularly memorable.

t = threatened nationally

r = at risk nationally

e = endemic to South Marlborough

ee = endemic to Vernon Coastal Terrestrial Area



Above: White Bluffs form a visually strategic and striking point along the Marlborough Coast

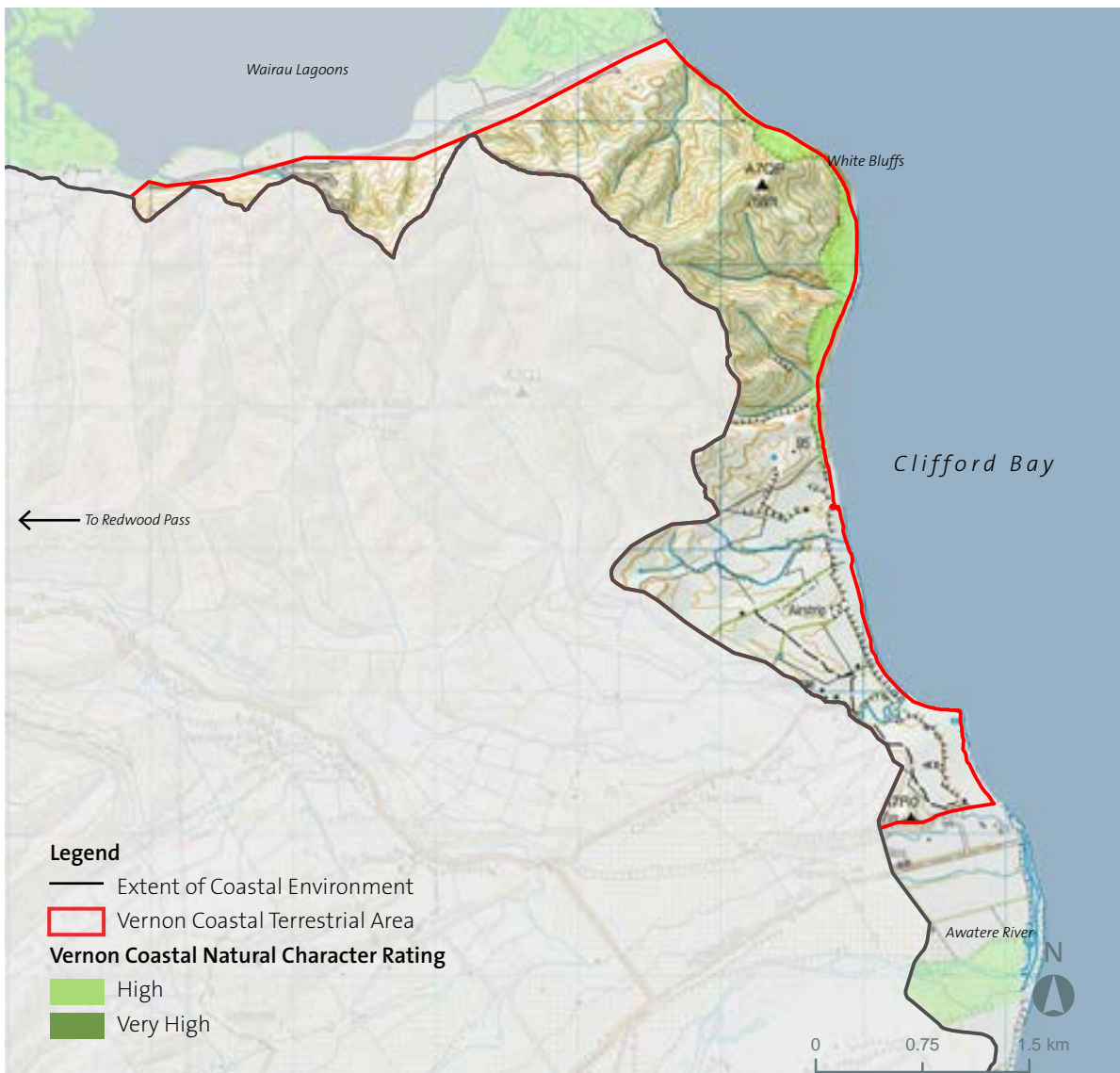
Level 3: Overall Area Rating for Vernon Coastal Terrestrial Area

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

Levels 4 & 5: Specific Parts within Coastal Terrestrial Area 12: Vernon Holding High or Very High Natural Character

Sub Area	Rating	Key Values	Additional Comments
White Bluffs	High	<p>The dissected hill country terminates in the regionally significant White Bluff sea cliff overlooking Cloudy Bay.</p> <p>With the constant erosion on these cliffs, vegetation is scarce, but it proliferates within the slot gorges where reclusive forests of ngaio, mahoe, akiraho, mapou, akiraho, akeake, kohuhu, five-finger and lancewood are found.</p> <p>The White Bluffs form a visually strategic and striking point along the Marlborough coast, acting as the headland that divides Cloudy Bay to the north from Clifford Bay to the south. Based on this they are extremely memorable.</p>	Area delimited by cliff faces only

Levels 4 & 5: Specific Parts within Vernon Coastal Terrestrial Area Holding High or Very High Natural Character



Coastal Terrestrial Area 13 : Awatere

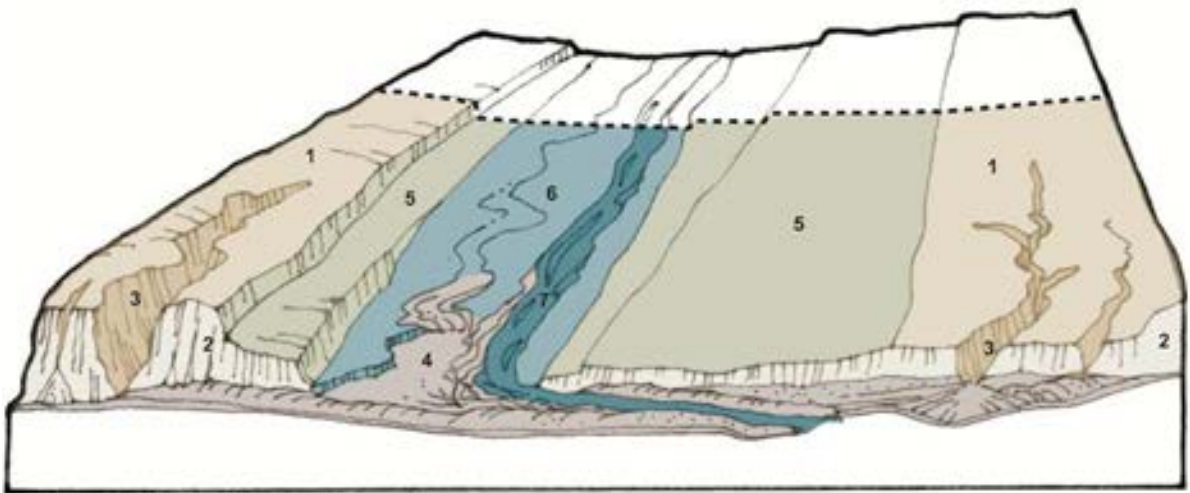
Collective Characteristics and Coastal Context

Carmichaelia muritai, Raoulia, black-fronted tern, banded dotterel, large dynamic river mouth ecosystem

This Coastal Terrestrial Area includes parts of two land types, the Lower plains, 13 and Plains – Recent floodplains and low terraces 14 (Refer to Appendix 5). It incorporates undulating loess mantled weakly dissected high and intermediate terrace treads terminating in low coastal cliffs and escarpments with active shoreline beaches and narrow vegetated dune-beach terraces seaward of the escarpments; and Recent floodplains and low terrace surfaces which transition seamlessly to an active river mouth-beach bar and lagoon complex or terminate in a low, 1-2 m wave cut escarpment. The active and recently abandoned floodplain comprises a complex braided gravel channel-bar and island micro topography. Small backswamps and lagoons are present at the mouths of the ephemeral minor streams. The climate is hot, dry and windy, and surface water resources are limited except adjacent to the major river channel. Elevation is less than 20 m.

The coastal context of the Awatere Coastal Terrestrial Area is predominantly flat, being the river plains of this large river. Much of the land use is dominated by vineyards, where occasional farmsteads are interspersed amongst the rows of the grapes. SH1 and the railway line are located some 9km inland from the coast. The Awatere Valley Road extends inland, along the north bank of the Awatere River and extends into Molesworth towards its headwaters. On the south bank of the Awatere River, the Marama Road connects many farmsteads and crosses the Awatere River to join the Awatere Valley Road just north of the Medway River.





Awatere Coastal Landform Components

--- Coastal Environment

1. Stony Terraces and Fans
2. Coastal Cliffs

3. Incised Gullies

4. Back Swamps and Lagoons and River Mouth Bar

5. Low Terraces

6. Recently abandoned flood plain

7. Active Braided Flood Plain

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
1	Well-drained stony fans and terraces	Late Pleistocene and Holocene alluvium, variable loess cover	0–20	There is virtually no native remnant vegetation remaining on this landform component. This area has been cultivated and converted to vineyards and cropping. Occasional occurrence of pohuehue or other shrubs along fencelines	Ngaio-akiraho forest Mixed broadleaved forest ⁽⁴⁾ (akiraho, kanuka, ngaio, akeake, mapou, lancewood, <i>Hebe parviflora</i>) forest ^(1,4) Matai-totara forest ^(7,2) Kanuka forest and treeland ⁽⁷⁾ Kowhai - lowland ribbonwood - narrow-leaved lacebark - kaikomako forest and treeland ⁽⁷⁾ <i>Coprosma crassifolia</i> - <i>Coprosma propinqua</i> - <i>Muehlenbeckia astonii</i> mixed shrubland and scrub ⁽⁷⁾ Silver tussock-danthonia grass-tussockland ⁽⁷⁾
2	Coastal cliffs and escarpments	Late Pleistocene and Holocene alluvium	0–20	Shore primrose herbfield ⁽¹⁾ Boxthorn-ngaio-karama shrubland ⁽²⁾ Karamu-wharariki shrubland ⁽¹⁾	Shore primrose herbfield ⁽¹⁾ Native iceplant herbfield ⁽²⁾ Ngaio-akiraho-mahoe forest ^(2,7) Karamu - wharariki flax-shrubland ⁽¹⁾
3	Steeply incised gullies and stream sides	Late Pleistocene and Holocene alluvium	0–20	Mahoe-ngaio coastal forest ⁽¹⁾	Mahoe-ngaio- mixed broad-leaf coastal forest ⁽¹⁾
4	Backswamps, lagoons and river mouth bar	Holocene and Recent alluvium	1–20	Harakeke flaxland ⁽²⁾ Raupo reedland ⁽²⁾ Saltmarsh ribbonwood shrubland ⁽¹⁾	(Kahikatea)/cabbage tree treeland ⁽⁷⁾ Harakeke flaxland ⁽²⁾ Raupo reedland ⁽²⁾ <i>Bolboschoenus medianus</i> sedgeland ⁽⁷⁾ Saltmarsh ribbonwood shrubland ⁽¹⁾

Coastal Terrestrial Area 13 : Awatere

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
5	Low terraces	Holo-cene and Recent alluvium	1–20	There is virtually no native remnant vegetation remaining on this landform component. This area has been cultivated and converted to vineyards and cropping. Occasional occurrence of pohuehue or other shrubs along fencelines	Kowhai - lowland ribbon-wood - narrow-leaved lace-bark forest ⁽⁷⁾ Kanuka scrub, treeland and forest. ⁽⁷⁾ Ngaio-akiraho forest Mixed broadleaved forest ⁽⁴⁾ (akiraho, kanuka, ngaio, akeake, mapou, lancewood, kaikomako, <i>Hebe parviflora</i>) forest ^(1,4) Matai-totara forest ^(7,2) <i>Coprosma crassifolia</i> - <i>Coprosma propinqua</i> mixed shrubland and scrub ⁽⁷⁾ Silver tussock-danthonia grass-tussockland ⁽⁷⁾
6	Recently abandoned braided floodplain	Holo-cene and Recent fluvial deposits	0–20	Mixed herb-grass-gravel-sandfield (<i>Raoulia australis</i> , <i>Muehlenbeckia axillaris</i> , <i>Epilobium spp.</i>) ⁽¹⁾	Mixed herb-grass-gravel-sandfield (<i>Raoulia australis</i> , <i>Muehlenbeckia axillaris</i> , <i>Epilobium spp.</i>) ⁽¹⁾ Tutu forest treeland and scrub ⁽⁷⁾ Kowhai - kanuka forest and treeland Coastal shrub daisy-matagouri-tauhinu - <i>Coprosma propinqua</i> - <i>Carmichaelia australis</i> scrub and shrubland
7	Active braided floodplain and river mouth bar	Holo-cene and Recent fluvial deposits	0–3	Mixed herb-grass-gravel-sandfield (<i>Raoulia australis</i> , <i>Raoulia tenuicaulis</i> , <i>Muehlenbeckia axillaris</i> , <i>Epilobium spp.</i>) ⁽¹⁾	Mixed herb-grass-gravel-sandfield (<i>Raoulia australis</i> , <i>Raoulia tenuicaulis</i> , <i>Muehlenbeckia axillaris</i> , <i>Epilobium spp.</i>) ⁽¹⁾

Refer to Appendix 1 (Coastal Terrestrial Area - Biotic - South Marlborough) for references

Abiotic

The Awatere Coastal Terrestrial Area extends from the northern boundary of Boundary Stream south to Station Creek. It comprises predominantly loess mantled weakly dissected high and intermediate terrace treads terminating in low coastal cliffs and escarpments with active shoreline beaches and narrow vegetated dune/beach terraces seaward of the escarpments. The Recent floodplains and low terrace surfaces transition seamlessly to an active river mouth/ beach bar and lagoon complex or terminate in a low, 1-2m wave cut escarpment. The active and recently

abandoned floodplain comprises a complex braided gravel channel-bar and island micro topography. Small backswamps and lagoons are present at the mouths of the ephemeral minor streams. Surface water resources are limited except adjacent to the major river channel. The climate is hot, dry and windy being expose to desiccating north-westerly winds blowing down the Awatere Valley, especially in summer, and subject to cool southerly winds off the Pacific Ocean. Elevation ranges from 0 to 20 m, and rainfall from 600 to 700 mm per year.



Above: Awatere River Mouth and Lagoon.

Biotic

Summary analysis: Total area of Awatere Coastal Terrestrial Area is 139ha of which 2% is in native shrubland, 4% in exotic treeland, 70% in pasture and 6% in vineyards/orchards/perennial crops. This biotic environment forms part of the Department of Conservation's Grassmere Ecological District.

Originally there would have been coastal forest of ngaio, akiraho and akeake, possibly also containing *Carmichaelia muritai* and totara, behind which would have been terrace forest of totara, matai and kanuka. Lowland ribbonwood, narrow-leaved lacebark and kowhai may also have occurred in the forest on terraces. On the recently abandoned floodplain was probably a mosaic of open gravel and sand with low-growing plants, mixed coastal scrub and forest and treeland of tutu, kowhai and kanuka. Gullies and stream sides probably had broadleaved species such as five-finger, mahoe, ngaio, akeake, kohuhu, mapou and akiraho. At the mouths of the small streams would have been combinations of saltmarsh ribbonwood, raupo, harakeke, various sedges, manuka and kahikatea. The active braided floodplain and river mouth bar would have supported ephemeral communities of low-growing plants. Fauna would have

included forest birds, braided river birds, wetland birds, coastal birds, fish, reptiles (tuatara, skinks and geckos) and dryland and wetland invertebrates.

This Coastal Terrestrial Area is hot, dry and dynamic. It has limited habitat diversity and has largely been denuded of native vegetation. The lower portion of the river, notably the floodplain, is highly important for birds such as black-billed gull, black-fronted tern and banded dotterel. The river itself is important habitat for freshwater fish (bullies, galaxids, eels and torrentfish).

The terraces and risers are virtually lacking in native plants. The floodplains and river mouth bar have sparse low-growing plants including *Raoulia australis*, *R. tenuicaulis*, *Muehlenbeckia axillaris* and *Epilobium spp.* The coastal cliffs and escarpments are largely bare, but karamu, ngaio and wharariki occur there.

In the incised gullies and on stream sides is forest of ngaio and mahoe and some harakeke with cabbage trees. *Carmichaelia muritai* is present. At the mouths of the streams are wet areas containing harakeke, raupo and saltmarsh ribbonwood. ►

Coastal Terrestrial Area 13 : Awatere



Above: Awatere River Mouth Lagoon

The following are notable plant species found : *Carmichaelia muritai* -t,e, ngaio, mahoe, harakeke, raupo, *Raoulia australis*, *Muehlenbeckia axillaris* and saltmarsh ribbonwood.

In terms of animals, kahu, , pipit -r, red-billed gull -t, black-billed gull -t, black-fronted tern -t, Caspian tern -t, banded dotterel -t, black-fronted dotterel -r, black shag -r, little shag, pied stilt -r, kingfisher, common gecko, common skink, inanga -r, common bully, upland bully, bluegill bully -r, giant bully, torrentfish -r, longfin eel -r and shortfin eel are all present.

For freshwater, this Coastal Terrestrial Area includes the lower Awatere, Blind and Station Creek watercourses, including a lagoon complex at the mouth of the Awatere. The dynamic coastal environment and intermittent opening of the smaller river mouths influences freshwater-brackish habitat and biota. The lower river zones under tidal influence support freshwater fish e.g. inanga, common bully, upland

bully, giant bully, bluegill bully, torrentfish, longfin eel and shortfin eel habitat with probable inanga spawning. There is limited brown trout habitat in the Awatere. Avifauna in the Awatere mouth and lower river zone includes banded dotterel, black-fronted dotterel, black-fronted terns.

