Wellington City and Hutt City
Coastal Natural Character Assessment

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Boffa Miskell

Wellington City and Hutt City COASTAL NATURAL CHARACTER ASSESSMENT

Prepared for Greater Wellington Regional Council, Wellington City Council and Hutt City Council

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1. Executive Summary

1. Executive Summary

Introduction

This assessment identifying the coastal environment and evaluating the natural character within it has been undertaken to give effect to the requirements in the Wellington Regional Policy Statement and the New Zealand Coastal Policy Statement (NZCPS) 2010. The study was jointly commissioned by Wellington City Council, Hutt City Council and Greater Wellington Regional Council.

Methodology Overview

The study area comprises the coastal environment of the Hutt City and Wellington City coasts, including both terrestrial and marine areas. The terrestrial components of the coastal environment were evaluated by Boffa Miskell (BML) landscape architects and ecologists while the marine component (i.e. the coastal marine area) was evaluated by marine scientists from National Institute Water and Atmosphere (NIWA).

The first step of the assessment identified and mapped the inland extent of the coastal environment for the Wellington City and Hutt City districts. The subsequent steps evaluated the level of natural character in the coastal environment, including identifying components of high and very high natural character. The final step identifies areas of outstanding natural character.

The Coastal Environment includes the coastal marine area (CMA) and a relatively narrow fringe of coastal land. The inland extent has been identified (with guidance from NZCPS Policy 1 (2)) as generally being the part of the coast where "coastal processes, influences or qualities are significant"[1]

To facilitate the assessment, the study area was considered to comprise 18 coastal areas (14 coastal terrestrial areas and four marine coastal areas). Each of these areas were evaluated in relation to three attributes - abiotic, biotic and experiential[2]. The natural character ratings for each attribute were combined to determine the overall level of natural character (Map 3). Each terrestrial and marine area was then assessed at a finer scale to identify components which have high or very high levels of natural character (based on abiotic and biotic attribute ratings (Map 4). Following this, marine and terrestrial components with at least high natural character were interrogated further to identify any areas considered to have outstanding natural character.

1. NZCPS Policy 1 (2)(c).

2. Attribute groupings based on the NZCPS Policy 13(2) list of items that may contribute to natural character.

Study Findings

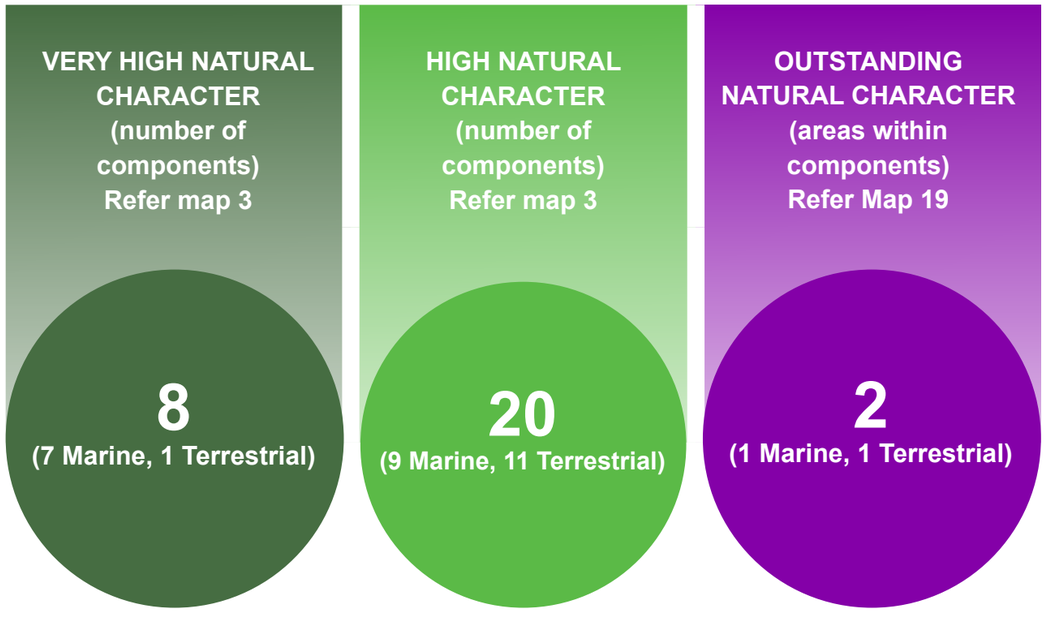
The aspects that comprise the collective coastal marine environment and coastal terrestrial environment are described in the report. The Wellington coast is a distinctive environment with broad scale variability that spans from the tops of coastal mountains and escarpments to the depths of adjacent marine canyons. Similarly, the level of natural character along the coast varies greatly from very low levels of natural character along the highly modified coastal edge of Wellington CBD to very high levels where there is the least modification in areas such as the reef systems along the west coast.

With the exception of the inner harbour and area just outside the harbour entrance; all of the marine area in the study was assessed as having high or very high natural character. In contrast, a much smaller proportion of the terrestrial coastal area was evaluated as having high or very high natural character (Map 4). Locations that were assessed as having very high natural character were predominantly in the marine parts of the coastal environment while the number of locations with high natural character were similar for both terrestrial and marine parts of the coast.

Two areas of outstanding natural coastal environment were identified; The Cook Strait Canyons and the Turakirae Uplifted Marine Beaches (Map19).

The table below summarise the findings of the assessment (also refer to Section 4.1 of this report).

Summary of Findings



2. Section A Introduction

Wellington City and Hutt City COASTAL NATURAL CHARACTER ASSESSMENT

2.1 Purpose & Background

The NZCPS 2010, requires local authorities under Policy 13 to map or otherwise identify (at least) areas of high natural character in the coastal environment. The NZCPS 2010 also refers to areas of outstanding natural character, necessitating additional evaluation.

Greater Wellington Regional Council (GWRC), Wellington City Council (WCC) and Hutt City Council (HCC) engaged Boffa Miskell Limited (BML) to undertake a natural character assessment within the coastal environment in light of the New Zealand Coastal Policy Statement 2010 (NZCPS 2010) and Wellington Regional Policy Statement 2010 (RPS). To complete this assessment BML engaged marine scientists from National Institute Water and Atmosphere (NIWA) to complement BML's terrestrial ecology and landscape expertise.

This report contains the results of the study, which the respective regional and city councils will use in their reviews and policy development of their resource management documents.

2.2 Study Scope

Using a methodology applied in other recent natural character assessments of the coastal environment, the BML/NIWA study team refined the approach of the assessment to ensure consistency in the way landscape, ecological and marine expertise is harnessed for this study, which effectively:

- Determines the inland extent of the coastal environment, as set out in Policy 1 of the NZCPS and;
- Identifies areas of at least high natural character in the coastal environment, as set out in Policy 13 of the NZCPS 2010.
- Identifies areas of outstanding natural character in the coastal environment .

This study does not address Policy 11 (indigenous biological diversity), Policy 14 (Restoration of natural character) nor Policy 15 (natural features and natural landscapes).

2.3 Study Process

The study has been undertaken as an independent technical assessment by BML and NIWA.

The methodology used for this study has been adapted from several recently completed natural character studies, including *Natural Character of the Marlborough Coast* (2014), *South Taranaki Landscape Assessment* (2014), *Nelson Coastal Study* (2015) and Natural *Character Study of the Waikato Region East Coast* (2015).

Refinement of the methodology for this project took place during two workshops held on the 12th October 20th November 2015. These were attended by terrestrial and marine scientists and landscape architects from NIWA and BML as well as representatives from GWRC and WCC. During the workshop, the extent of the coastal environment was discussed and refined as well as the methodology for natural character assessment. The methodology used for this assessment is detailed in Appendix 1.

The assessment used a combination of desktop research using GIS datasets and fieldwork, which included an aerial reconnaissance by helicopter as well as site visits to some locations by foot and by boat.

In addition, all of the study team members are very familiar with the Wellington coastal environment, which has further assisted interpretation of data.

The assessment process comprises four key steps:

1	Identification of the extent of the coastal environment, in particular the inland extent (study area);
2	Identification of the marine and terrestrial coastal sub areas that comprise the study area and the description and documentation of each area;
3	Evaluation of the level of natural character for each marine and terrestrial area, and identification of the components within each area that have high or very high natural character; and
4	Evaluation of outstanding natural character; that is, assessing those components with high and very high natural character to determine if any part of them qualify as having outstanding natural character.

2.4 Graphic Material and Mapping Scales

The printed graphics attached to this document illustrate the mapping provided in the corresponding GIS data sets. Detailed interrogation of the mapped areas should be carried out using the GIS data sets.

The mapping scale varies but most of the data used for this study is at scales greater than 1:50,000. The coastal terrestrial and coastal marine areas (Section B) have been mapped at 1:50,000. More detailed evaluation mapping in Sections C and D, including Outstanding Natural Character, have been mapped at 1:10,000.

Natural character assessments utilise different scales of reference that steadily decrease from the broad regional scale to the detailed local scale. Natural character is necessarily context and scale related. That is, the coastal environment can be perceived as having different levels of natural character, depending on the level of detail gathered and the scale at which natural character is appreciated.

As the simplified diagram in Figure 1 illustrates, regional, area and component scales are considered. The broader regional scale, which is essentially an understanding of natural character values within the context of the wider Wellington area, is described in Section B. Section C focuses on the coastal terrestrial and coastal marine areas (considered at 1:50,000) and includes specific recognition of components with at least high natural character (considered at 1:10,000).

Following identification of areas of high and very high natural character, areas of outstanding natural character are subsequently assessed in Section D of this report.

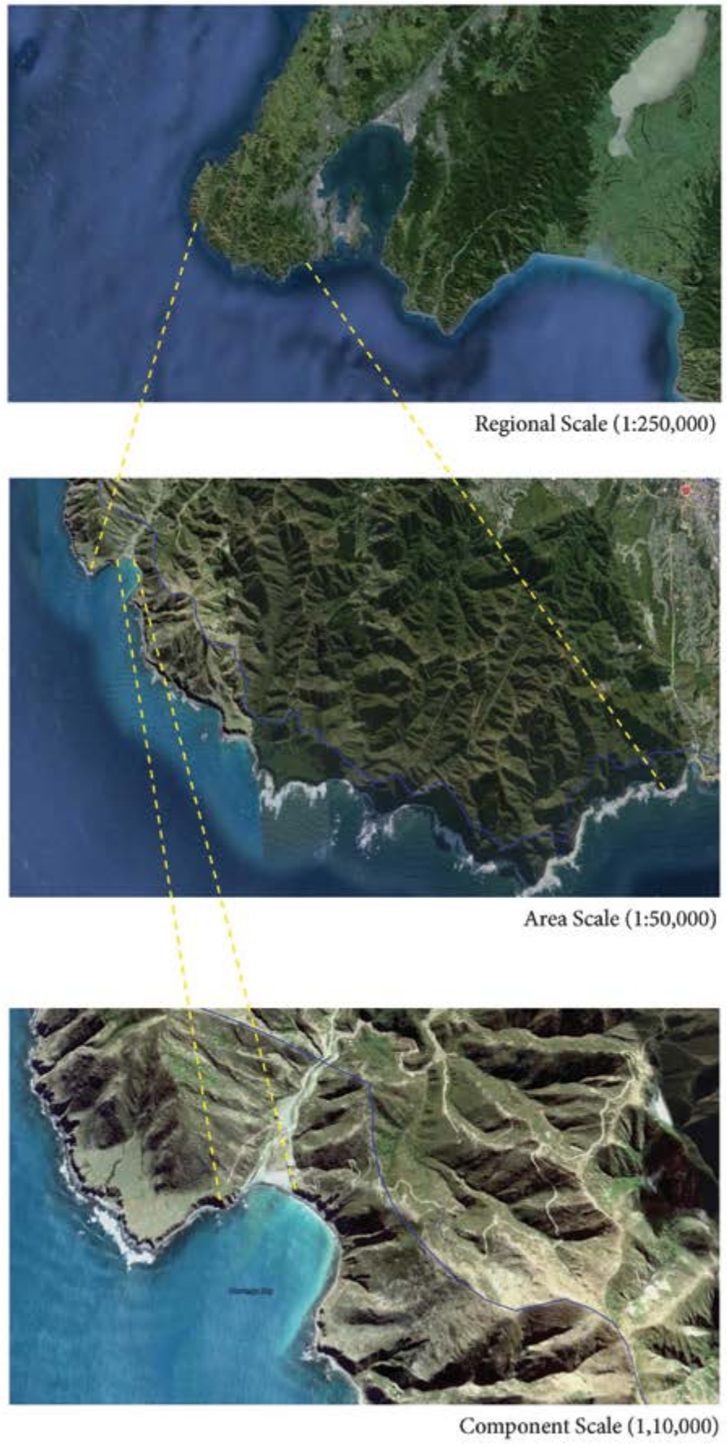
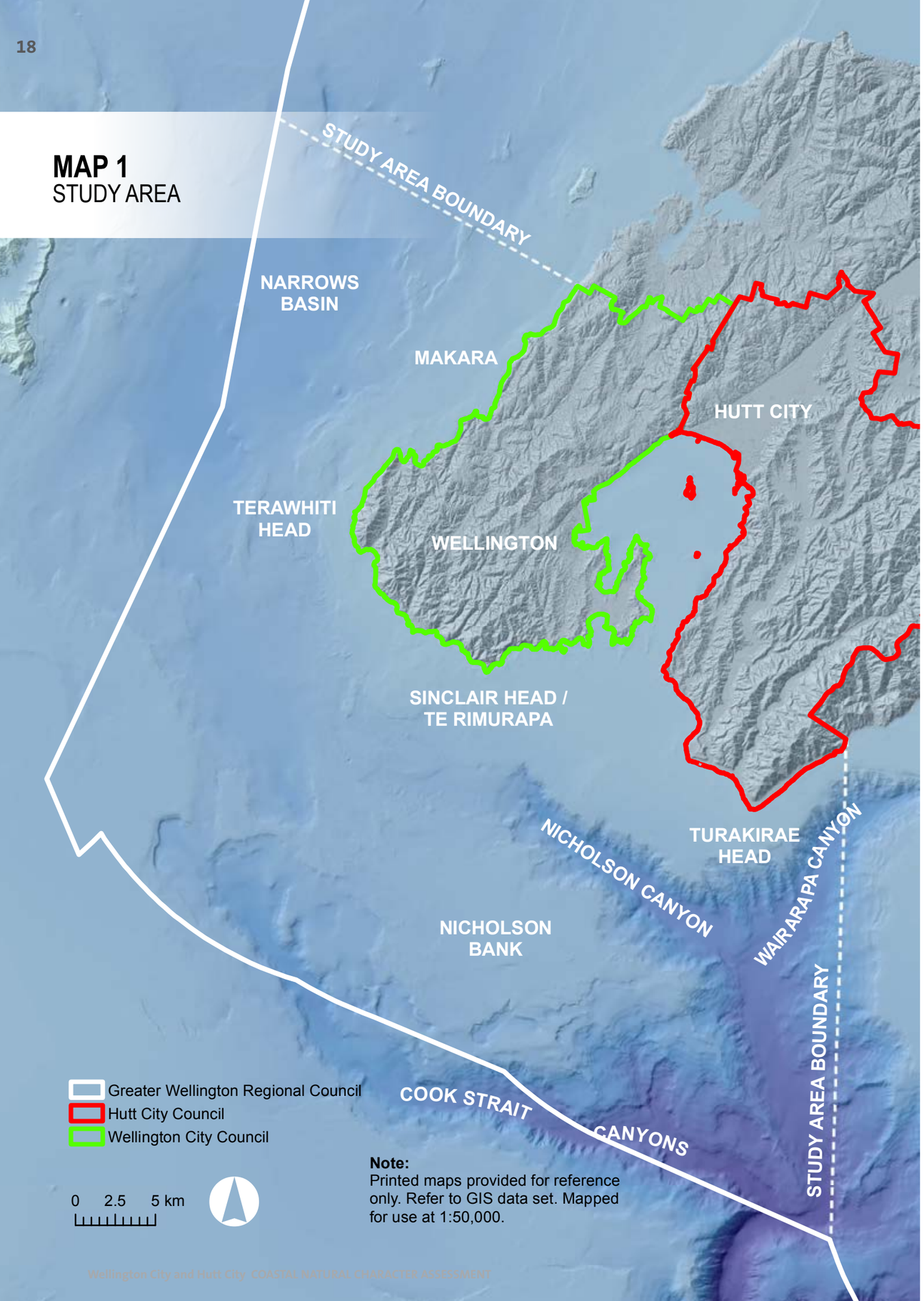


Figure 1: Natural Character Assessment Scales

Wellington City and Hutt City COASTAL NATURAL CHARACTER ASSESSMENT

3. Section B: Wellington Coastal Environment

Wellington City and Hutt City COASTAL NATURAL CHARACTER ASSESSMENT



3.1 Introduction to the Wellington Coastal Environment

The Wellington Region occupies the southern end of the North Island as well as the marine area to 12 nautical miles offshore, except where the boundary of the adjacent Marlborough District Council abuts halfway across the narrows of Cook Strait/ Raukawa (Cook Strait). Within this Region, the study area considers the coastal terrestrial areas within the jurisdictions of WCC and HCC and the adjoining marine area under the jurisdiction of GWRC (Map 1).

The coastal environment of Wellington comprises a relatively narrow strip of land and in most places, a 22 km wide coastal marine area which varies considerably from relatively wild and scenic character along the exposed southern coast to areas of highly modified reclaimed land within Wellington Harbour/Port Nicholson /Te Whanganui a Tara (Wellington Harbour).

The interplay of the various characteristics both on land and within the sea create a distinctive environment for its broad scale variability that span from the tops of coastal mountains to the depths of nearby adjacent marine canyons. The aspects that comprise the collective coastal marine environment and coastal terrestrial environment are described below.

3.2 Abiotic Characteristics of Wellington's Coastal Environment

Topography is the major defining element of Wellington's coastal environment with the Wellington Region occupying a zone of parallel NE-SW trending strike-slip faults, many of which are active. The marine area is dominated by the large and impressive Cook Strait Canyon which, as well as the main canyon mid-strait, has deeply incised arms in Palliser Bay (Wairarapa Canyon), and near the Wellington Harbour entrance (Nicholson Canyon).

Tectonic activity has formed a sequence of tilted bedrock greywacke blocks. This includes the Pukerua, Ohariu, Shepherd's Gully, Moonshine, Wellington and Wairarapa Faults (Begg & Johnston, 2000; Begg & Mazengarb, 1996; Stevens, 1974). There are also several secondary faults in the region that affect the shape of the terrestrial and marine landscapes, some of which are deemed active, such as the Evans Bay Fault, which probably extends into Lyall Bay (K. B. Lewis & Mildenhall, 1985) and the newly discovered Aotea Fault in inner Wellington Harbour (Barnes, Nodder, Woelz, & Orpin, 2014).

The resultant landforms are characterised by steep, strongly faulted ridges, hills and ranges together with buckled sunken valleys and basins. The bedrock is greywacke and the landscape can be thought of as series of tilted blocks, each uplifted on the western side of the main fault lines (Molloy & Smith, 2002). As a result, evidence of elevated coastal features occur at a number of locations around Wellington's coast. This includes very exposed, steep, coastal escarpments, terraces, headlands and islands within the larger sunken form of Wellington Harbour.

The Wellington Fault forms a prominent feature through the region extending from Cook Strait, a few kilometres west of Sinclair Head, through Brooklyn and several other suburbs of Wellington City and along the Western side of the Hutt Valley (Langridge et al., 2011). This has also influenced the mid to lower reaches of the Te Awa Kairangi/Hutt River (Hutt River), the shape and depth of the Wellington Harbour and the dramatic landscape around the Wellington and Hutt Valley areas.

During the 1855 earthquake, the shoreline around Petone and Wellington rose by 2-3 metres, creating land where the Hutt Road and urban motorway have been built and the narrow north-western shoreline of Wellington Harbour (Molloy & Smith, 2002). Uplift associated with similar historic fault movement probably contributed to the formation of Miramar Peninsula now joined to the mainland by a tombolo or sandspit extending between Evans Bay and Lyall Bay.

Historic tectonic activity has also resulted in beach ridges being raised beyond the reach of the highest seas by earth movements such as that generated by the 1460 and 1855 earthquakes. Older earthquake related uplift has also raised rocky shore platforms and

benches which have been cut by the sea as well as other erosional features such as sea caves, rock arches and stacks which have become standard above high water (Turner, 1985).

Soils range from greywacke and Pleistocene drift material and loess, with alluvial, peaty and stony soils in valleys. On coastal cliffs, soils are mainly shallow and stony steepland soils from greywacke with skeletal soils and areas of bare rock and scree. There are also some minor areas of shallow and gravelly soils on old beach benches (McEwen, 1987) in combination with coastal reefs which line much of the coastal edge.

Seafloor sediments vary from coarse gravels found close inshore in several places such as in Lyall Bay at the southern end of Wellington Airport, and near the old bluestone quarry west of Houghton Bay, to fine muds found in the deeper parts of Wellington Harbour and on the seafloor in the Nicholson and Wairarapa Canyons. Well sorted coarse sands occur in the bays along the south coast and in Wellington Harbour.

The climate is windy with prevailing north to north-westerly winds with high wind-run and frequent gales. The region experiences warm summers, mild winters with rainfall typically ranging between 900 and 1400mm per annum and evenly distributed (McEwen, 1987).

The water flows in Cook Strait are unique globally, due to the combined effect of the presence of Cook Strait and the scale of the land-mass relative to the tidal wave forced by the moon and sun. Essentially when it is high tide on one side it is low tide on the other. While some other places match this in scale (Iceland, Madagascar), they don't have a strait dividing the middle section of the island. Thus tidal, as well as non-tidal flows are squeezed through the contraction formed by the strait. Extreme wind exposure is also an important driver of water transport, with some suggestion that Cook Strait might be amongst the most turbulent ocean flows on the planet. Southerly storms and breaking swells are the dominant formative force right at the shore but tidal currents are also strong in shallow waters. Within Wellington Harbour, the currents and the eddy systems driven by the tides and the winds play an important role in determining fate of material from the Hutt River.

Marine water quality in the Wellington region is generally very high due to the strong wind and tidal currents which rapidly flush and dilute stormwater and outfall discharges, the great depth and volume of Wellington Harbour, and the presence of deep water relatively close inshore. However, there are some legacy seafloor sediment contamination issues in the inner parts of Wellington Harbour which can lower water quality when sediments are disturbed by waves during storm events or during dredging.

The large urban area of Wellington City has modified substantial areas of Wellington's coastal environment. Many parts of the coastal edge accommodate road and rail access which has been formed along the raised rocky shore platforms and are protected with rock armouring. Several parts of the natural coastline have been modified by reclamation, including Wellington CBD, Kaiwharawhara and parts of Evans Bay and Lyall Bay. Several coastal settlements are threaded along the numerous coastal bays within Wellington Harbour and along the south coast. Vehicle tracks and isolated coastal settlements continue throughout other parts of Wellington's south and west coast, whilst also retaining more limited areas of human modification and a remote and rugged coastal character. The coastal turbines of the two wind farms on the west coast are visually obvious modifications along that part of the coast.

3.3 Biotic Characteristics of Wellington's Coastal Environment

Terrestrial

Most of Wellington's terrestrial environment has been heavily modified by historic vegetation clearance and fire. Following this, much of the area was converted to pastoral grazing (semi-extensive sheep and cattle) with gorse becoming prevalent in many areas, especially on steeper slopes that are difficult to graze. Modification of biotic elements, patterns and processes have also resulted from the creation and expansion of the large urban area of Wellington City.

The original (pre-European) native land vegetation cover would have been a significant feature given that most of the terrestrial area was covered in native forest until 150 years ago when it was cleared by European settlers and converted to pastoral farming and settlements. Very little of the original vegetation remains and most of the larger remnants are confined to the valleys, steep gullies and lower slopes of ridges and hills.

Further changes to land cover have occurred and will continue to occur, as tracts of farmland revert from pasture to exotic scrub and secondary native vegetation. Climate has a significant influence on vegetation and the proximity of the coast and the strong salt-laden winds have a major influence on vegetation, especially in exposed locations.

The Wellington coastal environment is situated within the Sounds-Wellington and Tararua Ecological Regions, spanning three Ecological Districts:

- The band of coastal slopes that extend from Boom Rock to Owhiro Bay lies within the Cook Strait Ecological District;
- The coastline from Owhiro, around the Miramar Peninsula, western harbour hills along Petone to Seaview lie within the Wellington Ecological District;
- The coastal edge from Seaview along the eastern harbour hills around Pencarrow, Baring and Turakirae Heads to Windy Point lie within the Tararua Ecological District.

Wellington Peninsula's original vegetation was highly diverse. The southern and western coastlines carried a vegetation sequence moving inland from gravel beaches and rock platforms, to toe slopes, screes and bluffs, through to steeplands and finally into lowland valleys. Herbfield-shrubland dominated the foreshore and rocky platforms merging into shrubland-grassland-flaxland on rock outcrops and lower slopes. This then merged into low, single tier, coastal forest on the coastal slopes and steeplands.

Salt, drought and shallow alkaline soils influenced these coastal forests resulting in a diverse vegetation of hardy species including taupata, akiraho, tree-hebe, kohuhu, fivefinger, kapuka, and ngaio. Flax would have been present on rocky bluffs. Vinelands and shrublands, dominated by divaricate species, would have been present on unstable screes.

Areas of coastal dunes have also undergone significant modification within the Wellington coastal environment due to residential development, recreational activities, farming, roading and quarrying. Dunes form in coastal areas where there is shelter from strong waves, a supply of sand, onshore winds, and dune-binding plants are present or are capable of establishing (Milne & Sawyer, 2002). Such species include *Poa billardierei* (sand tussock), *Desmoschoenus spiralis* (pingao), *Spinifex sericeus* (spinifex), *Coprosma acerosa* (sand Coprosma), and *Pimelea aff. arenaria* (sand daphne), all of which are now much reduced within the Wellington region.

Moving from the immediate salt zone and into the first lowland valleys, the vegetation would have become taller and more diverse. On these sunny frost-free slopes, kohekohe would have been a dominant influence with tawa, hinau, and nikau. Rimu, northern rata and rewarewa were common emergent species.

Indigenous terrestrial fauna is now reduced in its species diversity and abundance due to historic habitat loss and fragmentation, reduced food supply through the reduced diversity of native plant species, and pest competition and predation (WCC, 2013).

Reefs and rock stacks at Baring Head

Avifauna communities would have include saddleback, piopio, robin, kokako, hihi, banded rail, little spotted kiwi, weka and huia; species which are now either locally or nationally extinct. It is estimated that over 50 species of forest bird would have been present, and perhaps another 100 species of coastal and marine bird, some common, others seasonal visitors or storm blown transients (Boffa Miskell Ltd, 2005). Nesting seabirds would have inhabited many of the forested coast cliffs, while the stream mouths and associated coast lines would have provided flocking, roosting, nesting and foraging habitat for a variety of shorebirds. Today the Wellington region native avifauna assemblage is significantly reduced in both species diversity and abundance.

A variety of geckos and skinks would have been present in large numbers in the forests and within the coastal shrublands, grasslands, open screes and boulder banks. Native frogs would have inhabited dark forested streambeds, or hidden under logs and in rock piles on damp slopes. Tuatara would have been common in the open coastal forests (Boffa Miskell Ltd, 2005). Though now reduced, the lizard fauna of the Wellington region is still considered to be diverse, particularly for a region with such a large urban population (Romijn, Adams, & Hitchmough, 2012). Five gecko (Wellington green, Southern North Island forest, Common, min-mac and Pacific) and five skink (common, spotted, brown, copper and ornate) species have been recorded within the Wellington / Poneke area (Adams, 2009; McEwen, 1987).

Marine

In general, human impacts on the marine environment have been less than on the terrestrial, with only three species extinctions in New Zealand. However, many species have depressed populations through historical or ongoing exploitation. Additionally, in some places there has been habitat destruction or modification through reclamation, installation of structures, or sustained human activity such as bottom trawling

The marine pelagic communities are mostly complete with all members present. There are no known extinctions but some fish species, such as hoki and jack mackerel support sustainable commercial fisheries which typically depress the population size and reduces the upper age and size distributions. Smaller pelagic components such as phytoplankton and zooplankton are typical of coastal waters in central New Zealand and rapidly transit through the area carried by the strong wind and tidal induced currents.

On a national scale, the Wellington region is notable for the number of genera and species of large brown seaweeds that fringe the reefs and extend into deeper water. Good examples of these seaweed and kelp beds extend well into Wellington Harbour. However, Wellington Harbour also has a high proportion of the nationally recorded introduced macroalgae and the Asian kelp *Undaria pinnatifida* is particularly common.

The reef fish communities reflect both northern warmer water and southern cooler water influences and are of moderate diversity on a national scale, with regional diversity increasing towards the west (Smith et al. 2013). The Taputeranga Marine Reserve provides a clear reference point for the effects of fishing on reef fish abundance in the remainder of the region (Gardner 2008).

The demersal or bottom associated fish community in the region is of moderate diversity with the greatest species richness found towards the east around the deepest margins of the Cook Strait Canyon system (Leathwick et al. 2006). This community supports locally important fisheries for common warehou, gurnard, tarakihi, ling, and moki. Fishering typically depress the population size and reduce the upper age and size distributions.

The wide variety of habitats in the region from sandy beaches, harbour muds, exposed rocky coasts, and deep canyons means the region supports a wide variety of seafloor invertebrates such as crabs and shrimps, sea urchins, seastars, and snake stars, snails and bivalves. These are impacted by bottom trawling where this is intense on the open shelf and some species, such as lobsters and paua, support valuable commercial, recreational, and/or customary fisheries on coastal rocky reefs. Non-indigenous marine invertebrate species occur mainly in Wellington Harbour with fewer occurring on Wellington's south coast and none known to occur in the deeper waters of Cook Strait.

The region supports a rich diversity of marine mammals with Cook Strait being an important conduit for whales migrating between polar and tropical seas and is a rich feeding ground for many species. Although some species are depleted due to historical whaling activity no species is extinct and some populations are thought to be slowly rebuilding.

3.4 Experiential Characteristics of Wellington's Coastal Environment

Experiential characteristics of natural character encompass the human response to the levels of abiotic and biotic condition that exists. Policy 13 of the NZCPS identifies that such natural character associations may include the natural darkness of the night sky, places that are wild or scenic and a range of related experiential attributes, including the sounds and smell of the sea.

Experiential natural character associations remain apparent across much of Wellington's coastal environment, particularly the rugged and exposed areas of Wellington's south and west coasts and the Hutt's south coast. Where access is more limited, human modification is less apparent with experiential associations including an overwhelming wild and isolated character. Within Wellington Harbour, and parts of Wellington's southern bays and Miramar Peninsula, human settlement has resulted in more apparent levels of modification, including night time lighting which reduces experiential natural character aspects.

Away from urban areas, steep escarpment backdrops are common and provide a sense of overwhelming human scale to beaches (e.g. Turakirae and Boom Rock) which enhances feelings of isolation and remoteness, particularly where there is limited and difficult access. Unusual beach characteristics such as Opau Bay with its surreal perfectly wave-worn cobbles and the series of intact dunes near Tongue Point provide additional experiential attributes along rugged coastal areas.