Experiential

SH1 and the railway line travel in land from this coastal area with only limited access gained from a small number of roads either side of the Awatere River mouth. Recreation fishing and whitebaiting occur in the lower river and mouth zone of the Awatere. The landscape is generally flat and terraced and mainly planted with vines. Modification is moderate.

t = threatened nationally
 r = at risk nationally
 e = endemic to South Marlborough

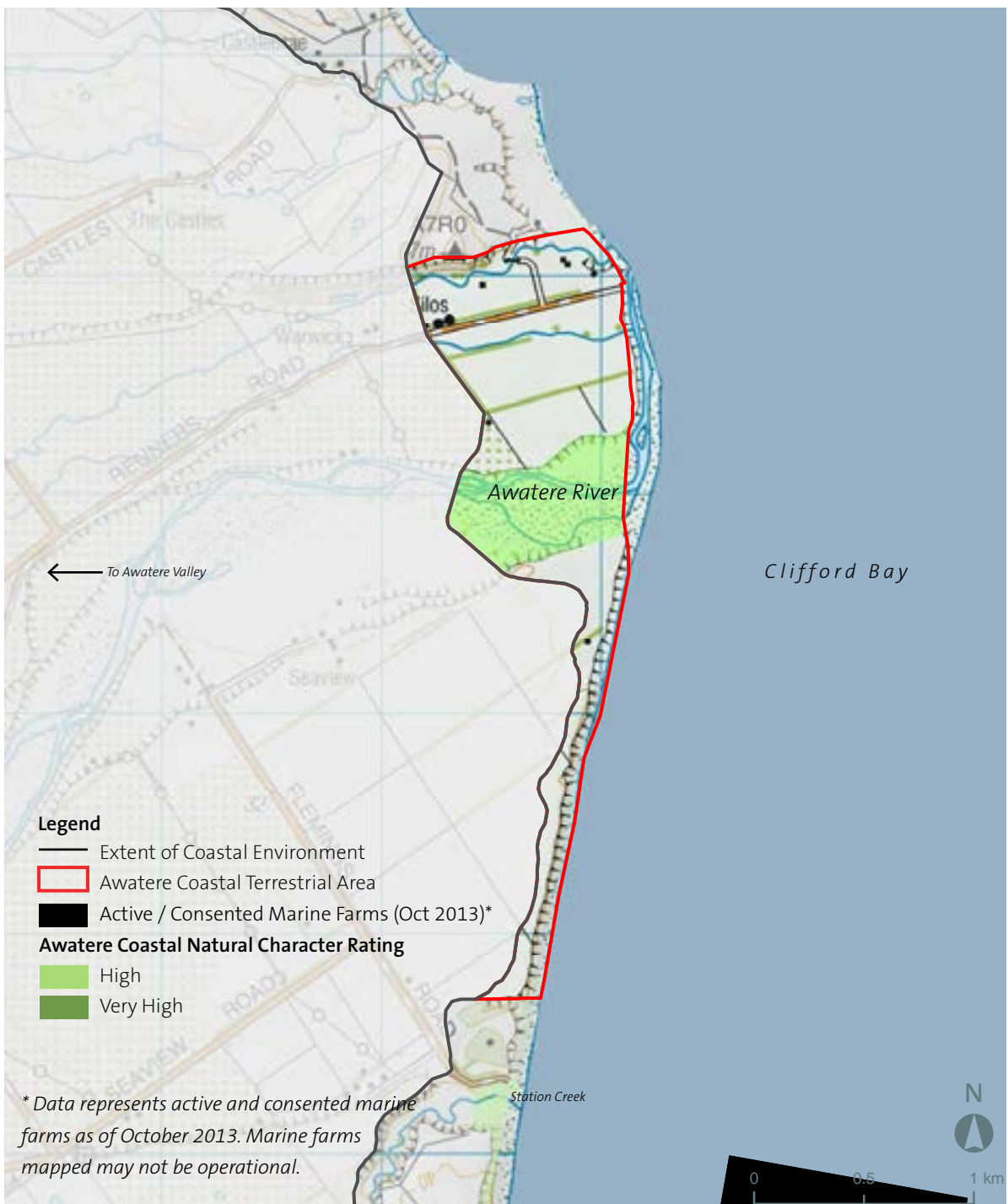
Level 3: Overall Area Rating for Awatere Coastal Terrestrial Area

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 - High

Levels 4 & 5: Specific Parts within Coastal Terrestrial Area 13: Awatere Holding High or Very High Natural Character

Sub Area	Rating	Key Values	Additional Comments
Awatere River Mouth	High	Incised gullies to river mouth containing ngaio, mahoe and harakeke forest Lower part of river important habitat for freshwater fish (bullies, galaxids, eels and torrentfish.	Contained by river cliffs.

Levels 4 & 5: Specific Parts within Awatere Coastal Terrestrial Area Holding High or Very High Natural Character



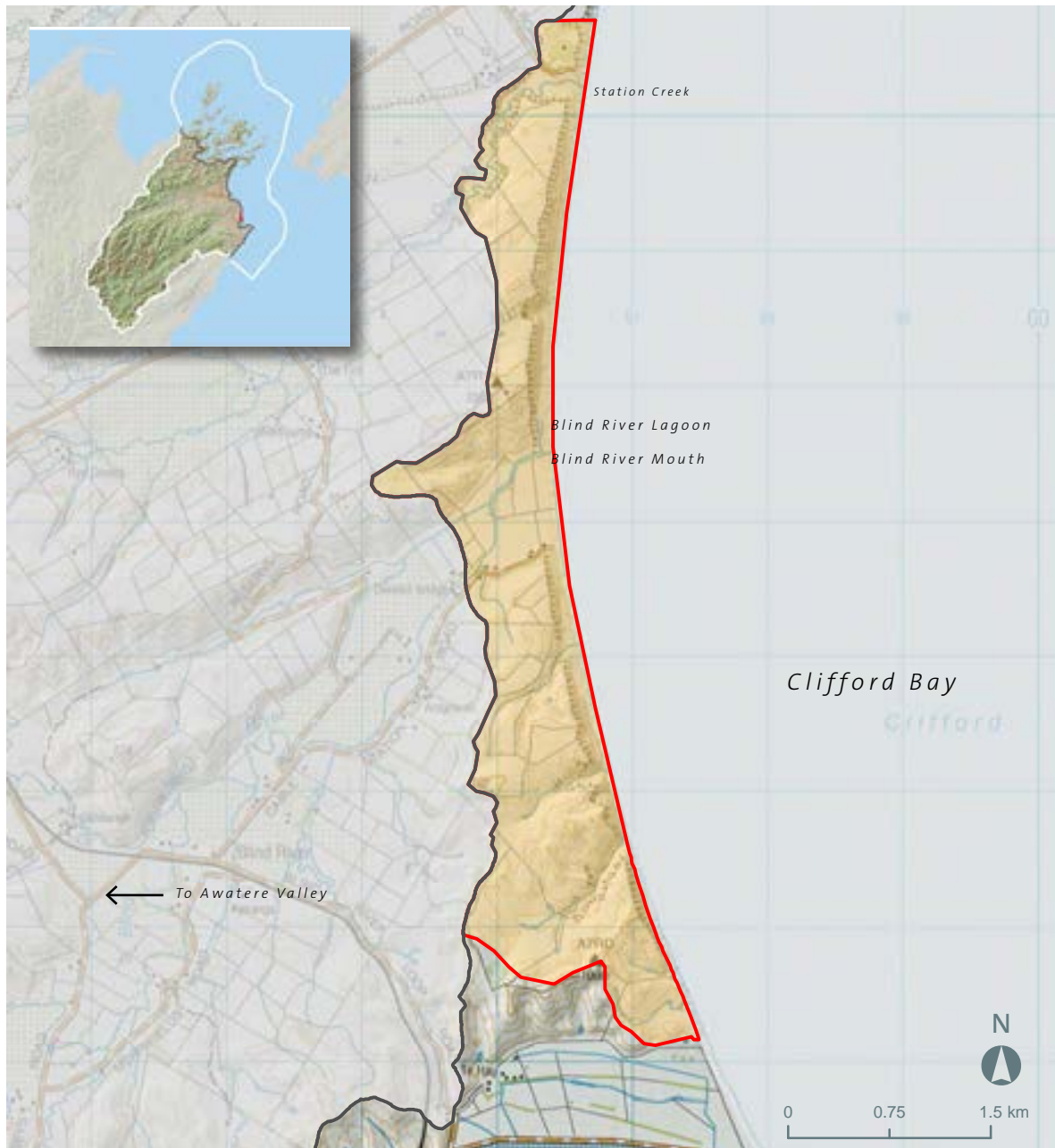
Coastal Terrestrial Area 14 : Blind

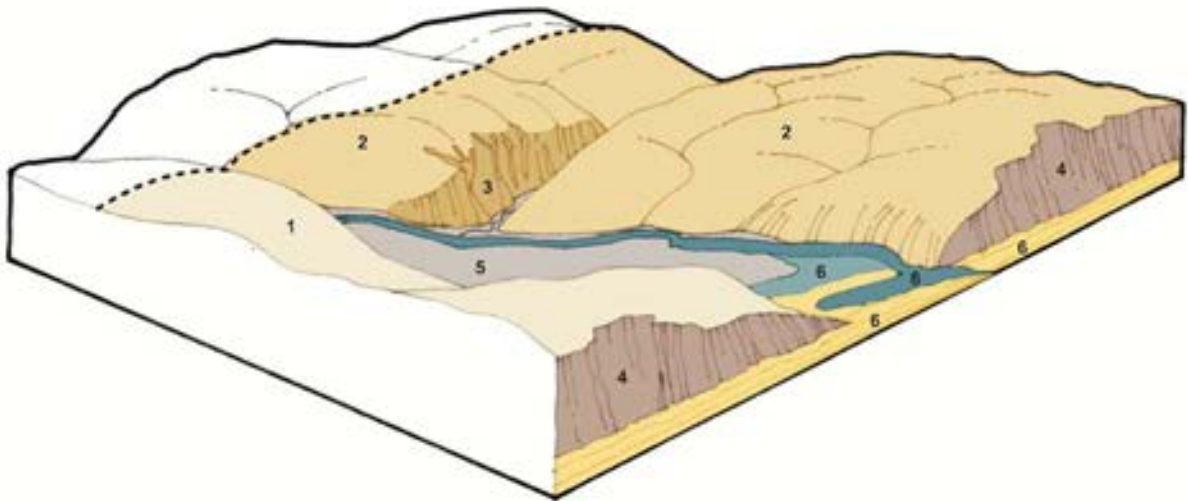
Collective Characteristics and Coastal Context

Shrubby tororaro, ngaio, Hebe stenophylla, Senecio hauwai, scaup, banded dotterel, river mouth and coastal cliff ecosystems.

This Coastal Terrestrial Area includes part of the Northern loess-mantled soft rock hills and downs land type 16 (Refer to Appendix 5). It encompasses smooth, rounded, rolling to strongly rolling and moderately steep weakly dissected hill country and associated valley floor landscapes underlain by loess-mantled weakly consolidated, siltstone, sandstone and conglomerates terminating in steep to very steep wave cut coastal cliffs and escarpments. The valley floor depositional landforms are dominated by late Pleistocene and Holocene gravels with variable loess cover and fine grained silts, sands and swamp deposits. The Blind (Otuwhero) River, most significant valley, terminates in a small river mouth backswamp-lagoon developed behind and inland of a coastal sand dune-active beach complex. The climate is hot, dry and windy. Surface water resources are limited and the streams including the Blind (Otuwhero) River are ephemeral.

The coastal context is defined by the upper catchment of the Blind River and its tributaries. Numerous roads criss-cross the farmed, undulating landscape with the small settlement of Seddon located on the upper banks of the south bank of the Awatere River. SH1 and the railway line sinuously weave through the undulating agricultural landscape.





Blind Coastal Landform Components

- Coastal Environment
- 1. Rolling Slopes
- 2. Spurs and Summits

- 3. Steep Slopes With Tunnel Gully Erosion
- 4. Coastal Cliffs
- 5. Valley Floor

- 6. Active Beach Bar, Lagoon & BackSwamp

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
1	Rolling to strongly rolling loess-mantled 'soft' rock erosional hill slopes	Loess over Tertiary aged poorly bedded sandstones, siltstones and conglomerate	0–110	There is virtually no native remnant vegetation remaining on this landform component, This area has been cultivated and converted to vineyards and cropping.	Matai-totara-titoki-mahoe forest ^(1,6) Ngaio-akiraho-mahoe-forest ^(1,6) Matai- kowhai - narrow-leaved lacebark forest and treeland ⁽⁷⁾ Kanuka-manuka scrub and forest ^(1,6) Tauhinu-coastal shrub daisy - <i>Carmichaelia australis</i> - <i>Muehlenbeckia astonii</i> - <i>Coprosma propinqua</i> - <i>Coprosma crassifolia</i> mixed shrubland and scrub ⁽⁷⁾ Fescue - silver tussock tussockland ^(1,6)
2.	Spur crests and summits	Thin loess over Tertiary aged poorly bedded sandstones, siltstones and conglomerate	50–110	There is virtually no native remnant vegetation remaining on this landform component, This area has been cultivated and converted to vineyards and cropping.	Silver tussock tussockland ⁽⁷⁾ <i>Sophora prostrata</i> - coastal shrub daisy - tauhinu - <i>Melicytus</i> "Waipapa" - <i>Muehlenbeckia astonii</i> - <i>Carmichaelia australis</i> mixed scrub and shrubland ⁽⁷⁾ Tauhinu-coastal shrub daisy - <i>Coprosma propinqua</i> - <i>Coprosma crassifolia</i> mixed shrubland and scrub ⁽⁷⁾ Wharariki flaxland ⁽⁷⁾ Akiraho-kowhai-kanuka forest ^(2,7)

Coastal Terrestrial Area 14 : Blind

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
3	Loess-mantled 'soft' rock strongly rolling to moderately steep hill slopes, with extensive tunnel gully erosion	Loess over Tertiary aged poorly bedded sandstones, siltstones and conglomerate	0–110	Matagouri - <i>Melicytus</i> "Waipapa"-briar shrubland ⁽¹⁾ Matagouri - coastal shrub daisy - briar shrubland ⁽¹⁾ Bracken fernland ⁽¹⁾ Silver tussock tussockland ⁽¹⁾ Ngaio-mahoe shrubland ⁽¹⁾ Akiraho forest and tree-land ⁽¹⁾ Manuka - coastal shrub daisy- <i>Hebe stenophylla</i> scrub ⁽¹⁾ Coastal shrub daisy - manuka shrubland ^(2,9) Manuka-akiraho- <i>Hebe stenophylla</i> scrub ⁽¹⁾ <i>Muehlenbeckia astonii</i> shrubland ⁽²⁾ Tauhinu shrubland ⁽⁸⁾ Boxthorn-matagouri shrubland ⁽²⁾	Manuka scrub and forest Akiraho - kanuka-manuka forest ⁽¹⁾ Kanuka shrubland and forest ⁽²⁾ Coastal broadleaved forest (mapou, mahoe, ngaio, akiraho, akeake, kohuhu, five-finger, lancewood) ⁽⁷⁾ Black beech - matai-titoki forest ^(2,7)
4	Coastal cliffs and escarpments (including steeply incised coastal gullies)	Tertiary aged poorly bedded sandstones, siltstones and conglomerate	0–80	Ngaio low forest and scrub ⁽¹⁾ Akiraho-ngaio-coastal tree broom low forest and scrub ⁽¹⁾ Ngaio-pohuehue vine-treeland Ngaio-mahoe low forest ⁽¹⁾ Native ice plant herb-rockland ⁽¹⁾ Mosaic of scattered shrubland, herbfield and grassland on mudstone bluffs ⁽¹⁾ Herbfield on mudstone (Plantago spathulata, Microseris scapigera, Spargularia tasmanica, shore primrose, Senecio aff. glaucophyllus, Senecio hauwai) ^(2,7,10) Coastal shrub daisy - tauhinu shrubland ^(2,10) Wharariki-manuka shrub-flaxland ⁽²⁾	Mahoe-titoki-ngaio forest and treeland Akiraho-ngaio - coastal tree broom low forest and scrub ⁽¹⁾ Manuka - kanuka scrub and forest ^(1,6) Fescue - silver tussock tussockland ^(1,6) Native ice plant herb-rockland ⁽¹⁾ Herbfield on mudstone (Plantago spathulata, Microseris scapigera, Spargularia tasmanica, shore primrose, Senecio aff. glaucophyllus, Senecio hauwai) ^(2,7,10)
5.	Minor valley floor meander floodplains and low terraces, e.g., Blind (Otuwhero) River	Recent alluvium and swamp deposits, late Pleistocene and Holocene gravels, variable loess cover	0–10	Harakeke flaxland ⁽¹⁾ Harakeke - sea rush flaxland ⁽¹⁾ Raupo reedland ⁽¹⁾ Matagouri shrubland ⁽¹⁾ <i>Melicytus</i> "Waipapa"- pohuehue -danthonia shrub-grassland ⁽¹⁾ Crack willow-harakeke treeland ⁽¹⁾	Kahikatea-cabbage tree forest ^(1,6,7) Harakeke flaxland ⁽¹⁾ Harakeke - sea rush flaxland ⁽¹⁾ Raupo reedland ⁽¹⁾ <i>Carex secta</i> tussockland ⁽⁷⁾ <i>Carex geminata</i> sedgeland ⁽¹⁾ Matai-totara-titoki-mahoe forest Mahoe-titoki -ngaio forest ^(1,6) Manuka - kanuka scrub ^(1,6) Kowhai - narrow-leaved lacebark - lowland ribbonwood, kaikomako forest and treeland Silver tussock-pohuehue vine-tussockland ^(1,6,7)

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
6	Active beach, bar, lagoon backswamp and minor dune complexes	Holocene and Recent beach, lagoon and swamp and dune deposits	0–5	Glasswort - <i>Atriplex prostrata</i> salt marsh herbfield ⁽¹⁾ Three square sedgeland ⁽¹⁾ Saltmarsh ribbonwood shrubland ⁽¹⁾ <i>Lilaeopsis ruthiana</i> aquatic herbfield ⁽¹⁾ Sea rush rushland ⁽¹⁾ Sea rush - kneed foxtail - glasswort rush - herbfield ⁽¹⁾	Glasswort - salt marsh herbfield ⁽¹⁾ Three square sedgeland ⁽¹⁾ Saltmarsh ribbonwood shrubland ⁽¹⁾ <i>Lilaeopsis ruthiana</i> aquatic herbfield ⁽¹⁾ Sea rush rushland ⁽¹⁾ Sea rush - glasswort rush - herbfield ⁽¹⁾ (Kahikatea)/cabbage tree - kaikomako - harakeke-toetoe flax-treeland ⁽¹⁾

Refer to Appendix 1 (Coastal Terrestrial Area - Biotic - South Marlborough) for references

Abiotic

The Blind Coastal Terrestrial Area extending south from Station Creek to the northern slopes of the Lake Grassmere catchment, comprises smooth, rounded, rolling to strongly rolling and moderately steep weakly dissected hill country and associated valley floor landscapes. The hill country is underlain by loess-mantled weakly consolidated, poorly bedded siltstone, sandstone and conglomerates, while the valley floor depositional landforms are dominated by late Pleistocene and Holocene gravels with variable loess cover and fine grained silts, sands and swamp deposits. The weakly dissected hill country terminates in steep to very steep wave cut coastal cliffs and escarpments dissected by steep incised gullies. Colluvial toeslopes and/or basal cliff beach sand dune belts are rarely present. The most significant valley floor meandering floodplain-low terrace sequence occupies the Blind (Otuwhero) River valley, terminating in a small river mouth backswamp-lagoon developed behind and inland of a coastal sand dune-active beach complex. Surface water resources are limited and the streams including the Blind (Otuwhero) River are ephemeral. The climate is hot, dry and windy. Elevation ranges from 0 to 110 m and rainfall from 600 to 750 mm per year.