The coastline is a popular and well frequented location for many recreational activities including fishing, swimming, diving or simply just being at the coast. Several surf breaks occur along the south coast through which people interact directly with natural wave processes which influence these areas. The windy and exposed waters of Cook Strait are renowned for their wild reputation and associations. Interisland ferries provide a vital link between the North and South Islands and along with other coastal shipping have a frequent presence in the harbour and Cook Strait.

Wellington City south coast bays and headlands

4. Section C: Wellington Coastal Marine and Coastal Terrestrial Areas

Wellington City and Hutt City COASTAL NATURAL CHARACTER ASSESSMENT

4.1 Natural Character Evaluation Summary

The assessment has involved consideration of the four coastal marine areas and 14 coastal terrestrial areas described and evaluated at both an 'area' scale and also at a more detailed 'component' (or local / specific) scale. The findings of these assessments are summarised below.

4.1.1 Area Scale Findings

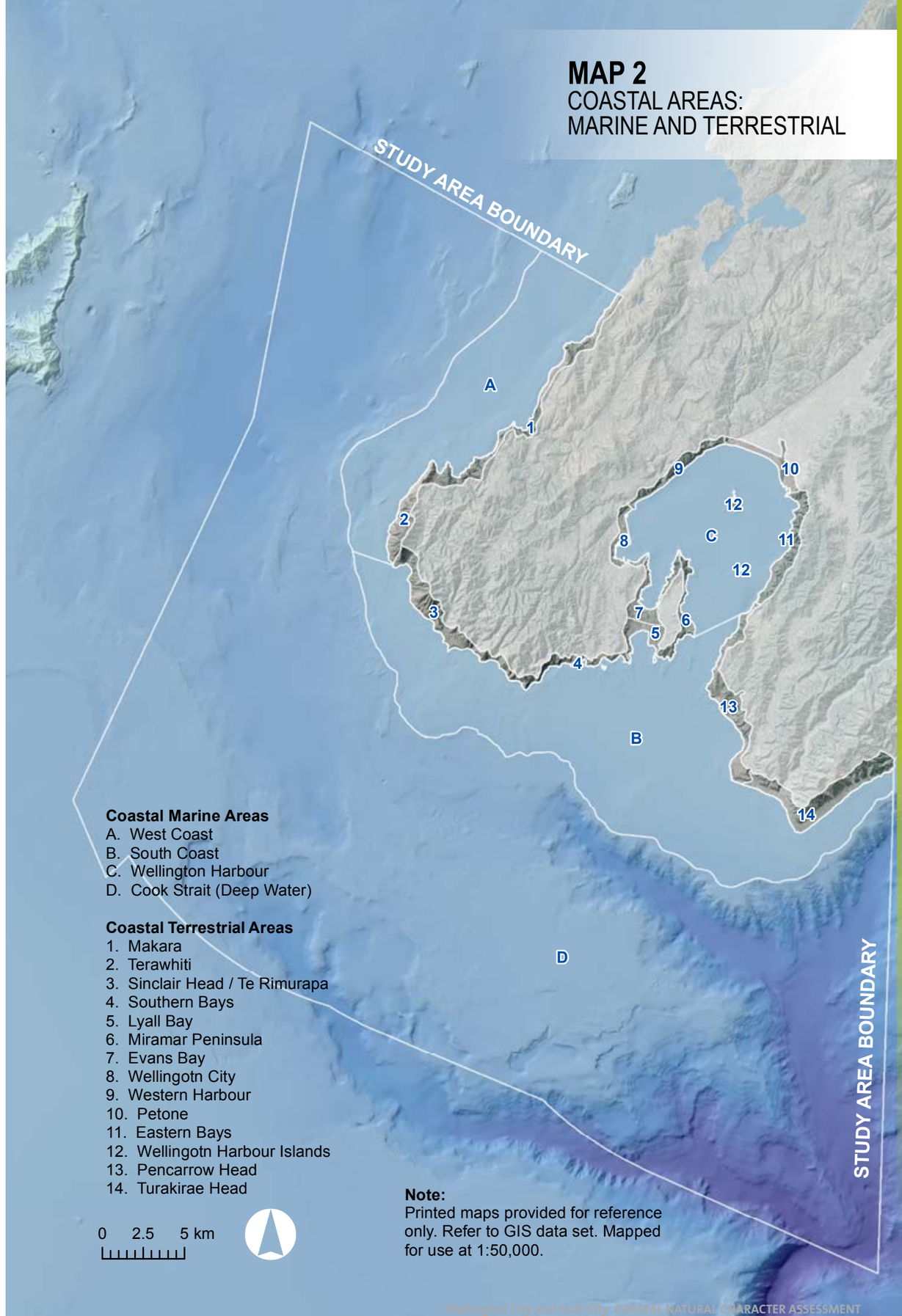
At the 'area' scale, a higher level of modification is evident within the terrestrial parts of Wellington Harbour, particularly where more intensive coastal edge urban development is well established. Accordingly, the Wellington City and Evans Bay areas have very low and low levels of natural character. A similar reduction in natural character occurs along the fringes of Wellington Harbour, including Miramar Peninsula, the Western Harbour Hills, Petone and the Eastern Bays, where transport infrastructure and urban development have modified natural elements and have resulted in respective low-moderate and moderate levels of natural character at the 'area' scale.

A similar pattern of modification occurs along the accessible parts of Wellington's south coast including Lyall Bay and the southern bays. In these areas, urban development is well established including Wellington Airport, roading along the coastal edge and residential housing and this results in low-moderate and moderate levels of natural character. Moving further from established urban areas, the level of abiotic modification is gradually reduced with roading and historic quarrying becoming less frequent. Notwithstanding this, rural activity will continue to modify the indigenous ecology and associated biotic attributes, with some access tracks and isolated buildings also apparent. Areas of moderate-high and high natural character extend along the remainder of Wellington's South and West Coast.

Within Hutt City the south coast is less accessible but there is some modification, including vehicle tracks, quarrying and agricultural activity. Notwithstanding this, much of this area retains high levels of natural character at the 'area' scale. Turakirae Head, the most remote aspect of Hutt City and together with the Wellington Harbour islands, forms the only two terrestrial areas identified with the study area with very high levels of natural character resulting from important geomorphological patterns and processes which support high biotic values.

Within the coastal marine areas, Wellington Harbour has a similar level of modification to the terrestrial areas given its proximity to established urban areas. The harbour itself has a low-moderate level of natural character with a moderate-high level of natural character in the more accessible waters along the South Coast resulting from the commercial and recreational marine activity impacting this area. Further from the entrance to the harbour, modification becomes more limited with high levels of natural character within the deep Cook Strait canyons and along Wellington's wild West Coast. A summary of the findings of the area scale evaluation is illustrated on Map 3. Refer also to the evaluation matrices (Tables 4 and 5) in Appendix 1.

MAP 2
COASTAL AREAS:
MARINE AND TERRESTRIAL



Coastal Marine Areas
A. West Coast
B. South Coast
C. Wellington Harbour
D. Cook Strait (Deep Water)

Coastal Terrestrial Areas
1. Makara
2. Terawhiti
3. Sinclair Head / Te Rimurapa
4. Southern Bays
5. Lyall Bay
6. Miramar Peninsula
7. Evans Bay
8. Wellingotn City
9. Western Harbour
10. Petone
11. Eastern Bays
12. Wellingotn Harbour Islands
13. Pencarrow Head
14. Turakirae Head

0 2.5 5 km

Note:
Printed maps provided for reference only. Refer to GIS data set. Mapped for use at 1:50,000.

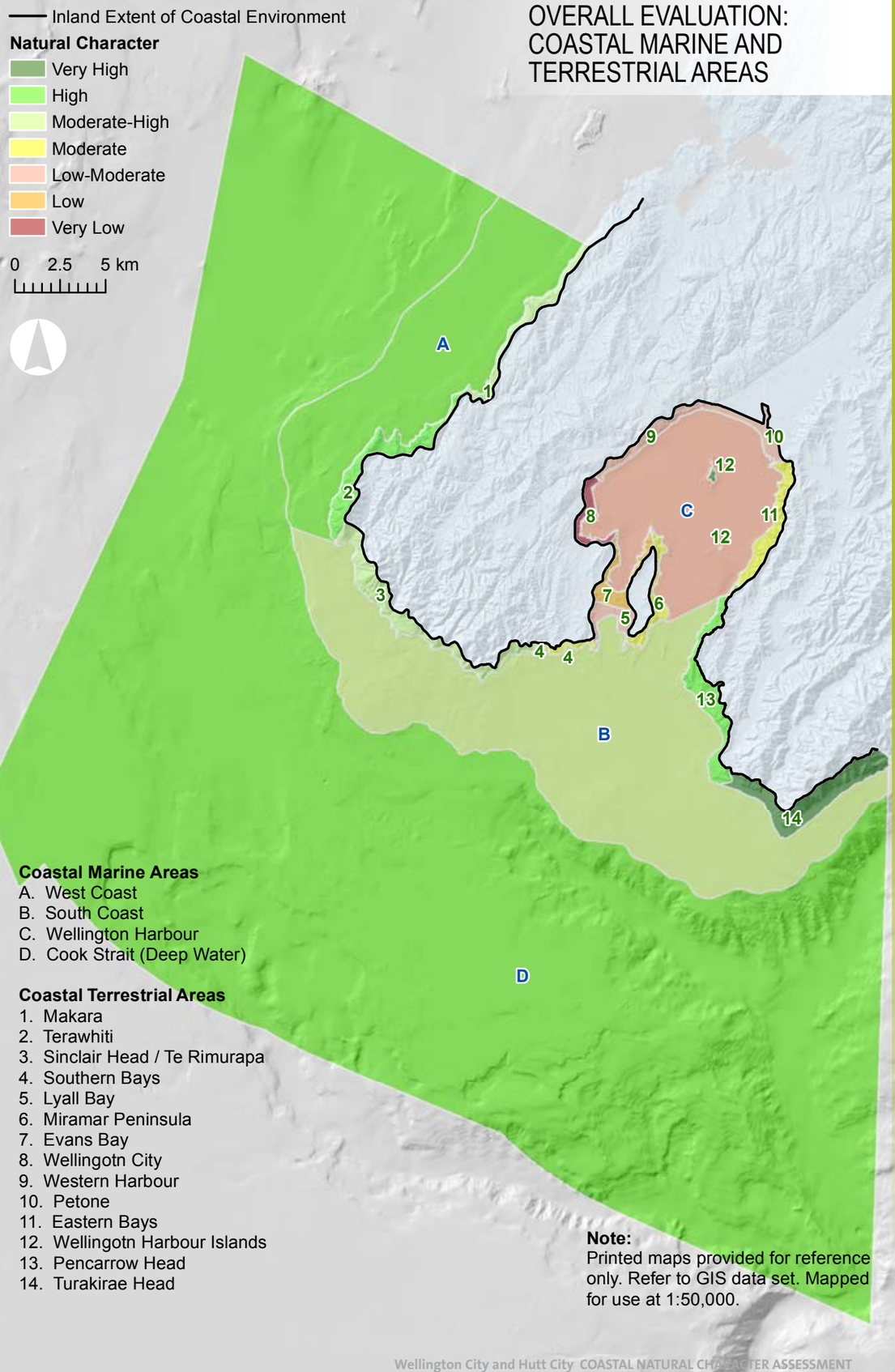
SUMMARY OF FINDINGS - AREA SCALE

	COASTAL AREA	LEVEL OF NATURAL CHARACTER
MARINE AREAS	West Coast	High
	South Coast	Moderate - High
	Wellington Harbour	Low - Moderate
	Cook Strait (Deep Water)	High
TERRESTRIAL AREAS	Makara	Moderate - High
	Terawhiti	High
	Sinclair Head / Te Rimurapa	Moderate - High
	Southern Bays	Moderate
	Lyall Bay	Low – Moderate
	Miramar Peninsula	Moderate
	Evans Bay	Low
	Wellington City	Very Low
	Western Harbour	Low – Moderate
	Petone	Low – Moderate
	Eastern Bays	Moderate
	Wellington Harbour Islands	Very High
	Pencarrow Head	High
	Turakirae Head	Very High

4.1.2 Components with High and Very High Natural Character

Following an assessment of each coastal marine and coastal terrestrial areas, a more detailed assessment of components has been undertaken and mapped at a scale of 1:10,000. At this more detailed scale, individual bays, estuaries, headlands, scarps and islands, as well as off shore canyons, shelves and basins have been mapped. Only components that were evaluated as having high or very high levels of natural character in terms of biotic or abiotic attributes have been documented and mapped recognising the primacy of such attributes when undertaking a natural character evaluation. The values of these places are described in the following sections as per the local level assessment tables. The components evaluated as high and very high are illustrated on Map 4.

MAP 3
OVERALL EVALUATION: COASTAL MARINE AND TERRESTRIAL AREAS



Coastal Marine Areas
A. West Coast
B. South Coast
C. Wellington Harbour
D. Cook Strait (Deep Water)

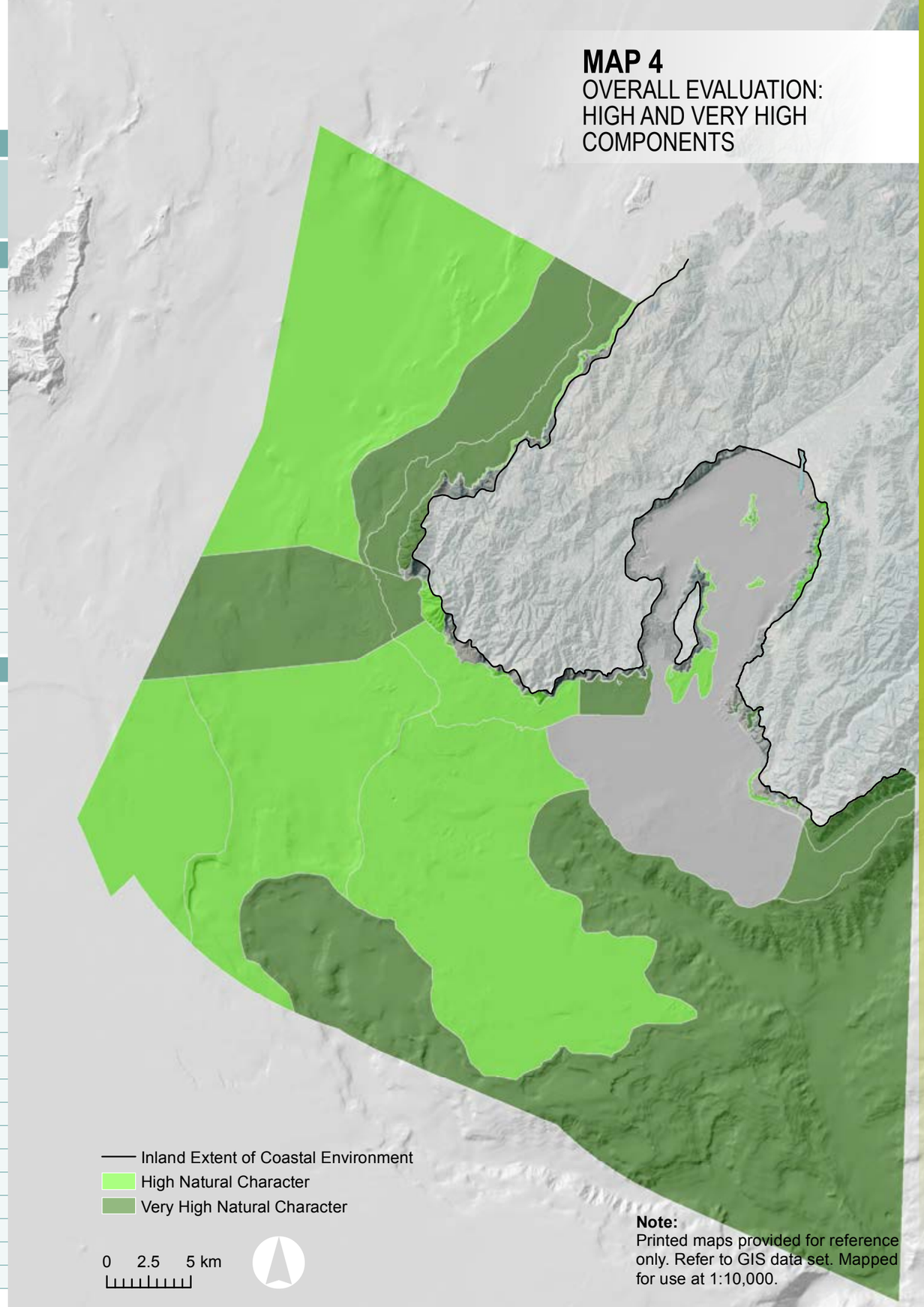
Coastal Terrestrial Areas
1. Makara
2. Terawhiti
3. Sinclair Head / Te Rimurapa
4. Southern Bays
5. Lyall Bay
6. Miramar Peninsula
7. Evans Bay
8. Wellingotn City
9. Western Harbour
10. Petone
11. Eastern Bays
12. Wellingotn Harbour Islands
13. Pencarrow Head
14. Turakirae Head

Note:
Printed maps provided for reference only. Refer to GIS data set. Mapped for use at 1:50,000.

SUMMARY OF FINDINGS - COMPONENT SCALE

	ABIOTIC NATURAL CHARACTER ATTRIBUTES	BIOTIC NATURAL CHARACTER ATTRIBUTES	EXPERIENTIAL NATURAL CHARACTER ATTRIBUTES	MAP #	EVALUATION REFER (SECTION #)
MARINE COMPONENTS					
West reef system	VH	VH	VH	5	4.3
West Shelf	VH	H	VH	5	4.3
Turakirae Reef and Shelf	VH	MH	VH	6	4.4
Palmer head	H	M	H	6	4.4
Taputeranga Marine Reserve	VH	VH	VH	6	4.4
Karori Light	H	MH	H	6	4.4
Cook Strait Cable Restricted Zone	VH	VH	VH	6	4.4
East Miramar	H	MH	H	7	4.5
Matiu/Somes Island	MH	H	VH	7	4.5
Makaro/Ward Island	H	H	VH	7	4.5
Narrows Basin	H	H	H	8	4.6
Terawhiti sill	VH	VH	VH	8	4.6
Cloudy Bay Shelf	H	H	VH	8	4.6
Cook Strait Basin	H	MH	H	8	4.6
Nicholson Bank	H	H	VH	8	4.6
Cook Strait Canyons	VH	H	VH	8	4.6
TERRESTRIAL COMPONENTS					
North Pipinui Scarp	H	M	H	9	4.7
Boom Rock / Pipinui Point	H	M	H	9	4.7
Smith Bay	H	M	H	9	4.7
Makara Estuary	H	H	H	9	4.7
Ohariu Bay	H	M	H	9	4.7
Opau Bay	H	M	H	10	4.8
Te Ikaamaru / Ohau Bays	H	M	H	10	4.8
Terawhiti / Ohau Point	VH	M	VH	10	4.8
Ōteranga Bay	H	M	H	11	4.9
Ōteranga Head / Outlook Hill	H	MH	H	11	4.9
Coastal Cliffs East of Karori Stream Estuary	H	MH	H	11	4.9
Sinclair Head	H	MH	VH	11	4.9
South Coast Shore Platform	H	M	H	12	4.10
Taputeranga Island	VH	MH	H	12	4.10
Hue tē Taka Peninsula / Moa Point	H	M	MH	13	4.11
Point Dorset	H	M	MH	14	4.12
Eastern Bay Hills	H	H	H	15	4.17
Mokopuna Island	VH	H	VH	16	4.18
Matiu / Somes Island	H	H	H	16	4.18
Mākaro / Ward Island	VH	H	VH	16	4.18
Pencarrow Lakes	VH	H	H	17	4.19
Pencarrow Lakes Scarp	H	MH	H	17	4.18
Baring Head scarp and foreshore	H	H	H	17	4.19
Wainuiomata River mouth / Estuary	H	H	H	18	4.20
Orongorongo Terrace Scarp	H	MH	H	18	4.20
Turakirae Head	VH	H	VH	18	4.20

MAP 4
OVERALL EVALUATION: HIGH AND VERY HIGH COMPONENTS



Note:
Printed maps provided for reference only. Refer to GIS data set. Mapped for use at 1:10,000.

4.2 Coastal Marine and Coastal Terrestrial Areas of Wellington

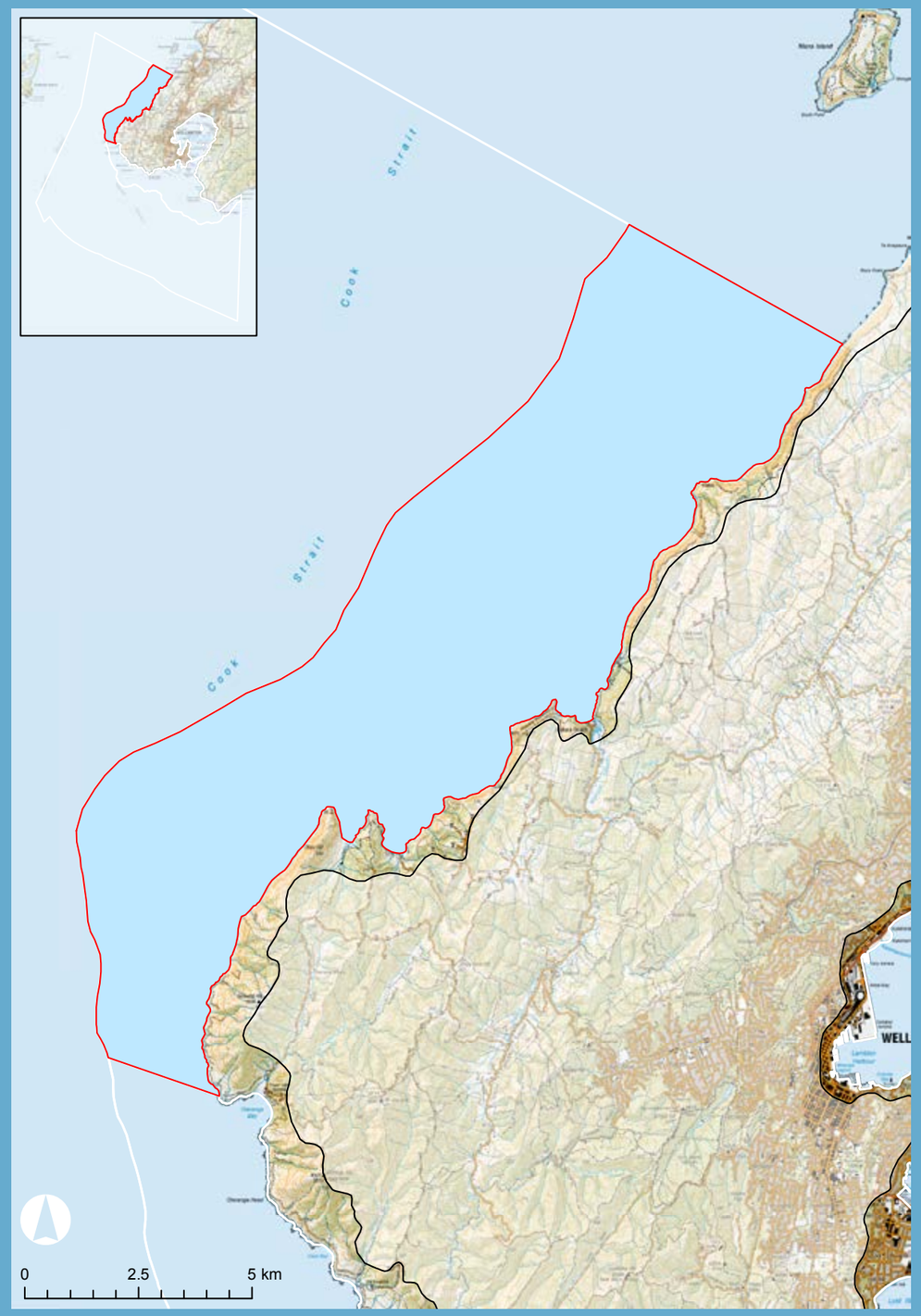
Four coastal marine areas and 14 coastal terrestrial areas were delineated in the study area encompassing the jurisdictions of Wellington City Council, Hutt City Council and the adjoining CMA which is in the jurisdiction of Wellington Regional Council. These are described in the commentary and tables below and illustrated on Map 2. These have been mapped and assessed at a scale of 1:50,000.

For each marine and terrestrial coastal area, the location and key characteristics have been described together with abiotic, biotic and experiential attributes. This includes an explanation about the size of each area and the extent to which natural elements, patterns and processes have been modified. As this assessment focuses specifically on natural character, greater focus has been given in areas where higher levels of natural character occur. The broader description of the coastal environment in each terrestrial and marine area provides the context and relationship for each component which has been identified in these areas.

An evaluation table at the end of the sub-sections summarises the values and ratings for each area. Specific values within the area are listed, mapped and rated at a component (or local/ specific scale).

Cook Strait/ Raukawa Moana

4.3 Coastal Marine Area A: **West Coast**



4.3.1 Location and Key Characteristics

The West Coast coastal marine area occupies the relatively more sheltered waters off Wellington's west coast and extends between the coastal edge and approximately 100m water depth between Cape Terawhiti and the northern boundary of Wellington City near Boom Rock. Most of the coastline comprises an exposed rocky shore, reefs and headlands with the exception of a few sheltered north-facing bays with gravel beaches, of which Makara Bay is the largest.

4.3.2 Abiotic

Two topographical components make up this area, the reef adjacent to the shore out to a depth of about 50m and the continental shelf beyond to a depth of about 100m. The area is noted for its consistently very strong currents that flow through Cook Strait.

The area is relatively sheltered from southerly winds and therefore has less southerly swell and wave action than other parts of the coast. It is also sheltered from the west by the Marlborough Sounds at the top of the South Island. However, it is exposed to the prevailing northerly and north-westerly winds resulting in a median wave height of about 1.2m.

The seafloor sediments on the continental shelf beyond the coastal reefs are likely to be dominated by sands with different mixtures of mud and/or gravel (K. B. Lewis & Mitchell, 1980). Off the continental shelf, in the Narrows Basin, data suggest that gravelly and sandy substrates dominate, with a thin sliver of muddy sediments along the continental slope (Lucieer & Lamarche, 2011). The basin floor and eastern wall of the Narrows Basin is also dominated by distinctive sediment wave fields (Torres et al., 2013).

The water in this region is generally sourced through the D'Urville Current, which sweeps around Farewell Spit and drives a southward flow down the Kāpiti Coast though this current has a significant wind-driven component. Water temperatures are similar to elsewhere in the Cook Strait region with a summer maximum of 18 degC and a winter minimum of 11degC. These sorts of processes are unmodified by human activity except at the climate change scale, which potentially will see changes in wind fields and ocean temperatures.

The abiotic environment is largely unmodified with the exception of some limited bottom trawling at depths of 100m or more that could have a minor effect of smoothing bottom relief. However, given the strength of currents in the area these effects are likely to be temporary.

4.3.3 Biotic

Algae

Macro algae communities in the region are in near pristine condition; their diversity and prevalence is high and similar to that found in the Cook Strait. The most exposed headlands and areas of reef are marked by the presence of the bull kelp *Durvillaea antarctica*. There are rhodoliths (free-living coralline algae) found on the west coast, but the exact position and extent of the beds has not been documented.

Fish

Inaccessibility and strong currents deter recreational fishing activity, but some bottom trawling on the shelf at depths of 100m targets mainly common warehou, gurnard, and tarakihi and impacts on seafloor invertebrate communities. Set-netting in this area inshore of 100m water depth targets mainly common warehou, moki, and flatfish on open ground, and butterfish on reefs. Little or no mid-water trawling occurs in this area and bottom longlining for ling and hapuka is rare. Thus, the fish communities along this stretch of coast are relatively lightly fished. The reef fish community retains a high diversity of species according to predictive models (see Figure 2). Reefs in all the other coastal marine areas within the region have a lower diversity of reef fish.

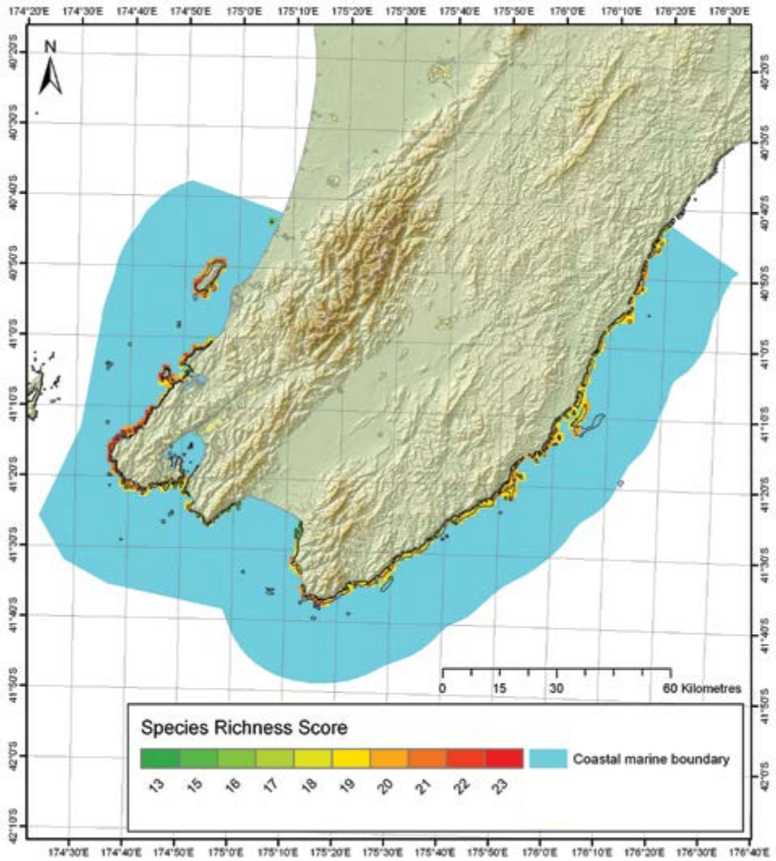


Figure 2: Predicted reef fish species richness in the Wellington region (Based on model output in Smith et al., 2013).

In contrast, the diversity of sand and mud bottom associated and pelagic fish in this area is moderate on both national and regional scales (Leathwick et al. 2006). Species abundant in this area include barracuda, carpet shark, elephant fish, gurnard, hapuka, horse mackerel, Murphy's mackerel, ling, red cod, school shark, spiny dogfish, rig, tarakihi, and common warehou.

Because of the limited human population, small catchments, and strong currents, effects of other factors such as run-off and waste disposal probably have minimal impact in this marine environment.

Marine mammals and seabirds

A wide variety of marine mammals and seabirds occur in the area but the numbers have been depleted since humans first settled New Zealand about 750 years ago. The fine scale distribution and abundance of most species is poorly known in this area. Predictive habitat modelling is available for four species; sperm whales, southern right whales, orca, and Hector's dolphins. This modelling suggests the southern tip of this area is of moderate importance as habitat for orca, the area just north of Ohau Bay and Te Ikaamaru Bay is of potentially moderately high importance for southern right whale cows and suckling calves, and the entire area is of low importance for Hector's dolphins and sperm whales (Torres et al., 2013). Some species are known to be recovering, notably New Zealand fur seals, southern right whales, and humpback whales.

4.3.4 Experiential

The exposed coastal waters and seabed are remote and relatively inaccessible by land and this combined with the strong currents and prevalent wind is not favourable conditions for commercial or recreational fishing or development. This results in a very rugged and isolated character with minimal apparent levels of modification. Consequentially, the experiential character of the area is very high.

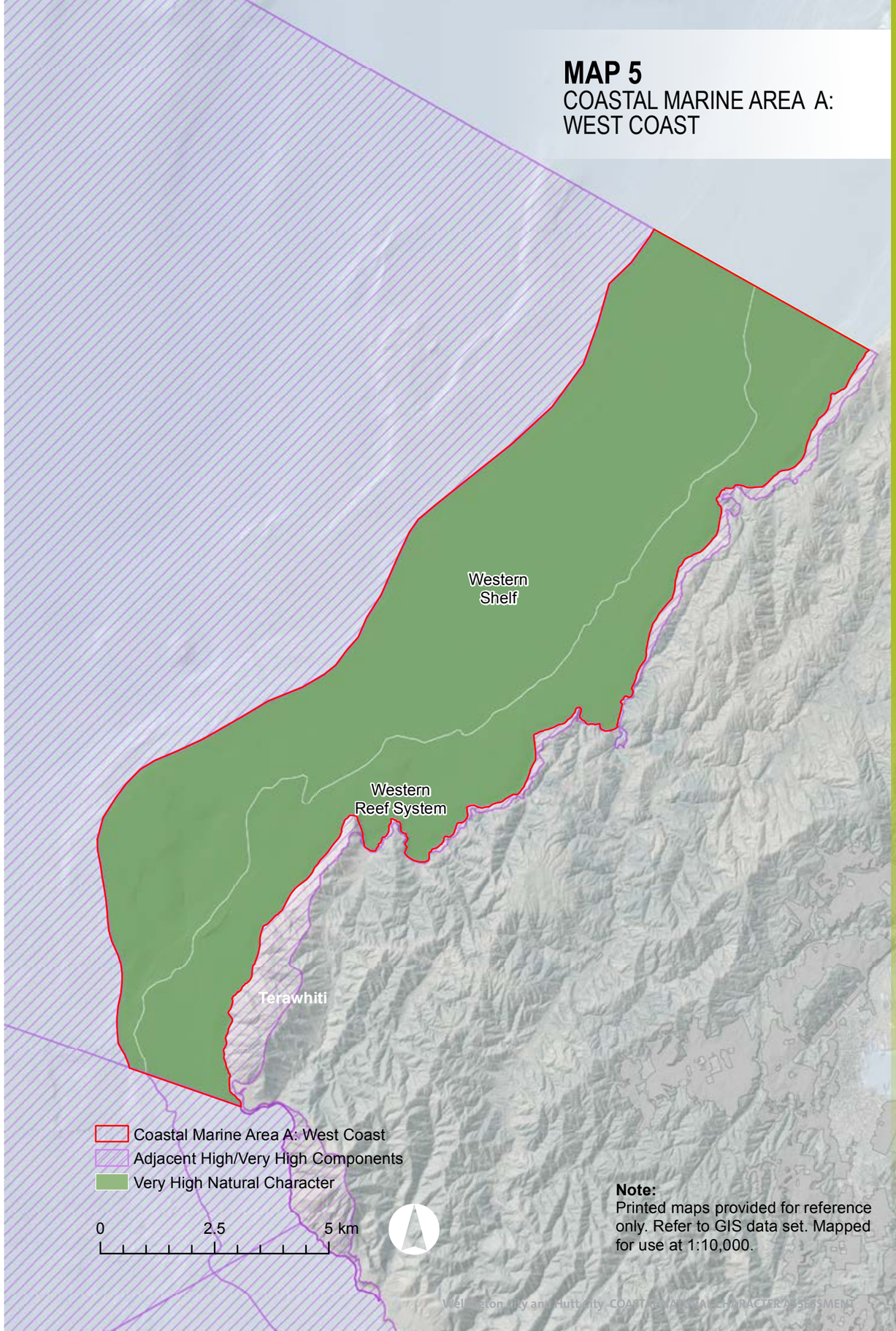
SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH	★		★
HIGH		★	
MODERATE TO HIGH			
MODERATE			
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	High		

COASTAL MARINE AREA A: WEST COAST SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

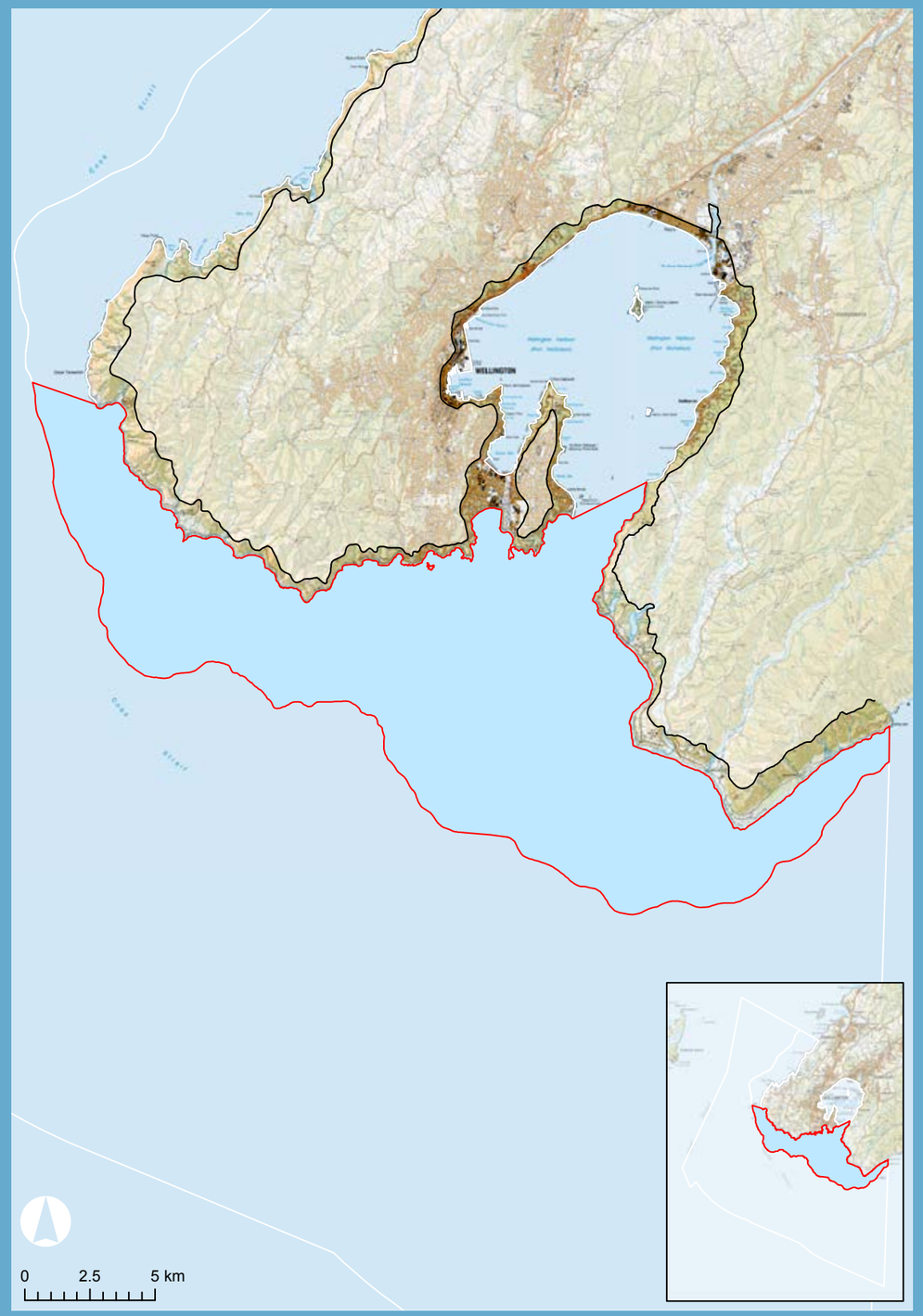
THESE ARE MAPPED WITH REFERENCE TO MAP 5.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
WEST REEF SYSTEM (0 – 50M)	Very High	VH	VH	VH	Unmodified abiotic environment characterised by high energy –with consistently strong sea currents of international note. Unmodified continuous reef system. Almost pristine biotic system characterised by • abundant and diverse indigenous seaweed. • high level of reef fish diversity north of Cape Terawhiti. • boundary of northern or southern extent of many species Largely unmodified with very high experiential values	Low level of commercial fishing and very little recreational activity. Minimal impacts of other factors such as run-off and waste disposal
WEST SHELF (50 – 100M)	Very High	VH	H	VH	Unmodified abiotic environment characterised by high energy levels with consistently strong sea currents of international note. Largely unmodified biotic environment with some threatened marine mammal and seabird species present. Largely unmodified with very high experiential values.	Low level of commercial fishing and very little recreational activity. Minimal impacts of other factors such as run-off and waste disposal

MAP 5
COASTAL MARINE AREA A: WEST COAST



4.4 Coastal Marine Area B: **South Coast**



4.4.1 Location and Key Characteristics

The exposed South Coast coastal marine area extends between Cape Terawhiti and Palliser Bay offshore to a water depth of 100m at the edge of the continental shelf. This area encompasses the coastal edge with its many exposed bays and headlands either side of Wellington Harbour; it also includes the harbour entrance. West of the entrance, the dense urban population along the coast has a significant effect on the coastal marine area, in particular biotic aspects. East of the harbour the land is farmed extensively and consequently this type of land use has a lesser influence on the coastal waters because of the low human population size, fewer hard surfaces, and small catchments. It also provides a unique juxtaposition - from high mountains to a deep trench separated by a relatively narrow coastal shelf.

4.4.2 Abiotic

Abiotic influences along the south coast are spatially diverse. The seafloor sediments on either side of the harbour mouth are dominated by the gravelly sands (K. B. Lewis & Mitchell, 1980), with localised fine sediment derived from the inland catchments forming frequent, though localised sediment plumes, especially east of the harbour entrance where the large Wainuiomata and Orongorongo Rivers reach the coast. At the coast, east of the harbour entrance, the coarse sediments are accumulating as gravel beaches and banks between the rocky headlands (Matthews, 1980). West of the harbour mouth the shoreline is predominantly rocky. The seafloor sediments beyond the coastal reefs are comprised mainly of well sorted fine-medium sands, with exposed mega-rippled gravels, near rocky promontories (Carter & Lewis, 1995). The sediments grade to muddy gravelly sands further offshore along the narrow shelf-edge. Sediments in the harbour entrance are also dominated by gravel and sand that are actively moved into the harbour, especially under the influence of southerly swells (Carter & Lewis, 1995; Matthews, 1980). In places, the impact of shipping propeller wash on seafloor sediments is evident.

Intensive fishing and bottom trawling have modified the seafloor in many areas including the south coast shelf. The sediments, however, are generally relatively mobile due to the prevailing wave and tidal activity (Carter & Lewis, 1995).

Southerly storms and breaking swells are the dominant formative force right at the shore but tidal currents are also strong (2 m/s or more). Harbour entrance currents are modest comparably (0.5 m/s). Tides in the region are quite complicated due to the presence of a virtual amphidrome, a stationary ocean point around which tides rotate[3].

The Karori Rip in this zone is recognised by shipping more for the wave-current interaction that results from the strong tidal flows and strong local winds rather than specifically for the currents. Because of the strong winds and their bi-directional bias being aligned with the dominant tidal axis, conditions are very commonly suitable for the generation of large quasi-standing waves. Highly localised variations in the wave breaking field where waves encounter an opposing current are a regular occurrence. The picture is however complicated by the gradients in current magnitude and direction moving inshore, and around headlands. This results in significant refraction of wave direction which results in a complex, steepened, breaking wave field with waves arriving seemingly from a multitude of directions.

3. Measured sea-level data are available to the north: http://graphs.gw.govt.nz/Porirua-Harbour-at-Mana-Cruising-Club/ and to the south: http://www.linz.govt.nz/sea/tides/sea-level-data/sea-level-data-downloads.

4.4.3 Biotic

Algae

The Wellington south coast has a rich and largely unmodified macroalgal flora (ca 380 taxa recorded) which represents about 40% of the national total (from the Kermadecs to the subantarctic islands). The most exposed headlands support bull-kelp, and there are extensive sub-tidal forests of the kelp *Lessonia variegata*, as well as extensive beds of mixed large brown algal species with representatives of a number of genera (e.g. *Landsburgia, Marginariella, Cystophora, Carpophyllum*). There are also areas of relative shelter where the giant kelp *Macrocystis pyrifera* is found (e.g. in the shelter of Taputeranga Island). The forests of brown algae provide critical three dimensional habitat structure for a range of associated organisms, as well as being key primary producers. The Wellington south coast has a very diverse red algae flora which makes up about 65% of the total flora in the area. The introduced Asian kelp *Undaria pinnatifida* is present along the south coast and appears to be increasing in its range and extent.

Fish

The relative ease of access of the urban population to the south coast means that this area is subject to significant pressure from recreational fishing, bottom trawling, set-netting, customary fishing, and illegal fishing. Bottom trawling also impacts on seafloor invertebrate communities. These activities decrease the abundance of targeted fish species and generally constrain the upper age and size classes. However, fishing is unlikely to have decreased the diversity of fish species. The diversity of reef fishes along this stretch of coast is about average for the region and decreases from west to east along the coast according to predictive models published by Smith et al. (2013) (see Figure 2). Similarly, the diversity of sand and mud bottom associated and pelagic fish in this area is moderate on both national and regional scales (K. B. Lewis & Mitchell, 1980, Leathwick et al. 2006). Species abundant in this area include barracuda, carpet shark, elephant fish, gurnard, hapuka, horse mackerel, Murphy's mackerel, leather jacket, red cod, school shark, spiny dogfish, rig, tarakihi, and common warehou.

Marine mammals and seabirds

A wide variety of marine mammals and seabirds occur in the area but together with loss of habitat for shore and coastal birds and historical exploitation of marine mammals most populations are depressed. The fine scale distribution and abundance of most species is poorly known in this area. Predictive habitat modelling is available for four species of whales and dolphins; sperm whales, southern right whales, orca, and Hector's dolphins. This modelling suggests that apart from the harbour entrance, most of the area is of moderate to low importance for southern right whales, the areas between Cape Terawhiti and Sinclair Head and from Baring Head to Turakirae Head are of moderate high suitability for orca, and the whole area is of low suitability for Hector's dolphins and sperm whales (Torres et al., 2013). Some species occurring in the area are known to be recovering, notably New Zealand fur seals and southern right whales.

4.4.4 Experiential

This coastal marine area is readily accessed from Wellington's urban area. Shipping traffic (commercial shipping, interisland ferries, cruise liners, commercial fishing boats) together with recreational vessels are prevalent throughout much of this area and increase the level of modification. Human modification such as navigation aids and lighthouses occur along parts of the rocky reefs, including an isolated light house constructed on Karori Rock (Karori Light) following the loss of the SS Penguin in 1909 along this section of rugged coast, which resulted in substantial loss of life. Such modifications reduce the level of natural character in their immediate vicinity, however they are relatively small elements so do not significantly reduce the experiential value of the wider area. However, underwater divers can be treated to clear water, impressive beds of macroalgae and, in the Taputeranga Marine Reserve, recovering reef fish and invertebrate communities. Consequentially, the experiential character of the area is high.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH	★		★
MODERATE TO HIGH			
MODERATE		★	
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Moderate - High		

South coast upper subtidal habitat

South coast, coraline algae

COASTAL MARINE AREA B: SOUTH COAST SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 6.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
TURAKIRAE REEF AND SHELF	Very High	VH	MH	VH	Unmodified abiotic environment characterised by: • most exposed part of the south coast with very high waves and swell in storms. • Strong tidal currents. • Substantial sub-tidal and intertidal reef system. • Large mobile gravel loads and fines (plumes), gravel beaches and sediments. Biotic environment somewhat modified and characterised by: • Healthy population of kelp. • Productive and resilient lobster population, (despite intensive fishing). • Presence of shore birds and recovering marine mammals. Experientially offers significant juxtaposition from high mountains to deep trench.	Recreation fishing is common.
PALMER HEAD	High	H	M	H	Largely unmodified abiotic environment characterised by: • Exposed part of the south coast at the harbour entrance. High storm waves and swells, some parts more sheltered. • Extensive subtidal / intertidal reef system including Barrett's Reef and Steeple Rock / Te Aroaro-o-Kupe. • Gravel and sand beaches. • Raised shore platform containing rock stacks which remain relatively intact. Biotic values moderate due to extensive harvesting activities High experiential values due to low level of modification.	Includes a narrow margin of terrestrial coastal environment. Tarakena Bay previously mined in 1958. Includes Wellington Eco sites identified at Tarakena Bay, Palmer Head and Point Dorset.

COASTAL MARINE AREA B: SOUTH COAST SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 6.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
TAPUTERANGA MARINE RESERVE	Very High	VH	VH	VH	Abiotic environment largely unmodified. Taputeranga Island provides shelter to the bay which creates more diverse habitats. Biota near pristine with high biodiversity and abundance of indigenous species. Better condition in terms of species diversity, size and abundance than outside the Reserve and will improve over time. But several invasive species prominent (e.g., Undaria). Wild and rugged character and protection as a marine reserve provides very high experiential values.	
KARORI LIGHT	High	H	MH	H	Slightly modified abiotic environment characterised by: • coastal edge shelf below uplifted marine benches. • Red Rocks provide evidence of submarine volcanic eruptions and were formed 200 million years ago. • The area immediately seaward of Karori Light is infamous for its strong currents and short steep-fronted choppy waves, which are hazardous for small boats. • Seafloor gravels inshore, a legacy of prolonged mining of the seaward cliffs, reduces abiotic values to High. • Seafloor gravels inshore, a legacy of prolonged mining of the seaward cliffs, reduces abiotic values to High. Moderate-high biotic values characterised by • a particularly rich macro-algal flora • Seal colony at Tongue Point. • Fish populations impacted by fishing activities The ruggedness of the coast combined with the dramatic surface currents and waves provides high experiential values	Includes Sinclair Red Rocks Scientific Reserves and Wellington City Council Eco Sites at Tongue Point. A range of fishing activities means that the biotic values are only medium-high

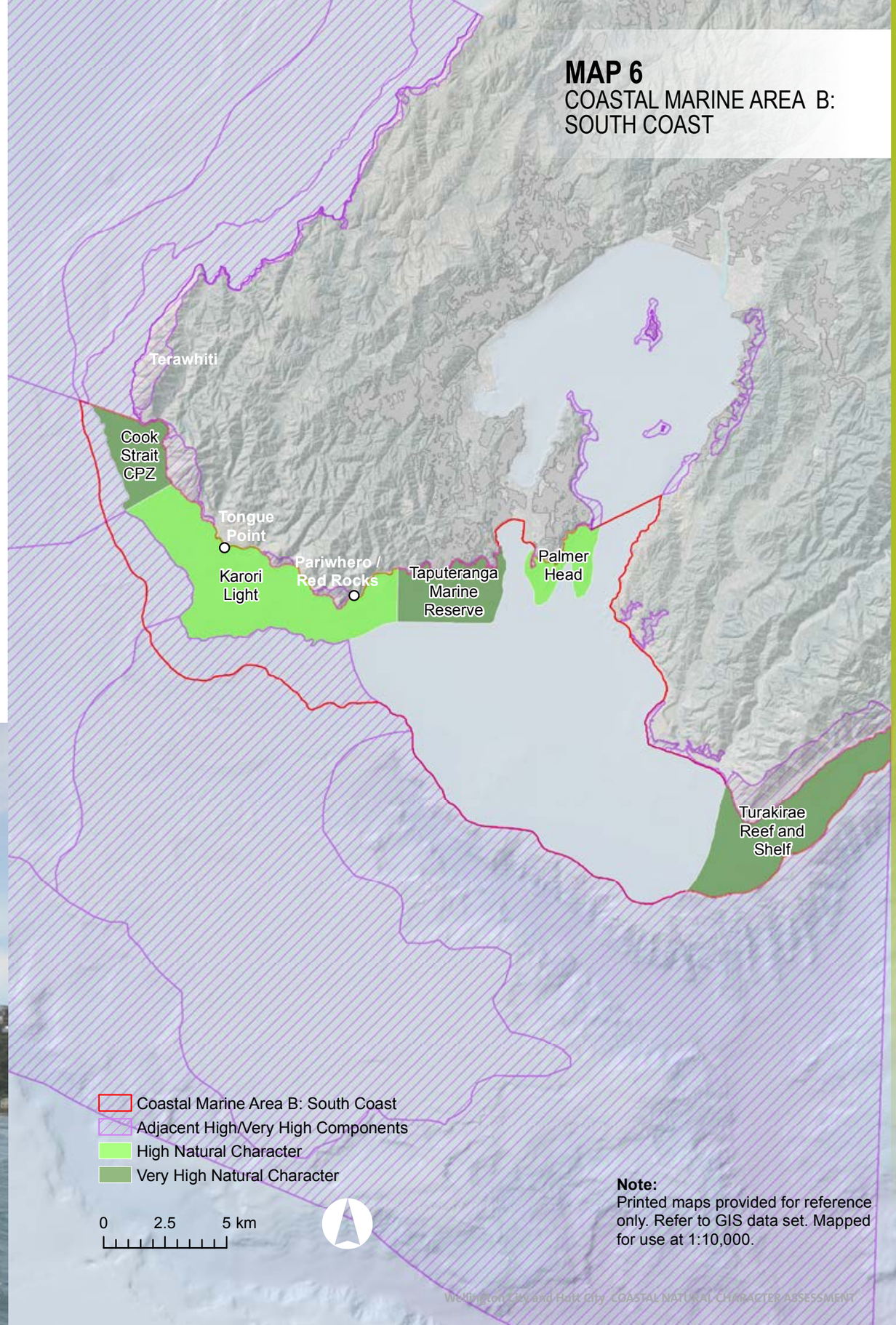
COASTAL MARINE AREA B: SOUTH COAST SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 6.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
COOK STRAIT CABLE RESTRICTED ZONE	Very High	VH	VH	VH	Abiotic environment largely unmodified except by the presence of power cables. Long term (50+ yrs) no-go zone and strict compliance results in high biotic diversity and production similar to the Taputeranga Marine Reserve. The lack of bottom trawling means the seafloor community is probably the best remaining example in central NZ. The ruggedness of the coast combined with the dramatic surface currents and waves and knowledge of its protection provides very high experiential values.	Unique situation of higher level of natural character resulting from the presence of the cable exclusion zone, thus creating a de facto marine reserve

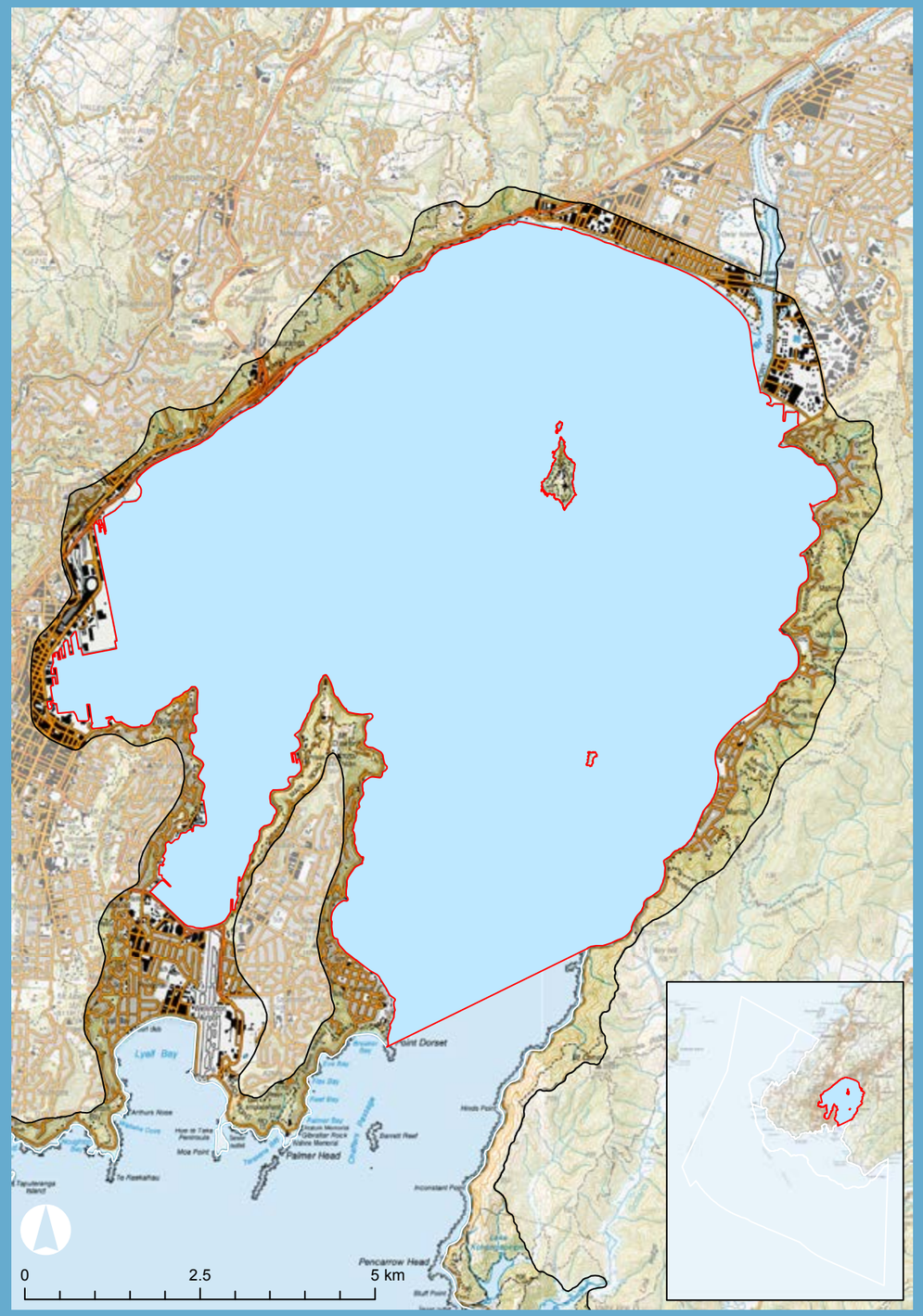
Taputeranga Island

MAP 6
COASTAL MARINE AREA B: SOUTH COAST



Note:
Printed maps provided for reference only. Refer to GIS data set. Mapped for use at 1:10,000.

4.5 Coastal Marine Area C: **Wellington Harbour**



4.5.1 Location and Key Characteristics

The sheltered waters of the Wellington Harbour coastal marine area extend to the mouth of Port Nicholson defined by a line running between Port Dorset and Camp Bay.

Wellington Harbour is the product of several interacting yet contrasting earth movements. The land on the north-western side of the harbour has been pushed up along the Wellington Fault and on the south-eastern side the land has been generally submerging, but portions have been warped upwards (Stevens, 1974). One of the most striking features of the Wellington landscape is the great sea-filled basin of the harbour bounded by an imposing wall-like fault scarp along its northwest side but with clear indications of an extensive drowning of a landscape of hills and valleys(Stevens, 1974). Somes / Matiu and Ward / Makaro Islands that lie within the harbour are the tops of exposed ridges, almost completely submerged (Stevens, 1974).

Uplift accompanying the 1855 Wairarapa earthquake exposed stretches of rocky seabed clearly seen around the coastline of the harbour and also other parts of the Wellington region shoreline.

The Hutt River (Te Awa Kairangi) has a significant influence on Wellington Harbour. Previously, the Hutt River flowed through a valley between Miramar and Kilbirnie, now occupied by the Rongotai isthmus, as well as the current harbour entrance prior to this (K. B. Lewis & Carter, 1976). After a large 15th century earthquake (‘Hao Whenua’), the uplift led to the start of the tombolo development across Rongotai isthmus and the eventual closure of this entrance. The river was subsequently pushed towards the eastern side of the basin and eventually pushed its way to the sea through a low point where the harbour entrance is today. Sediments flowing down the Hutt River and Waiwhetu Stream built up a delta which progressively advanced into the harbour. Some of the sediment transported by the Hutt River was swept by currents southwards towards the harbour entrance. However, counter currents flowing in from the open sea encountered these sediments and deposited material to form a prominent headland where Eastbourne has developed (Stevens, 1974).

4.5.2 Abiotic

Reclamation and ongoing dredging have occurred throughout parts of Wellington Harbour. The coastal edge is highly modified near downtown Wellington City, in Evans Bay, along the Hutt Motorway, along the Petone foreshore, around Seaview and Eastbourne. Jetties and marinas are also dispersed at various locations in these general areas throughout the Harbour.

Inside the Harbour entrance, seafloor sediments comprise sandy muds and muds (K. B. Lewis & Mitchell, 1980). Sedimentation rates in the harbour have been affected by regional tectonics, including the 1855 Wairarapa Earthquake (magnitude ~8.0-8.2; (Begg & Johnston, 2000), localised spoil dumping and changes in historic catchment land-use practices (Goff, Whitehead, & Ditchburn, 1998). There are several sites of active freshwater seepage within the Harbour that have formed large depressions in the harbour seafloor, especially near Seaview and off the Hutt River mouth (Harding, 2000; Pallentin et al., 2009).

Contaminants are mainly derived from urban stormwater discharge points distributed around the Harbour (Stephenson et al., 2008), although there may have also been historic dumping of human-made chemicals, such as DDT at discrete locations in the Harbour. Heavy metals, such as lead, mercury, zinc and copper, and total DDT are present above sediment quality guidelines, especially close to downtown Wellington City. Certain polycyclic aromatic hydrocarbons are also above sediment quality guidelines in certain locations, such as Evans Bay and Lambton Harbour (Harding, 2000, Oliver 2013).

Little work has been conducted on hydrodynamics in the Harbour despite its proximity to NIWA laboratories and that Wellington is a major city and port. The currents and the eddy systems driven by the tides and the winds play an important role in determining the fate of material from the Hutt River. Certainly the strong winds in the region, predominantly along the north-south axis of the Harbour, encourage vertical mixing of the water column. The climatological wind rose reveals that the Harbour is 'calm' (in the sense of the wind) only 5% of the time, and so mixing and variability driven by the wind will be important, especially in forcing dispersal.

Heath (1977), referring to Brodie (1958) in terms of earlier dye studies, states that material becomes confined to the northern Harbour area under a strong southerly wind, and material becomes confined to the eastern shore under the influence of a northerly. Booth (1975) also notes that despite the wind, there are periods where the water column becomes stratified (particularly in summer), and further that freshwater influences of the Hutt River can be measured in the Harbour waters as far south as Somes / Matiu Island. The observations also suggest that the inner Harbour is relatively partially isolated from the outer oceanic waters of Cook Strait. Several studies over the years, notably Abraham (1997), have looked at Harbour sea-surface oscillations.

Little direct measurement of waves has been conducted within the Harbour. Some modelling has explored the wave height distributions, finding them mostly small with an average significant wave height in the range of 0.14-2.3m. This doesn't account for southerly ocean swell which can penetrate through the Harbour entrance.

As it is a partially confined basin, the Harbour warms and cools to a greater degree than the open waters of Cook Strait. Temperatures measured in Evans Bay range from 8°C up to almost 21°C, which is around two degrees wider in range than that seen in Lyall Bay.

Wellington Harbour/Te Whanganui-a-tara

4.5.3 Biotic

The biotic environment is varied ranging from estuarine influences in the mouth of Hutt River to strongly oceanic habitats towards the harbour entrance and from shallow well-lit rocky reefs to shaded muddy environments in the deeper parts of the harbour. Although modified by deposition of terrestrial sediments, dredging of the seafloor, reclamation of the seabed, and building of seawalls, the biotic environment retains some key features.