Biotic

Summary analysis: Total area of Blind Coastal Terrestrial Area is 519ha of which 0.2% is in native forest, 3% in native shrubland, 1% in exotic treeland, 84% in pasture and 10% in vineyards/orchards/perennial crops This biotic environment forms part of the Department of Conservation's Grassmere Ecological District.

Originally there would have been coastal forest of ngaio, akiraho and akeake, possibly also containing *Carmichaelia muritai* and totara, behind which would have been forest of totara, matai, black beech and kanuka. Lowland ribbonwood, narrow-leaved lacebark, titoki and kowhai may also have occurred in the forest. On the swampy valley floor was probably kahikatea-cabbage tree forest, and areas of harakeke, raupo and tussock sedges.

At the mouth of the river would have been combinations of saltmarsh ribbonwood, sea rush, various sedges, glasswort and aquatic herbs, with a backing of harakeke, toetoe, cabbage trees and perhaps kahikatea. Coastal cliffs and escarpments would have had a mix of coastal forest, scrub and herbaceous shore specialists. Fauna would have included forest birds, wetland birds, coastal birds, fish, reptiles (tuatara, skinks and geckos) and dryland and wetland invertebrates.

This Coastal Terrestrial Area is hot, dry and dynamic. It has limited habitat diversity and has largely been denuded of native vegetation. The lower portion of the river is important for birds such as waterfowl, shags and banded dotterel. It is also important for freshwater fish (galaxids, bullies and eels).

The hill slopes have a scattering of native vegetation, mostly induced shrubland. The main plants are silver tussock, matagouri, bracken, coastal shrub daisy, manuka, tauhinu, *Hebe stenophylla* and *Meliccytus* "Waipapa". Shrubby tororaro is present. There are pockets of forest and treelands of ngaio, mahoe, akiraho and kanuka. Manuka and kanuka are dominant in the tunnel erosion area.

Coastal Terrestrial Area 14 : Blind

The coastal cliffs and escarpments have some low forest and scrub of ngaio and akiraho, wharariki and a scattering of other shrubs, grasses and herbs.

The river valley floor has harakeke and raupo where wet and matagouri, *Melicytus* "Waipapa", pohuehue and danthonia where drier. At the river mouth and beach are saltmarsh ribbonwood, sea rush, glasswort, three square and aquatic herbs.

The following notable plant species are found: *Senecio hauwai* -t,e; shrubby tororaro -t; sand spurge -r; ngaio, mahoe, harakeke, raupo, kanuka, manuka, saltmarsh ribbonwood, *Hebe stenophylla* and *Melicytus* "Waipapa".

In terms of animals, pipit -r, welcome swallow, red-billed gull -t, scaup, black swan, paradise shelduck, banded dotterel -t, black shag -r, little shag, kingfisher, common gecko, common skink, inanga -r, common

t = threatened nationally

r = at risk nationally

e = endemic to South Marlborough

bully, upland bully, longfin eel -r, shortfin eel, shield shrimp and koura are all present.

For freshwater, this Coastal Terrestrial Area includes several small water courses with the Blind River (Otuwhero) the largest of these. The lower Blind River and lagoon habitat support banded dotterel, black shag, scaup and other waterfowl. Fish species recorded include inanga, common and upland bully, longfin and shortfin eel. Whitebait fishing occurs when the lagoon is open to the sea and some waterfowl hunting occurs. Invertebrate communities include shield shrimp and koura.

Experiential

SH1 and the railway line travel in land along this Coastal Terrestrial Area with Flemings Road (near Station Creek) and Cable Station Road providing access to the coast. The gently undulating, predominantly grazed land south of the Awatere River mouth terminates at the beach edge by a small coastal cliff. This area forms the central part of Clifford Bay.



Above: The Blind River Mouth contains threatened plant species

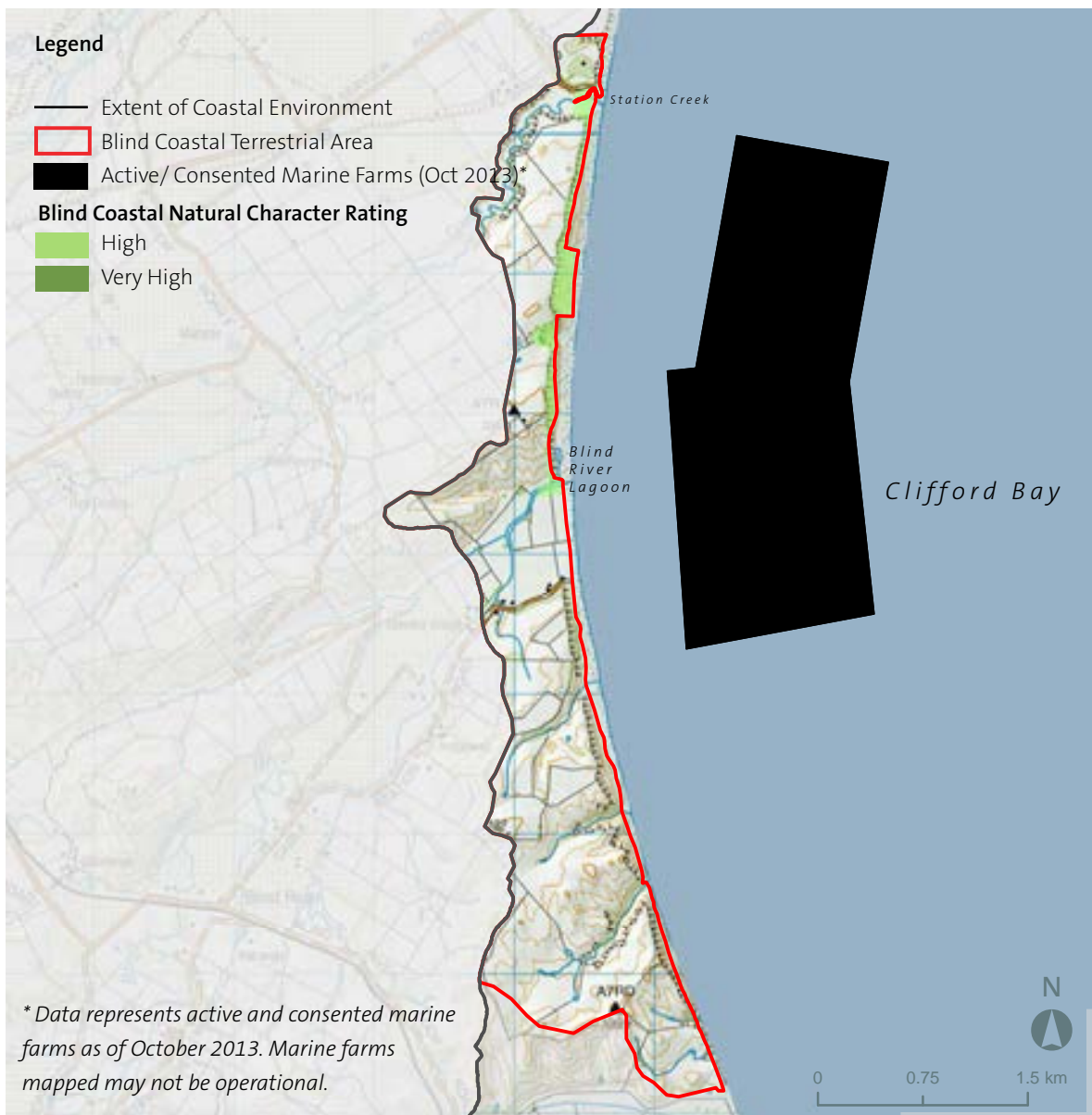
Level 3: Overall Area Rating for Blind Coastal Terrestrial Area

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 - High

Levels 4 & 5: Specific Parts within Coastal Terrestrial Area 14: Blind Holding High or Very High Natural Character

Sub Area	Rating	Key Values	Additional Comments
Blind (Otuwhero) River Mouth & coastal cliffs	High	<p>The most significant valley floor meandering floodplain-low terrace sequence occupies the Blind (Otuwhero) River valley, terminating in a small river mouth backswamp-lagoon developed behind and inland of a coastal sand dune-active beach complex.</p> <p>Remnant coastal escarpment forest support nationally threatened species [coastal treebroom].</p> <p>The lower Blind River and lagoon habitat support banded dotterel, black shag, scaup and other waterfowl.</p>	

Levels 4 & 5: Specific Parts within Blind Coastal Terrestrial Area Holding High or Very High Natural Character



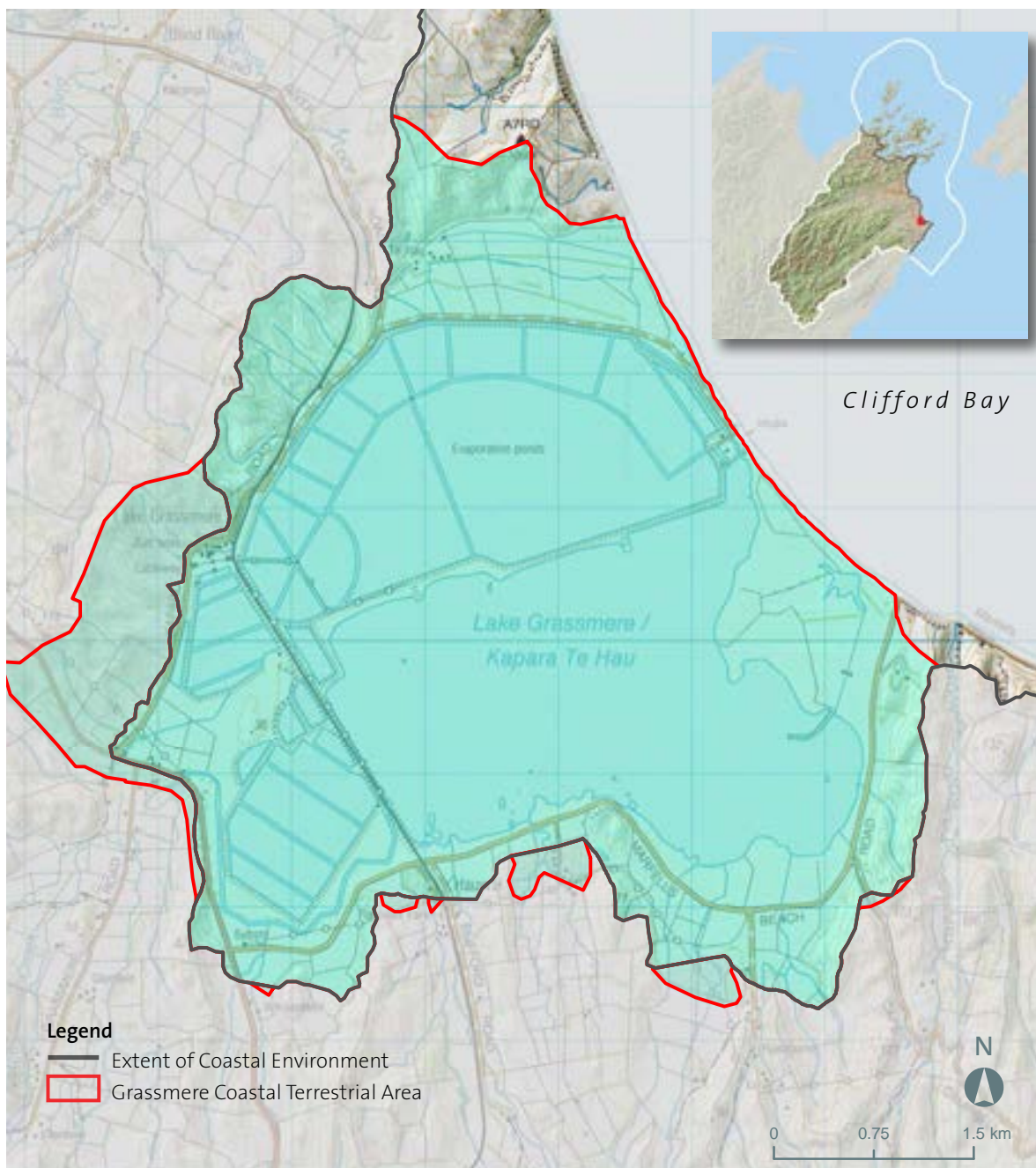
Coastal Terrestrial Area 15 : Grassmere

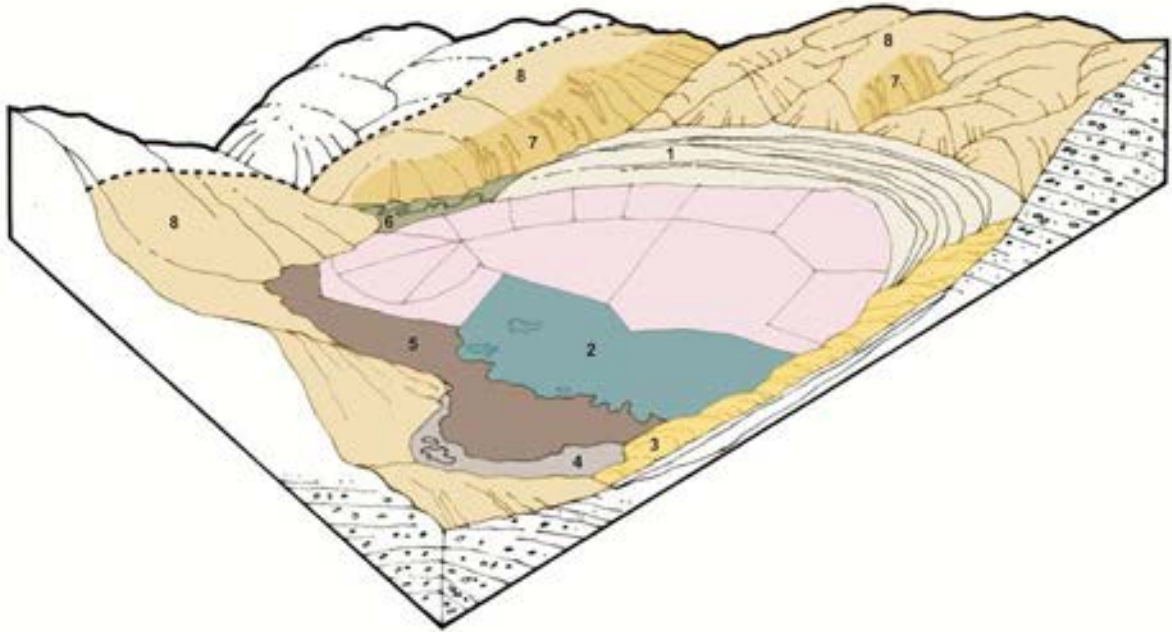
Collective Characteristics and Coastal Context

Glasswort, spinifex, silver tussock, prostrate kowhai, black-fronted tern, saline lake ecosystem.

This Coastal Terrestrial Area includes parts of the Plains–coastal fringe land type 12, and Northern loess-mantled soft rock hills and downs land type 16 (Refer to Appendix 5). It encompasses Lake Grassmere, the basin floor and shoreline features, and the surrounding eroding hill slopes. It includes undulating to rolling marine gravel beach ridges and associated inter-ridge wetlands, saline estuarine-lake and wetland deposits, the narrow sand dune covered boulder bank, and low gradient meandering floodplains. The moderately steep to steep hill country is underlain by loess-mantled weakly consolidated, siltstone, sandstone and conglomerates. The climate is hot, dry and windy. Surface water resources are very limited and the streams are ephemeral. Elevation ranges from 0 to 120 m above sea level.

The coastal context is characterised by a series of low undulating cleared hills, where a network of small watercourses, many of which are ephemeral, dissect the landscape and drain into Lake Grassmere.