Algae

This area is notable for beds of giant kelp *Macrocystis pyrifera* along the eastern side of the Miramar Peninsular from Kau Bay to Seatoun and on the opposite side of the Harbour from Point Howard to Hinds Point. *Macrocystis* beds are considered to sustain "one of the most diverse, productive and dynamic ecosystems of the planet" (Hay 1990, Graham 2004). The beds in the Wellington region are patchily distributed and known to vary in size and position over time. The Wellington region is the northern distribution limit for this species and is likely to disappear if sea surface temperatures rise.

Sites in the eastern bays, particularly Muritai, have yielded very rich collections of red macroalgae which grow on the margins of the reefs and on stable cobble substrates. Meadows of the indigenous red algae *Adamsiella* sp. attached to small shells or pebbles occur over substantial areas of muddy sediment at the southern end of Evans Bay. These meadows were discovered during routine biosecurity surveys of yachts and motor launches in the Evans Bay marina (Inglis et al. 2006) but have not been surveyed to determine their full extent.

Wellington Harbour also has a high proportion of the nationally recorded introduced macroalgae which reduces natural character. The Asian kelp *Undaria pinnatifida*, which was first reported in New Zealand from the Freyberg pool area, is now very widespread.

Fish

There is some set-net fishing in the Harbour for flatfishes but little other commercial fishing. Recreational fishing for snapper, tarakihi, and kahawai occurs throughout the Harbour. Fishing for kahawai is particularly common from the Hutt River Bridge. These activities decrease the abundance of targeted fish species and generally constrain the upper age and size classes. However, fishing is unlikely to have decreased the diversity of reef, sand and mud bottom associated and pelagic fish in the Harbour which naturally is low on both national and regional scales (Leathwick et al. 2006). Species abundant in this area include barracuda, elephant fish, gurnard, kahawai, red cod, school shark, spiny dogfish, rig, spotties, tarakihi, and common warehou. Terrestrial sediments carried by the Hutt River and deposited in the estuary and in Wellington Harbour have modified the original seafloor habitat

Marine mammals and seabirds

A variety of marine mammals and seabirds occur in the area but together with loss of habitat for shore and coastal birds and historical exploitation of marine mammals most populations are depressed. The fine scale distribution and abundance of most species is poorly known in this area. Predictive habitat modelling is available for four species of whales and dolphins; sperm whales, southern right whales, orca, and Hector's dolphins. This modelling suggests that the whole area is of low suitability for all four species (Torres et al., 2013).

The close proximity to urban areas, historical exploitation of marine mammals that formerly used the harbour, loss of shore and wading bird nesting and feeding sites, reclamation of seafloor habitat, and smothering of seafloor habitats by sediments deposited from the Hutt River have impacted on the biotic natural character value of the Harbour.

Experiential

Much of the periphery of the Harbour has been modified with reclamation, road construction and a foreshore comprising rock revetment, rip rap and other similar materials.

Frequent shipping within the Harbour combined with recreational vessels and navigation structures create a pervasive level of modification but the scale of the Harbour retains an open expansive character which responds to changing climatic patterns throughout different times of the day and year.

The TEV Wahine was lost in the Harbour entrance in 1968. It forms an iconic part of the recent history of the Harbour and for both residents and visitors is a poignant part of experiencing the Harbour. Revell and Gorman (2003) state "the 'Wahine storm' was one of the two worst regenerating tropical cyclones to hit New Zealand last century. Ex-tropical systems of this type are the major source of coastal hazards in the form of severe winds and waves in the New Zealand region. At the time, the likely weather associated with the storm was well forecast, although its expected path was not."

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE			
MODERATE TO LOW	★	★	★
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Low -Moderate		

Ward / Makaro Island

COASTAL MARINE AREA C: WELLINGTON HARBOUR SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 7.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
EAST MIRAMAR	High	H	MH	H	Abiotic environment largely intact and characterised by: • Extensive subtidal/intertidal reef system, rocky headlands and sandy beaches. • Good water clarity because sheltered from the worst of southerly influences. • Rock stacks and shore platform remains relatively intact. Biotic environment somewhat modified and characterised by: • Prolific giant kelp beds that creates a dense canopy and three dimensional habitat for other communities. • Healthy paua and rock lobster communities • Targeted fish species impacted by fishing activities High experiential values due to low level of modification.	Includes a narrow margin of terrestrial coastal environment Some reclaimed edges and small jetties (does not include buildings) Beach areas were cleared by early settlers and planted in marram. No commercial fishing. Includes Wellington Eco Sites at Scorching Bay.
MATIU/SOMES ISLAND	High	MH	H	VH	Abiotic environment slightly modified and characterised by: • Reefs and rocky shore with varied offshore rock stacks with no physical modification. • Mud sediments from the Hutt River-historical pollution-recent sediments cleaner. • Island provides shelter from north and south- varied habitats available. Biotic natural character reduced by recreational fishing High experiential values due to low level of modification.	Recreational fishing. Small jetties along north-eastern side of island.

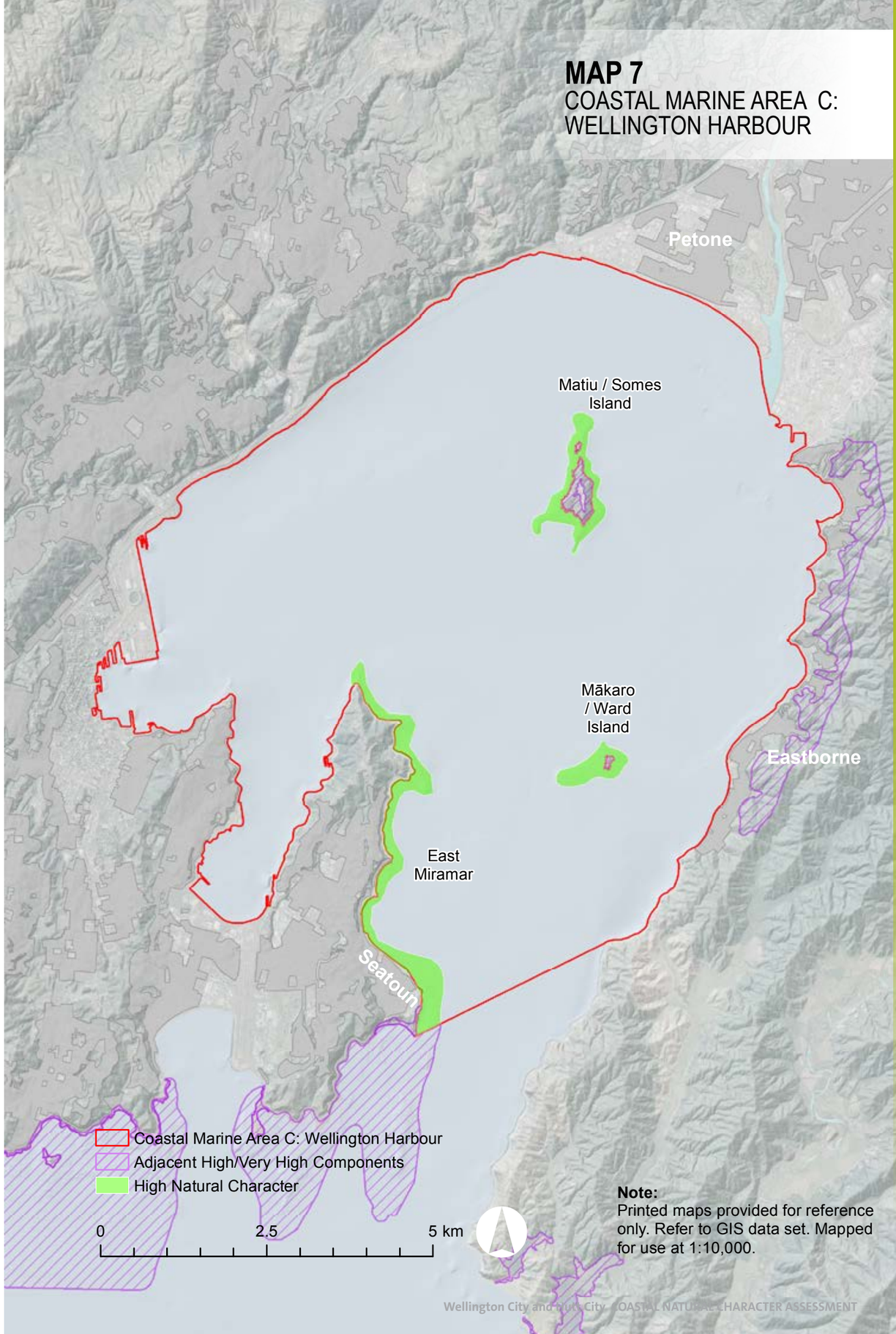
Intertidal community

COASTAL MARINE AREA C: WELLINGTON HARBOUR SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

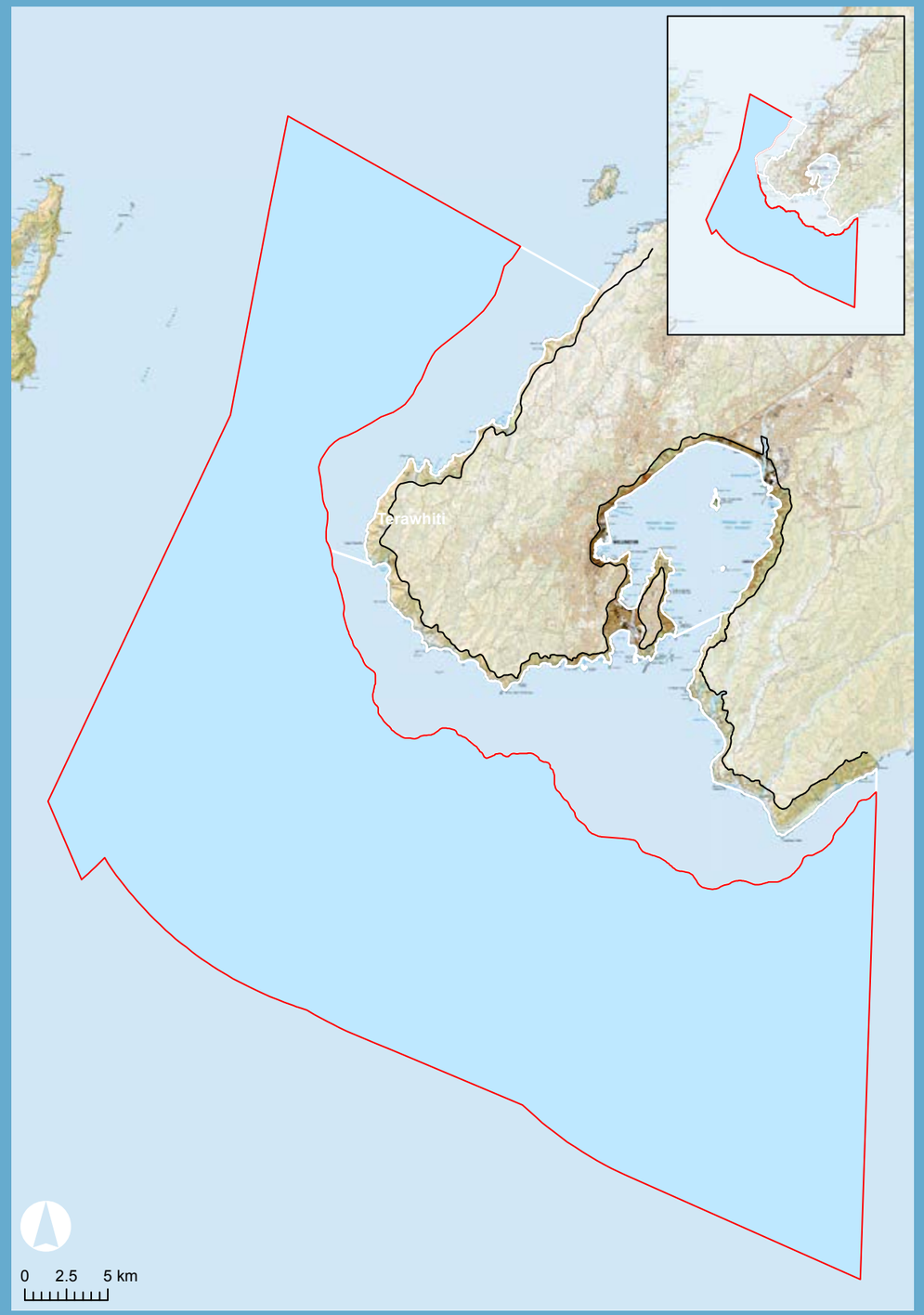
THESE ARE MAPPED WITH REFERENCE TO MAP 7.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
MAKARO/WARD ISLAND	High	H	H	VH	Abiotic environment slightly modified and characterised by: • Location on the boundary shelf inside the harbour entrance where the gravels brought by currents from the south coast meet the mud sediments from the Hutt River. • Mud sediments from the Hutt River-historical pollution-recent sediments cleaner. • Reefs and rocky shore with no physical modification. • Island provides shelter from north and south- varied habitats available. Biotic natural character reduced by recreational fishing Very high experiential values due to low level of modification.	Recreational fishing.

MAP 7
COASTAL MARINE AREA C: WELLINGTON HARBOUR



4.6 Coastal Marine Area D: **Cook Strait (Deep Water)**



4.6.1 Location and Key Characteristics

The Cook Strait coastal marine area is defined as the deep water which extends below approximately 100m out to the 12 nautical mile limit and includes the Nicholson and Wairarapa arms of the Cook Strait canyons, Terawhiti Sill and the Narrows.

4.6.2 Abiotic

Cook Strait retains an unmodified abiotic environment. It is characterised by the occurrence of deep-water submarine canyons only a few kilometres off the coast. The Cook Strait canyon is unusual as most submarine canyons terminate onshore – this system (like the Strait of Georgia) enters into a fast flowing strait.

The flows in Cook Strait are unique globally. The size of the New Zealand landmass is such that a 'tidal wave' (i.e. a true wave formed by tidal processes as opposed to anachronistic reference to tsunami) rotates around the islands resulting in it being high water on one side and low on the other at any given time. This in itself is rare and only seen in large islands like Madagascar and Iceland. The difference in New Zealand's case is it has a gap – Cook Strait – through which tidal and non-tidal flows are squeezed. The flow speeds that result are large; up to 4m per second have been observed. This is very unusual in a flow of the scale of Cook Strait. The tides tend to push water back and forth with little net result.

At least locally to the Cook Strait narrows, the wind is considered an important driver of water transport. The wind speeds on either side of Cook Strait are comparable during north-westerly winds. However, at the Brothers (western side) wind speeds are often double that of Mana Island during southerly winds. This occurs because this latter weather station is not located within the narrowest region and is also set back from the likely fastest wind flow topographically steered through the Strait. Consequently, the Mana Island station to the east is dominated by north westerly winds, whereas the western Brothers station has an even mix of southerlies and northerlies while the directions are spread. Winds can rapidly switch directions at both stations. The Strait has changed with sea level, being closed off for periods in the ancient past. There is some suggestion that the Strait might be amongst the most turbulent ocean flows on the planet. Indications are that Cook Strait is very energetic simply because of its scale. As such, the Strait has a reputation for being unforgiving on sea-going endeavours.

The annual temperature signal varies from 18°C in summer through to around 11°C in winter (see Figure 3). It appears that summer temperatures in the Strait can stratify by a degree or more.

Muddy gravelly sands occur in the head of Nicholson Canyon, with a sliver of coarse sandy gravels along the continental slope just off the entrance to Wellington Harbour (K. B. Lewis & Mitchell, 1980). Sediments on the deep seafloor of the upper parts of Nicholson and Cook Strait canyons, extending up to the Terawhiti Sill and the Narrows in the north, are dominated by sandy gravels (K. B. Lewis & Mitchell, 1980). Despite the coarse nature of these substrates, the sediments are highly mobile due to strong tidal current activity (Carter, 1992), with sandy silts and silty muds in the lower, deeper reaches of the canyon systems, as also suggested by data classifications of the seafloor (Lucieer & Lamarche, 2011). The head of Nicholson Canyon is also the site of possible fluid seep structures (Lewis & Marshall, 1996).

Although there has been some modification of the sea floor due to trawling, recovery is expected to be reasonably fast given the high velocity of currents.

4.6.3 Biotic

Fish

The biotic environment in the deeper water of Cook Strait have been modified through harvesting. These activities decrease the abundance of targeted fish species and generally constrain the upper age and size classes. However, fishing is unlikely to have decreased the diversity of sand and mud bottom associated pelagic fish in this area which is high on a regional scale and moderate-high on a national scale (Leathwick et al. 2006). Species abundant in this area include barracuda, frostfish, pale ghost shark, hapuka, hoki, Murphy's mackerel, ling, red cod, school shark, silver dory, gemfish, spiny dogfish, sea perch, silver warehou, tarakihi, and common warehou.

Bottom trawling on the shelf at depths of 100m or more targets mainly common warehou and tarakihi and has impacts on seafloor invertebrate communities. During winter months, midwater trawling in the canyons targets spawning hoki. Bottom long-lining targets ling and hapuka. Set-netting in this area is rare.

Marine mammals and seabirds

A wide variety of marine mammals and seabirds occur in the area but the numbers have been depleted since humans first settled in the area about 750 years ago. The fine scale distribution and abundance of most species is poorly known in this area. Predictive habitat modelling is available for four species; sperm whales, southern right whales, orca, and Hector's dolphins. This modelling suggests that the canyons are highly suitable habitat for sperm whales, that the area nearest to Cape Terawhiti in about 100mof water is moderately suitable habitat for southern right whale cows and calves, much of the area is of moderate-high suitability for orca, and that none of the area is suitable habitat for Hector's dolphins (Torres et al., 2013).

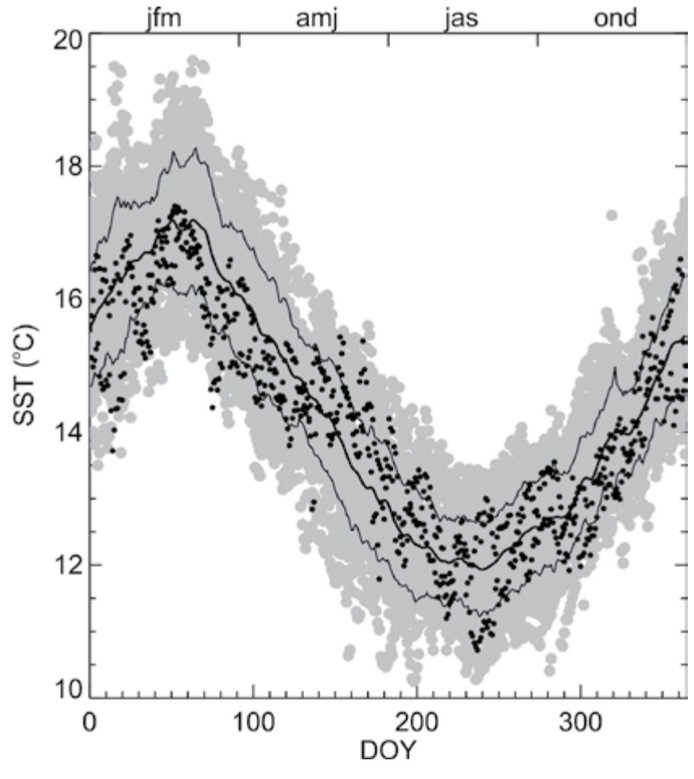


Figure 3: Surface water temperature from the middle of Cook Strait - grey shows all measurements between 1982 and 2012. Black are samples between 2010 - 2012 and the lines are the average and +/- 1 standard deviation

4.6.4 Experiential

The exposed strait retains a very high degree of wild and scenic associations for those crossing Cook Strait by ferry or who venture out in their own vessels. The deep water is exposed to frequent storms which reinforce isolated experiential associations several kilometres from any apparent modification establish along the nearest areas of land.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH	★		★
HIGH			
MODERATE TO HIGH			
MODERATE		★	
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	High		

COASTAL MARINE AREA D: COOK STRAIT (DEEP WATER) SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 8.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
NARROWS BASIN	High	H	H	H	The abiotic environment is slightly modified and is characterised by: Extremely strong tidal currents. Physical modification is low and quick to recover through natural processes of currents. Gravel beds moved around by currents. High water quality through whole of water column The biotic environment is slightly modified due to fishing activities. High experiential values due to low level of modification.	Some bottom trawling along edge of Nicholson Bank. Spider crab fishery, hoki mid-water trawl fishery in winter.
TERAWHITI SILL	Very High	VH	VH	VH	Modification of abiotic elements is low. Biotic environment unmodified because of high levels of protection for 50+ years Largely unmodified with very high experiential values.	3km wide protected zone essentially a marine reserve.
CLOUDY BAY SHELF	High	H	H	VH	Abiotic environment unmodified apart from impact of trawling on seafloor features. Biotic environment impacted by fishing activities but expected to have good recovery following disruption. Largely unmodified with very high experiential values.	Bottom trawling modified seabed in short term, but recovery good.
COOK STRAIT BASIN	High	H	MH	H	Abiotic environment impacted by some bottom trawling Mid depth trawling impacts hoki populations in particular as well as some other species. High experiential values due to low level of modification.	Mid depth trawling.

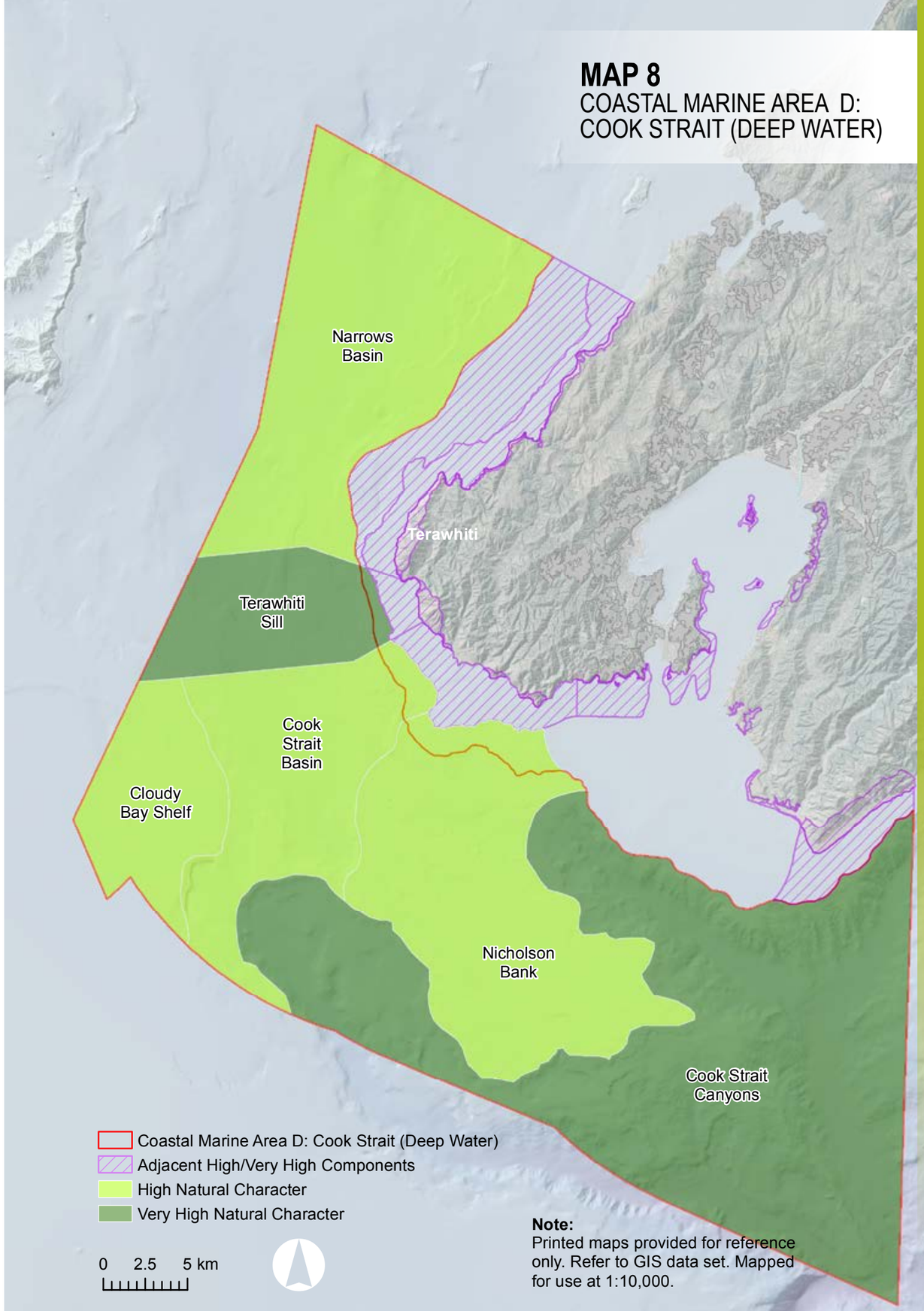
A calm day in Cook Strait

COASTAL MARINE AREA D: COOK STRAIT (DEEP WATER) SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 8.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
NICHOLSON BANK	High	H	H	VH	Abiotic environment only slightly modified by bottom trawling activities. But extremely strong tidal currents with gravel beds moved around by tidal currents. High levels and diversity of biotic elements with good recovery following disruption from trawling. Biota characterised by: High numbers of invertebrates. Fish diversity high but low compared to canyons. Methane seep communities present. Largely unmodified area with very high experiential values.	Bottom trawling modified seabed in short term, but recovery good,
COOK STRAIT CANYONS	Very High	VH	H	VH	Abiotic environment largely unmodified and characterised by: Extreme wind exposure-nationally and internationally significant. Very strong southerly can stop or reverse the tidal flow. High waves, but wave energy low. Deep water, near vertical canyon walls. Water temperature mixing- create cloud banks. Methane seep sites. High water quality. Biotic environment slightly modified and characterised by: Sperm whales in canyons. Fur seal population depressed but recovering. Pelagic community un-modified other than fish and seabirds. Sea birds affected as by-catch that has reduced population size, but still rich diversity. Largely unmodified with very high experiential values. Unique juxtaposition of deep canyon so close to land.	Scuttling of ships occurred within the Nicholson Canyon up until the 1930s. Hapuka fishery- long line fishing

MAP 8
COASTAL MARINE AREA D: COOK STRAIT (DEEP WATER)



4.7 Coastal Terrestrial Area 1: **Makara**

4.7.1 Location and Key Characteristics

The Makara coastal terrestrial area is located along Wellington City's west coast and extends between the district boundary with Porirua City and the rock promontory west of Wharehou (Fisherman's) Bay. Steep coastal scarps are dominant along this coastal edge above a narrow gravel beach following the coastline. A small headland at Pipinui Point punctuates the larger sequence of coastal scarps. Further to the south, Ohariu Bay provides an opening along the coastal scarps at the mouth of the Makara Stream.

The inland extent of the coastal environment typically follows the first dominant ridge set back from the top of the coastal scarp through areas of open pasture. Small coastal settlements are located at Makara Beach and Smiths Bay; dwellings originally located in Wharehou Bay were removed in the 1970s.

4.7.2 Abiotic

The geology forms part of the highly complex faulted geological past revealing alternating greywacke and argillite. The steep coastal scarps which occur along much of this coastal environment reach approximately 240m above the narrow gravel beach and rock reefs along the coastal edge.

The geology of this coastline largely reflects a zone of parallel northeast to south-west trending strike-slip faults, many of which are still active (Molloy & Smith, 2002). The main branch of the Pukerua Fault emerges at the western edge of Ohariu Bay (Stevens, 1974) with Pipinui Point and Boom Rock forming rock promontories which extend into the exposed coastline along the Pukerua Fault Ridge to the north of Makara. The Makara Stream estuary also forms a significant feature which contrasts with the surrounding coastal scarps.

Soils are mainly shallow and stony steepland soils from greywacke with skeletal soils and areas of bare rock and scree on coastal cliffs (McEwen, 1987). Minor areas of shallow and gravelly soils also occur along old beach ridges. With the exception of the small coastal settlements at Makara Beach and Smiths Bay with associated access, limited modification is apparent along most of the coastal edge along which coastal processes remain largely intact. Some isolated structures and tracking occurs along the top of the coastal scarp. Mill Creek Wind Farm is located just inland of the coastal environment on the ridges beyond the coastal scarp, between Pipinui Point and Ohariu Bay.

Whilst comparatively more sheltered when compared with Cook Strait, much of this coastline remains exposed to severe gales.

4.7.3 Biotic

The Makara coastal terrestrial area covers a total land area of 473 hectares. Pasture is the most common land cover with 26% of this area covered in high producing exotic grassland and a further 30% being in low producing exotic grassland. Grey shrubland accounts for 29% of the remaining area and this vegetation type has recolonised many areas of coastal scarp. A further 10% is gorse and/or broom, with the remaining areas comprising approximately 1% each of sand or gravel, river, herbaceous saline vegetation and built up areas. Only 0.5% of the total area is identified as broadleaved indigenous hardwood.

This area is located within the Cook Strait Ecological District, where the original cover on the steep hill slopes and cliffs would probably have been mixed low forest and scrub dominated by akiraho, mahoe, kiekie, coastal flax and manuka. Beyond this, the forest

cover would have included karaka, kohekohe and ngaio with tawa, titoki, occasional podocarps and northern rata (McEwen, 1987).

Historically, the entire coastal environment and adjoining inland area were cleared and burnt to accommodate pastoral grazing. Little of this former vegetation cover is now present with most of the remaining landscape within the coastal environment managed as part of a large pastoral farm with reduced natural character values.

Regeneration of coastal species is slowly occurring in some areas, particularly in some inland locations which are less exposed to extreme coastal winds and which continue to be farmed.

The Makara Stream mouth and estuary have several ecological values in relation to vegetation, katipo (historic record), freshwater fish and avifauna (Greater Wellington Regional Council, 2015; Todd, Graeme, Kettles, & Sawyer, 2010). Todd et al. (2010) report a historic record of katipo spider in beach adjacent to the estuary mouth (Todd et al., 2010). Several lizard species have also been recorded on the Makara Coast (Adams, 2009).

The Makara Stream drains a large portion of the western Wellington coast, with the catchment comprising mainly pasture on hill country. Water quality is seldom rated better than fair, mainly due to agricultural run-off and faecal contamination (Todd et al., 2010).

Overall, historical land uses (i.e. grazing and burning) in this area have resulted in a significantly modified coastal ecosystem.

4.7.4 Experiential

Whilst much of the original vegetation cover has been removed, the steep exposed coastal cliffs retain a predominantly remote wild and scenic character along which very limited development is apparent. Development which does occur, remains isolated with limited disruption to the overall experience along the coastal edge. The settlements at Makara Beach and Smiths Bay reflect the harsh coastal environment in which they are located; stony beaches that have a rugged interface with extreme/exposed coastal forces.

The turbines of the Mill Creek Wind Farm, which is located beyond the inland extent of the coastal environment, is visible from along the top of the coastal scarp.