Grassmere Coastal Landform Components

••• Coastal Environment

- 1. Gravel Beach Ridges
- 2. Saline Lake
- 3. Sand Dunes
- 4. Backswamps

- 5. Sand Plains
- 6. Meander Floodplain
- 7. Steep Slopes With Tunnel Erosion

- 8. Rolling Slopes and Spurs
- Eutrophic waterbody

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
1	Gravel beach ridges, wetlands and bar	Holocene and Recent beach gravel with minor dune sands	0–20	No native vegetation remaining on this landform component.	Matagouri - <i>Melicytus</i> "Waipapa" - knobby clubbrush shrubland Matagouri stonefield Tauhinu - matagouri - knobby clubbrush rush-shrubland <i>Muehlenbeckia ephedroides</i> - matagouri - <i>Coprosma propinqua</i> shrub-stonefield <i>Pimelea prostrata</i> ⁽³⁾ - <i>Raoulia</i> "hookeri coast" herb-sandfield <i>Coprosma crassifolia</i> scrub and shrubland <i>Melicytus</i> "Waipapa" - pohuehue - matagouri shrubland Kanuka (± manuka) open forest and treeland Ngaio-akiraho-akeake open forest ⁽⁴⁾ and treeland Totara-matai-kanuka open forest ⁽¹⁾ and treeland

Coastal Terrestrial Area 15 : Grassmere

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
2	Saline lake and estuary fringes	Holocene and Recent fluvial and lagoonal deposits	0–3	Glasswort salt-herbfield Glasswort - Puccinellia stricta salt-herbfield(1) Sea rush rushland Three square sedgeland(1) Bolboschoenus caldwellii - clubrush sedgeland Bolboschoenus caldwellii - three square sedgeland Saltmarsh ribbonwood - sea rush shrubland Saltmarsh ribbonwood shrubland Saltmarsh ribbonwood - oioi rush-shrubland Mimulus repens herb-siltfield Selliera radicans - glasswort herbfield Samolus-Selliera - glasswort herbfield(1) Carex litorosa tussockland(5)	Glasswort salt herbfield Glasswort - Puccinellia stricta salt-herbfield(1) Glasswort - sea primrose - remuremu - Leptinella dioica salt-herbfield Sea rush rushland Three square sedgeland(1) Bolboschoenus caldwellii - clubrush sedgeland Bolboschoenus caldwellii - three square sedgeland Saltmarsh ribbonwood - sea rush shrubland Saltmarsh ribbonwood shrubland Saltmarsh ribbonwood - oioi rush-shrubland Mimulus repens herb-siltfield Selliera radicans - glasswort herbfield Samolus-Selliera - glasswort herbfield(1) Carex litorosa tussockland(5)
3	Coastal beach sand dune complexes	Holocene and Recent dune sand	0–5	Shore convolvulus sandfield <i>Carex pumila</i> sandfield Spinifex grassland Pingao - spinifex - sand tussock grass-sedgeland Sand coprosma shrubland	Shore convolvulus sandfield <i>Carex pumila</i> sandfield Knobby clubrush sedgeland Knobby clubrush - danthonia sedge-grassland Knobby clubrush - pingao - <i>Raoulia "hookeri coast"</i> mat-sedgeland Spinifex grassland Pingao - spinifex - sand tussock grass-sedgeland Sand coprosma shrubland Pohuehue vineland Matagouri shrubland Matagouri - knobby clubrush rush-shrubland Coastal shrub daisy shrubland
4	Backswamps	Holocene and Recent alluvium and organic deposits	0–5	Oioi-saltmarsh ribbonwood shrub-rushland Raupo reedland in wetland swales Harakeke flaxland in wetland swales Cabbage tree - harakeke flax-treeland <i>Cyperus ustulatus</i> sedgeland in wetland swales Manuka forest and scrub on wetland margins <i>Carex secta</i> sedgeland in wetland swales Kahikatea - cabbage tree forest	Raupo reedland in wetland swales Harakeke flaxland in wetland swales <i>Cyperus ustulatus</i> sedgeland(5) in swales Manuka forest and scrub on wetland margins <i>Carex secta</i> sedgeland in wetland swales Kahikatea-cabbage tree - kaikomako forest on wetland margins

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
5	Sand plains	Holocene and Recent sands and lagoonal deposits	0–5	No native vegetation remaining on this landform component	Oioi-saltmarsh ribbonwood shrub-rushland(1) Saltmarsh ribbonwood - knobby clubrush - pohuehue vine-rush-shrubland Knobby clubrush - danthonia-grassland(1) Silver tussock - knobby clubrush rush-tussockland Pohuehue vineland(7) Matagouri shrubland Tauhinu - matagouri - knobby clubrush rush-shrubland(7) Coprosma propinqua - Coprosma crassifolia - Melicytus “Waipapa” - pohuehue - Muehlenbeckia astonii - matagouri - Carmichaelia australis mixed scrub and shrubland(7) Kanuka (± manuka) forest and treeland Ngaio forest(4) Totara-matai-titoki-kanuka forest(1,7) Kowhai - narrow-leaved lacebark - lowland ribbonwood - kaikomako forest and treeland(7)
6	Low gradient minor valley floor meander floodplains	Recent alluvium and swamp deposits, late Pleistocene and Holocene gravels, variable loess cover	0–10	No native vegetation remaining on this landform component	Kahikatea - cabbage tree - kaikomako forest(1,6,7) Harakeke flaxland(1) Cabbage tree - harakeke - flax-treeland Raupo reedland(1) Carex secta tussockland(7) Carex geminata sedgeland(7) Cyperus ustulatus sedgeland(7) Manuka scrub and forest
7	Loess-mantled ‘soft’ rock strongly rolling to moderately steep hill slopes, with extensive tunnel gully erosion	loess over weakly consolidated siltstone, sandstone and conglomerate	0–120	Silver tussock tussockland Carmichaelia australis - silver tussock tussock-shrubland Coprosma propinqua - tauhinu - coastal shrub daisy - Melicytus “Waipapa” - pohuehue - Muehlenbeckia astonii - matagouri - Carmichaelia australis mixed scrub and shrubland	Manuka scrub and forest Coprosma propinqua - tauhinu - coastal shrub daisy - Melicytus “Waipapa” - pohuehue - Muehlenbeckia astonii - matagouri - Carmichaelia australis mixed scrub and shrubland Akiraho - kanuka-manuka forest(1) Kanuka shrubland and forest(2) Kowhai - mixed broadleaved forest (mapou, mahoe, ngaio, akiraho, akeake, kohuhu, five-finger, lancewood)(7) Black beech - matai-titoki forest(2,7)

Coastal Terrestrial Area 15 : Grassmere

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
8	Loess-mantled 'soft' rock rolling to strongly rolling hill slopes and spurs	Loess over weakly consolidated siltstone, sandstone and conglomerate	0–80	Manuka scrub ⁽¹⁾ Kanuka - akiraho forest ⁽¹⁾ Kanuka shrubland ⁽²⁾	Manuka forest Akiraho - kanuka-manuka forest Coastal broadleaved forest (mapou, mahoe, ngaio, akiraho, akeake, kohuhu, five-finger, lancewood, coastal tree broom) ⁽⁷⁾

Refer to Appendix 1 (Coastal Terrestrial Area - Biotic - South Marlborough) for references

Abiotic

The Grassmere Coastal Terrestrial Area is centred on Lake Grassmere and comprises the lake, the basin floor and shoreline features, and the surrounding eroding hill slopes. Depositional landforms from gravel and fine grained silts dominate. It incorporates the undulating to rolling marine gravel beach ridges and associated inter-ridge wetlands to the north between Blind River Loop Road and the sea. Fine grained saline estuarine/ lake and wetland deposits have accumulated inland of the narrow sand dune covered boulder bank which separates the Lake from Clifford Bay especially to the south, and fringe the lake. Low gradient meandering floodplains feature on the small streams draining into the lake from the south and west. The moderately steep to steep hill country is underlain by loess-mantled weakly consolidated, poorly bedded siltstone, sandstone and conglomerates with extensive tunnel gully erosion especially on mid and lower hill slopes with a sunny aspect. The climate is hot, dry and windy. Rainfall ranges from <600 to 700 mm p.a. and annual sunshine hours are high (2,515 hours per year). Surface water resources are very limited and the streams are ephemeral. Elevation ranges from 0 to 120 m above sea level.

Biotic

Summary analysis: Total area of Grassmere Coastal Terrestrial Area is 1,291ha of which 1% is in native shrubland, 0.1% in exotic treeland, 77% in pasture and 13% in herbaceous aquatic vegetation. This biotic environment forms part of the Department of Conservation's Grassmere Ecological District.

Originally this Coastal Terrestrial Area was a functional estuary which closed naturally to form a freshwater lake before being artificially converted into a saline lake. Within the tidal influence would have been

extensive glasswort herbfields, backed by sea rush, sedges and saltmarsh ribbonwood. That vegetation would have largely disappeared once the connection with the sea was severed, probably replaced by harakeke, raupo, oioi, kuta, tussock sedge and various other sedges and rushes. There would have been turfs at the water's edge, maintained by fluctuations in water levels and the effects of innumerable wetland birds. Toetoe and cabbage trees would have been abundant behind the wet zone, and kahikatea forest may have been quite extensive on the adjacent moist flats.

The dune system would have been clad in spinifex, sand tussock, pingao, sand coprosma, sand daphne and sand spurge. Matagouri, coastal shrub daisy, pohuehue and tauhinu may have also been on the dunes. On the hill country close to the shore would have been coastal forest of ngaio, akiraho and akeake, possibly also containing *Carmichaelia muritai* and totara. Behind would have been forest of totara, matai, black beech and kanuka, with lowland ribbonwood, narrow-leaved lacebark, titoki and kowhai. Fauna would have included forest birds, wetland birds, coastal birds, fish, reptiles (tuatara, skinks and geckos) and dryland and wetland invertebrates.

This Coastal Terrestrial Area is now hot, dry and saline. It has limited habitat diversity and has largely been denuded of native vegetation. The lake and its surrounds are highly important for migratory wading birds, including wrybill, and others such as waterfowl, shags, gulls, terns and banded dotterel.

The sand dune complex is dominated by marram grass, but spinifex, pingao and sand tussock are present. Coastal mat daisy (*Raoulia* "hookeri coast") is present in dune slacks. Matagouri, pohuehue, knobby

clubrush, *Carex pumila* and coastal shrub daisy are also on the dunes. The gravel beach ridges and bar have similar vegetation but with the addition of *Melicytus* “Waipapa”, tauhinu, *Muehlenbeckia ephedroides*, *Pimelea prostrata*, *Coprosma crassifolia*, kanuka and manuka.

Around the lake are extensive glasswort herbfields, with areas of sea rush, saltmarsh ribbonwood, oioi, three square, *Bolboschoenus caldwellii* and low herbfields of *Samolus repens*, *Mimulus repens* and *Selliera radicans*. The back swamps have oioi, saltmarsh ribbonwood, harakeke, raupo and marginal manuka forest. The meander floodplain has an eclectic mix of harakeke, raupo, sea rush, matagouri, prostrate kowhai, pohuehue and *Melicytus* “Waipapa”.

The hill slopes have a scattering of native vegetation, mostly induced shrubland. The main plants are silver tussock, matagouri, prostrate kowhai, manuka, and kanuka. Shrubby tororaro is present. There are pockets of akiraho-kanuka forest associated with the tunnel erosion areas.

The following are notable plant species found: pingao -r, sand tussock -r, sea holly -r, *Raoulia* “hookeri coast” -r, *Muehlenbeckia ephedroides* -r; *Mimulus repens* -r; harakeke, raupo, kanuka, manuka, saltmarsh ribbonwood, oioi, prostrate kowhai, glasswort, spinifex, and *Melicytus* “Waipapa”.

In terms of animals, kahu, pipit -r, welcome swallow, red-billed gull -t, black-billed gull -t, black-fronted tern -t, white-fronted tern -r, Caspian tern -t, pied stilt -r, oystercatchers -r, black swan, paradise shelduck, banded dotterel -t, wrybill -t, black shag -r, pied shag -t, little shag, kingfisher, common gecko and common skink are all present.

For freshwater, Cattle Creek is the main catchment feeding the unique saline environment of Lake Grassmere. While the northern half of the lagoon is heavily modified for the purposes of salt harvest, the southern lagoons support significant populations of a diverse range of wading birds and waterfowl including pied stilt, oystercatchers, grey duck, grey teal, paradise shelduck and large numbers of black swan. The area is an important stop over and feeding ground for migratory species.

t = threatened nationally

r = at risk nationally

e = endemic to South Marlborough



Pied shag



Eryngium vesiculosum (sea holly)



Sand coprosma (foreground), pingao and sand tussock (background)

Coastal Terrestrial Area 15 : Grassmere

Experiential

The large, flat and expansive ponds associated with Lake Grassmere are extremely memorable and offer a ‘glimpse’ of the ocean beyond for people travelling through the dry inland hills on SH1. Access can be gained ‘around’ the lake, via Marfells Beach Road to the south and Kaparu Road to the north. The often vivid pink colouration of the salt-drying works dominates the lake and provides a memorable visual cue when travelling past. Despite the extensive modification to the area, there remains a reasonably strong hold for migratory birds.



Salt drying process



The often vivid pink colouration of the salt-drying works dominates the lake

Level 3: Overall Area Rating for Grassmere Coastal Terrestrial Area

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

Levels 4 & 5: Specific Parts within Grassmere Coastal Terrestrial Area Holding High or Very High Natural Character

Specific Parts holding High or Very High Natural Character

There are no specific areas within this Coastal Terrestrial Area holding Outstanding, High or Very High Coastal Natural Character.



This Coastal Terrestrial Area is now hot, dry and saline. It has limited habitat diversity and has largely been denuded of native vegetation. Haldon Hills can be seen in the background

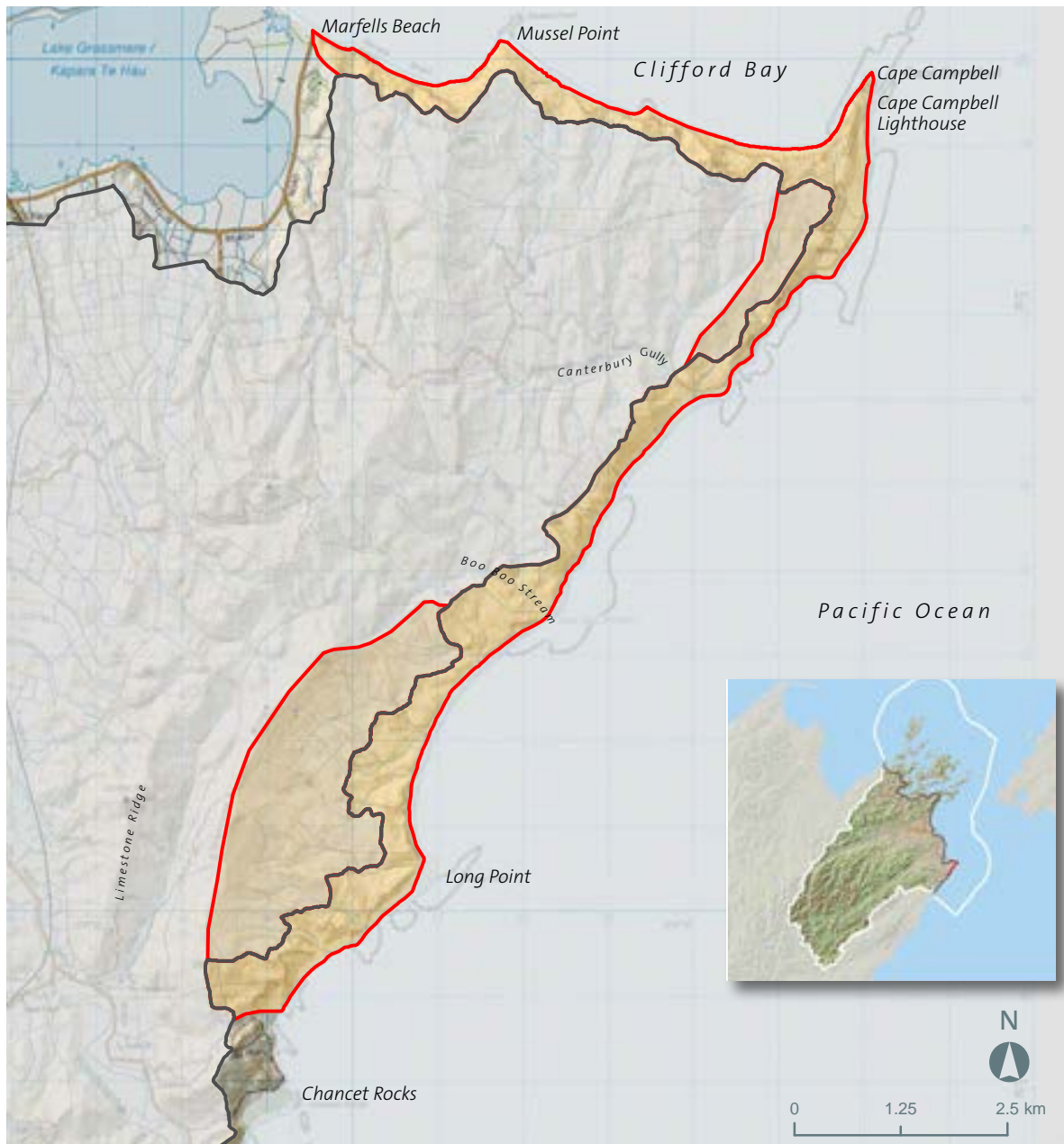
Coastal Terrestrial Area 16 : Campbell

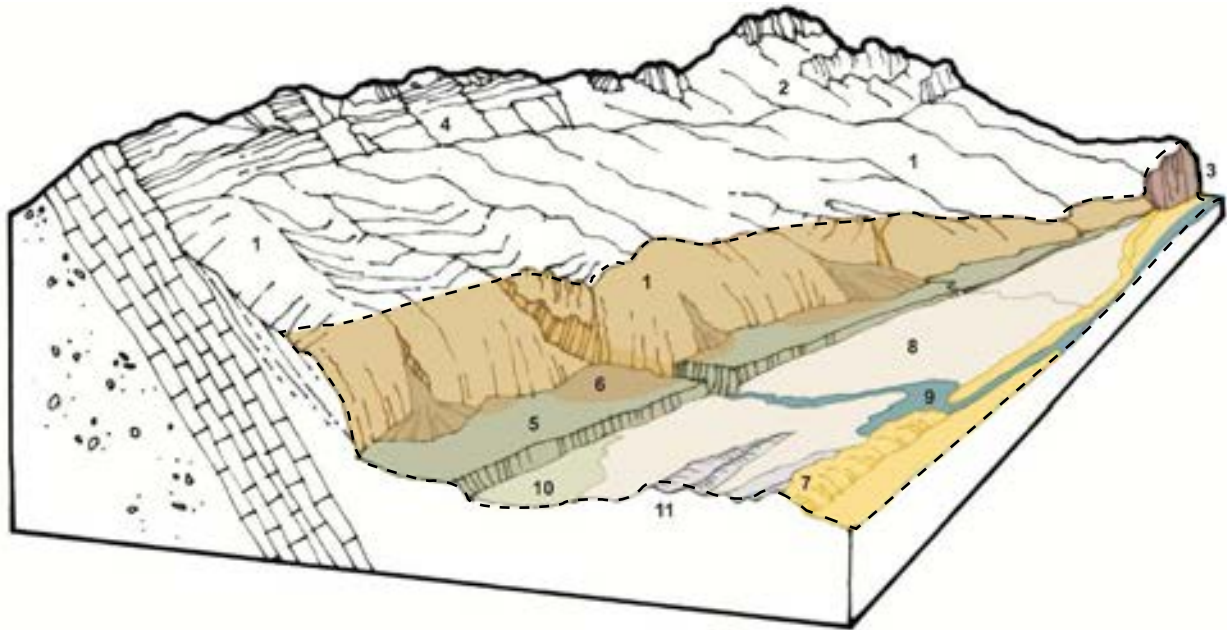
Collective Characteristics and Coastal Context

Shrubby tororaro, silver tussock, matagouri, coastal mat daisy, banded dotterel, coastal cliff, gravel beach and dune ecosystem.