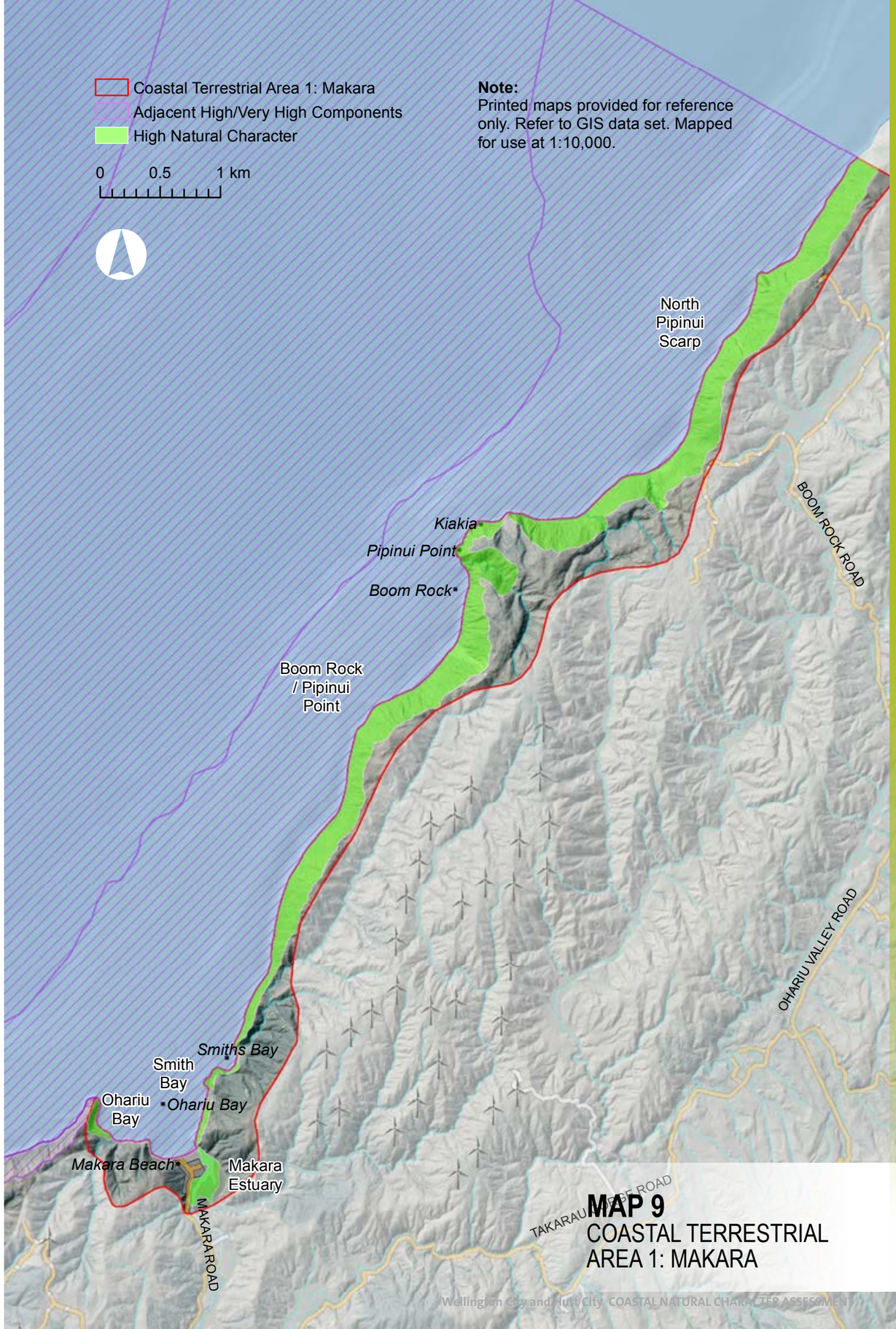
SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			★
HIGH	★		
MODERATE TO HIGH			
MODERATE		★	
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Moderate - High		

Pipinui Point

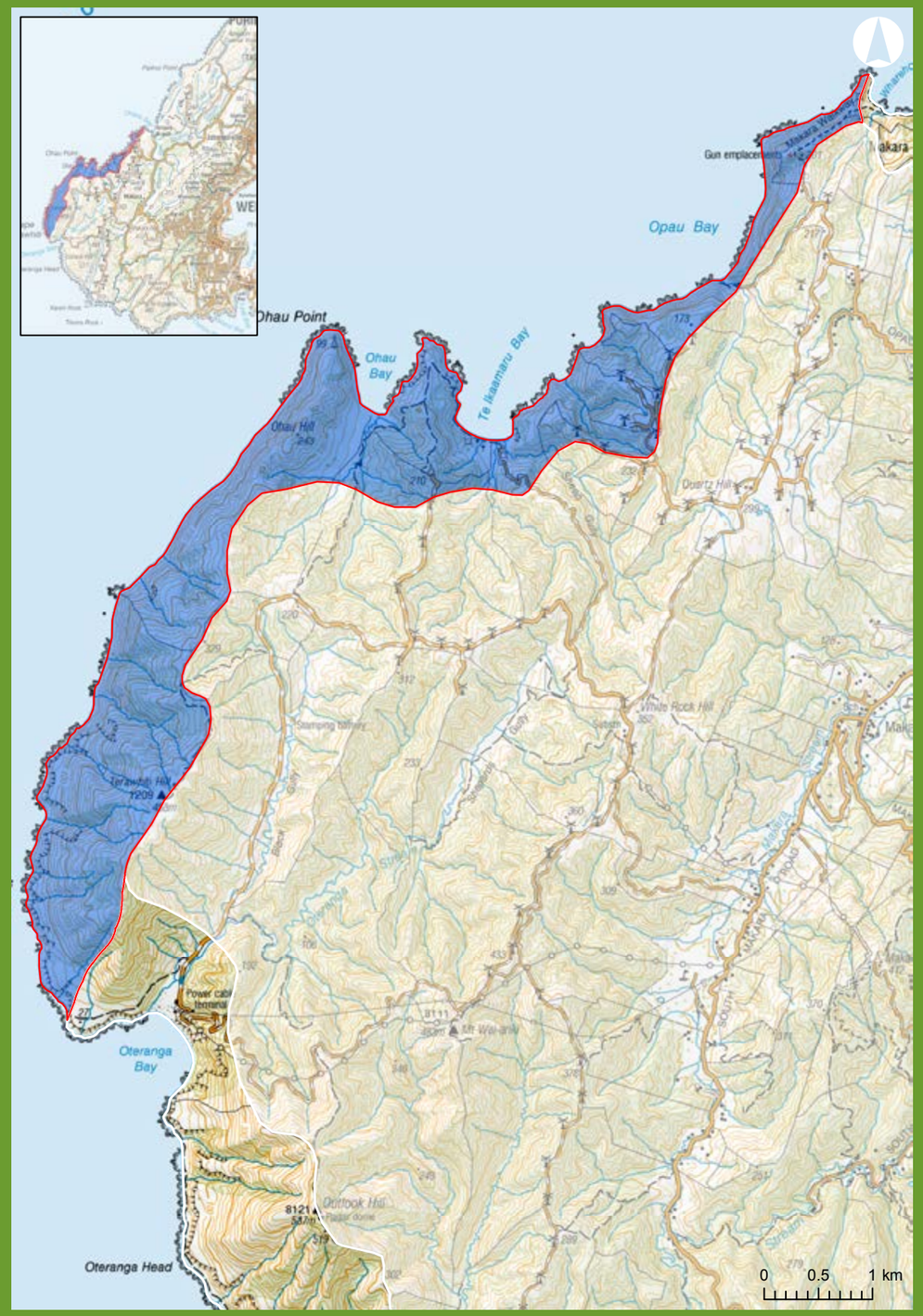
COASTAL TERRESTRIAL AREA 1: MAKARA - SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 9.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
NORTH PIPINUI SCARP	High	H	M	H	Low level of abiotic modification-Scarp slopes and narrow rocky shore have very limited physical modification. Moderately modified biotic modification. Coastal scarps are reverting to native grey shrubland. The steep exposed coastal cliffs retain a predominantly remote wild and scenic character.	Mill Creek wind turbines visible from top of scarp.
BOOM ROCK / PIPINUI POINT	High	H	M	H	Best example of coastal cliffs in Wellington City and the west of the region. High plant diversity including uncommon plants such as native broom. White fronted tern nesting site at Pipinui Point. The steep exposed coastal cliffs retain a predominantly remote wild and scenic character.	Includes Wellington City Council Eco Sites Boom Rock and North Makara Esplanade Reserve
SMITH BAY	High	H	M	H	High energy gravel beach largely unmodified. Large volume of beach-cast seaweed (significant role in the coastal ecosystem). The steep exposed coastal cliffs retain a remote wild and scenic character. Includes Wellington City Council Eco Site at Smiths Bay	Baches within Smiths Bay have been excluded.
MAKARA ESTUARY	High	H	H	H	Unusual for west coast estuary in having higher proportion of mud to sand. Diverse native wetland vegetation with salt marsh providing habitat for feeding and nesting birds, several indigenous fish, native lizard species and katipo spider. High experiential values due to low level of modification.	Roads & built structures not included Includes Wellington City Council Eco Site at Makara Estuary
OHARIU BAY	High	H	M	H	A highly natural coastline modified in part by only some minor structures and pasture growth. High experiential values due to low level of modification.	



4.8 Coastal Terrestrial Area 2: **Terawhiti**



4.8.1 Location and Key Characteristics

The Terawhiti coastal terrestrial area occupies the south-west coastal edge of Wellington City and extends between the narrow promontory to the west of Wharehou Bay and Cape Terawhiti marking the entrance to Cook Strait at the south-western edge of Wellington's coastline.

Much of this area is farmed as part of Terawhiti Station characterised by strong open landforms which include steep slopes which support regenerating shrubland and coastal bush in valleys. Isolated bays are located at the northern end of Cape Terawhiti forming Ohau Bay and Te Ikaamaru Bay together with the larger scalloped form of Opau Bay further to the north.

4.8.2 Abiotic

The geology of this area continues a folded and buckled form along a zone of parallel north- east to southwest trending strike-slip faults (Stevens, 1974). Cape Terawhiti is separated from the main mass of southwest Wellington by a long valley, excavated along a branch of the Pukerua Fault (Stevens, 1974).

This is an extremely exposed and rugged part of the coast subject to the full force of the Cook Strait climate and sea currents. The coast is studded with rocky headlands and reefs separated by small stony beaches. At Cape Terawhiti the steep slopes rise directly from the narrow beach to heights of 200-300m and beyond to the Terawhiti Hill summit at 485m. The slopes descend to 240m at Ohau hill.

Isolated north facing bays are located at the northern end of Cape Terawhiti forming Ohau Bay and Te Ikaamaru Bay together with the larger scalloped form of Opau Bay further to the north. Rugged wave-cut platforms with narrow rocky shorelines dominate the coastal edge along which banks of driftwood and seaweed typically define the intertidal zone. Above the coastal edge, some stock fencing and minor tracking is apparent.

Further to the north, Makara Walkway and two gun emplacements are within the coastal environment with other gun emplacements just beyond. Several turbines of the West Wind Farm are within the coastal environment near the tops of the coastal scarp at Opau Bay and many more are visible from the top of the scarp, but not from the shore.

4.8.3 Biotic

The Terawhiti coastal terrestrial area covers a total area of 843 hectares. The majority of the coastal environment is managed as pasture with 27% containing high producing exotic grassland and a further 35% covered in low producing exotic grassland. Of the remaining land area, 35% is covered in gorse and/or broom, 2% is covered in broadleaved indigenous hardwood and 1% matagouri or scrubland.

This area is located within the Cook Strait Ecological District, and as such the original vegetation would have been similar to that described for the Makara coastal terrestrial area (Section 4.7.3).

As with most of Wellington's Coastal environment, much of the former vegetation cover within the Terawhiti terrestrial area has been cleared and continues to be managed through pastoral grazing. The coastal escarpment has a shrubland vegetation cover consisting of tauhinu, mingimingi, and pohuehue, over pasture grasses and silver tussock. Flax occurs in some areas. Tiny stands of regenerating native trees dominated by karaka and mahoe occur in deep sheltered gullies.

Cape Terawhiti to Ohau Point is an important winter haul out for New Zealand fur seals (Greater Wellington Regional Council, 2000, 2015).

Historical land uses (i.e. grazing and burning) in this area have resulted in a significantly modified coastal ecosystem.

4.8.4 Experiential

Access to this coastal terrestrial area is very limited and it therefore retains a rugged and remote coastal character. The dominant forces of the waves, tides and winds; the sense of wildness and isolation; the presence of wildlife including a seal haul out, all contribute to a strong sense of natural character through much of this coastal environment. Where wind turbines are present, this reduces some sense of natural character values; however turbines are not generally visible from the coastal edge.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH	★		
HIGH			★
MODERATE TO HIGH			
MODERATE		★	
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	High		

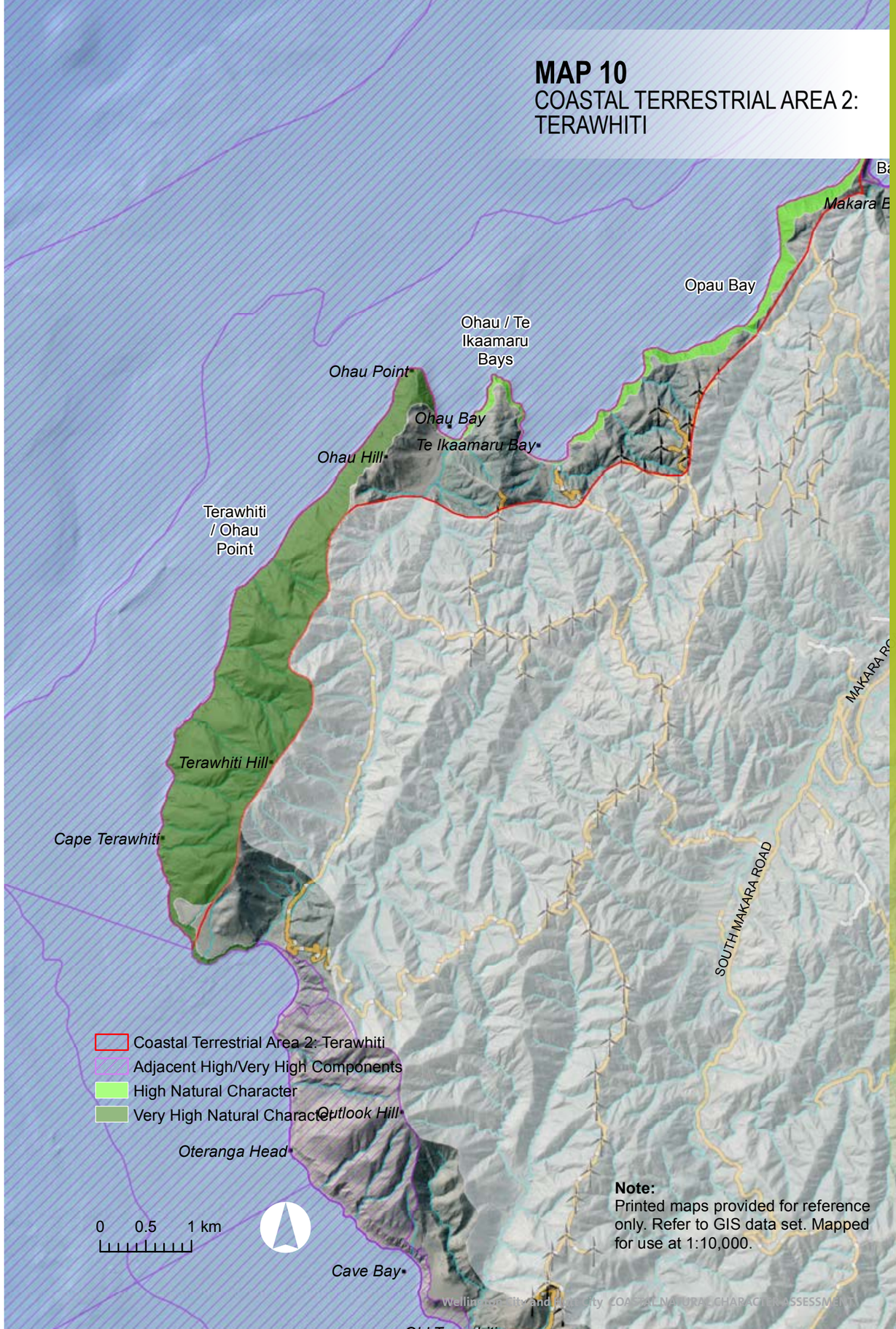
Terawhiti coastal scarp

COASTAL TERRESTRIAL AREA 2: TERAWHITI SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 10.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
OPAU BAY	High	H	M	H	Steep and exposed coastal cliffs with very limited levels of modification. The coastal scarps are reverting to native grey shrubland. The steep exposed coastal cliffs retain a remote wild and scenic character.	
TE IKAAMARU / OHAU BAYS	High	H	M	H	Largely unmodified coastal escarpments, terraces and beaches. Small stands of coastal forest. Shrubland regeneration is occurring on the promontories. A rugged and stark coastal character with limited human interference.	A navigation beacon and some fences and a section of the farm road on the promontories Includes Wellington City Council Eco Site at Te Ikaamaru Bay Point.
TERAWHITI / OHAU POINT	Very High	VH	M	VH	Very limited landform modification / structures. Wave cut platform with rugged coastal rock outcrops and stacks following the coastal edge. A well preserved interglacial terrace occurs to the west of Oteranga Bay. Seal haulout site at Black Point. Areas of regenerating shrubland with coastal bush in gullies. Ecological significant native grasses, shrubs and vines along the summit of Terawhiti Hill. Coastal forms remain extremely isolated with overtly rugged and wild character.	Includes Wellington City Council Eco Sites in coastal gullies.

MAP 10
COASTAL TERRESTRIAL AREA 2: TERAWHITI



4.9 Coastal Terrestrial Area 3: **Sinclair Head / Te Rimurapa**

4.9.1 Location and Key Characteristics

The Sinclair Head / Te Rimurapa coastal terrestrial area extends from the southern tip of Cape Terawhiti to the western edge of Owhiro Bay along Wellington's exposed southern coast encompassing several small bays together with Oteranga Head, Tongue Point and Sinclair Head / Te Rimurapa. Rocky raised shore platforms continue along much of this section of coastline below steep coastal scarps which include distinctive uplifted marine terraces at Oteranga Head and Tongue Point.

4.9.2 Abiotic

The larger south coast land mass has been successively tilted, domed and broken by successive fault activity to reflect the present day landscape (Stevens, 1974). Terraces along the coastal edge were cut by the sea at a time when the land level was lower and the sea level was higher than the present day. This has resulted in a steep convoluted coastal edge punctuated by rocky promontories.

Raised rocky shore platforms approximately 2 and 3m above sea level occur between Owhiro Bay and Sinclair Head and express more recent earth movement activity; the lower of the two platforms was probably uplifted during the 1855 earthquake while the higher level relates to an earlier event (Stevens 1973 in Turner, 1985). Uplifted marine terraces are also particularly well defined at Tongue Point (Kenny & Hayward, 1993).

Steep escarpments rise from narrow gravel beaches and rocky shore platforms along the coastal edge, reaching heights of between approximately 40 and 50m. The resultant steep escarpment faces remain largely unmodified by human influences with farm tracking and fencing established in some more accessible areas. At Tongue Point, the top of the escarpment gives way to a broad flat raised plain which contrasts with the rugged and steep slopes to the east. West of Tongue Point the coastal escarpments are much higher reaching heights of 100m at the toe of Outlook Hill.

The narrow shore platform which follows the coastal edge is largely undeveloped with access limited to a 4WD track often unpassable during high tide. Coastal baches and stock fences occur close to the shore in some areas and tend to be clustered in the more sheltered bays. The surrounding coast is a popular recreational area but the restricted access limits use to 4WD vehicles, mountain bikes and walkers.

Oteranga Bay on the south coast has been the North Island terminus site for telegraph cables and since 1965 for the Cook Strait undersea power cable. Several streams discharge to the sea along this section of the coast, the largest of which are Karori Stream, Waiariki Stream and Oteranga Stream. A sewer outfall has also been established to the east of Tongue Point.

The influences of the Cook Strait high winds, strong sea currents and storm swell environment are major components of the physical environment.

4.9.3 Biotic

The Sinclair Head / Te Rimurapa terrestrial character area comprises a total land area of 1083 hectares. About 14% of this area is covered with high producing exotic grassland with an additional 28% covered in low producing exotic grassland. Of the remaining land area, 26% is identified as gorse and / or broom with approximately 20% identified as matagouri or grey shrubland. In addition, 6% is either sand or gravel or rock with 2% identified as surface mine or dump located within Owhiro Bay. Areas of larger vegetation are very limited with 3% is identified as broadleaved indigenous hardwoods within some of the steeper gullies to the east of Oteranga Bay. Less than 1% is identified as exotic forest.

This area is located within the Cook Strait Ecological District, and as such the original vegetation would have been similar to that described for the Makara coastal terrestrial area (Section 4.7.3). Taupata, stunted karaka, mahoe, manuka, akiraho, tree hebe, five-

finger and kowhai would once have created a dense scrub given suitable slope and soil (Wellington City Council, 2002). Today, the steep coastal cliffs support a mosaic of coastal scrub, flax and tussock land, and scree (Wellington City Council, 2002).

This area has historically been cleared and grazed, and continues to be managed through pastoral grazing. Regenerating vegetation typically occupies the steeper scarp areas and gullies, with small areas of coastal forest occurring within several steep gullies. Pasture becomes more prevalent on the flatter terrace tops and accessible slopes. The Sinclair Head coastal escarpment is an area of extensive coastal shrubland containing threatened plant species and Marlborough minimac gecko.

The recreational track along the shoreline has resulted in the modification of the foreshore area, including bisecting through areas of dune vegetation which include foredune sand-binding species (sand tussock, pingao, spinifex, sand coprosma and sand daphne). The Frying Pan dunes in Long Gully Bay, is the only dune of its type in the Cook Strait Ecological District.

Both Ōteranga and Karori Streams which exit over this stretch of coastline have freshwater ecological values (Greater Wellington Regional Council, 2015). Historically, there would have been a lagoon at Ōteranga Stream mouth, formed behind the high gravel bars pushed up by the swell during southerly storms; this lagoon has largely been lost to natural? gravel build-up (Boffa Miskell Ltd, 2007).

Banded dotterel utilise the land surrounding the Ōteranga Stream mouth (Boffa Miskell Ltd, 2007), while the section of coast from Sinclair Head to Owhiro Bay provides habitat for a number of Threatened or At Risk bird species (Greater Wellington Regional Council, 2015). Several seal haul outs have been identified within this area, including Tongue Point and Sinclair Head. Five species of lizard have also been recorded within this area.

Overall, while an expansive stretch of coast line, the area has undergone significant modification associated with historic and current land uses, resulting in modified environment with much reduced biotic values.

4.9.4 Experiential

Given the limited access (4WD and pedestrian access) and remote location, much of this area retains a wild and isolated character. However, higher recreational use of the narrow coastal space during the weekends can detract from the otherwise unmodified area at times.

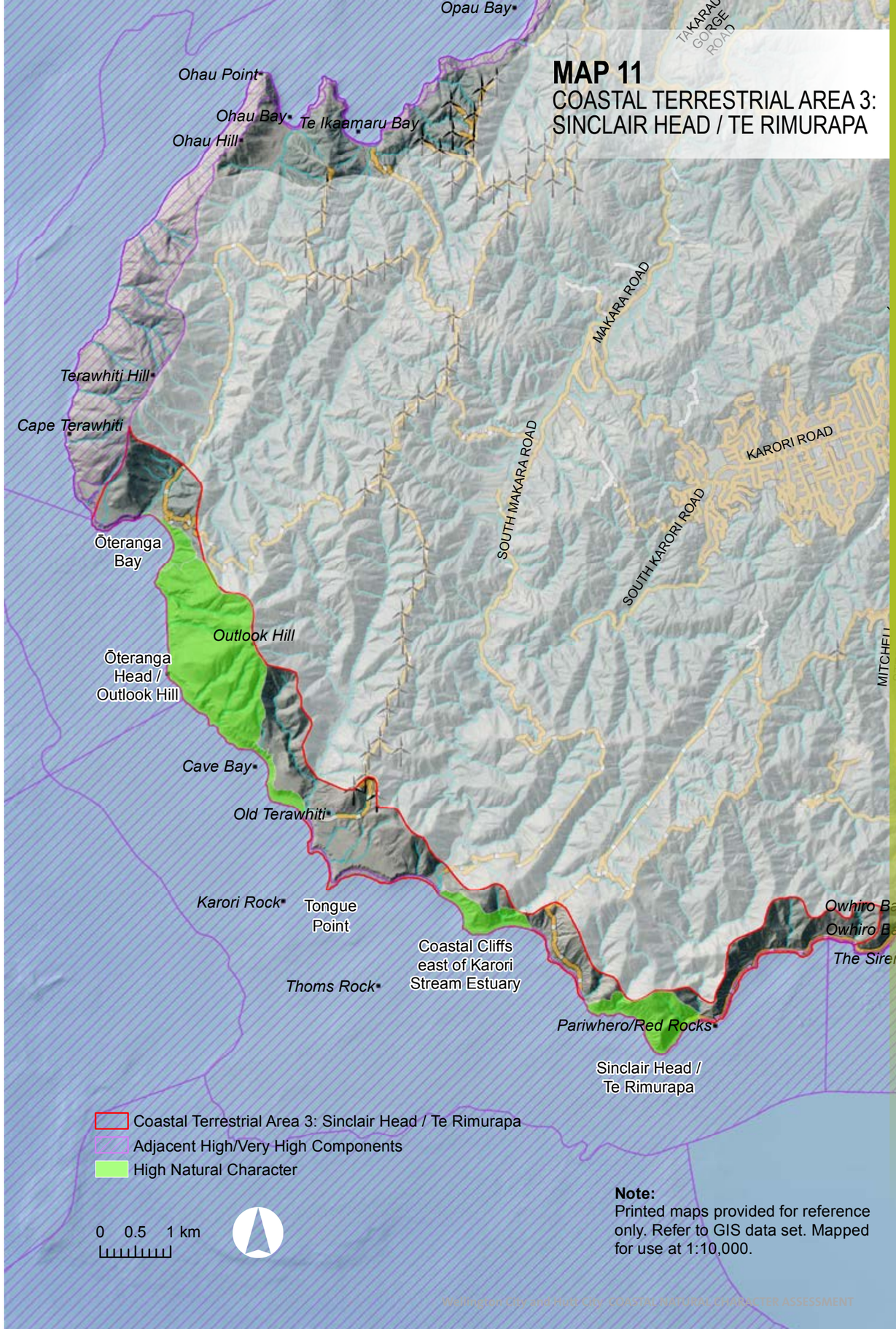
SUMMARY OF NATURAL CHARACTER VALUES			
NATURAL CHARACTER ATTRIBUTES			
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH	★		★
MODERATE TO HIGH			
MODERATE		★	
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Moderate - High		

COASTAL TERRESTRIAL AREA 3: SINCLAIR HEAD / TE RIMURAPA SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)						
THESE ARE MAPPED WITH REFERENCE TO MAP 11.						
AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
ŌTERANGA BAY	High	H	M	H	Beach and coastal scarp backdrop form largely unmodified coastal edge. At Risk and Threatened fish species recorded in the catchment include banded kokopu, common smelt, inanga, koaro, longfin eel, Redfin bully and short fin eel. Breeding population of banded dotterel. Isolated with high degree of remoteness and wildness.	4WD access along beach and coastal shelf. Structures associated with Cook Strait Cable above the beach not included. Includes part of Ōteranga Bay marginal strip.
ŌTERANGA HEAD / OUTLOOK HILL	High	H	MH	H	Very limited landform modification / structures. Steep uplifted marine terraces and escarpment slopes rise up to 80 metres above a wave cut platform along the shoreline. The coastal scarps are reverting to native grey shrubland. Pockets of coastal bush retained within the gullies. Predominantly wild and remote with limited human interference.	4WD access along coastal shelf. Highest biotic values occur on the shore platform. Include Wellington City Council Eco Sites within Ōteranga Bay

COASTAL TERRESTRIAL AREA 3: SINCLAIR HEAD / TE RIMURAPA SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 11.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
COASTAL CLIFFS EAST OF KARORI STREAM ESTUARY	High	H	MH	H	Steep escarpment slope rising above a wave cut platform along the coastline with limited modification. Areas of unmodified duneland and habitat for historic habitat for Long Bay Beach Weevil. Copper skink, common skink and Marlborough minimac gecko present. Rugged coastal landforms retain a predominantly remote wild and scenic character.	4WD access along the coastal edge Includes Wellington City Council Eco Sites at Long Beach Weevil Reserve, Frying Pan Dunes
SINCLAIR HEAD	High	H	H	VH	Steep escarpment slope rising above a wave cut platform along the coastline with limited modification. Threatened or At Risk species known to be resident or regular visitors include: black shag, variable oyster catcher, red-billed gull, white-fronted tern and NZ pipit. Copper skink, common skink and Marlborough minimac gecko present. Rugged coastal landforms retain a predominantly remote wild and scenic character.	4WD access along the coastal edge Includes isolated baches along coastal edge Includes Sinclair Head Scientific Reserves and part of Wellington City Ecosite along Coastal cliffs from former Owhiro Bay Quarry



4.10 Coastal Terrestrial Area 4: **Southern Bays**

4.10.1 Location and Key Characteristics

The Southern Bays coastal terrestrial area extends along Wellington's south coast between the former quarry in Owhiro Bay and Te Raekaihau Point. Narrow shore platforms backed by steep escarpments occur along much of the Southern Bays coastline, where exposure to rigorous environmental conditions has helped shape the rugged landforms. Coastal characteristics include accessible rocky reefs and beaches, relic dunes and steep coastal faces accommodating regenerating coastal scrub. Taputeranga Island is also a distinctive terrestrial component associated with this area.

Most of the accessible land areas inland from the coastal edge have been heavily modified by residential development with regenerating vegetation recolonising the steeper less accessible slopes. The adjacent coastal marine area is designated as a marine reserve, which increases the natural character associations along the coastal edge.

4.10.2 Abiotic

Much of the coastline has been shaped by tectonic processes, including periodic dramatic changes along fault lines, some of which are relatively recent. The steep coastal ridges and topography mostly run north-south and are dissected by streams. The coastal edge comprises a narrow rocky shore platform and reef system with rocky headlands enclosing narrow gravel and broader sandy bays. The stretches of rocky sea bed exposed by the uplift accompanying the 1855 earthquake are clearly visible around much of the coastal edge.

Inland from the coastal edge, roading and residential development has resulted in a high degree of modification to underlying landforms. The benched topography resulting from tectonic processes has been modified to enable vehicle access beyond which residential building platforms have been cut into moderately steep slopes to take advantage of sea views.

Taputeranga Island within Island Bay is largely undeveloped and consists of two parts both encircled by a rocky shore platform uplifted during the 1855 earthquake and now permanently exposed above present day sea level (Turner, 1985). The larger part consists of a small central hill surrounded by shingle flats. The smaller portion consists of shingle flats.

The southern bays are exposed to the extremes of the Cook Strait climate with strong winds, strong tidal currents and the breaking swells of southerly storms. Overall, the abiotic aspects of the coastal edge, seaward of the road, remain relatively unmodified but inland of the road the level of modification is high.

4.10.3 Biotic

The Southern Bays coastal terrestrial area covers an area of 135 hectares. Approximately 50% of this area comprises residential settlement with the remaining area predominantly regenerating vegetation which is becoming re-established on the steeper retired hill faces, including 29% identified as broadleaved indigenous hardwoods. A further 14% is identified as gorse and / or broom. Less than 1% is identified as low producing exotic grassland with a further 7% identified as sand, gravel or rock.