This Coastal Terrestrial Area encompasses parts of two land types: Northern loess-mantled soft rock hills and downs 16 and Northern Coastal Strip 15 (Refer to Appendix 5). It includes weakly dissected hill country, structurally controlled escarpments, and steep to very steep wave cut coastal cliffs dissected by steep incised gullies. Depositional landforms include colluvial fans and alluvial terraces, raised gravel beaches, gravel beach ridges and sand dunes with inter-ridge and inter-dune wetlands between the former sea cliffs and the present shoreline. The climate is hot, dry and windy with extreme exposure to wind directly off the ocean. Surface water resources are limited and the streams are ephemeral. Elevation ranges from sea level to 350 m.

The coastal context is characterised by a series of low undulating cleared hills, where a network of small watercourses, many of which are ephemeral, dissect the landscape. SH1 and the railway line are located some five to eight kilometres inland from the coast.





Campbell Coastal Landform Components

••• Coastal Environment

- 1. Marginal Hill Country
- 2. Spurs and Summits
- 3. Coastal Cliffs
- 4. Soft Rock Structural Landforms

5. Coastal Terraces

- 6. Colluvial Fans
- 7. Beach Sand Dune Dune Slack
- 8. Gravel Beach Terraces
- 9. Beach Lagoon Bar Complex

10. Backswamps

- 11. Gravel Beach Ridges

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
	1	Loess over Tertiary aged poorly bedded sandstones, siltstones with some conglomerate and limestone	0–200	Silver tussock tussockland Bracken fernland ⁽¹⁾ Tauhinu shrubland ⁽⁸⁾ Tauhinu - coastal shrub daisy shrubland ^(2,9) Boxthorn-matagouri shrubland ⁽²⁾ Manuka - coastal shrub daisy- <i>Hebe parviflora</i> scrub ⁽¹⁾ Manuka-akiraho- <i>Hebe parviflora</i> scrub ⁽¹⁾ Ngaio-mahoe shrubland ⁽¹⁾ Akiraho forest and treeland ⁽¹⁾	Fescue - silver tussock tussockland ^(1,6) Tauhinu - coastal shrub daisy - <i>Carmichaelia australis</i> - <i>Muehlenbeckia astonii</i> - <i>Coprosma propinqua</i> - <i>Coprosma crassifolia</i> - <i>Hebe stricta</i> mixed shrubland and scrub ⁽⁷⁾ Kanuka-manuka scrub ^(1,6) Ngaio-akiraho-mahoe forest ^(1,6) Matai-totara/titoki-mahoe forest ^(1,6) Titoki-mahoe-ngaio forest ^(2,7) Black beech - matai forest ^(2,7) Matai-kowhai - narrow-leaved lacebark forest and treeland ⁽⁷⁾
(Outside of Coastal Environment)	2	Thin loess over Tertiary aged poorly bedded sandstones, siltstones with some conglomerate and limestone	50–200	Very little native vegetation left on this landform component. Bracken fernland ⁽²⁾ Silver tussock tussockland Matagouri and <i>Sophora prostrata</i> scrub Coastal shrub daisy - tauhinu shrubland ⁽²⁾	Silver tussock tussockland ⁽⁷⁾ Wharariki flaxland ⁽⁷⁾ Matagouri shrubland <i>Sophora prostrata</i> -coastal shrub daisy - tauhinu - <i>Melicytus</i> “Waipapa” - <i>Muehlenbeckia astonii</i> - <i>Carmichaelia australis</i> mixed scrub and shrubland ⁽⁷⁾ Coastal broadleaved forest (puka, titoki, mapou, mahoe, ngaio, akiraho, akeake, kohuhu, five-finger, lancewood) ⁽⁷⁾ Matai - black beech - titoki forest ^(2,7)

Coastal Terrestrial Area 16 : Campbell

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
3	Coastal cliffs, escarpments, coastal rock outcrops and reefs, and steeply incised coastal gullies)	Tertiary aged poorly bedded sandstones, siltstones with some conglomerate and limestone	0–150	Ngaio low forest and scrub ⁽¹⁾ Akiraho low forest and scrub ⁽¹⁾ Ngaio-pohuehue shrub-grassland ⁽¹⁾ Ngaio-mahoe low forest ⁽¹⁾ Coastal shrub daisy - tauhinu shrubland ^(2,10) Wharariki-manuka shrub-flaxland ⁽²⁾ Tauhinu - silver tussock shrub grassland ⁽²⁾ Mosaic of very scattered shrubs, herbs and grasses on mudstone bluffs ⁽¹⁾ Herbfield on mudstone ^(2,7,10) (<i>Pimelea prostrata</i> , <i>Plantago spathulata</i> , <i>Microseris scapigera</i> , <i>Spergularia tasmanica</i> , shore primrose, <i>Senecio</i> aff. <i>glaucophyllus</i> , <i>Senecio hawaii</i>) Sparse <i>Pachystegia insignis</i> shrubland on bluffs ⁽²⁾ Native ice plant herb-rockland ⁽¹⁾	Coastal broadleaved forest and treeland (puka, titoki, mapou, mahoe, ngaio, akiraho, akeake, kohuhu, five-finger, lancewood) ⁽⁷⁾ Ngaio-mahoe-titoki forest ^(1,6) Manuka - kanuka scrub ^(1,6) Tutu-toetoe-karamu- <i>Hebe parviflora</i> -wharariki-manuka shrubland Wharariki-manuka shrub-flaxland ⁽²⁾ Coastal shrub daisy - tauhinu shrubland ^(2,10) Sparse <i>Pachystegia insignis</i> shrubland on bluffs ⁽²⁾ Fescue - silver tussock tussockland ^(1,6) Native ice plant herb-rockland ⁽¹⁾ Herbfield on mudstone ^(2,7,10) (<i>Pimelea prostrata</i> , <i>Plantago spathulata</i> , <i>Microseris scapigera</i> , <i>Spergularia tasmanica</i> , shore primrose, <i>Senecio</i> aff. <i>glaucophyllus</i> , <i>Senecio hawaii</i>)
4 (Outside of Coastal Environment)	'Soft' rock structural landforms, e.g. cuestas, including escarpments and outcrops (e.g., crest of Limestone Ridge)	Cretaceous–Tertiary limestones and calcareous sandstones	40–350	<i>Pachystegia insignis</i> shrub-rockland ⁽²⁾ <i>Aciphylla</i> aff. <i>aurea</i> - tauhinu - silver tussock shrub-tussockland ⁽²⁾ on talus Tauhinu - silver tussock shrub-tussockland ⁽²⁾ Mixed native and exotic grass-herbfield on limestone talus and ledges ⁽²⁾ <i>Coprosma crassifolia</i> - <i>Coprosma propinqua</i> scrub and shrubland	Totara forest and treeland ^(2,7) Totara-matai-titoki-mahoe forest and treeland ^(1,7) Titoki-mahoe-ngaio forest ^(2,7) Mixed coastal broadleaved forest and treeland (puka, titoki, mapou, mahoe, ngaio, akiraho, akeake, kohuhu, five-finger, lancewood) ⁽⁷⁾ <i>Pachystegia insignis</i> - native lilac - <i>Brachyglottis monroi</i> - <i>Carmichaelia astonii</i> shrub-rockland ^(2,7) Mixed grass-herbfield (<i>Gentianella</i> , <i>Wahlenbergia</i> , <i>Ranunculus</i> , <i>Gingidia</i> , <i>Microseris</i> , <i>Poa</i> , <i>Anthosachne</i> , <i>Dichelachne</i> , <i>Festuca</i>) ^(2,7) <i>Aciphylla</i> aff. <i>aurea</i> - tauhinu - silver tussock shrub-tussockland ⁽²⁾ on talus
5	Coastal terraces	Late Pleistocene and Recent sands, silts and gravel	5–20	Ngaio treeland ⁽²⁾ Coastal shrub daisy - tauhinu shrubland ^(2,8) Wharariki-toetoe-tauhinu shrub-flaxland ^(2,8) Matagouri shrubland ⁽⁸⁾ <i>Muehlenbeckia astonii</i> shrubland ⁽²⁾ Silver tussock tussockland ⁽²⁾ Shore primrose - <i>Spergularia tasmanica</i> herbfield ⁽²⁾ ,	Totara-matai-titoki-mahoe-ngaio-mapou-kaikomako forest ⁽⁷⁾ Totara-matai-kowhai-lacebark - narrow-leaved ribbonwood forest and treeland ⁽⁷⁾ Coastal shrub daisy - tauhinu - wharariki - toetoe flax-shrubland ⁽⁷⁾ Coastal shrub daisy - <i>Muehlenbeckia astonii</i> - <i>Coprosma</i> spp. - <i>Carmichaelia australis</i> scrub ⁽⁷⁾ Tutu treeland ⁽⁷⁾ Silver tussock - matagouri shrub-tussockland ⁽²⁾ Shore primrose - <i>Spergularia tasmanica</i> - sea holly - remuremu herbfield ⁽⁷⁾

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
6	Accumulative colluvial/alluvial fans at the base of steep slopes and former cliffs	Late Pleistocene and Recent gravel, sands, and silts	5–20	Ngaio treeland ⁽²⁾ Coastal shrub daisy - tauhinu shrubland ^(2,8) Wharariki -toetoe - tauhinu shrub-flaxland ^(2,8) Matagouri shrubland ⁽⁸⁾ Silver tussock tussockland ⁽²⁾	Matai-totara-titoki-mahoe-ngaio-mapou-kaikomako forest ⁽⁷⁾ Mixed coastal broadleaved forest and treeland (titoki, mapou, mahoe, ngaio, akeake, kohuhu, five-finger, lancewood) ⁽⁷⁾ Coastal shrub daisy - tauhinu - toetoe-tutu - <i>Carmichaelia australis</i> scrub ⁽⁷⁾ Silver tussock - matagouri shrub-tussockland ⁽²⁾
7	Beach, sand dune and interdune slack complexes e.g., Marfells Beach	Holocene and Recent dune sand	0–5	Shore convolvulus sandfield ⁽⁷⁾ Marram-pingao grass-sedge-land ^(2,8) Marram-spinifex grassland ⁽⁷⁾ Raoulia “hookeri coast” cushion-duneland ^(2,7) Marram - knobby clubrush rush-grassland ⁽²⁾ Marram - wharariki grassland ⁽⁸⁾ Marram-sand tussock-sand coprosma - matagouri grass-shrubland ⁽⁷⁾ Coastal shrub daisy - tauhinu shrubland ⁽²⁾ Matagouri-pohuehue shrubland ⁽²⁾ Marram-matagouri shrub-grassland ⁽²⁾ Pimelea prostrata - harestalk - knobby clubrush grass-shrubland ⁽²⁾ Raoulia australis cushionfield ⁽²⁾ Ngaio treeland ⁽²⁾	Shore convolvulus sandfield ⁽⁷⁾ Pingao sedgeland ^(2,8) Pingao - spinifex-sand tussock grass-sedgeland ^(2,7) Carex pumila sandfield ⁽⁷⁾ Raoulia “hookeri coast” cushion-duneland ⁽²⁾ Sand coprosma - sand daphne - matagouri shrubland ⁽⁷⁾ Coastal shrub daisy - tauhinu-wharariki flax-shrubland ⁽²⁾ Matagouri - pohuehue-bracken fern-shrubland ^(2,7) Pimelea prostrata- knobby clubrush rush-shrubland ⁽²⁾ Raoulia australis cushionfield ⁽²⁾ Ngaio-akeake-akiraho-kanuka treeland and shrubland ⁽⁷⁾
8	Gravel beach terraces	Holocene and Recent beach gravels and sands	5-10	Very little native vegetation remaining on this landform component Knobby clubrush - harestalk sedge-grassland ⁽²⁾ <i>Muehlenbeckia astonii</i> - <i>Coprosma propinqua</i> - pohuehue vine-shrubland and gravelfield Tauhinu - coastal shrub daisy shrubland Bracken fern-gravelfield	Knobby clubrush - danthonia grass sedge-grassland ⁽²⁾ <i>Pimelea prostrata</i> - <i>Raoulia</i> “hookeri coast” - danthonia mat-gravelfield ⁽⁷⁾ <i>Muehlenbeckia ephedroides</i> - <i>Meliclytus</i> “Waipapa” shrub-stonefield ⁽²⁾ <i>Muehlenbeckia astonii</i> - <i>Coprosma propinqua</i> - pohuehue vine-shrubland and gravelfield Matagouri - <i>Meliclytus</i> “Waipapa” - pohuehue-tauhinu-bracken vine-shrubland ^(2,7) Tauhinu-coastal shrub daisy shrubland and scrub Ngaio treeland and forest

Coastal Terrestrial Area 16 : Campbell

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
9	Active beach, bar, lagoon backswamp and minor dune complexes	Holocene and Recent beach, lagoon and swamp and dune deposits	0–10	Little or no native vegetation remaining on this landform component	Sea rush rushland Three-square sedgeland Bolboschoenus caldwellii - Schoenoplectus tabernaemontani rush-sedgeland Saltmarsh ribbonwood - sea rush shrubland Saltmarsh ribbonwood - oioi rush-shrubland
10	Minor backswamps between beach dunes or ridges and landward terraces, including river/stream mouths	Holocene and Recent beach, lagoon and swamp deposits	0–4	Raupo reedland ⁽²⁾ <i>Carex secta</i> sedgeland ⁽²⁾ Harakeke-manuka-coastal shrub daisy shrubland ⁽²⁾	Raupo reedland ⁽²⁾ Harakeke flaxland ⁽⁷⁾ <i>Carex geminata</i> sedgeland ⁽⁷⁾ <i>Cyperus ustulatus</i> sedgeland <i>Carex secta</i> - <i>Carex virgata</i> sedgeland Cabbage tree - harakeke flax-treeland Kahikatea forest and treeland (Kahikatea)/cabbage tree- harakeke - <i>Carex secta</i> -toetoe sedge-flax-treeland ⁽⁷⁾ Harakeke-manuka-coastal shrub daisy shrubland ⁽²⁾
11	Gravel beach ridges with sand	Holocene and Recent beach gravels and sands	0–5	Very little native vegetation remaining on this landform component. Knobby clubrush - haretail rush-grassland ^(2,8) Pohuehue vineland ⁽²⁾ Matagouri shrubland ⁽⁸⁾	Knobby clubrush - danthonia rush-grassland ^(2,8) Tauhinu-wharariki-knobby clubrush gravelfield ⁽⁷⁾ Matagouri - <i>Melicytus</i> "Waipapa"-tauhinu-pohuehue vine-shrubland ⁽⁷⁾ Ngaio-akiraho treeland ⁽⁷⁾

Refer to Appendix 1 (Coastal Terrestrial Area - Biotic - South Marlborough) for references

Abiotic

The Campbell Coastal Terrestrial Area extends from the western end of Marfells Beach south to a point just north of Chancet Rocks. It encompasses weakly dissected hill country, structurally controlled escarpments, and steep to very steep wave cut coastal cliffs dissected by steep incised gullies. Depositional landforms include colluvial fans and marine coastal terraces, raised gravel beaches, gravel beach ridges and sand dunes with inter-ridge and inter-dune wetlands between the former sea cliffs and the present shoreline.

The predominantly loess-mantled smooth, rounded, rolling to strongly rolling and moderately steep hill country and downlands are underlain by weakly consolidated poorly bedded sandstones and siltstones with minor amounts of conglomerate and limestone. The more resistant limestone and calcareous



Above: *Pachystegia insignis* (Marlborough rock daisy)

Opposite: East Coast of Marlborough from Cape Campbell

mudstone cores the structural landscape components (e.g., Limestone Ridge), and the numerous coastal rock outcrops, wave cut platforms and reefs that extend outwards from the coast e.g., Mussel Point, Cape Campbell and Long Point. Steep to very steep coastal cliffs are cut into all lithologies and are prominent in the north inland of Marfells Beach, between Mussel Point and Cape Campbell and adjacent to Long Point. Accumulative debris slopes at the foot of abandoned former sea cliffs are narrow and basal cliff beach sand dune belts are frequently present.

Raised coastal terraces and gravel beaches are present between Canterbury Gully and Cape Campbell capped

in places by minor belts of sand dunes. Active gravel beaches are extensive south of Cape Campbell. Gravel beach ridges and sand dunes with associated inter-ridge and inter-dune wetlands between the former sea cliffs and the present shoreline are also present. Small lagoons and wetlands have developed behind the beach dunes or ridges at the mouths of stream and rivers.

Surface water resources are limited and the streams are ephemeral. The climate is hot, dry and windy with extreme exposure to wind directly off the ocean. Rainfall ranges from 600 to 750 mm per year and elevation from 0 to 350 m above sea level.