The vegetation cover on the retired slopes is typical of the indigenous regenerating vegetation communities on the hills within the Wellington region. Those areas associated with Happy Valley and Houghton Bay have been identified by GWRC as Key Native Ecosystems (KNEs).

Wellington's south coast accommodates extensive areas of rocky shore and reefs; however the coastal ecosystem processes along this area have been significantly modified due to the construction of the road along the entire coastal edge, as well as various recreational areas and residential development.

A number of coastal systems have been identified as eco-sites by WCC, including the Island

Bay and Princes Bay dune systems (a critically under-protected system in Wellington City), Houghton Bay (very dynamic coastal system backed by low dunes) and its rock stacks (naturally uncommon ecosystem). However, in each of these instances the ecosystems have been severely modified due to the location of the road and also by weed invasion.

The Owhiro Stream has been diverted into a channel prior to exiting the beach under the coastal road. Despite this modification, the stream itself has been identified as a significant indigenous ecosystem as it provides habitat for migratory, Threatened and At Risk fish species (Greater Wellington Regional Council, 2015).

Historically, Taputeranga Island would have comprised coastal cliffs, grass, tussock and flax lands, vinelands, shrublands and low forest (Boffa Miskell Ltd, 2011). While this is generally the case on the Island today, there are areas where invasive shrubs and trees have almost reached the point where they have become the dominant species. The rock stacks that are located across the Island are dominated by coastal flax, native ice plant and taupata. Given their relative protection from many invasive pests (plants and animal grazing species), these rock stacks have retained the most 'natural' vegetation.

The Island is identified as providing habitat for indigenous birds in the coastal marine area, including Threatened and At Risk species, and is one of only two sites at which reef heron have been recorded breeding (GWRC 2015). Common skink and Marlborough minimac gecko have also been recorded on the Island (Romijn et al., 2012).

Overall, the biotic values within this area have been significantly modified by historic and current land uses.

4.10.4 Experiential

Residential development occurs throughout most of this coastal environment in suburbs named after the bays. Whilst access runs parallel with this coastline, modification typically becomes less apparent along the coastal edge where exposed rocky shore platforms and outcrops occur within the intertidal zone.

Frequent swells and wave action retain a dynamic coastal interface along this coastal edge and occasionally wash rock, driftwood and other material over the road during storms. Seaward of the coastal road, more limited modification is apparent along rugged coastal rock formations, providing a wild and scenic character.

The south coast is popular for recreational fishing and for gathering of paua, kina and rock lobster (crayfish). The road extending around the southern bays provides good access and the many small bays are typical of much of the south coast where there are residential settlements.

SUMMARY OF NATURAL CHARACTER VALUES			
NATURAL CHARACTER ATTRIBUTES			
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE	★	★	★
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Moderate		

Sirens Rocks, Owhiro Bay

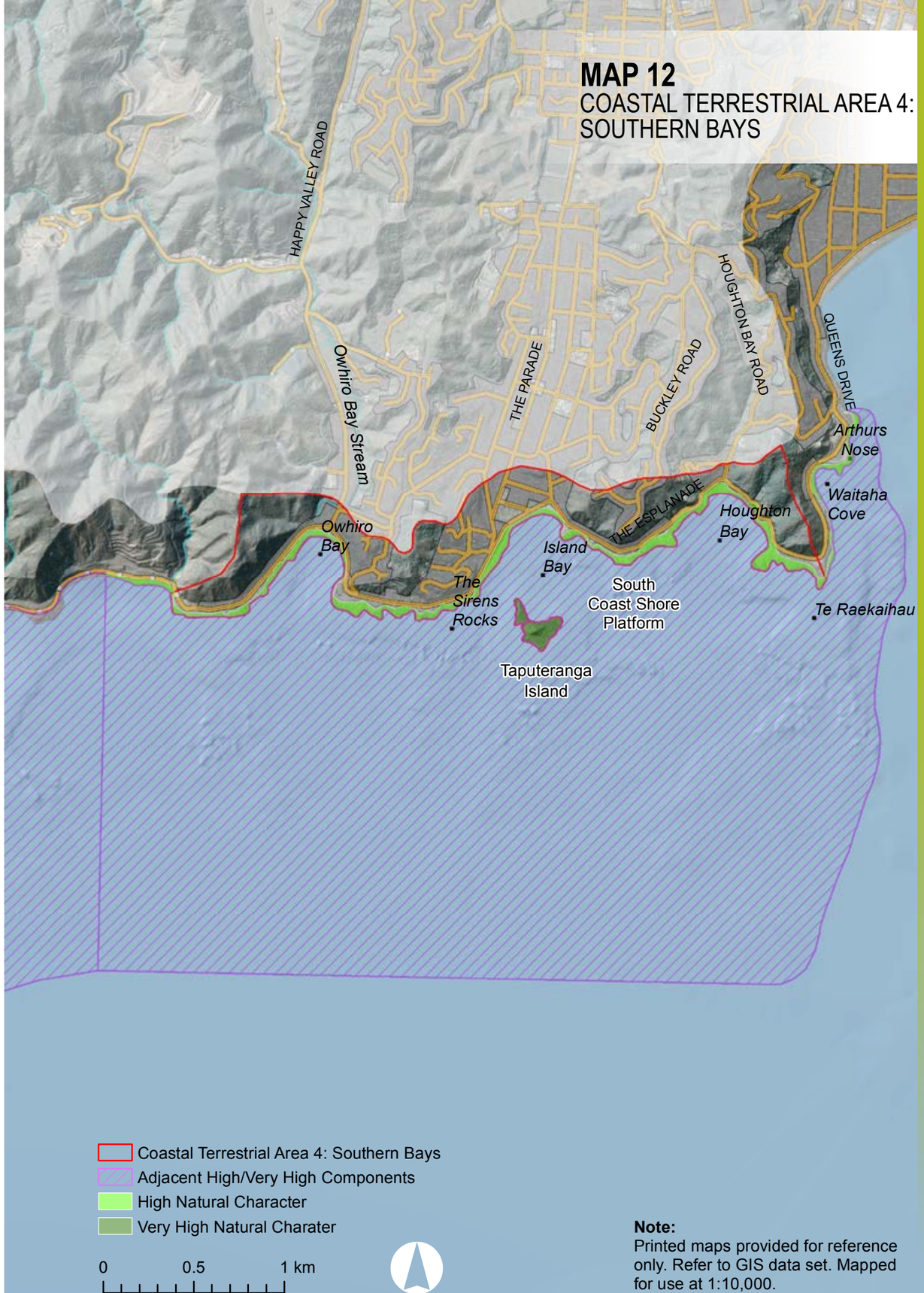
Wellington City and Hutt City COASTAL NATURAL CHARACTER ASSESSMENT

COASTAL TERRESTRIAL AREA 4: SOUTHERN BAYS SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 12.

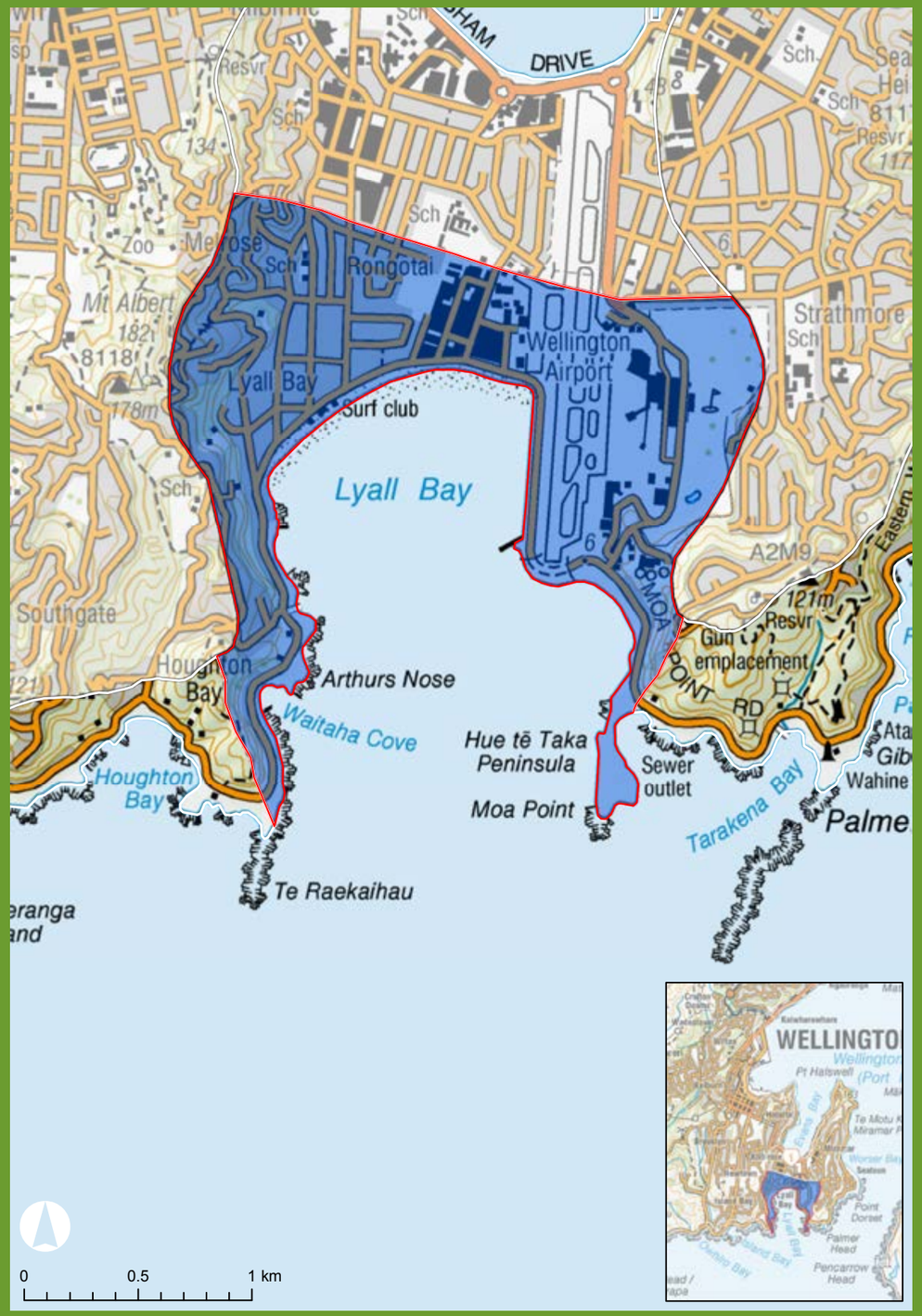
AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
SOUTH COAST SHORE PLATFORM	High	H	M	H	Shore platforms and raised beach ridges incl. 1855 uplift ridge remain largely intact Rock stacks, coastal turf, sand, small coastal dune areas and shingle beaches with limited modification Regionally significant Island Bay lawsonite and prehinite-pumpellyite facies metamorphism, veined greywacke and pillow lava melange. Very dynamic coastal system, including gravel cobble beach and low dunes. Diverse range of plant species. One of four large stream estuaries in the City. Possible penguin habitat and skinks present. Predominantly wild and scenic coastal edge.	Most of the coastal edge is contiguous with Taputeranga Marine Reserve Includes Wellington City Council Ecological Sites at South Coast Visitor Centre Car Park Shore Platform, Owhiro Bay, Sirens Rock, Island Bay Dunes, Elsdon Point, Houghton Bay, Houghton - Princess Rock Stacks, Princess Bay Dunes, Te Raekaihau Point
TAPUTERANGA ISLAND	Very High	VH	MH	H	Formed through volcanic intrusive into Wellington greywacke with limited modification. Threatened or at risk bird species are known to be resident or regular visitors. Limited human interference retaining largely wild and scenic island character.	

MAP 12
COASTAL TERRESTRIAL AREA 4: SOUTHERN BAYS



Note:
Printed maps provided for reference only. Refer to GIS data set. Mapped for use at 1:10,000.

4.11 Coastal Terrestrial Area 5: **Lyall Bay**



4.11.1 Location and Key Characteristics

The Lyall Bay terrestrial coastal area forms part of the larger settled urban area of Wellington's south coast between Te Raekaihau and Hue tē Taka Peninsula/ Moa Point connected by the Rongotai isthmus. The outer edges of Lyall Bay include rocky headlands and reefs which frame the seaward opening into Cook Strait. A large sweeping sandy beach extends along the inner edge of the bay, part of which has been reclaimed at its eastern end to form Wellington International Airport's runway. Mount Albert and Miramar Peninsula form backdrops along the western and eastern edges of the bay and accommodates residential dwellings together with regenerating vegetation on the steeper slopes.

4.11.2 Abiotic

Lyall Bay is the largest sandy bay on the south coast and it forms the southern end of the Rongotai isthmus. The isthmus is relatively recent in geological terms; formerly a shallow tombolo that has filled up. The former Miramar Island (Motu-Kairangi) was separated from the mainland and a second harbour entrance was situated between the Miramar Peninsula and Kilbirnie. The combined effects of sediment accumulation and upward earth movements have eventually connected Miramar to the main land mass of Wellington at Kilbirnie (Stevens, 1974).

The outer edges of the bay include an uplifted rock shelf and seabed which continues along the wider coastal edge of the south coast and has been exposed by recent tectonic earth movement. At Hue tē Taka Peninsula / Moa Point, a modern storm beach and ridge raised by the 1855 earthquake also encircle a large stack (Turner, 1985).

Most of the Lyall Bay terrestrial area has been highly modified to accommodate urban, infrastructure and recreational development. Originally, there were sand dunes present in Lyall Bay and across the Rongotai isthmus but these have been significantly reduced to be just the modified foredunes on the seaward side of the seawall and the Esplanade. Roads adjacent to the coast occupy part of the narrow coastal platforms at the toe of the coastal slopes and escarpments.

Construction of Wellington International Airport runway resulted in the eastern part of Lyall Bay being reclaimed in 1950s and again in the 1970s. The runway encloses a small embayment to its east. The runway is a major modification in Lyall Bay in terms of the new shoreline it created, the associated breakwater, the rock and akmon armouring, and the loss of the underlying beach and reefs.

The rocky shores and small gravel beaches on the west side of the Bay are intact but typically the land beyond is modified with roads, carparks and walking tracks and houses. The east side of the original Bay is less modified with intact rocky shore and small gravel beaches, the immediately adjoining land between the shore and the road is relatively unmodified.

At Arthurs Nose on the western side of Lyall Bay there was a former quarry, which through excavation of the cliff face has substantially widened this part of the shore platform.

The climate and weather retain a strong influence on the south coast, especially in relation to the vegetation. While parts of Lyall Bay are relatively sheltered, the climate and exposure are a major factor that has shaped and continues to shape the environment.

4.11.3 Biotic

The Lyall Bay coastal terrestrial area covers a total land area of 284 hectares. The majority of this area is highly modified with 62% forming built-up areas and an additional 11% supporting transport infrastructure at Wellington International Airport. About 11% of the land area is identified as broadleaved indigenous hardwoods resulting from regenerating vegetation established along the steeper hill slopes to the west and east of the Bay. A further 10% is urban parkland / open space comprising Rongotai College and Miramar Golf Links with 5% of the terrestrial area sand or gravel, which includes the sandy beach at Lyall Bay and the rocky headland at Moa Point.

The coastal ecosystems and processes within this area have been significantly modified due to the impacts on the coast associated with roading, airport reclamation, recreational areas and residential development. Nevertheless, the coastal edge of this entire area has been identified as habitat for indigenous birds in the coastal marine area (GWRC, 2015).

While there are small areas of naturally growing plant species on the coastal fringe (glasswort, ice plant and other turf field species), the foreshore has mainly been planted with a limited range of native coastal species (e.g. pingao, spinifex, taupata, coastal flax, pohuehue).

The headlands are protected as reserves. The coastal cliffs on the eastern and western sides of Lyall Bay are dominated by taupata shrubland and coastal flaxland and in a few sheltered gullies there is a low canopy of taupata and mahoe. The dry faces and hill slopes are dominated by grasses, such as silver tussock, with club sedge, gorse and boneseed. There are many adventive species present such as Japanese honeysuckle, Cape ivy, boneseed, broom, karo and spur valerian which have a propensity to colonise low stature coastal vegetation communities.

Hue tē Taka Peninsula / Moa Point supports a range of coastal vegetation, indigenous coastal bird species (e.g. little blue penguin, black shag, pied shag, variable oyster catcher, black-backed gull) and lizards (common skink and gecko). The diversity of species occurring here has been attributed to its relative isolation and tidal restrictions have limited public access to the area and also limited predation from cats.

4.11.4 Experiential

High levels of human modification are apparent throughout this terrestrial area, including modification associated with the road network along the coastal edge, reclamation and aircraft activity associated with Wellington International Airport. In many places, sea walls back onto the coastal edge, beyond which urban land uses have become established. Wellington's Wastewater Treatment plant and sewer outfall are located at the eastern end of the Bay and contribute to the highly modified character of this area.

The beach at Lyall Bay has a long history of recreational use and there are many historic records and photographs depicting its popularity prior to and subsequent to the construction of the airport. Lyall Bay's popularity and the ongoing high level of use is not surprising given that Lyall Bay is the largest sandy bay on the south coast and 'The Corner' the most accessible surf break to Wellington's urban population.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE			
MODERATE TO LOW	★	★	★
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Low - Moderate		

Lyall Bay

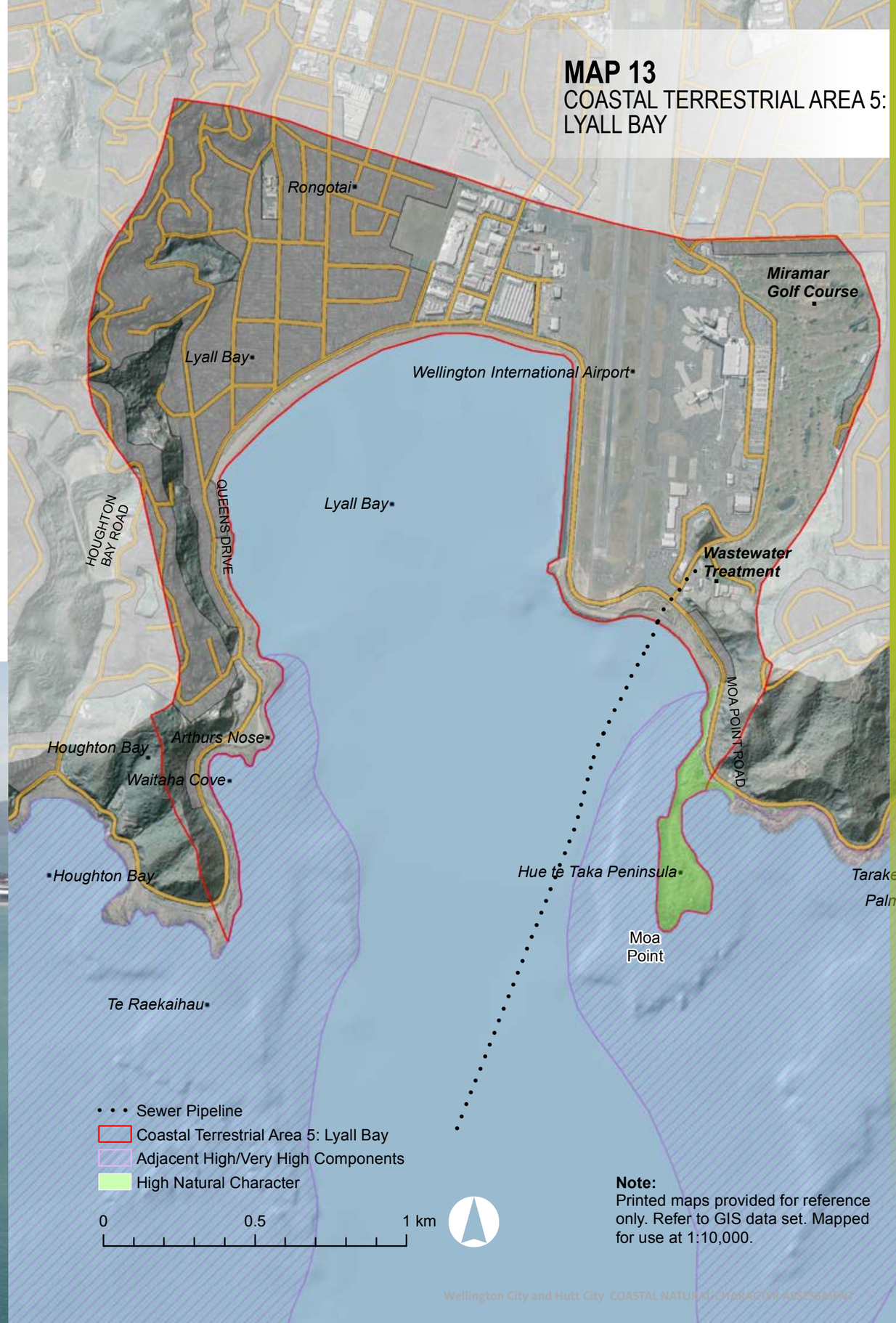
COASTAL TERRESTRIAL AREA 5: LYALL BAY SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 13.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
HUE TĒ TAKA PENINSULA / MOA POINT	High	H	M	MH	Rock stacks, shore platforms and raised beach incl. 1855 uplift ridge which remain largely intact. Representative of former vegetation along Wellington's coast. Important as lizard habitat with second highest number of lizards in Wellington. High experiential values due to low level of modification.	Includes Wellington City Council Eco Site at Moa Point

Te Raekaihau Point

MAP 13
COASTAL TERRESTRIAL AREA 5: LYALL BAY



Note:
Printed maps provided for reference only. Refer to GIS data set. Mapped for use at 1:10,000.

4.12 Coastal Terrestrial Area 6: Miramar Peninsula

4.12.1 Location and Key Characteristics

The Miramar Peninsula terrestrial character area extends from east of Hue tē Taka Peninsula / Moa Point to Point Halswell and forms the western side of the Wellington Harbour entrance. The area includes Palmer Head and Point Dorset and all the bays and headlands on the eastern side of Miramar Peninsula. This area comprises a sequence of small gravel / sandy beaches and rocky embayment's separated by rocky headlands and reefs. Sections of sea wall have been built in places to support the coastal road and other built modifications on the coastal edge include informal carparks on some headlands, and a few jetties and boatsheds.

4.12.2 Abiotic

Extensive shore platforms uplifted during the 1855 Wairarapa earthquake fringe the Miramar Peninsula between Moa Point and Point Dorset (Turner, 1985), most of which have been at least partially modified to accommodate vehicle access along the coastal edge and to establish residential housing. Notwithstanding these modifications, the shoreline beyond the road is largely intact.

The section of coast from Hue tē Taka Peninsula / Moa Point to Point Dorset is essentially within the Cook Strait environment and therefore exposed to the strong ocean currents and southerly storms, but it is sheltered from the prevailing northerly weather. Point Dorset marks the narrowest point of the Harbour entrance north of which the coast becomes more sheltered from the Cook Strait influences, but exposed to the northerly weather systems and wave action. Point Dorset is the only part of this coast where there is not a road or residential development immediately adjacent to the shore.

Residential dwellings line the full length of the coastal road between Palmer Head and Breaker Bay and from Worser Bay to Scorching Bay. Residential development also occupies the slopes and flat land beyond the coastal road. However, there is no residential development north of Scorching Bay and west of Palmer Head.

4.12.3 Biotic

The Miramar Peninsula terrestrial area covers a total of 301 hectares of which 39% is residential development. There is 38% in broadleaved indigenous hardwoods which accounts for regeneration on the steeper, less accessible slopes. Of the remaining land area, 6% is urban parkland / open space including school playing fields and urban parks established to the east of Seatoun and4% is exotic forest and 2% is gorse and / or broom. Sand or gravel accounts for the remaining 10% of the land cover most of which accounts for the intertidal area which encircles most of the peninsula.

Larger areas of regenerating indigenous vegetation are generally confined to the northern and southern ends of the peninsula.

There are a number of different coastal ecosystems within this area, including dunes and dune swale (Tarakena Bay), beach-rocky shore platform (Palmer Head), coastal shrubland / duneland / coastal hills (Point Dorset, dune system Worser Bay), rock stacks and shore platform (Point Gordon) and coastal forest (Fort Ballance Road). However, all of these have been significantly modified due to the construction of roading and other development activities.

At Tarakena Bay, a very small stream exits into the low dunes that remain but the vegetation is radically modified, comprising mainly tall fescue and marram with some pingao and spinifex. There are no fish in the stream which would only be open to the sea during high rainfall events.

The entire coastal edge and adjacent waters are identified as habitat for indigenous birds in the coastal marine area (GWRC, 2015), however these terrestrial values are compromised due to the coastal land uses (e.g. roads, recreational and residential). .

4.12.4 Experiential

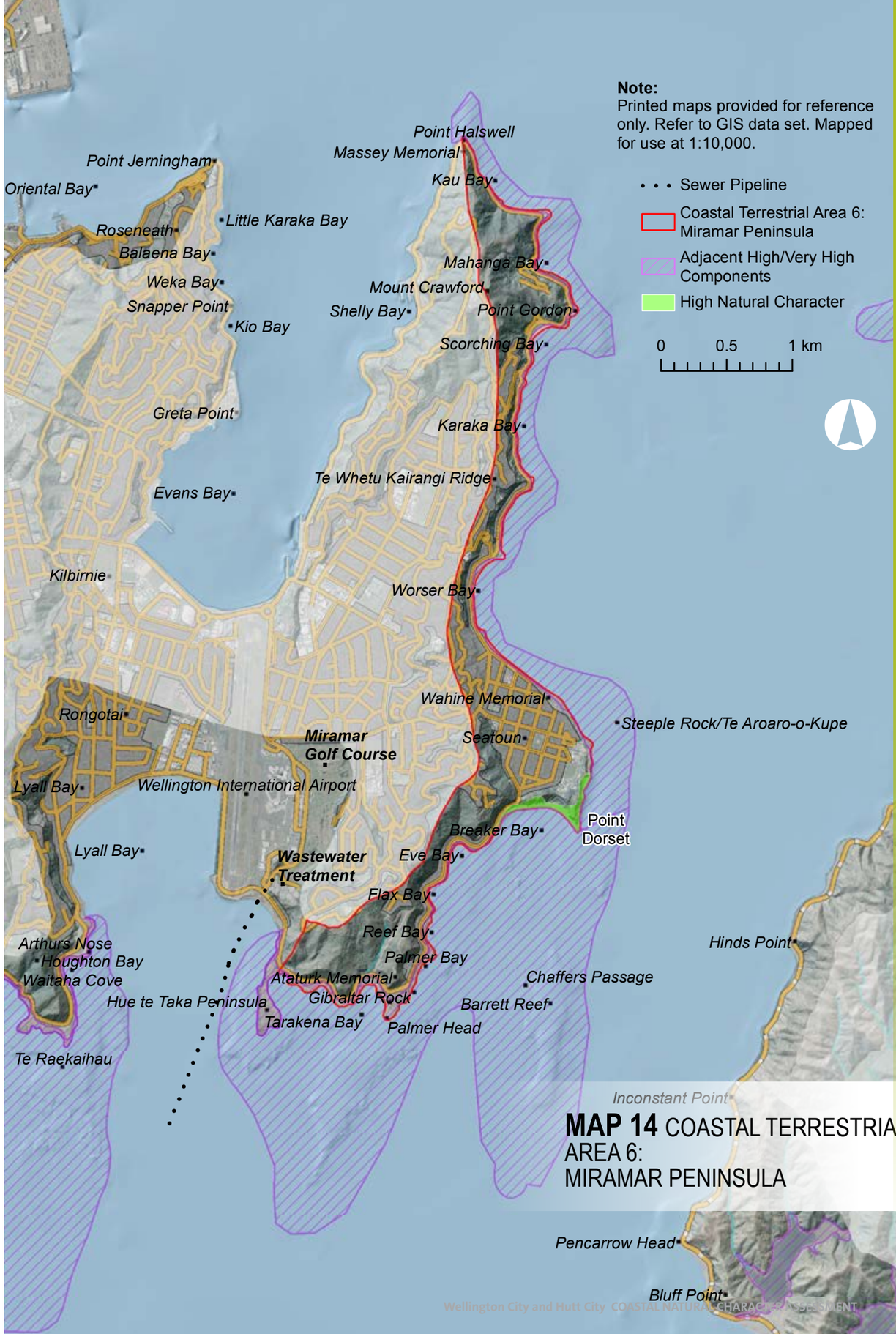
The shoreline along this coast is easily accessed and is a popular recreation destination. While isolated parts of the shore are modified by built structures, the overall wildness of the coast can still be experienced on the shore and along the numerous rugged coastal outcrops. In the wider context of the coastal environment, which includes the coastal road and residential development, the wildness of the coastal environment is diminished.

SUMMARY OF NATURAL CHARACTER VALUES			
NATURAL CHARACTER ATTRIBUTES			
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE	★	★	★
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Moderate		

COASTAL TERRESTRIAL AREA 6: MIRAMAR PENINSULA SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 14.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
POINT DORSET	High	H	M	MH	Only section of coast where there is no coastal road-relatively unmodified. Regenerating indigenous coastal vegetation on the escarpment. Coastal experience of wildness retained in dynamic and relatively unmodified headland.	Includes recreation tracks and isolated defence elements.



4.13 Coastal Terrestrial Area 7: **Evans Bay**

4.13.1 Location and Key Characteristics

This character area extends between Point Halswell and Point Jerningham and includes the northern edge of the Rongotai isthmus which opens into Evans Bay. Most of this coastal environment has been heavily modified with roads and harbour edge development. Large wharves occupy Shelly Bay, several of which are no longer used. Evans Bay Marina and several harbour edge buildings continue along the western edge of the Bay in association with large areas of reclamation. Urban development extends along much of the surrounding coastal environment including parts of the residential suburbs of Roseneath, Hataitai, Kilbirnie and Maupuia.

4.13.2 Abiotic

As with Lyall Bay, Evans Bay reflects the faulted geological form of Wellington Harbour and gradual uplift and sedimentation which has connected the raised island of Miramar Peninsula to Kilbirnie and exposing Rongotai isthmus.

Nearly all of the coastal edge has been heavily modified with either sea walls or riprap armour and large areas of reclamation, particularly at Greta Point and the southern parts of the Bay. The eastern side of the Bay is comparatively less modified retaining several rocky reefs and small gravel beaches, however vehicle access also continues adjacent to these areas along part of the narrow coastal platform. Large wharves and buildings are also present in Shelly Bay with buildings at the former Mount Crawford Prison occupying the summit of the headland above the less developed steep coastal scarps.

Residential development dominates the slopes on the western side of the bay and continues along the small embayments towards Point Jerningham and the eastern slopes of Mount Victoria. Cobham Drive defines the southern edge of the bay accommodating industrial and residential development beyond, parts of which occupy reclaimed land.

4.13.3 Biotic

The Evans Bay terrestrial area covers a total land area of 382 hectares. About 65% of this area is built up with a further 6% in transport infrastructure associated with Wellington International Airport. Broadleaved indigenous forest accounts for 10% of land cover with exotic forest a further 8%, which is predominantly located along the eastern edge of Evans Bay. Of the remaining land area, 7% is urban parkland / open space and another 3% sand or gravel.

As indicated by the land cover analysis, the coastal margin within this area has been greatly modified with very little native vegetation remaining. Shark Bay, on the western side of the Miramar Peninsula provides a rare (though modified) example of coastal forest in the area.

The entire coastal edge and adjacent harbour waters are identified as habitat for indigenous birds in the coastal marine area (GWRC, 2015), however these terrestrial values are compromised due to the coastal land uses (e.g. roads, recreational and residential).

4.13.4 Experiential

High levels of human modification are apparent throughout Evans Bay. The coastal edge is highly modified with urban development extending along most of the enclosing slopes encompassing Mount Victoria and Miramar Peninsula. Cycling and walking are popular activities along Shelly Bay Road with coastal fishing also common where there is access to rock outcrops and from wharves. While such activities benefit from obvious coastal associations there is no appreciable sense of wildness and very limited natural character attributes.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE			
MODERATE TO LOW	★	★	
LOW			★
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Low		

No Specific Values at the Local Level (Component Scale)

Evans Bay

4.14 Coastal Terrestrial Area 8: **Wellington City**

4.14.1 Location and Key Characteristics

The Wellington City coastal terrestrial area extends between Point Jerningham and Kaiwharawhara Stream and encompasses Lambton Harbour and Oriental Bay as well as reclamation areas along Aotea Quay and the Thorndon container wharf. This forms a highly modified urban environment within which very limited natural character remains.

4.14.2 Abiotic

The coastal environment throughout this terrestrial area is dominated by the urban and port development including large areas of reclamation. Almost the entirety of the coastal edge has been modified by port infrastructure, marinas, seawalls and substantial areas of reclamation with little evidence of the former coastal edge which existed prior to settlement. The small sandy beaches in Oriental Bay have been enlarged by the importation of sand.

4.14.3 Biotic

The Wellington City terrestrial area covers a total land area of 259 hectares of which 95% represents either built-up areas and transport infrastructure or urban parkland / open space. Of the remaining land area, 3% is covered in broadleaved indigenous hardwoods forming part of the wider belt of regenerating vegetation established along the Wellington Fault Scarp, with 2% in exotic forest near the northern end of Mount Victoria.

As illustrated by this land cover analysis, the coastal margin within this area has been greatly modified with very little native vegetation remaining.

The entire coastal edge and adjacent harbour waters are identified as habitat for indigenous birds in the coastal marine area (GWRC, 2015), however these terrestrial values are compromised due to the coastal land uses (e.g. roads, recreational, reclamations).

At the northern end of this area, Kaiwharawhara Stream is contained within a concrete channel as it enters the estuary, at which point it is bound on both sides by reclaimed land. Kaiwharawhara Stream has a large catchment and is the only waterway that connects Zealandia with the coast. The estuary itself is dominated by gravel and is not considered to be particularly estuarine in character (BML, 2011). This is in part a consequence of the estuary being substantially modified as a result of several reclamations. The lower Kaiwharawhara Stream reach within the industrial area and the estuary has been significantly impacted through high levels of contamination and modification (e.g. channelization, reduced riparian vegetation, invasive weed species, and sedimentation). Todd et al. (2010) report that below the railway culverts, the estuary offers little habitat for birdlife or fish.

4.14.4 Experiential

The coastal edge of the Wellington waterfront and Oriental Bay is a significant recreational feature of the city. While little of the natural coastal processes and vegetation remain, the salt-laden winds, views to the harbour and access to the water are all highly valued by the community.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE TO LOW			
LOW			
VERY LOW	★	★	★
OVERALL NATURAL CHARACTER RATING	Very Low		

Commentary of 'Very Low' rating:

No Specific Values at the Local Level (Component Scale)

Inner harbour, Oriental Bay

4.15 Coastal Terrestrial Area 9: **Western Harbour**

4.15.1 Location and Key Characteristics

The Western Harbour coastal terrestrial area is located along the western edge of Wellington Harbour and follows the alignment of the Wellington Fault scarp between Kaiwharawhara Stream and the Wellington City and Hutt City Council boundaries near Korokoro Stream. The area extends to the top of the densely vegetated Wellington Fault escarpment above State Highway 2 (SH2) and the Wairarapa Railway line which occupies a narrow coastal platform.

4.15.2 Abiotic

The Western Harbour follows along the western edge of Wellington Harbour along the Wellington Fault Scarp. In broad terms, the land to the west of the Wellington Fault, has been uplifted, and land to the east of the Fault has moved downward and has formed a basin that is now Wellington Harbour. The coastal edge comprises a narrow platform which was raised during the 1855 Wairarapa earthquake and was subsequently highly modified to accommodate SH2, the railway line and numerous utilities such as water and electricity. Some parts of the coastal edge is reclaimed and all of the coastal edge consists of riprap armouring.

The Wellington Fault Scarp includes steep intact slopes which are relatively unmodified and support advanced secondary native vegetation. Residential areas are scattered along the flatter more accessible rolling slopes at the top of the escarpment. More significant modification is apparent within the Ngauranga Gorge with SH1 and a large interchange. At the mouth of the Kaiwharawhara Stream is an area of reclamation (Kaiwharawhara Point) formed from spoil from various developments in Wellington City.

This stretch of the harbour coast line is relatively sheltered from the prevailing northerly weather but is exposed to southerly storms.

4.15.3 Biotic

The Western Harbour Hills terrestrial area comprises a total area of 346 hectares. The transport infrastructure corridor accounts for 15% of this area and the vegetated escarpment adjoining the motorway includes 56% broadleaved indigenous hardwoods and 11% gorse and /or broom. An additional 5% is surface mine or dump, with 2% exotic forest. Sand or gravel accounts for 2% with most of the coastal edge modified in order to accommodate transport infrastructure.

This terrestrial character area is located within the Wellington Ecological District, where rimu-rata/kohekohe forest would have originally occurred near the coast. Today, the vegetation cover comprises a relatively intact area of regenerating indigenous vegetation typical of other areas in the Wellington region which have undergone historical land clearance. The area between Ngauranga Gorge and the Horokiwi Quarry is identified as the Hutt Road scarp Eco-site by WCC; there are other eco-sites scattered throughout this area. This expanse of regenerating shrubland and forest vegetation provide habitat for common indigenous bird species.

The coastal edge and adjacent harbour waters are identified as habitat for indigenous birds in the coastal marine area (GWRC, 2015). However, the entire coastal margin is completely modified, having been reclaimed with edge a reinforced with rip-rap to accommodate road and rail corridor.

4.15.4 Experiential

Road and rail influences along a reinforced coastal edge have resulted in a high level of modification and restricting public access to the coastal edge. Most of the adjoining escarpment however retains a natural appearance due to the dense vegetation and low level of development. The Ngauranga Gorge and the Kaiwharawhara reclamation area are also highly modified and inaccessible to the public.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE			
MODERATE TO LOW	★	★	★
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Low – Moderate		

No Specific Values at the Local Level (Component Scale)

Reclaimed harbour edge, Ngaranga Gorge

4.16 Coastal Terrestrial Area 10: **Petone**

4.16.1 Location and Key Characteristics

This coastal terrestrial area is located in Hutt City at the northern end of Wellington Harbour within Hutt City and extends from the Wellington City boundary and Point Howard. It includes Petone Beach and foreshore, the mouth of the Hutt River, Seaview industrial area and the adjoining Point Hayward Marina.

Urban development on the flat land beyond the beach and margins of the Hutt River cover most of this area. The inland boundaries extend onto elevated areas defining the margins of the adjoining Western Harbour Hills and Eastern Bays. Regenerating vegetation becomes more prevalent in these areas, including scrub with areas of native vegetation and pine.

4.16.2 Abiotic

Petone Beach forms most of the coastline comprising a sandy depositional coastal edge which separates Wellington Harbour from Petone's urban development. A raised beach ridge (0.6 – 1.8m) known as 'the rise' resulting from tectonic uplift, once traversed much of the Petone area from the vicinity of Campbell Terrace and Victoria Street eastward to Hardham Crescent (Turner, 1985). Urban development and roading has destroyed most of this feature but it can still be observed as a prominent hump running east – west across William Street between Emerson and Heretaunga streets.

The seawall, Petone Esplanade and urban development flanking Petone beach have replaced the coastal dunes and severely restrict the natural coastal processes beyond the foreshore.

The Hutt River flows into Wellington Harbour to the east of Petone, separating residential development from the industrial area of Seaview. The coastal environment extends approximately 1.8km up the Hutt River to the Ava railway bridge where tidal influences are still significant. This stretch of the river is contained within stopbanks.

The development of the Seaview industrial area east of the Hutt River and Seaview Marina adjoining Point Howard have completely modified the original coastal edge. This has included reclamation, marina structures, breakwaters and riprap armouring along the east side of the Hutt River mouth.

4.16.3 Biotic

The Petone coastal terrestrial area covers a total area of 346 hectares and most of this comprises highly modified urban development, including 75% of built up area, 5% transport infrastructure and 8% urban parkland and open space. Of the remaining land area, 3% is broadleaved forest with a further 2% indigenous forest and less than 1% gorse and /or broom occurs along the Wellington Fault escarpment and elevated slopes of Point Hayward. The remaining 11% of the coastal terrestrial area is herbaceous saline vegetation along the Hutt River.

Both the estuaries of two waterways (Korokoro Stream and Hutt River) have undergone significant modifications (Todd et al., 2010). The Korkokoro Stream is piped as it enters the industrial area and under the road and rail corridor, before exiting on the Petone beach via large concrete culverts. At the eastern end, the Hutt River mouth has been significantly modified by reclamation along the edge. Some ecological values have been identified associated with both of these, including habitat for avifauna and fish (Greater Wellington Regional Council, 2015; Todd et al., 2010).

The entire Petone foreshore (and adjacent waters) is identified as a habitat for indigenous birds in the coastal marine area, providing seasonal or core habitat for a number of species (GWRC, 2015; McArthur & Lawson, 2013). However, much of the dune sequence and indigenous vegetation along the Petone foreshore has been lost or modified due to urban and industrial activities. Community planting programmes have focused on reinstating some of the original species that originally grew along the foreshore.

4.16.4 Experiential

While parts of the Petone foreshore and beach retain some natural character values, particularly along the open areas of Petone Beach, most of this area is highly modified and has an established urban and industrial edge.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE TO LOW	★	★	★
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Low - Moderate		

No Specific Values at the Local Level (Component Scale)

Seaview Marina

4.17 Coastal Terrestrial Area 11: **Eastern Bays**

4.17.1 Location and Key Characteristics

This terrestrial character area encompasses the eastern bays of Wellington Harbour extending between Point Howard and Point Arthur. Road access extends along most of this coastal edge together with established residential development along most of the accessible flatter toe slopes and below the vegetated hills that provide a backdrop to the Eastern Bays. There is a commercial precinct at Eastbourne.

4.17.2 Abiotic

Much of the shore along this section of the coast has been modified to some extent with sea walls constructed to protect the coastal road. Breakwaters and jetties occur in places as well as reclamation and buildings.

Raised shore platforms, caves, stacks and bay-head bars have been recorded from Point Howard, Lowry Bay and Days Bay (Turner, 1985). Areas of tidal lagoon which were previously located within Lowry Bay and Days Bay were drained during the 1855 Wairarapa earthquake when the ground was uplifted by some 2m (Stevens, 1974). Such areas have subsequently been developed for residential housing.

At Eastbourne, the beaches are predominantly sand in contrast to the gravel beaches further to the south toward the harbour mouth. Progradation has occurred throughout this area, particularly along the coastal edge of Eastbourne (Matthews, 1979).

Days Bay

4.17.3 Biotic

The Eastern Bays coastal terrestrial area covers a total land area of 540 hectares. Of this the various coastal suburbs that have established within the bays comprise 30% and 46% is indigenous forest on the hill slopes, predominantly beech.

Much of the foreshore and gentler sloping toe slopes have been modified by urban development including roading and housing and consequently this has removed much of the former native forest which occupied the harbour edge, including areas of kahikatea swamp forest in Lowry Bay which were drained following the 1855 Wairarapa earthquake.

Today, the dry and less fertile ridges and hill faces are covered in open forest dominated by kāmahi (*Weinmannia racemosa*), black beech (*Fuscospora solandri*) and hard beech (*Fuscospora truncata*) with patches of northern rātā (*Metrosideros robusta*) and an understory of mingimingi (*Leucopogon fasciculatus*) and prickly mingimingi (*Leptecophylla juniperina*) (GWRC, 2014b).

On the slopes above residential housing there is a belt of lowland beech forest, at various stages of regeneration. This area is identified by GWRC as the East Harbour Northern Forest Key Native Ecosystem (KNE), and is one of the most significant forest ecosystems in the Wellington region (GWRC, 2014b). Several Significant Natural Resource Areas and potential Significant Natural Areas[4] have been identified in this area, including areas of coastal and lowland forest which provides habitat for indigenous birds, invertebrates and lizards (Lower Hutt City Council, 2004; Wildlands, 2016).

The entire coastal edge and adjacent harbour waters are identified as habitat for indigenous birds in the coastal marine area (GWRC, 2015). However, these values are compromised due to coastal modification and land uses (e.g. roads, recreational and residential).

4.17.4 Experiential

Modification is mostly apparent along the coastal edge. The beech forest on the slopes above the residential areas retains a high level of naturalness and the walking tracks are popular and well-used.

SUMMARY OF NATURAL CHARACTER VALUES			
NATURAL CHARACTER ATTRIBUTES			
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE	★	★	★
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Moderate		

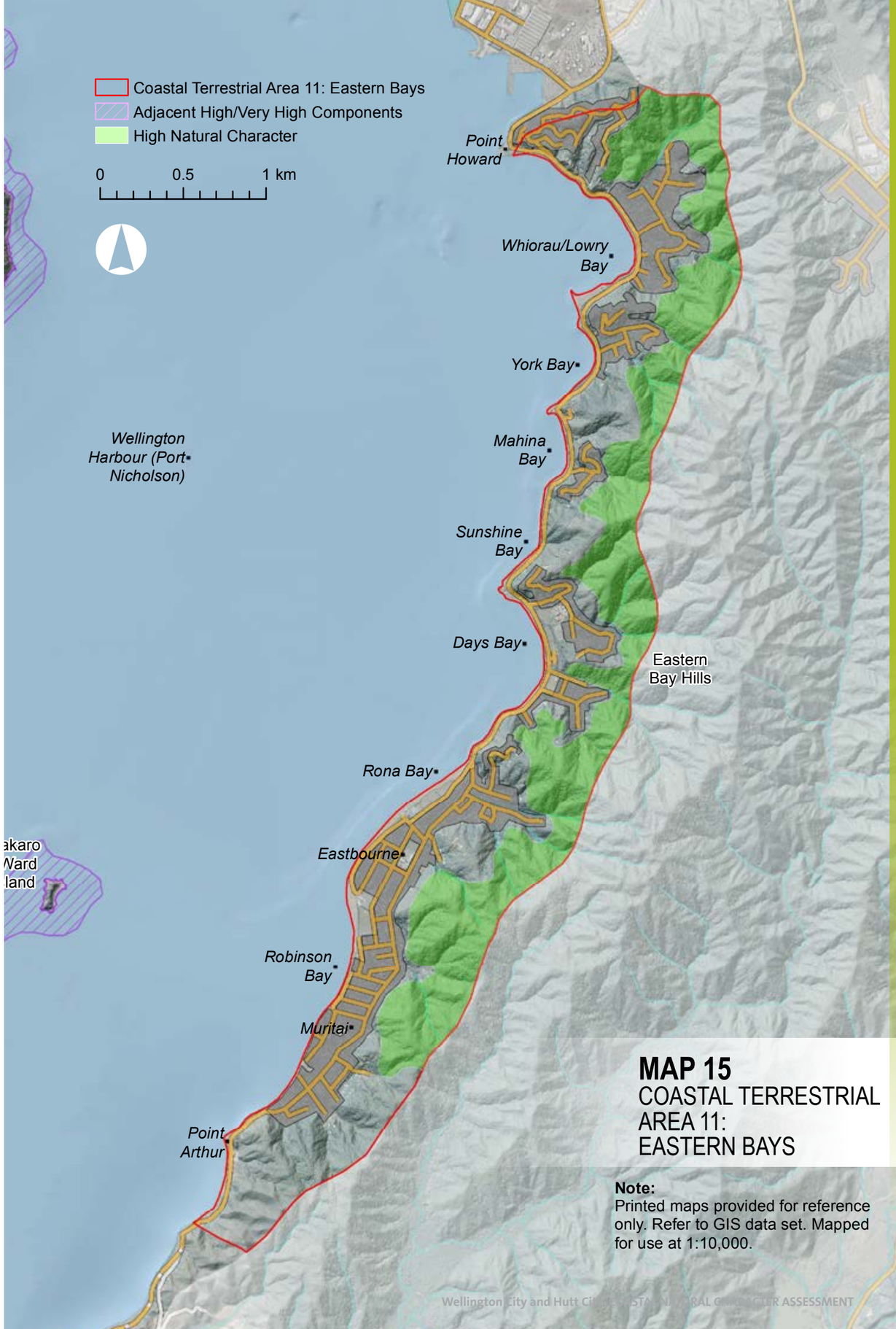
4. As per the project scope, the Wildlands (2016) analysis only identified potential SNA sites on private land in Hutt City and Upper Hutt City

Lowry Bay

COASTAL TERRESTRIAL AREA 11: EASTERN BAYS SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 15.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
EASTERN BAY HILLS	High	H	H	H	The steep eastern flank of a sequence of down-tilted hill forms creating Wellington Harbour which remain relatively intact. Diverse lowland forest and manuka scrub, including hard beech and black beech forest with kahikatea and pukatea remnants in valleys and a few stands or northern rata on ridgeline. Large numbers and diverse native avifauna including falcon, kaka and reef heron Native land snails and common green gecko Diverse lowland forest and manuka scrub, including hard beech and black beech forest with kahikatea and pukatea remnants in valleys and a few stands or northern rata on ridgeline. Large numbers and diverse native avifauna including falcon, kaka and reef heron Native land snails and common green gecko Part of the eco-corridor connecting East Harbour Regional Park's forest to the north along the Eastern Hutt hills to the northern boundary Low levels of modification associated with recreation activity retaining a natural unmodified backdrop to residential development at lower elevations along the eastern bays	Includes land forming East Harbour Regional Park. Follows boundary of a number of contiguous HCC SNRS including: SNR 10 SNR 32 SNR 36; and SNR 61 Includes potential SNAs: LH007 LH008 LH009 LH083 LH004 LH040 LH039 LH024 LH082 LH081



MAP 15
COASTAL TERRESTRIAL AREA 11: EASTERN BAYS

Note:
Printed maps provided for reference only. Refer to GIS data set. Mapped for use at 1:10,000.

4.18 Coastal Terrestrial Area 12: **Wellington Harbour Islands**

4.18.1 Location and Key Characteristics

The Wellington Harbour Island coastal terrestrial areas comprise three islands, Matiu / Somes, Mokopuna and Mākaro / Ward Islands. Collectively, these form the high points of a submerged ridgeline in Wellington Harbour. Matiu / Somes Island is a pest free, historic and scientific reserve and Mokopuna Island is a bird reserve where boat landing is not permitted. Mākaro / Ward Island is the most southern Island, it is a DoC Scientific Reserve

4.18.2 Abiotic

Matiu / Somes and Mokopuna Islands are each encircled by a shore platform cut by the sea, together with sea caves and rock arches, which were uplifted 1.5 metres above the present sea level during the 1855 Wairarapa earthquake. Above this, remnants of older raised platforms and stacks are also evident (Turner, 1985).

Matiu / Somes Island is the most modified of the three Wellington Harbour islands, with a collection of former quarantine buildings established near the summit. A jetty also provides for boat access at the north-eastern end of the island and supports recreational use along the numerous tracks established on the island. Mokopuna Island remains separated from Matiu / Somes Island and has no apparent modification.

Mākaro / Ward Island has narrow rocky shore platforms, shallow reefs and small gravel beaches with near vertical escarpments. This island, near the harbour entrance, is particularly exposed to the strong southerly winds and waves of Cook Strait.

4.18.3 Biotic

The total land area of the Wellington Harbour Islands terrestrial area is 28 hectares. Of this 87% is covered with broadleaved indigenous hardwoods and the remaining 13% is either high producing exotic grassland or identified as built-up (Matiu / Somes Island).

Much of the original vegetation on Matiu / Somes Island was cleared to make way for farmland. Today, hardy, native, salt-tolerant species dominate the vegetation on the steep escarpments on all three islands. Regeneration of indigenous native vegetation, together with revegetation on Matiu / Somes has meant that this vegetation now provides a regionally representative example of coastal cliff and rocky shore vegetation (Hutt City Council, 2004).

Pest-free Matiu / Somes Island offers a safe habitat for a diversity of indigenous fauna, including re-introductions of species which had become locally extinct on the island (e.g. red-crowned parakeet, Brothers Island tuatara, Cook Strait giant weta).

There are eight species of endemic reptiles on Matiu / Somes - common skink, spotted skink, copper skink, ornate skink, common gecko, forest gecko, Wellington green gecko and Brothers Island tuatara (Adams, 2009). A subset of these species has been recorded on Mokopuna (two) and Makaro / Ward (six) Islands.

The foreshore and adjacent harbour waters of all three islands are recognised as providing habitats for indigenous birds in the coastal marine area (GWRC, 2015). Furthermore, the cliffs, slopes and interior of islands provide nesting habitat for several coastal and terrestrial bird species.

With the exception of the wharf area on Matiu/Somes Island, the coastal edges of the islands are unmodified; thus the ecosystem processes and functions are largely intact and the coastal sequences evident. The ongoing management of Matiu/Somes Island as a DoC Reserve will continue to benefit the biodiversity, and therefore the natural character, of the Island in the future.

4.18.4 Experiential

Due to the restricted ability to access the islands, they retain a dominant sense of wildness and absence of human influence, particularly Mokopuna and Makaro / Ward islands.

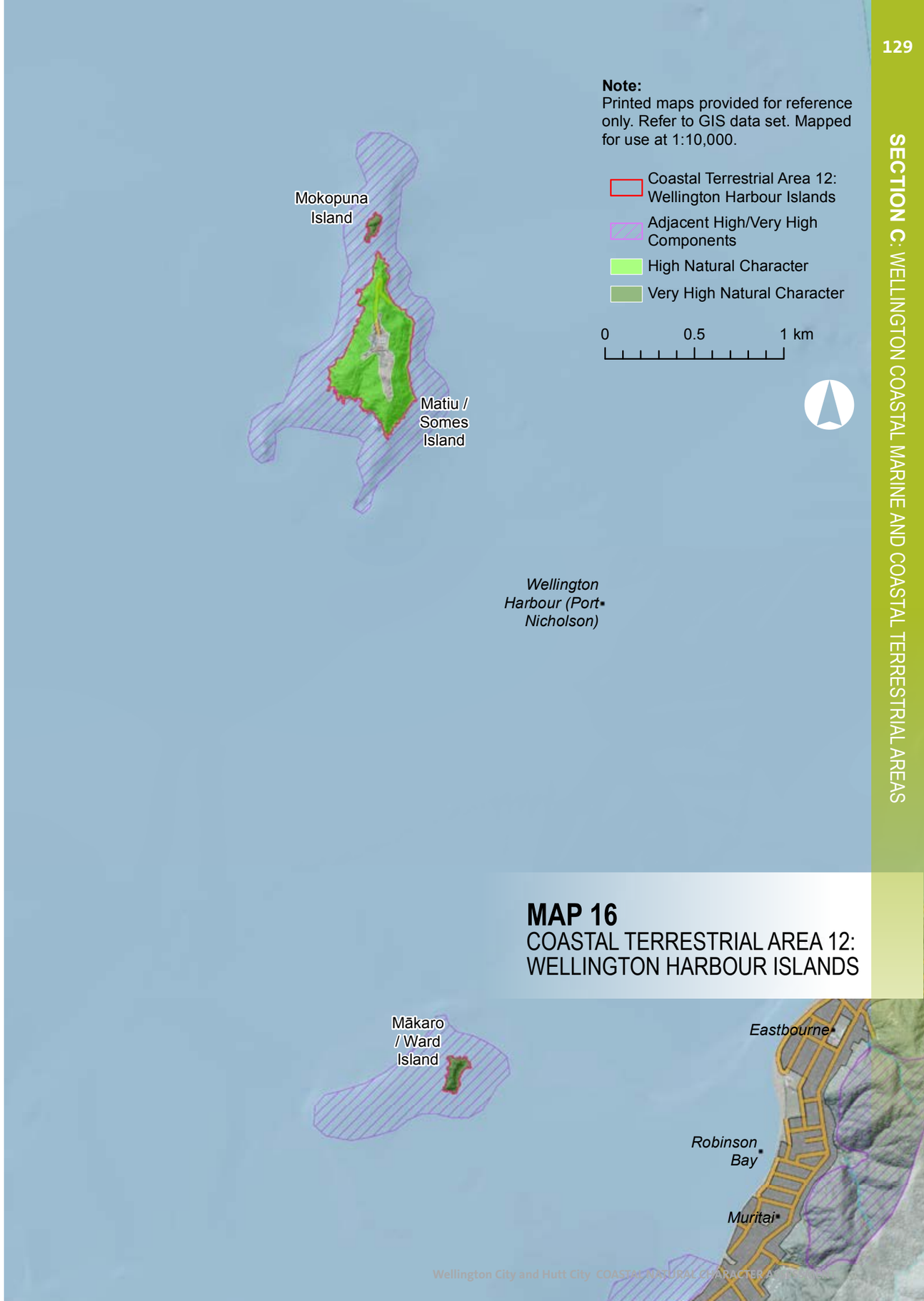
SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH	★		★
HIGH		★	
MODERATE TO HIGH			
MODERATE			
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Very High		

Matiu / Somes Island

COASTAL TERRESTRIAL AREA 12: WELLINGTON HARBOUR ISLANDS SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

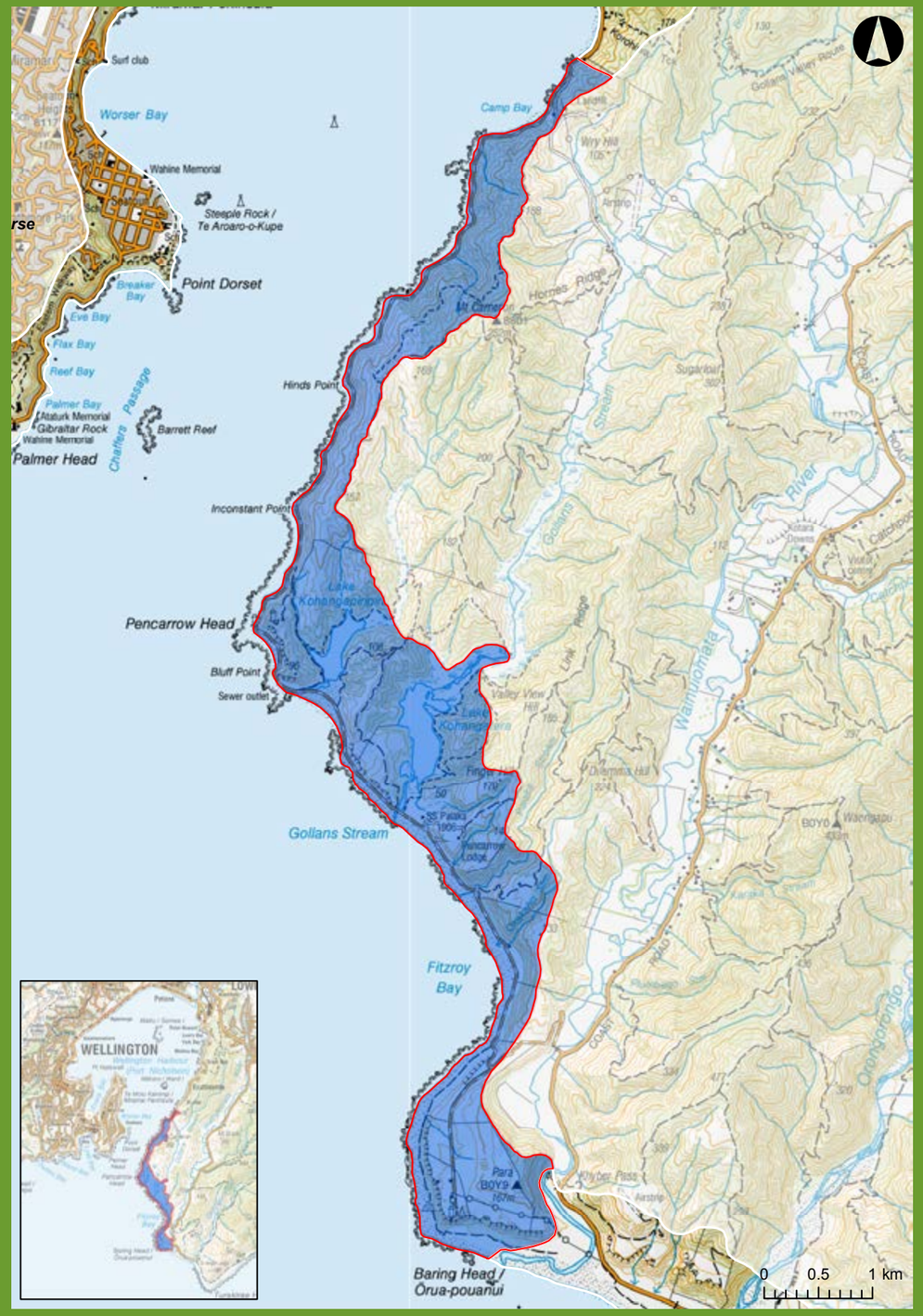
THESE ARE MAPPED WITH REFERENCE TO MAP 16.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
MOKOPUNA ISLAND	Very High	VH	H	VH	The northern end of an exposed drowned ridge submerged beneath Wellington Harbour. Wave-cut shore platform with caves and rock arches uplifted above the present sea level during the 1855 earthquake remains largely intact. Regenerating coastal scrub vegetation. Threatened or At Risk bird species known to be resident or regular visitors. Native lizards present. Very limited human modification retaining a wild and scenic character.	
MATIU / SOMES ISLAND	High	H	H	H	Part of the exposed top of a larger drowned ridge submerged beneath Wellington Harbour. Wave-cut shore platform with caves and rock arches uplifted above the present sea level during the 1855 earthquake remains largely intact. Salt marsh, and regionally representative example of coastal cliff and rocky shore vegetation. Threatened or At Risk bird species known to be resident or regular visitors. Several lizard and weta species present. Frequent sense of wildness and remoteness with areas of more obvious human influence	Buildings and cleared land near summit of island are not included. Includes small jetties and wharf buildings along north-eastern edge of island
MĀKARO / WARD ISLAND	Very High	VH	H	VH	The exposed top of a larger drowned ridge submerged beneath Wellington Harbour which remains largely intact Threatened or At Risk bird species known to be resident or regular visitors. Diverse native lizard population. Salt marsh present. Very limited human modification retaining an isolated and exposed island character	



MAP 16
COASTAL TERRESTRIAL AREA 12: WELLINGTON HARBOUR ISLANDS

4.19 Coastal Terrestrial Area 13: **Pencarrow Head**



4.19.1 Location and Key Characteristics

The Pencarrow Head coastal terrestrial area is located along Wellington's south coast between Burden's Gate on the eastern edge of Wellington Harbour and encompassing Pencarrow Head and Baring Head, each end of Fitzroy Bay. Most of this area is characterised by rock reefs and a wide gravel foreshore which narrows at its eastern end at the entrance of Wellington Harbour. The coastal environment typically culminates at the first ridge beyond the coastal escarpment and encompasses wetland areas associated with Lakes Kohangapiripiri and Kohangatera.