Coastal Terrestrial Area 16 : Campbell

Biotic

Summary analysis: Total area of Campbell Coastal Terrestrial Area is 1,484ha of which 4% is in native shrubland, 0.1% in exotic treeland, 2% in exotic scrub and 87% in pasture. This biotic environment forms part of the Department of Conservation's Kekerengu Ecological District.

Originally the hill country would have been clad in forest of totara, matai, titoki, mahoe, ngaio, akiraho, manuka and kanuka. Tree hebe, lowland ribbonwood, kowhai, narrow-leaved lacebark, five-finger, akeake and Carmichaelia muritai may have been present. On spur crests, outcrops and escarpments was probably mixed shrubland and wharariki, with prostrate kowhai, rock daisies, native lilac, speargrasses and various herbaceous plants. Coastal terraces and fans would have supported forest of ngaio, titoki, mapou and mahoe, perhaps also containing totara, matai, akeake, akiraho and kanuka. Coastal cliffs would have had discontinuous vegetation of low forest (ngaio, titoki and mahoe), wharariki, various shrubs and coastal herbs.

The dune and gravel beach ridge system would have been clad in spinifex, sand tussock, pingao, sand coprosma, sand daphne and sand spurge. Matagouri, coastal shrub daisy, shrubby tororaro, wharariki, pohuehue and tauhinu may have also been on the dunes. There may also have been pockets of ngaio forest. Coastal mat daisy would have been abundant in dune slacks. At stream mouths were small coastal wetlands containing harakeke, raupo, toetoe, sedges, kahikatea, cabbage tree, manuka and coastal shrub daisy. Where there was saline influence were glasswort, sea rush and saltmarsh ribbonwood.

Fauna would have included forest birds, wetland birds, coastal birds, reptiles (tuatara, skinks and geckos), seals and dryland and wetland invertebrates.

This Coastal Terrestrial Area now is hot, dry and windy. It has considerable habitat diversity but has largely been denuded of native vegetation.

The sand dune and beach ridge complex is dominated by marram grass, but spinifex, pingao, sand coprosma and sand tussock are present and locally dominant. Coastal mat daisy (*Raoulia* "hookeri coast") is present in dune slacks. Matagouri, pohuehue, knobby clubrush, *Carex pumila*, coastal shrub daisy, *Melicytus* "Waipapa", tauhinu, *Muehlenbeckia ephedroides* and *Pimelea prostrata* are also on the dunes.

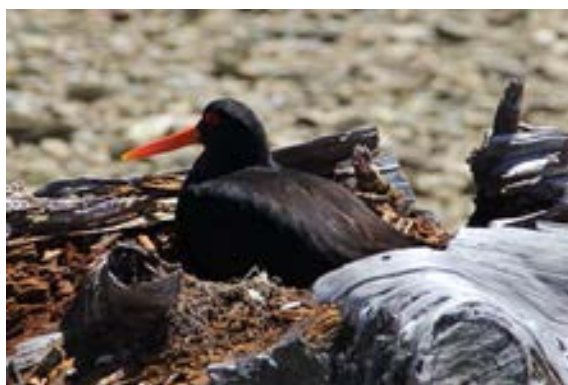
On the coastal terraces and fans are silver tussock, scrub (tauhinu, coastal shrub daisy and matagouri, with localised shrubby tororaro), wharariki, toetoe and some ngaio.

The wetlands at the stream mouths have glasswort, three square, saltmarsh ribbonwood, sea rush, raupo, harakeke, tussock sedge, manuka and coastal shrub daisy.

The coastal cliffs and escarpments have small low forest remnants of ngaio, mahoe and akiraho, also wharariki, shrubs (manuka, coastal shrub daisy and tauhinu), silver tussock and various herbs including *Senecio hauwai*. *Pachystegia insignis* occurs at its northern coastal limit.



Above: Fur Seal



Above: Variable oyster catcher

The hill slopes have a scattering of native vegetation, mostly induced scrub and shrubland. The main plants are silver tussock, matagouri, tauhinu, coastal shrub daisy, manuka and bracken. Shrubby tororaro, *Carmichaelia australis*, *Melicytus* “Waipapa” and *Hebe stenophylla* are present. There are pockets of akiraho forest and treeland. The crest of Limestone Ridge has scrub of *Coprosma crassifolia* and *C. propinqua* and an abundance of *Aciphylla aurea*.

The following are notable plant species found: *Muehlenbeckia astonii* -t; poroporo -r; pingao -r; sand tussock -r; sand coprosma -r; *Raoulia* “hookeri coast” -r; *Muehlenbeckia ephedroides* -r; *Einadia allanii* -r; sea holly -r; *Sonchus kirkii* -r; *Senecio* aff. *glaucohyllus* “Cape Campbell”; prostrate kowhai; *Plantago spathulata*, harakeke, raupo, manuka, coastal shrub daisy, saltmarsh ribbonwood, spinifex, ngaio, *Aciphylla aurea* and *Melicytus* “Waipapa”.

In terms of animals, kahu, pipit -r, welcome swallow, red-billed gull -t, black-backed gull, white-fronted tern -r, pied stilt -r, oystercatchers -r, banded dotterel -t, pied shag -t, scaup, paradise shelduck, kingfisher, common gecko and common skink are all present. There are invertebrates endemic to Cape Campbell

For freshwater, this Coastal Terrestrial Area includes several small unnamed watercourses that drain Limestone Ridge. Canterbury Gully is the largest catchment. Many of these water courses only flow to the sea after heavy or sustained rain fall events. The brackish lagoons at the river mouths frequently support banded dotterel, pied stilts, and water fowl.

Experiential

Due to the majority of this Coastal Terrestrial Area being in private ownership, much of this coastline is difficult to access. In the north, access is possible along Marfells Beach, although terminates close to Mussel Point. Camping is also available here through the Department of Conservation. Access to Cape Campbell Lighthouse can be arranged through contacting the landowner. Views from this location are spectacular, where panoramic vistas of the sweeping curve of Clifford Bay and the southern shores of the North Island are evident.

From these limited access point, the coastline is extremely dramatic and holds some extremely memorable elements, including the white cliffs and the peninsula of Cape Campbell as well as the ever changing surf. Modification is limited to light grazing and the occasional track and small building.

t = threatened nationally

r = at risk nationally

e = endemic to South Marlborough



Above: Sand tussock

Coastal Terrestrial Area 16 : Campbell



Above: Large *Raoulia* Cushions

Level 3: Overall Area Rating for Campbell Coastal Terrestrial Area

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

Levels 4 & 5: Specific Parts within Coastal Terrestrial Area 16: Campbell Holding High or Very High Natural Character

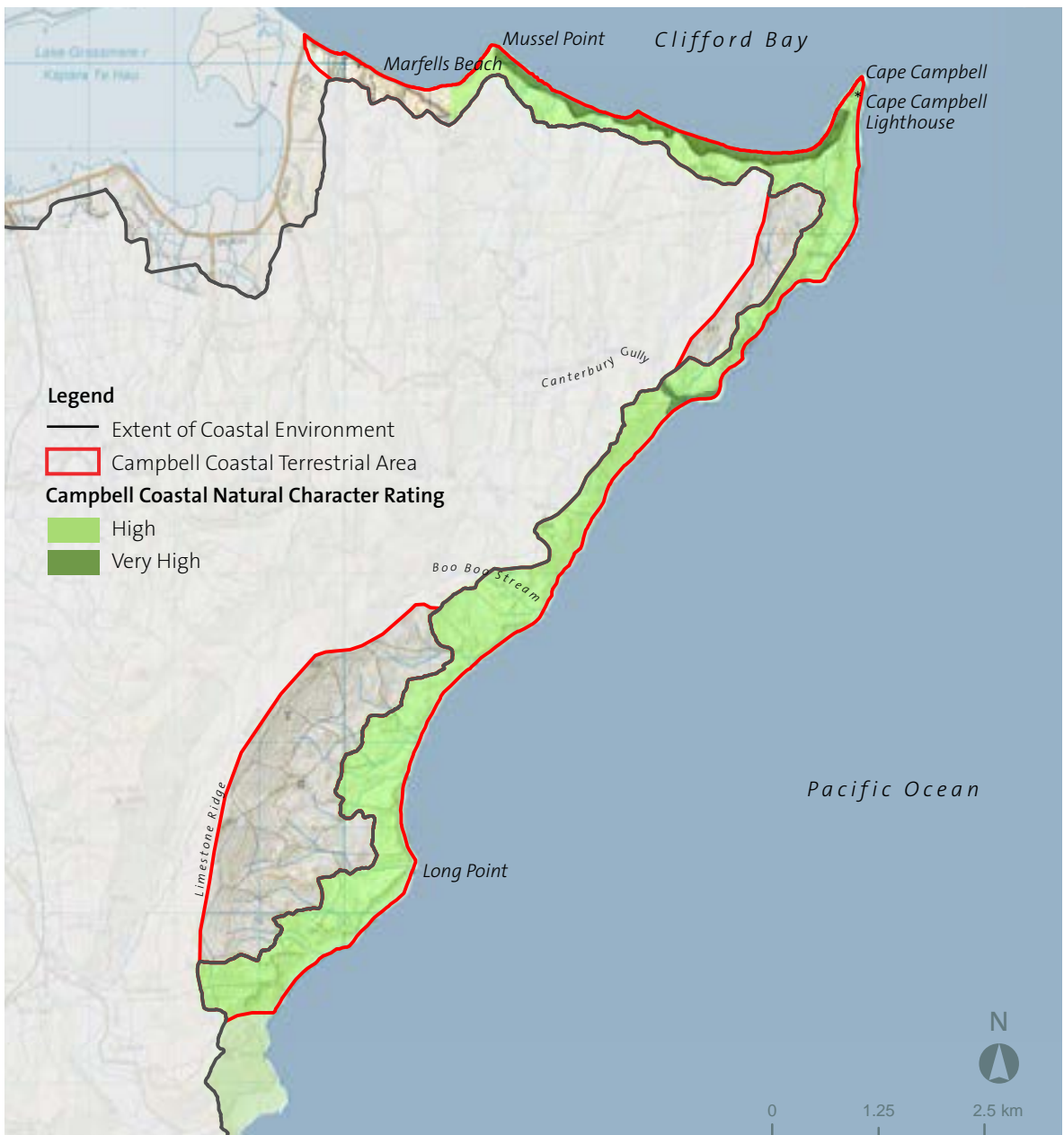
Sub Area	Rating	Key Values	Additional Comments
Coast west of Cape Campbell	Very High	<p>The coastal cliffs and escarpments have small low indigenous forest remnants and unusual, highly distinctive herbfields with nationally threatened species.</p> <p>The dunes and coastal flats also contain nationally threatened species.</p> <p>Views from Cape Campbell lighthouse are spectacular, where panoramic vistas of the sweeping curve of Clifford Bay and the southern shores of the North Island are evident</p>	

Levels 4 & 5: Specific Parts within Coastal Terrestrial Area 16: Campbell Holding High or Very High Natural Character

Sub Area	Rating	Key Values	Additional Comments
Canterbury Gully mouth	Very High	Canterbury Gully dunefield contains nationally threatened ecosystem types and plant species.	
Southern Coast	High	Modification is limited to light grazing and the occasional track, fence and small building. The coastal scarps and flats have nationally significant ecosystems, including dunes and salt turfs, and good sequences of native coastal vegetation. Several areas are set aside for conservation of natural values.	

Refer also to Section F of this report for:

Outstanding Coastal Natural Character Area 15: Cape Campbell

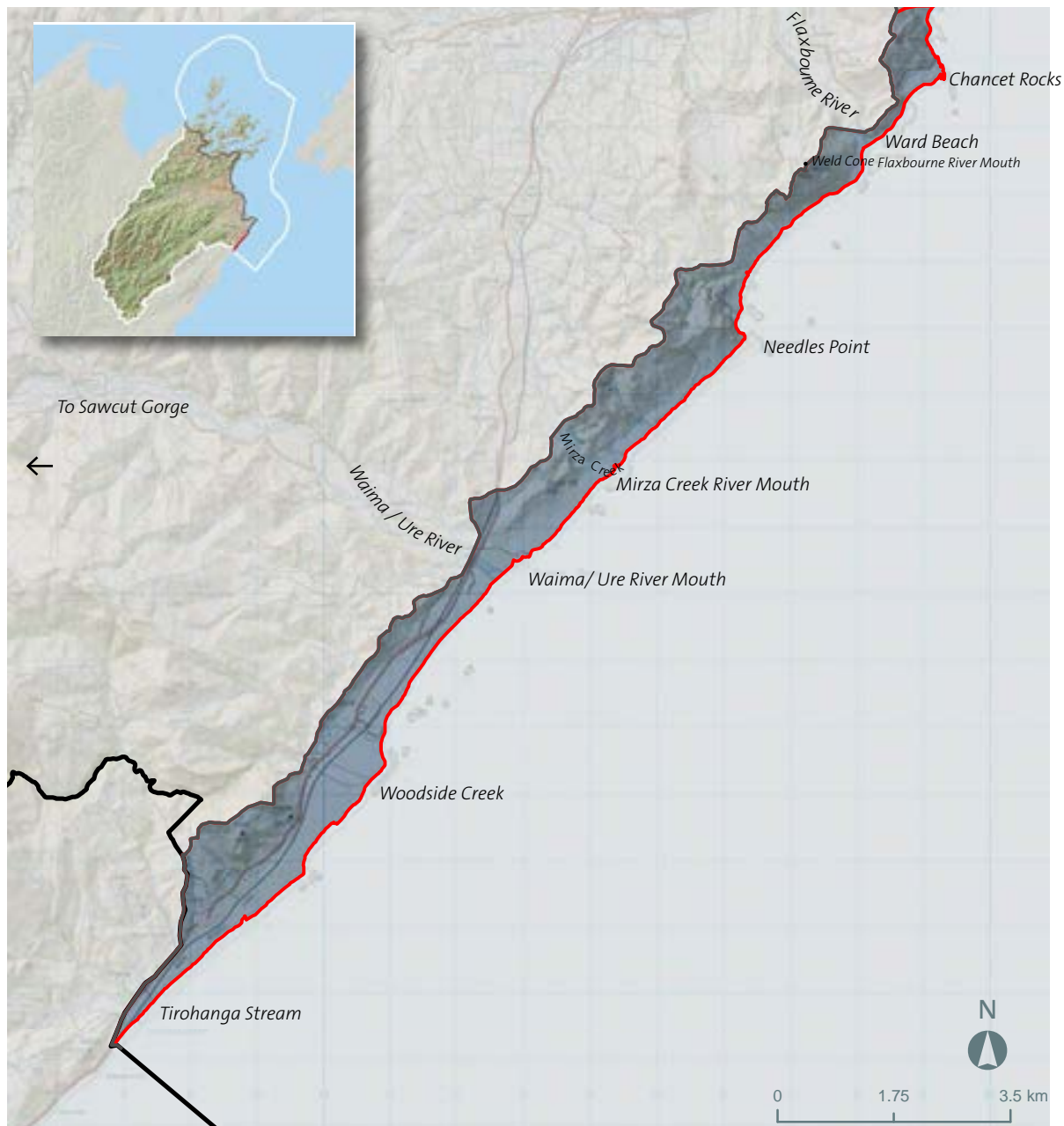


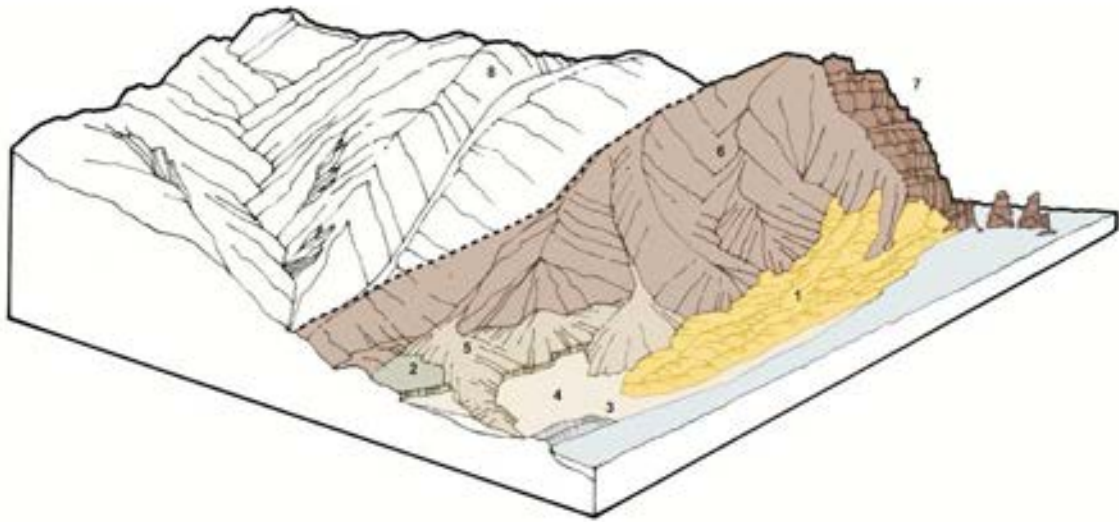
Coastal Terrestrial Area 17 : Wharanui

Collective Characteristics and Coastal Context

Silver tussock, matagouri, pingao, coastal mat daisy, banded dotterel, fur seal, rock stacks, coastal scarp, gravel beach and dune ecosystem

This Coastal Terrestrial Area encompasses part of four different land types: Northern coastal strip land type 15, Northern soft rock hills and downs land type 17, and small parts of Moist, coastal limestone hills land type 20 and Dry, coastal hard rock hills land type 21 (Refer to Appendix 5). It includes narrow coastal sand dune-interdune complexes, alluvial coastal terraces and floodplains, colluvial footslope fans, gravel beaches, and gravel beach ridges between the former sea cliffs or hill slopes and the present shoreline. Erosional landforms include steep to moderately steep 'soft' rock hill slopes, steep, structurally controlled 'soft' rock landforms, escarpments and coastal stacks; and steep to very steep deformed 'hard' rock hill slopes. Active migrating sand dunes are common, coarse and fine grained floodplains are of limited extent. The hill slopes are underlain by a variety of rock types ranging from weakly consolidated sandstone, mudstone and conglomerate to more indurated limestone and calcareous lithologies and very hard sandstone rocks. The climate is hot, dry and windy with extreme exposure to wind directly off the ocean in many sites. Surface water resources are limited and the majority of streams are ephemeral. The Waima and Flaxbourne Rivers usually maintain some flow along the more coastal section of their catchments and channels. Elevation from sea level to 300 m. (continued on page 250)





Wharanui Coastal Landform Components

- *** Coastal Environment
- 1. Sand Dune Complex
- 2. Alluvial Coastal Terrace
- 3. Gravel Beach Ridges
- 4. Gravel Beach Terrace
- 5. Colluvial Fan
- 6. Soft Rock Hills
- 7. Structural Landform and Reef
- 8. Hard rock hills

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
1	Sand dune / interdune complexes (frequently migrating onto the toeslopes of abandoned former seacliff or hill slopes), extensive between Willawa Point and the Waima River, around Mirza Creek and Needles Point, and the Flaxbourne River mouth	Holocene and Recent dune sand	0–20	Sand convolvulus sandfield <i>Carex pumila</i> sandfield ^(1,2) Marram-pingao grass-sedgeland ^(2,8) Marram - knobby clubrush rush-grassland ⁽²⁾ Marram - wharariki flax-grassland ⁽⁸⁾ Marram - knobby clubrush-bracken fern-grassland ⁽⁷⁾ Marram - matagouri shrub-grassland ⁽²⁾ Coastal shrub daisy- tauhinu shrubland ⁽²⁾ Matagouri - pohuehue vine-shrubland ⁽²⁾ <i>Pimelea prostrata</i> - harestail - knobby clubrush grass-shrubland ⁽²⁾ <i>Raoulia australis</i> - stonecrop herb-cushionfield ⁽²⁾ Sea rush rushland in brackish swales ⁽²⁾ Glasswort herbfield in brackish swales ⁽²⁾ Raupo reedland in swales ⁽²⁾ <i>Carex secta</i> sedgeland in swales ⁽²⁾ Ngaio treeland ⁽²⁾	Sand convolvulus sandfield <i>Carex pumila</i> sandfield ^(1,2) Pingao sedgeland ^(2,8) Pingao - spinifex - sand tussock sedge-grassland ⁽²⁾ <i>Raoulia "hookeri coast" cushion-sandfield</i> ⁽²⁾ Sand coprosma - sand pimelea - matagouri shrubland ⁽⁷⁾ Coastal shrub daisy - tauhinu-wharariki shrubland ⁽²⁾ Matagouri - pohuehue-bracken fern-shrubland ^(2,7) <i>Pimelea prostrata</i> - <i>Raoulia australis</i> - knobby clubrush rush-mat-cushionfield ^(2,7) Sea rush rushland in brackish swales ⁽²⁾ Glasswort herbfield in brackish swales ⁽²⁾ Raupo reedland in swales ⁽²⁾ <i>Carex secta</i> sedgeland in swales ⁽²⁾ Ngaio-akeake-kanuka-akiraho treeland and forest ⁽⁷⁾ Ngaio treeland and forest ^(2,7) (Kahikatea)/cabbage tree-harakeke- <i>Carex secta</i> -toetoe sedge-flax-treeland in swales ^(2,7) Harakeke-manuka-coastal shrub daisy flax-shrubland ⁽²⁾ Mixed broadleaf forest (mahoe, kaikomako, karamu, kohuohu) ^(2,7)

Coastal Terrestrial Area 17 : Wharanui

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
2	Alluvial coastal terraces and floodplains, e.g., near Tirohanga, and the Waima River mouth	Late Pleistocene and Recent gravel, sands, and silts	5–20	Ngaio treeland ⁽²⁾ on terraces Coastal shrub daisy-tauhinu shrubland ^(2,8) Wharariki - tauhinu shrub-flaxland ^(2,8) Matagouri shrubland ⁽⁸⁾ Tauhinu - silver tussock shrub grassland ⁽²⁾ Silver tussock tussockland ⁽²⁾ <i>Raoulia australis</i> - stonecrop - <i>Pimelea prostrata</i> - <i>Muehlenbeckia axillaris</i> herb-cushionfield on floodplains ⁽²⁾	Totara-matai-titoki-mahoe-forest on terraces ⁽⁷⁾ Titoki-mahoe-ngaio-mapou forest on terraces ⁽⁷⁾ Kahikatea/cabbage tree - toetoe-harakeke flax-treeland ⁽⁷⁾ Tauhinu - coastal shrub daisy - matagouri shrubland on floodplains Coastal shrub daisy - <i>Coprosma</i> spp. - <i>Carmichaelia australis</i> scrub on floodplains ⁽⁷⁾ Tutu treeland on floodplains ⁽⁷⁾ Silver tussock tussockland on floodplains ⁽²⁾ Matagouri shrubland ⁽⁸⁾ <i>Raoulia australis</i> - <i>Pimelea prostrata</i> - <i>Muehlenbeckia axillaris</i> cushionfield on floodplains ⁽²⁾
3	Gravel beaches and beach ridges	Holocene and Recent beach gravels and sands	0–8	Shore convolvulus gravelfield on beaches ⁽⁷⁾ Marram-pingao grassland ^(2,8) Knobby clubrush - harestalk rush-grassland ^(2,8) Pohuehue vineland ⁽²⁾ Matagouri shrubland ⁽⁸⁾	Shore convolvulus gravelfield on beaches ⁽⁷⁾ Pingao gravel and sandfields Knobby clubrush - danthonia rush-grassland Knobby clubrush gravelfield Tauhinu-wharariki-knobby clubrush gravelfield ⁽⁷⁾ Matagouri shrubland ⁽⁸⁾
4	Gravel beach terraces	Holocene and Recent beach gravels and sands	5–10	Knobby clubrush - harestalk sedge-grassland ⁽²⁾ <i>Pimelea prostrata</i> - <i>Raoulia</i> "hookeri coast" - danthonia mat-gravelfield ⁽⁷⁾ <i>Muehlenbeckia ephedroides</i> - <i>Melicytus</i> "Waipapa" shrub-stonefield ⁽²⁾ Matagouri - <i>Melicytus</i> "Waipapa" - pohuehue vine-shrubland ⁽²⁾ Gorse-ngaio shrubland ⁽²⁾ Boxthorn-gorse-ngaio shrubland ⁽²⁾ Pingao sand-gravelfield ⁽⁷⁾	Knobby clubrush - danthonia grass sedge-grassland ⁽²⁾ <i>Pimelea prostrata</i> - <i>Raoulia</i> "hookeri coast" - danthonia cushion-gravelfield ⁽⁷⁾ Matagouri - <i>Melicytus</i> "Waipapa" - pohuehue vine-shrubland ⁽²⁾ Ngaio forest and treeland Pingao-spinifex sand-gravelfield ⁽¹⁾
5	Accumulative colluvial footslope fans	Late Pleistocene and Recent gravel, sands, and silts	5–20	Ngaio treeland ⁽²⁾ Coastal shrub daisy-tauhinu shrubland ^(2,8) Wharariki-tauhinu shrub-flaxland ^(2,8) Tauhinu - silver tussock shrub grassland ⁽²⁾ Matagouri shrubland ⁽⁸⁾ Silver tussock tussockland ⁽²⁾	Totara-matao-titoki-mahoe-forest and treeland ^(1,7) Titoki-mahoe-ngaio-mapou-kaikomako forest ⁽⁷⁾ <i>Coprosma</i> spp. - <i>Carmichaelia australis</i> tutu - toetoe - <i>Hebe stricta</i> - tauhinu - coastal shrub daisy scrub ⁽⁷⁾ Tauhinu - silver tussock shrub-tussockland ⁽²⁾ Silver tussock tussockland ⁽²⁾

	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Past & potential native vegetation
6	Steep to moderately steep 'soft' rock erosional hill slopes often with extensive mass movement erosion, (frequently abandoned former sea cliffs)	Cretaceous–Tertiary sandstone, mudstones, conglomerate and limestone	40–280	Mixed exotic pasture grass - silver tussock tussockland ⁽²⁾ Silver tussock tussockland Tauhinu - silver tussock shrub grassland ⁽²⁾ <i>Aciphylla</i> aff. <i>aurea</i> - tauhinu - silver tussock shrub-tussockland ⁽²⁾ <i>Coprosma crassifolia</i> - pohuehue shrubland ⁽²⁾ Ngaio treeland ⁽²⁾ Kanuka scrub ⁽²⁾ Kanuka-manuka scrub ⁽²⁾	Totara forest ^(2,7) Totara-matai-titoki-mahoe-forest and treeland ^(1,7) Matai - black beech forest ⁽⁷⁾ Titoki-mahoe-ngaio forest ^(2,7) Titoki-mahoe-ngaio- mixed broadleaf treeland and forest (puka, mapou, akiraho, akeake, kohuhu, five-finger, lancewood' coastal tree broom) ^(2,7) Kanuka-manuka forest <i>Aciphylla</i> aff. <i>aurea</i> - tauhinu - silver tussock shrub-tussockland ⁽²⁾ Tutu-toetoe-karamu - <i>Hebe stricta</i> - wharariki flax-shrubland and scrub ⁽⁷⁾
7	'Soft' rock structural landforms, e.g. cuestas, including escarpments, coastal stacks, reefs and outcrops e.g. Weld Cone and the slopes inland of Chancet Rocks	Cretaceous–Tertiary limestone and calcareous sandstones	40–380	Ngaio treeland ⁽²⁾ Kanuka scrub ⁽²⁾ Kanuka-manuka scrub ⁽²⁾ <i>Coprosma crassifolia</i> -pohuehue shrubland ⁽²⁾ <i>Aciphylla</i> aff. <i>aurea</i> - tauhinu - silver tussock shrub-tussockland ⁽²⁾ <i>Pachystegia insignis</i> shrub-rockland ⁽²⁾ Silver tussock tussockland Mixed exotic pasture grass - silver tussock tussockland ⁽²⁾ Mixed native and exotic grass-herbfield on limestone talus and ledges ⁽²⁾	Totara treeland ⁽⁷⁾ Totara-matai-titoki-mahoe treeland ^(1,7) Titoki-mahoe-ngaio- mixed broadleaf treeland and forest (puka, mapou, akiraho, akeake, kohuhu, five-finger, lancewood) ⁽⁷⁾ <i>Pachystegia insignis</i> - native lilac - <i>Brachyglottis monroi</i> - <i>Carmichaelia astonii</i> shrub-rockland ⁽⁷⁾ <i>Aciphylla</i> aff. <i>aurea</i> - tauhinu - silver tussock shrub-tussockland ⁽²⁾ Mixed grass-herbfield and herb-rockland (<i>Gentianella</i> , <i>Wahlenbergia</i> , <i>Ranunculus</i> , <i>Gingidia</i> , <i>Microseris</i> , <i>Anthosachne</i> , <i>Poa</i> , <i>Dichelachne</i> , <i>Festuca</i>) ⁽⁷⁾ Kanuka-manuka treeland and shrubland ⁽⁷⁾ Tauhinu - silver tussock tussock-shrubland ⁽²⁾
∞ (Outside of Coastal Environment)	Erosional 'hard' rock hill slopes with extensive mass movement erosion e.g., from Flags Creek to the Waima River	Torlesse Group sandstones and siltstones, and Cretaceous sedimentary units	10–200	Bracken fernland ⁽²⁾ Mixed exotic pasture grass - silver tussock tussockland ⁽²⁾ Very sparse kanuka - cabbage tree treeland ⁽²⁾	Matai - black beech forest ⁽⁷⁾ Matai-titoki-mahoe-ngaio forest and treeland ⁽⁷⁾ Titoki-mahoe-ngaio forest with mixed broadleaved spp. (puka, mapou, akiraho, akeake, kohuhu, five-finger, lancewood) ⁽⁷⁾ Manuka-kanuka scrub and forest ⁽²⁾ Tauhinu - silver tussock tussock-shrubland ⁽²⁾

Refer to Appendix 1 (Coastal Terrestrial Area - Biotic - South Marlborough) for references

Coastal Terrestrial Area 17 : Wharanui

The coastal context is predominantly farmed, where SH1 and the railway head inland from the coast. The small settlement of Ward is nestled within the crumpled landscape where a network of small watercourses, often ephemeral splinters the area. The headwaters of the Flaxbourne and Waima Rivers extend inland to the higher backcountry some 10-20km. Sawcut Gorge, on the Waima River and set within the Chalk Range, is particularly dramatic. Lake Elterwater within the Flaxbourne catchment occasionally dries in extreme events but generally holds water and when as such supports good feeding habitat for pied stilts, royal spoonbills, dabchick, shags, paradise shelduck, grey teal and waterfowl. Paradise duck moulting. This lake is a Wildlife Refuge.

Abiotic

The Wharanui coastal area extends from just north of Chancet Rocks south to Willawa Point. It encompasses narrow coastal sand dune-interdune complexes, alluvial coastal terraces and floodplains, colluvial footslope fans, gravel beaches, and gravel beach ridges between the former sea cliffs or hill slopes and the present shoreline. Erosional landforms include steep to moderately steep 'soft' rock hill slopes often with extensive mass movement erosion, steep, structurally controlled 'soft' rock landforms, e.g. limestone cored cuestas, including escarpments and coastal stacks; and steep to very steep deformed 'hard' rock hill slopes with extensive mass movement erosion.

Active migrating sand dunes are common. Sand dune fields are extensive between Willawa Point and the Waima River between SH1 and the sea. The Waima dune field south of the river mouth is considered to be the best examples of coastal sand dunes in Marlborough. North of the Waima River around Mirza Creek and towards Needles Point strong south easterly winds drive migrating sand dunes up onto the toe and mid slopes of abandoned former seacliffs to elevations of more than 40m. From Needles Point to the Flaxbourne River mouth and to Chancet Rocks the dune-interdune complexes are more subdued and restricted to the inland foreshore, and generally only cover lower elevation toeslopes.

The coastal margin of the low gradient meandering floodplain of Tirohanga Stream is composed of fine grained materials from a variety of rock sources and is largely confined behind the coastal dune belt. In contrast the floodplains and low terraces of the Waima River and Woodside Creek are composed largely of coarse limestone derived gravels and sands, and penetrate the coastal dune belt in the form of depositional fan-deltas. A gravel bar-lagoon system has developed at the mouth of the Flaxbourne River, where the floodplain and low terraces comprise a mixture of coarse and fine grained materials.

Small remnants of coastal terraces, gravel beach ridges and active gravel beaches are scattered through this area especially adjacent to prominent rock outcrops and the major river mouths.

The steep to moderately steep 'soft' rock erosional hill slopes are underlain by weakly consolidated sandstone, mudstone, and conglomerate with more indurated limestones and more highly calcareous lithologies in places. These slopes, frequently abandoned former sea cliffs, often exhibit evidence of extensive mass movement erosion. The more resistant limestone and more highly calcareous lithologies core the structural landscape components e.g., Weld Cone, rocky escarpments, coastal stacks and outcrops, and wave cut platforms and reefs e.g., Chancet Rocks and Needles Point.

The steep to very steep erosional 'hard' rock hill slopes with extensive mass movement erosion between Flags Creek and the Waima River are underlain by very strong well-bedded sandstone and mudstone and poorly bedded sandstone.

Accumulative debris slopes and fans at the foot of abandoned former sea cliffs and steep coastal hill slopes are generally narrow.

The climate is hot, dry and windy with extreme exposure to wind directly off the ocean in many sites. Surface water resources are limited and the majority of streams are ephemeral. The Waima and Flaxbourne Rivers usually maintain some flow along the more coastal section of their catchments and channels. Rainfall ranges from 650 and 850 mm per year and elevation from 0 to 300 m above sea level.

Opposite: Weld Cone (368m) and the River Mouth and Lagoon of Flaxbourne River

Biotic

Summary analysis: Total area of Wharanui Coastal Terrestrial Area is 1,500ha of which 5% is in native shrubland, 1% in exotic treeland, 13% in exotic scrub and 73% in pasture. This biotic environment forms part of the Department of Conservation's Kekerengu Ecological District.

Originally the hill country would have been clad in forest of totara, matai, titoki, mahoe, ngaio, akiraho, manuka and kanuka, lowland ribbonwood, kowhai, narrow-leaved lacebark, five-finger and akeake may have been present. On coastal stacks, outcrops and

escarpments was probably mixed shrubland and wharariki, with prostrate kowhai, rock daisies, specialist limestone plants, native lilac, speargrasses and various herbaceous plants. Coastal terraces and fans would have supported forest of ngaio, titoki, mapou and mahoe, perhaps also containing totara, matai, akeake, akiraho and kanuka.

The dune and gravel beach ridge system would have been clad in spinifex, sand tussock, pingao, sand coprosma, sand daphne and sand spurge. Matagouri, coastal shrub daisy, shrubby tororaro, wharariki, ►



Coastal Terrestrial Area 17 : Wharanui

pohuehue and tauhinu may have also been on the dunes. There may also have been pockets of ngaio forest. Coastal mat daisy would have been abundant in dune slacks. At stream and river mouths were small coastal wetlands containing harakeke, raupo, toetoe, sedges, kahikatea, cabbage tree and manuka.

Fauna would have included forest birds, wetland birds, coastal birds, reptiles (tuatara, skinks and geckos), seals and dryland and wetland invertebrates.

This Coastal Terrestrial Area now is hot, dry and windy. It has considerable habitat diversity but has largely been denuded of native vegetation.

The extensive sand dune and beach ridge complex is dominated by marram grass, but spinifex, pingao and sand coprosma are present and locally dominant. Coastal mat daisy (*Raoulia* "hookeri coast") and *Raoulia australis* are present in dune slacks. Matagouri, pohuehue, knobby clubrush, *Carex pumila*, coastal shrub daisy, *Melicytus* "Waipapa", tauhinu, *Muehlenbeckia ephedroides* and *Pimelea prostrata* are also on the dunes.

On the coastal terraces and fans are silver tussock, scrub (tauhinu, coastal shrub daisy and matagouri, with localised shrubby tororaro), wharariki, toetoe and some ngaio.

The wetlands at the stream and river mouths have some glasswort, three square, saltmarsh ribbonwood, sea rush, raupo, harakeke and coastal shrub daisy. The rivers have populations of black flounder, bullies, galaxids and eels.

The hill slopes have a scattering of native vegetation, mostly induced scrub and shrubland. The main plants are silver tussock, matagouri, tauhinu, kanuka, manuka and bracken. There are pockets of kanuka forest with broadleaved species and rare treelands of ngaio, cabbage trees or mountain lacebark. *Coprosma crassifolia*, prostrate kowhai and *Aciphylla aurea* occur on some structural landforms. On coastal stacks, outcrops and escarpments are specialist limestone plants such as *Carmichaelia astonii*, *Epilobium wilsonii*, *Asplenium lyallii*, *Trisetum drucei*, *Brachyscome* "Ward", *Dichelachne lautumia*, *Gentianella astonii* subsp. *arduana* and *Pimelea* subsp. *oliga aridula*, along with the ubiquitous endemic rock specialists (*Pachystegia insignis*, native lilac, *Celmisia monroi* and others).

The following are notable plant species found:

Brachyscome "Ward" -t,ee; *Muehlenbeckia astonii* -t; *Pimelea aridula* subsp. *oliga* -t,e; *Carmichaelia astonii* -t,e; *Isolepis basilaris* -t; native lilac -r,e, *Pimelea traversii* subsp. *borea* -r,e; *Gentianella astonii* subsp. *arduana* -r,e; pingao -r; *Trisetum drucei* -r; sand coprosma -r; *Raoulia* "hookeri coast" -r; *Craspedia uniflora* var. cf. *grandis* -r; *Epilobium wilsonii* -r; *Wahlenbergia albomarginata* subsp. *flexilis* -r,e; *Pleurosorus rutifolius* -r; *Muehlenbeckia ephedroides* -r; spinifex; *Raoulia australis*, *Pachystegia insignis*, *Celmisia monroi*, *Pimelea prostrata*, *Asplenium lyallii*, *Convolvulus waitaha*, ngaio, *Aciphylla aurea* and *Melicytus* "Waipapa", *Rytidosperma maculatum*.

In terms of animals, kahu, pipit -r, welcome swallow, red-billed gull -t, black-backed gull, white-fronted tern -r, pied stilt -r, oystercatchers -r, banded dotterel -t, pied shag -t, paradise shelduck, kingfisher, common gecko, common skink, black flounder, common bully, upland bully, giant bully, inanga -r, longfin eel -r and shortfin eel are all present. There are colonies of NZ fur seals at Chancet Rocks and The Needles.



Above: New Zealand Fur Seals

For freshwater, this Coastal Terrestrial Area includes several smaller watercourses including Mirza, Woodside, Flagstaff and the Flaxbourne with the Waima the largest of these. Only the Flaxbourne and Waima have semi regular connection with the sea during periods of higher flows. The whitebait runs into these streams when they are open to the sea are targeted by local whitebaiters and may yield good catches. Black flounder, common bully, upland bully, giant bully, inanga, longfin and shortfin eels are present. Avifauna in the lower reaches and on the lagoons of these streams include braided river birds such as terns, banded dotterel, pied stilts and waterfowl such as paradise shelduck.

- t** = threatened nationally
- r** = at risk nationally
- e** = endemic to South Marlborough
- ee** = endemic to Wharanui Coastal Terrestrial Area

Experiential

The slender Coastal Terrestrial Area includes SH1 and the Main North Railway Line as well as numerous residences. In the northern part of this coastal area the principal access is gained from Ward Beach Road, a road which wends through dramatic limestone hills to a small cobbled beach close to the mouth of the Flaxbourne River. Here, camping is possible through arrangement with the landowner and fishing is also possible from this point.

Beach access is limited to a number of areas further south, notably close to the Waima River mouth. Modification to this part of the coast is reasonably evident, however limited, with much of the land used for farming purposes. Sand dunes and marram grass occupy the coastal low back dunes and provide for opportunities to view the ocean. This part of the Marlborough coast is extremely memorable, not only for people travelling through the landscape either by road or rail, but also for the dramatic coast-sculpted limestone features of Weld Cone and the coastal stacks as well as the wave cut platforms and reefs of Chancet Rock and the Needles further north.



Above: *Heliohebe hulkeana* (NZ lilac)

Level 3: Overall Area Rating for Wharanui Coastal Terrestrial Area

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 Terrestrial Area 17 : Wharanui

Levels 4 & 5: Specific Parts within Coastal Terrestrial Area 17: Wharanui Holding High or Very High Natural Character

Sub Area	Rating	Key Values	Additional Comments
Chancet Rocks to Waima/ Ure River Mouth	High	<p>The coastal zone contains localised endemic plants, nationally threatened plants and naturally rare ecosystems (calcareous bluffs, stacks and screes; dunes, gravel beaches, small wetlands and marine mammal haulouts). There are two NZ fur seal colonies (Chancet Rocks and Needles Point). There is also a ventifact field.</p> <p>The coastline from the Chancet Rocks to the Waima River holds high experiential values. The dramatic coast-sculpted limestone features of Weld Cone, the numerous coastal stacks as well as the wave cut platforms and reefs of Chancet Rock and the Needles are prominent features displaying limited modification, despite the agricultural land use.</p>	Light grazing dominates the land use

Refer also to Section F of this report for:

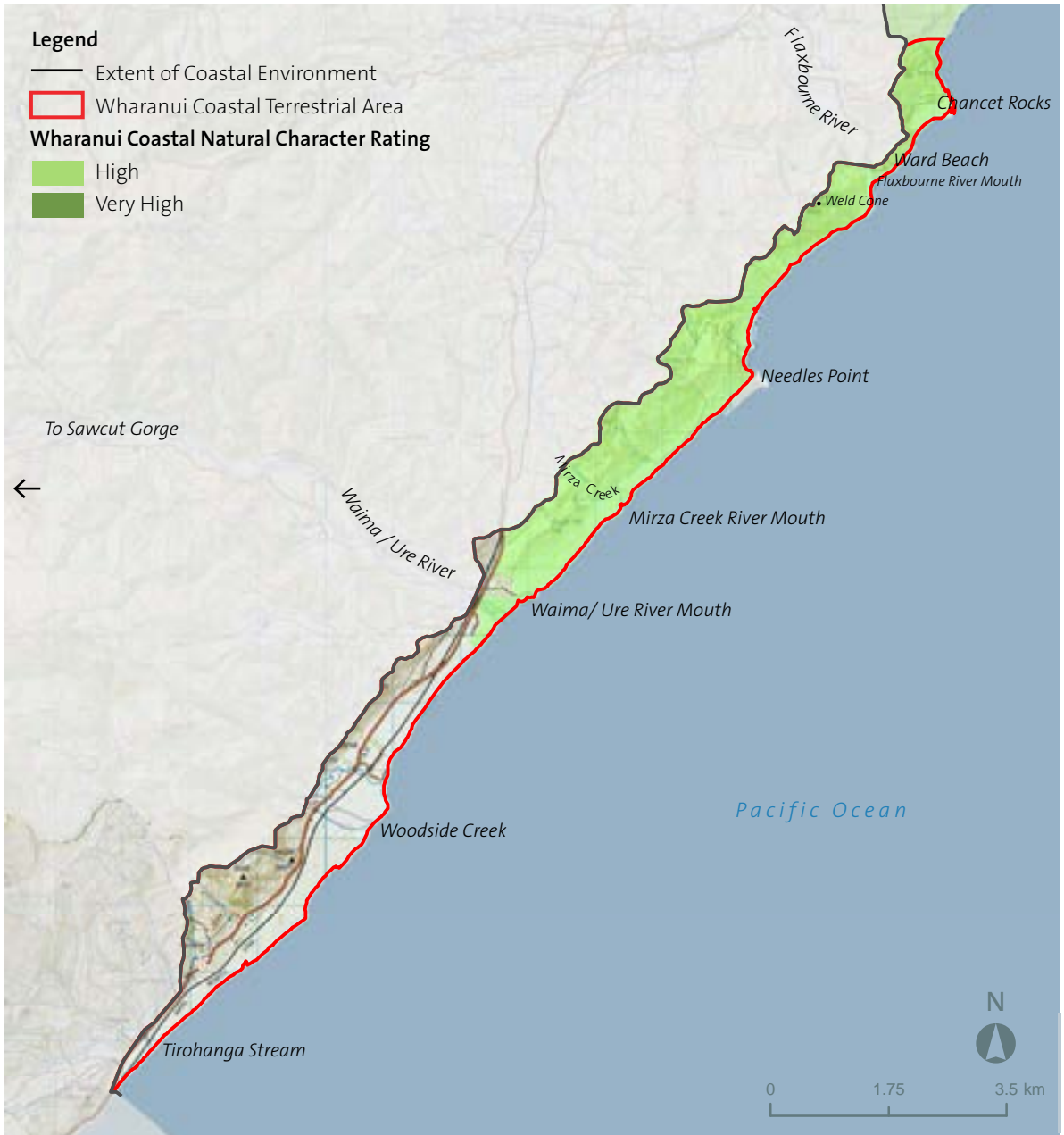
Outstanding Coastal Natural Character Area 16: Chancet Rocks & The Needles



Above: Chancet Rocks are a Geopreservation site of international importance and home to numerous seals

Opposite: Looking southwards towards Chancet Rocks and Weld Cone

Levels 4 & 5: Specific Parts within Wharanui Coastal Terrestrial Area Holding High or Very High Natural Character



South Marlborough Study Findings: Coastal Natural Character Values at the 'Area' Scale (Level 3)

As explained at the beginning of this section (Section E), the seven Coastal Terrestrial Areas (which include freshwater) and two Coastal Marine Areas of South Marlborough have been described and evaluated at the 'Area' wide scale (i.e. at Level 3 of diagram on page 27). Components specifically mentioned within each of the 'Areas' have been mapped and evaluated at the next scale (i.e. Levels 4 & 5). Refer overleaf for more about the finer scale mapping.

At the broader Level 3 'Area' scale, the areas (e.g. Campbell) were found to be broadly homogenous, with moderate, moderate to high, high or very high abiotic, biotic and experiential values. Many of the Coastal Terrestrial Areas in South Marlborough have seen original land uses change to varying degrees. Many 'Areas', especially those that occupy more undulating terrain, are used for light grazing. More fertile flatter areas, such as areas around the Wairau and Awatere River mouths, tend to be used for grape growing. Natural character ratings for each Coastal Marine Area and each Coastal Terrestrial Area for

South Marlborough are shown in the tables below and mapped opposite.

Within each Coastal Terrestrial and Coastal Marine Area, there are specific parts that hold high or very high abiotic, biotic or experiential values. These are considered at the next scale down (i.e. Levels 4 & 5 in the diagram on page 27). However, due to the knowledge and information available, it has only been possible to map Marine Areas holding high or very high levels of abiotic and biotic natural character. See next pages for this more detailed evaluation and mapping.

As part of a separate assessment, there are three areas within South Marlborough that hold Outstanding Natural Character. These areas are the Wairau Lagoons, noted for its exceptional bird habitat, Cape Campbell and the Chancet Rocks/ Needles. See Section F for the evaluation and mapping of these outstanding areas.

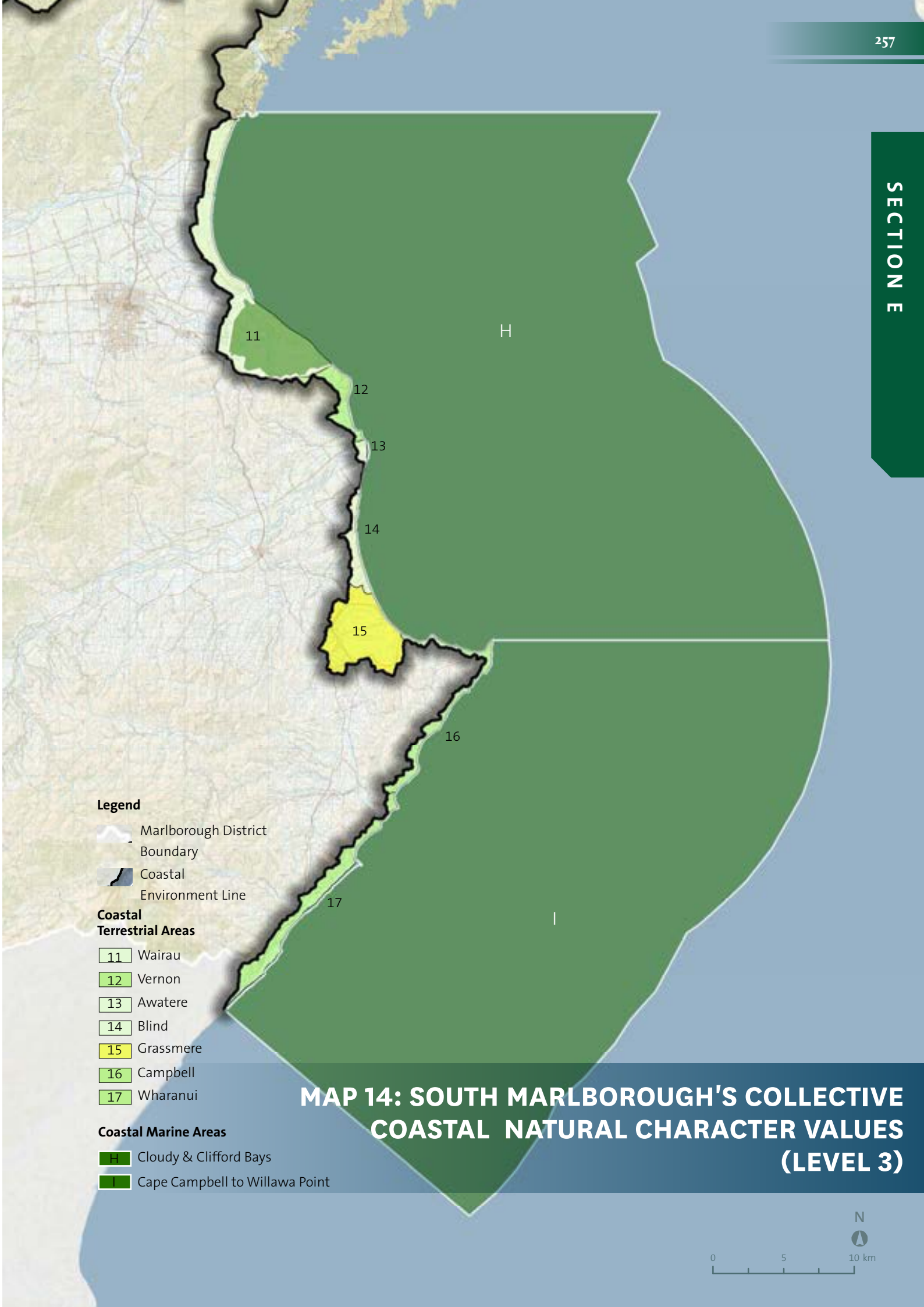
Summary Table of Natural Character Evaluation at the 'Area' scale (i.e. Level 3):

Coastal Marine Areas - Natural Character Rating		
H	Cloudy and Clifford Bays	Very High
I	Cape Campbell to Willawa Point	Very High



Coastal Terrestrial Areas- Natural Character Rating		
11	Wairau	Moderate to High
12	Vernon	High
13	Awatere	Moderate to High
14	Blind	Moderate to High
15	Grassmere	Moderate
16	Campbell	High
17	Wharanui	High





Sea cliffs at Clifford Bay as seen from Cape Campbell





Legend

-  Marlborough District Boundary
-  Coastal Environment Line

Coastal Terrestrial Areas

-  11 Wairau
-  12 Vernon
-  13 Awatere
-  14 Blind
-  15 Grassmere
-  16 Campbell
-  17 Wharanui

Coastal Marine Areas

-  H Cloudy & Clifford Bays
-  I Cape Campbell to Willawa Point

MAP 14: SOUTH MARLBOROUGH'S COLLECTIVE COASTAL NATURAL CHARACTER VALUES (LEVEL 3)



South Marlborough Study Findings: Coastal Natural Character Values at the Specific Scale (Levels 4 & 5)

Following on from the broader evaluation mapping exercise on the preceding pages, this page and the map opposite outlines the natural character evaluation of South Marlborough at the finest or most detailed scale (i.e. Levels 4 and 5 of the diagram on page 21). Here, specific stretches of coastline, river mouths and headlands have been mapped as best as possible to illustrate those areas holding high or very high levels of natural character.



This more detailed mapping has only been done where specific mention or detail has been included within the broader 'Area' descriptions and evaluations. For example, the Wairau Coastal Terrestrial Area has been rated moderate to high

as a collective area (see previous page at Level 3). At a more detailed level (i.e. Levels 4 and 5 of the diagram on page 21) specific mention is made of the Wairau Lagoons due to their collective wetland system harbouring numerous wildfowl and other wetland birds. Its lack of modification indicates that this specific part of the larger 'Wairau' Area retains 'very high' levels of natural character, (sitting within an area holding broad 'moderate to high' levels of natural character).

See Section F of this study for mapping of the Outstanding Natural Character Areas.

Key to Levels 4 & 5 Natural character mapping *opposite*

Coastal Terrestrial Areas	
11	Wairau
12	Vernon
13	Awatere
14	Blind
15	Grassmere
16	Campbell
17	Wharanui

Specific Parts Holding Very High or High Natural Character	
	Very High
	High

Refer to individual Coastal Terrestrial Areas within Section E for a more detailed map illustrating High and Very High Natural Character at the specific scale (i.e. levels 4 and 5).



Limestone scree slopes are a distinctive feature of the South Marlborough coastline



MAP 15: SPECIFIC COASTAL NATURAL CHARACTER VALUES OF SOUTH MARLBOROUGH (LEVELS 4 & 5)