4.19.2 Abiotic

The Pencarrow Head coastal terrestrial area includes a sequence of north-south running ridges and valleys between the edge of Wellington Harbour and the Wainuiomata River. This landform culminates along steep coastal escarpments raised above long, narrow, stony beaches with reefs and outcrops extending from headlands. In Fitzroy Bay there are large amounts of gravel washed down from the nearby Orongorongo and Wainuiomata Rivers. This is mined to supply high quality aggregate for use in concrete production. Mining and gravel extraction began in this area around 1905 (Frank, 1993).

To the east of Pencarrow Head, Lakes Kohangapiripiri and Kohangatera (known collectively as Parangarahu Lakes) are formerly drained valleys which have been dammed by raised beach ridges along the coastal edge (Kenny & Hayward, 1993). The beach ridge provides a record of a former beach position that has been uplifted. While two parallel beach ridges were recorded in the literature adjacent to Pencarrow Lakes, the most recent raised beach was thought to be raised during the 1855 Wairarapa earthquake and has been obliterated by mining (Kenny & Hayward, 1993). In addition, an access road (over culverts) has been built across the outlet of both lakes (Todd et al., 2010).

A distinctive sequence of marine terraces occurs at Baring Head, recognised as the largest and most distinctive in the Wellington Area (Kenny & Hayward, 1993). Further evidence of ancient uplifted marine terraces are evident above coastal scarps between the Pencarrow Lakes. Along the coastal edge, previous evidence of raised beaches between Pencarrow and Eastbourne have subsequently been destroyed by roading (Matthews, 1979).

The climate of this part of the south coast is strongly influenced by its proximity to the Cook Strait and is frequently exposed to strong southerly gales.

4.19.3 Biotic

The total land area of the Pencarrow Head terrestrial area is 844 hectares. Much of the surrounding land has been modified for farming which is now reverting to scrub. Of this, 35% now comprises low and high producing exotic grassland with gorse and broom covering an additional 30% of this area. 12% of the remaining area is covered in sand or gravel with 5% herbaceous freshwater vegetation and 3% lakes.

The original vegetation type on the coast would have been: ngaio, taupata treeland / herbfield / rockland (GWRC, 2014a). Much of the area has been modified for farming and today the coastal scarp vegetation is mainly 'grey scrub', now a rare plant community of mainly low-growing, divaricating plants which are salt-tolerant (GWRC, 2014a). Mingimingi (*Coprosma propinqua*), thick-leaved māhoe (*Melicytus crassifolius*) and speargrass (*Aciphylla squarrosa* var. *squarrosa*) are important vegetation components on the escarpments.

GWRC (2014a) have identified the Baring Head / Ōrua-pouanui KNE (Key Native Ecosystem) as one of the top coastal ecosystem sites in the region, having uninterrupted sequences of different ecosystem types ranging from coastal and valley escarpments through to the coast. However, GWRC (2014a) notes that while the area is highly modified by historic and current farming practices, it retains many components of its former flora and fauna.

Deep back dunes, up to 100 metres in places, run from behind the foreshore to the base of the escarpment. The dune ecosystem of the Baring Head / Ōrua-pouanui KNE includes spinifex, remnants of pīngao and a significant population of the threatened sand tussock (GWRC, 2014a). A *Raoulia australis*-dominated cushionfield occupies a large

area of the foreshore, providing habitat for native insects such as Wellington coastal moth (*Notoreas perornata*), katipō spider (*Latrodectus katipo*), red admiral butterfly (*Vanessa gonerilla gonerilla*) and Myers' cicada (*Maoricicada myersi*) (GWRC, 2014a).

The Pencarrow Lakes are shallow, slightly brackish and grade into extensive valley wetlands at their upstream ends (Gibbs, 2002). They are recognised as some of the most significant and least modified freshwater lakes in the lower North Island. A number of ecosystem and species values have attributed to these lakes, including aquatic plant communities and habitats of indigenous birds in lakes (GWRC, 2015). Hutt City Council (2004) identifies Lake Kohangatera as a wetland of national significance, being regionally representative of vegetation succession after uplifts, containing nationally uncommon and endangered plants and birds. While the lakes themselves have remained unmodified, the immediate environs have been historically burned and farmed.

Milne & Sawyer (2002) identify the lakes and coast to Baring Head as a key site for coastal dune systems in Wellington, with the dunes at the mouth of Gollans Stream (Lake Kohangatera) and Cameron Creek (Lake Kohangapiripiri) and east to Baring Head supporting coastal flora and fauna of value. The higher beaches of the lakes support sensitive plant and invertebrate communities (Gibbs, 2002).

Lizard habitat also occurs through this coastal area and around the lakes (GWRC, 2014a; Todd et al., 2010). Romijn et al. (2012) recorded copper skink spotted skink, common skink and common gecko at Baring Head.

Four potential SNA sites (LH071, LH072, LH075 and LH079) have been identified by Wildlands (2016) within the Pencarrow Head terrestrial area; several of which show high levels of modification.

The coastal platform extends from the high water mark along the beach to the bottom of the coastal escarpment. The majority of the coastal margin within this area has been identified as providing habitat for indigenous birds in the coastal marine environment (GWRC, 2015).

Modification is apparent within this terrestrial area in the historic land clearance associated with farming, quarrying and the presence of a coastal recreational track.

4.19.4 Experiential

While relatively remote from urban areas, this part of the coast is well used for active recreation (mainly pedestrian and cycle traffic) due to the easy access along the coastal 'road' (Burdens Gate prevents vehicle access along the track). . The low impact nature of the recreational use means the area retains its wild costal nature, particularly outside areas undergoing gravel extraction activity. Light houses located on Pencarrow Head and Baring Head retain a strong coastal association with shipping entering Wellington Harbour and reduce the natural darkness of the night sky.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH	★	★	★
MODERATE TO HIGH			
MODERATE			
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	High		

Lake Kohangapirpiri and Pencarrow Head

Wellington City and Hutt City COASTAL NATURAL CHARACTER ASSESSMENT

COASTAL TERRESTRIAL AREA 13: PENCARROW HEAD SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 17.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
PENCARROW LAKES (LAKE KOHANGAPIRIPIRI AND LAKE KOHANGATERA)	Very High	VH	H	H	Drowned river valley which has become impounded by raised gravel beaches, part of which remains intact. Some of the most significant and least modified freshwater wetlands in the lower North Island with wetland vegetation almost exclusively indigenous plants with high ecological condition. Threatened or At Risk bird species resident or regular visitors. Native fish, lizard and moth habitat with several species present. The lake has remained largely unmodified with strong wild and scenic associations, but the immediate environs have been historically burned and farmed.	The lakes themselves remain unmodified, but the immediate environs have been historically burned and farmed An access road has been built across the lake outlet, with concrete pipes laid to funnel the outflow
PENCARROW LAKES SCARP	High	H	MH	H	Steep uplifted terrace scarp with wave trimmed cliffs, small caves and rock outcrops. Advanced regenerating coastal scrub vegetation and established pingao population. Limited human interference retaining a predominantly rugged and wild backdrop	
BARING HEAD SCARP AND FORESHORE	High	H	H	H	The largest and most distinctive set of uplifted marine terraces in the Wellington area. Habitats for indigenous birds. Limited human interference retaining a largely wild and scenic character.	Includes land identified within East Harbour Regional Park

4.20 Coastal Terrestrial Area 14: **Turakirae Head**

4.20.1 Location and Key Characteristics

The Turakirae Head coastal terrestrial area encompasses the southern tip of the Rimutaka Ranges along Wellington's southern coastline extending from Baring Head to the boundary with South Wairarapa within Palliser Bay. This area comprises a shore platform of varying widths backed by steep coastal escarpments. The western end of this coastal area includes the mouths of the Wainuiomata and Orongorongo Rivers to the east of Baring Head. The eastern end of the coastal environment extends into the Rimutaka Forest Park.

Road access is provided along Coast Road along the Wainuiomata River and terminates at the Orongorongo River. Pedestrian and cycle access extends around Turakirae Head and forms a component of a recreational trail to the Wairarapa.

4.20.2 Abiotic

Turakirae Head is a classic example of a progressively uplifting coastline (Begg & Johnston, 2000) and is considered one of the best examples of this phenomenon in the world (Turner, 1985). This provides a sequence of five raised beach ridges which extend between the Orongorongo River and Barneys Stream to form a preserved record of historic earthquake events. The oldest of the five ridges lies at the above of the high cliff backing the coastal platform and was probably formed around 6500 years ago, with the two younger ridges were formed around 1460 and 1855 AD respectively (Turner, 1985).

Parts of Turakirae Head (128 hectares) were gazetted as scientific reserve in recognition of their geological importance. This has prevented boulder and gravel extraction extending east along the headland and preserving the raised beach ridges which occur along the headland and along part of the western edge of Palliser Bay.

A preserved interglacial uplifted marine terrace occurs to the west of the Orongorongo River thought to represent the last interglacial period probably about 100,000 years ago (Wellman, 1969 in Matthews, 1979).

Water courses have relatively steep gradients and transport and discharge large volumes of gravel and sediments into the sea, forming the gravel beaches along this part of the coast.

4.20.3 Biotic

The total land area of the Turakirae Head terrestrial area is 1,190 hectares. Whilst most of the surrounding land was previously modified to accommodate pastoral farming, 46% now comprises matagouri or grey scrub, and 21% indigenous forest. 15% is low or high producing exotic grassland with a further 10% identified as gravel or rock, landslide or sand and gravel accounting for the numerous shingle screes and fans extending inland from the rocky shore. Of the remaining land area, there is also 4% herbaceous freshwater vegetation and 1% tall tussock grassland.

As with other coastal areas in Wellington, historical modification of the Turakirae Head area has occurred in the form of burning and farming. Bagnall (1975) reports that originally the hillslopes, alluvium-filled beach ridges, peat-covered beach ridges and older platforms, where not too waterlogged, carried a windswept coastal forest with local areas of swamp forest. The remaining areas of beach ridges probably also carried coastal forest. Dense tall shrubland of xerophytic shrubs and climbers of the same species were also probably likely on other beach ridges (Bagnall, 1975). Today, forest remnants are found only in moist valleys above the series of raised beaches and in isolated clumps on the upper raised beaches, lower hill slopes, and alluvial fans (Bagnall, 1975).

Turakirae Head Scientific Reserve contains shrubland, wetland and forest on marine terrace which are considered to be of international importance (Lower Hutt City Council, 2004). Bagnall (1975) identified 40 different vegetation types within the Scientific Reserve. The vegetation comprises a mixture of salt-tolerant herbs, tussock and reed associations, dune associations and coastal forest. Fire, both pre-European and more recent, has been the principal environmental factor influencing the present vegetation pattern (Bagnall,

1975). Nevertheless, an intact coastal sequence grades from gravel / rock coastal beach, through to wetlands and boulderfields up to the coastal escarpment. Turakirae Head wetland has been identified as having outstanding biodiversity values attributed to representativeness, diversity and rarity (GWRC, 2015).

The Turakirae Head area supports one of the largest of the several winter colonies of the NZ fur seal in the region and is known to support banded dotterels. Coastal foredune species occurring on the raised beach systems in the area include Shore spurge, *Crassula peduncularis, Muehlenbeckia astonii* and pingao. The site supports large populations of endemic lizards, including copper skink, spotted skink, common skink and common gecko (Romijn et al., 2012). A series of gravel fans at the northern end of Turakirae provide habitat for Maori cicada and most likely lizard too (Lower Hutt City Council, 2004).

Milne & Sawyer (2002) identified Wainuiomata River – Turakirae Head as a key site for coastal dune systems in Wellington due to the coastal fauna and flora occurring there.

The Wainuiomata River runs parallel to the coast for approximately 700m, separated by a low dune. The northern bank is farmed and exotic pastureland dominates, whereas the coastal side of the river blends into a dune system (Todd et al., 2010). The Wainuiomata River and Estuary are identified as a significant indigenous ecosystem with significant indigenous biodiversity values in the coastal marine area. The Wainuiomata River and Turakirae Head provides important nesting and roosting habitat for indigenous birds in the coastal marine area (GWRC, 2015).

Wildlands (2016) identified two potential SNA sites within the Turakirae terrestrial area (but extending a considerable distance inland beyond the coastal environment); those being the Orongorongo Hills (LH073) and the southern coast east of Orongorongo River (LH070).

4.20.4 Experiential

The natural values along this area of the coastal environment are very high. Much of the area retains a remote and isolated character with strong wild and scenic associations. Some shore-based recreation activity including walking, cycling, snorkelling and fishing occur accounting for the high wild and scenic associations.

SUMMARY OF NATURAL CHARACTER VALUES			
	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH	★		★
HIGH		★	
MODERATE TO HIGH			
MODERATE			
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING	Very High		

Raised beaches at Cape Turakirae

COASTAL TERRESTRIAL AREA 14: TURAKIRAE HEAD SPECIFIC VALUES AT THE LOCAL LEVEL (COMPONENT SCALE)

THESE ARE MAPPED WITH REFERENCE TO MAP 18.

AREA	RATING	ABIOTIC	BIOTIC	EXPERIENTIAL	KEY VALUES	ADDITIONAL COMMENTS
WAINUIOMATA RIVER MOUTH / ESTUARY	High	H	H	H	Raised beaches which retain dynamic coastal processes. Native lizards are well represented in the area as well as several nesting bird species and chirping cicada. Seasonal or core habitat for threatened indigenous migratory fish species Limited human interference retaining a wild and scenic character	Includes a potential SNA site (LH070)
ORONGORONGO TERRACE SCARP	High	H	MH	H	Preserved steep interglacial marine terrace scarp Advanced regenerating coastal scrub vegetation Limited human interference retaining a wild and scenic character	Includes a potential SNA site (LH070)
TURAKIRAE HEAD	Very High	VH	H	VH	Best preserved example of raised beach ridges on the Wellington coast recording previous earthquake events. Wetlands with Outstanding indigenous biodiversity value. Diverse shrubland, wetland and forest on marine terrace as well as seven species of orchids. Threatened or At Risk bird species resident or regular visitors as well as lizards and cicada. NZ fur seal breeding colony. Limited human interference retaining a largely remote wild and scenic character	Includes a potential SNA site (LH073)

5. Section D: Outstanding Natural Character

Wellington City and Hutt City COASTAL NATURAL CHARACTER ASSESSMENT

5.1 Introduction to Outstanding Coastal Natural Character

The NZCPS 2010 requires, (via Policy 13(1)(a)), that areas of the coastal environment with outstanding natural character are identified in order to determine whether Policy 13(1)(a) is triggered. Following the evaluative work as presented in Section B of this report, a further level of assessment was undertaken to determine which parts of the Wellington Coastal Environment would reach the threshold of Outstanding Natural Character (ONC).

The study team determined that outstanding natural character should be assessed as a separate step in the assessment process once the degree of natural character for each terrestrial and marine area had been determined. This is described further in Appendix 1 of this report.

The assessment of whether an area qualifies as having outstanding natural character combines both terrestrial and marine components. This means that where sequences of ecological naturalness are considered important are captured (such as from the top of a ridge on the land to the bottom of the sea adjacent). Furthermore, outstanding natural character, by its very term, determines the highest rated areas should include systems that interconnect with each other and therefore should not be considered in isolation.

During the assessment of outstanding natural character, only areas which have been identified as having very high natural character were considered as candidates for areas of coastal environment with outstanding natural character as illustrated on Map 4. Under the methodology an area of outstanding natural character must be:

> **"those areas that exhibit a combination of natural elements, patterns and processes that are exceptional in their extent, intactness, integrity and lack of built structures (the 'clutter' factor) and other modifications". (BML)**

The following pages outline the results of this separate assessment. Of all of the areas holding at least very high levels of natural character, only two areas were mapped as outstanding. These areas were considered by the study team to meet the threshold statement above and their values are outlined within the table below. There was debate around areas rated as holding either high or very high levels of natural character but that did not reach the 'outstanding' threshold.

All areas of outstanding natural character hold at least high or very high abiotic, biotic and experiential attributes. Map 19 provides an overview of all ONC's for Wellington City, Hutt City and the adjoining coastal marine areas; Maps 20 - 21 illustrate the two specific areas described below. The areas were mapped at a scale of 1:10,000 and therefore represent the same resolution as the more detailed component assessment.

OUTSTANDING NATURAL CHARACTER AREAS
1. Turakirae Uplifted Marine Beaches
2. Cook Strait Canyon

5.2 Turakirae Uplifted Marine Beaches

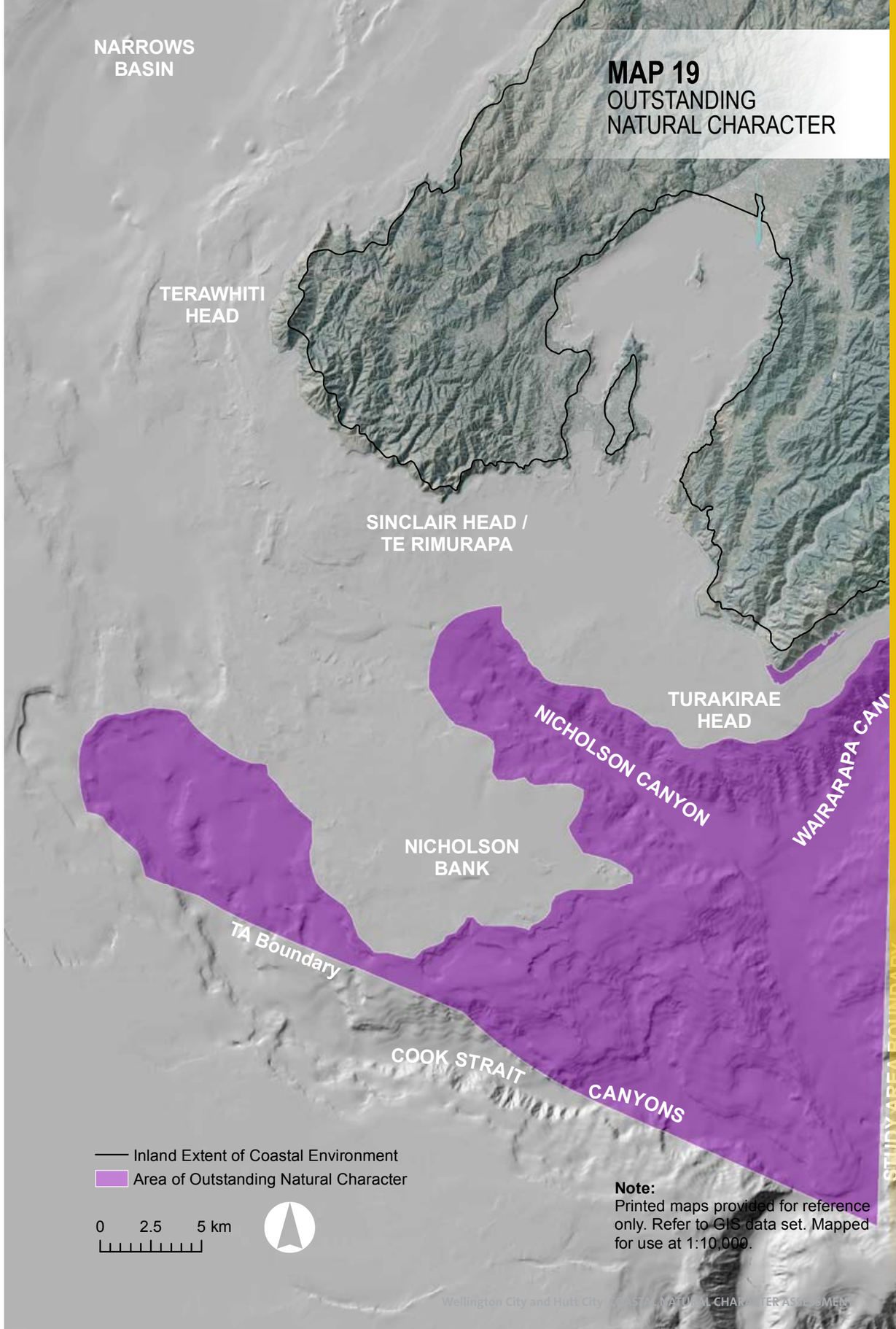
This area of outstanding natural character includes the remote and unmodified parts of Turakirae Head and western edge of Palliser Bay. In this area, the sequence of uplifted marine beaches remain exceptional in their extent, intactness, integrity and lack of built structures and support a diverse array of coastal native flora and fauna. In this area, modification is limited to recreation tracks and very low levels of grazing.

OUTSTANDING NATURAL CHARACTER ATTRIBUTE			
COASTAL TERRESTRIAL AREA AND RATING	Turakirae Head (Very High)		
COASTAL MARINE AREA AND RATING	Turakirae Reef and Shelf (Very High)		
VALUES			
ABIOTIC	Very High	Unmodified abiotic environment characterised by: Best preserved example of raised beach ridges on the Wellington coast recording earthquake previous events Includes areas gazetted as scientific reserve in recognition of their geological importance.	
BIOTIC	High - Very High	Largely unmodified biotic environment characterised by: Intact coastal sequence grades from gravel / rock coastal beach, through to wetlands and boulderfields up to coastal escarpment. Includes wetlands with outstanding indigenous biodiversity value attributed to representativeness, diversity and rarity. Contains shrubland, wetland and forest on marine terrace considered to be of international importance within Turakirae Head Scientific Reserve. Supports large populations of endemic lizards, including copper skink, spotted skink, common skink and common gecko. One of the largest of the several winter colonies of the NZ fur seal in the region. Habitat for indigenous birds in the coastal marine area	
EXPERIENTIAL	Very High	Rugged and remote coastal edge with minimal apparent modification. Exposed to severe gales which reflect its exposed coastal edge aspect.	
MAPPED EXTENT			
The mapped extent encompasses scientific reserves, areas of outstanding wetland and adjoining uplifted marine beaches which remain very legible. This area culminates along the toe of the rising scarp slopes and rocky outcrops which extend along the coastal edge. The escarpment backdrop is not included in the outstanding classification because of the extensive clearing and grazing, which has affected the landform and associated ecological values.			
RATING	OUTSTANDING		

5.3 Cook Strait Canyons

This area of outstanding natural character includes the deep and unmodified parts within Cook Strait which includes arms of the Cook, Nicholson and Wairarapa Canyons. In this area, the unique sequence of deep offshore canyons remain exceptional in their extent, intactness, integrity and lack of structures which support a diverse array of marine biota. Modification in this area is very limited with the exception of scuttling of ships which occurred within the Nicholson Canyon up until the 1930s, long line hapuka fishing and midwater trawling for hoki.

OUTSTANDING NATURAL CHARACTER ATTRIBUTE			
COASTAL TERRESTRIAL AREA AND RATING	n/a		
COASTAL MARINE AREA AND RATING	Cook Strait Canyons (Very High)		
VALUES			
ABIOTIC	Very High	Unmodified abiotic environment characterised by: • Deep water, near vertical canyon walls, with unique juxtaposition of deep offshore canyon close to land. • Extreme wind exposure-nationally and internationally significant. • Canyon landforms and floor remain unmodified. • High water quality. • Unmodified methane seeps.	
BIOTIC	High	Largely unmodified biotic environment characterised by: • Rich diversity of marine animals. • Sperm whales in canyons. • Recovering fur seal population. • Sea birds affected as by-catch that has reduced population size, but still rich diversity. • Un-modified pelagic community.	
EXPERIENTIAL	Very High	• Remote and very exposed coastal waters with negligible apparent modification. • Extreme exposure to natural weather patterns and processes	
MAPPED EXTENT The mapped extent aligns with the Cook Strait Canyon Component which differentiates the change between the south coast shelf and the steeper edges of the canyons at a water depth of approximately 100 metres. A jurisdictional boundary defines the outer edge of this outstanding natural character area however values extend beyond this edge.			
RATING	OUTSTANDING		



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Appendices

Wellington City and Hutt City COASTAL NATURAL CHARACTER ASSESSMENT

Appendix 1: Project Methodology

Study Approach

In this section, the key components of the study methodology are outlined. The NZCPS 2010 and Resource Management Act 1991 (RMA) contexts and the interpretation of relevant policies for the purposes of this study are discussed. Technical aspects are explained, including the scales at which the study was undertaken; the approach to natural character evaluation; digital mapping and the use of the New Zealand Land Cover Database (NZLCDB).

Defining the Coastal Environment

The RMA does not define 'coastal environment', however its extent needs to be considered in order to respond to Policy 1 of the NZCPS 2010. This recognises that the extent and characteristics of the coastal environment will vary from location to location. It also recognises that the coastal environment may include the following nine characteristics set out in Policy 1(2):

a. The coastal marine area;

b. Islands within the coastal marine area;

c. Areas where coastal processes, influences or qualities are significant, including coastal lakes, lagoons, tidal estuaries, saltmarshes, coastal wetlands, and the margins of these; (Study Team emphasis)

d. Areas at risk from coastal hazards;

e. Coastal vegetation and the habitat of indigenous coastal species including migratory birds;

f. Elements and features that contribute to the natural character, landscape, visual qualities or amenity values;

g. Items of cultural and historic heritage in the coastal marine area or on the coast;

h. Inter-related coastal marine and terrestrial systems, including the intertidal zone; and

i. Physical resources and built facilities, including infrastructure, that have modified the coastal environment

The above list of characteristics has assisted in defining what is included within the coastal environment. DoC has also provided guidance material on implementing Policy 1[5], which reflects best practice including Environment Court and Board of Inquiry decisions to date. The boundary identifying the inland extent of the coastal environment within Wellington City was undertaken in a separate report prepared by Boffa Miskell in 2014. The Inland Extent of the Coastal Environment within Hutt City was undertaken in the first phase of this current study.

5. http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/coastal-management/guidance/policy-1.pdf

Method for Identifying the Coastal Environment

The methodology used recognises that the coastal environment is a dynamic system where the inland influence of coastal elements and processes on the environment gradually decreases with distance. The mapping of the coastal environment was delineated at a scale of 1:50,000, acknowledging that the information provided for this study ranged in detail and mapping scale.

In applying the methodology, the study team addressed all of the characteristics of the coastal environment listed in NZCPS Policy 1(2) (see above) but gave particular consideration to "where coastal processes, influences or qualities are **significant**" (emphasis added) as this provides the clearest and strongest direction for interpreting the coastal extent. The term 'significant' is not defined in the NZCPS but in the context of its Policy 1(2)(c), the study team have interpreted the term 'significant' to mean "sufficiently great or important to be worthy of attention; noteworthy", as outlined within the Oxford English Dictionary.

The seaward extent of the coastal environment managed by the GWRC extends 12 nautical miles from MHWS (Mean High Water Springs) and is easy to define.

Wellington City's coastline extends for over 100 kilometres and forms an important and defining topographical element along the edge of the district. Narrow shore platforms and steep escarpment and cliff faces are typical along this coastline, particularly around the south and west coasts where exposure to rigorous environmental conditions has helped shape rugged landforms. Wellington Harbour has approximately 60km of coastline, split between Wellington City and Hutt City. A further 20 kilometres of coastline extends east of Pencarrow Head around Baring Head and Cape Terawhiti to the boundary between Hutt City and South Wairarapa within Palliser Bay.

Identifying the landward extent has relied on relevant and accessible data available to inform judgements. Data includes specialist terrestrial and freshwater ecological advice from BML as well as data received from WCC, HCC and GWRC, including heritage and cultural values and coastal hazard information. Future changes resulting from climate change are predicted to have significant consequences for Wellington's coastal environment and its natural character but those potential changes were not included in this study.

The study team also used, as an essential source of information, its own professional knowledge and judgement in relation to the characteristics outlined within Policy 1 of the NZCPS and the DoC guidance from 2012. The work undertaken for the landscape characterisation[6] has also provided additional information particularly relating to cultural and historic aspects as has marine benthic/ bathymetry and ecological / physical data recorded by NIWA. Based on this information, the delineation of the inland extent of Wellington and Hutt City's varied coastal environment has utilised several different methods. Where more open and exposed coastlines are evident, such as the west coast of Wellington City, the first ridgeline above the top of the coastal scarp was the key element in delineating the inland extent of the coastal environment.

Where structures, such as roads and buildings are evident, these can dramatically reduce the natural elements, patterns and attenuate processes of the coastal environment. Therefore, the extent of the coastal environment in built up areas, tends to be more limited than in rural areas such as evident in the more exposed south coast. Roads and topographical relief have assisted in determining the extent in these areas.

In flatter areas such as to the Rongotai isthmus, the extent of the coastal environment has been guided by the extent of coastal hazards as well as areas where coastal processes have formed and have significantly influenced the landforms. The level of modification can also decrease the extent of the coastal environment in flatter areas such Wellington City and Petone.

6. Wellington Landscape Character Description (Boffa Miskell Ltd, 2014), and Hutt Landscape Study (Boffa Miskell Ltd, 2012)

Zones of Significance

In combination with mapping the inland extent of the coastal environment, BML have developed the following Zones of Significance framework to apply to the coastline to determine the extent of the Coastal Environment, as interpreted under Policy 1 of the NZCPS. As illustrated in Table 1 below., the framework interprets the Coastal Environment to contain the following zones that, collectively, are called the Coastal Landscape:

a. Zones A and B (the coastal marine area and the coastal significance zone), which make up the Coastal Environment, and

b. Zone C, the Coastal Context.

TABLE 1: ZONES OF COASTAL SIGNIFICANCE

COASTAL LANDSCAPE

COASTAL ENVIRONMENT

COASTAL CONTEXT

Zone A	This zone includes the Coastal Marine Area (CMA). Within the statutory context the CMA means the foreshore, seabed and coastal water and the air above the water to twelve nautical miles (or the territorial sea boundary). Inland, the CMA extends to the mean high water spring (MHWS). The CMA includes the rock, beach, coastal lagoons and lakes below MHWS. The CMA extends approximately 1km upstream of a river or a point that is calculated by multiplying the width of the river mouth by five.
Zone B	The Coastal Significance Zone includes the Active Coastal Interface (land above MHWS) and generally includes land up to the summit of the first coastal ridge/ crest or escarpment (with the width of this zone varying depending on the topographic environment). The Active Coastal Interface is generally a slender component of the Coastal Significance Zone where the sea is the dominant element and the primary or significant influence on landform, vegetation and perception. This zone is where coastal processes are significant and may include cliffs, settled (or modified) dune lands, farm land, settlements and coastal forests. For this project, this zone is also referred to as the Coastal Terrestrial Zone.
Zone C	Coastal Context. This area is where coastal elements, patterns and processes have an influencing presence on the coastal landscape and would include developed dune ridges which no longer exhibit significant coastal processes plus coastal plains, and hill-slopes. This zone generally extends inland from Zone B to where coastal influences are sufficiently diminished. It is also recognised that some activities occurring within this zone can significantly affect the coastal environment (Zones A and B), either experientially or physically, to varying degrees. The inland extent of Zone C will not be identified, as it falls outside of the Coastal Environment.

Representations of the range of coastal environments in Wellington and Hutt City are illustrated in Figures 5, 6 & 7. These illustrate the extent of the zones and the Coastal Environment at the local scale in three very different types of coastal areas: from steep coastal scarps to urban areas. The diagrams illustrate that the character and extent of the coastal environment is determined by a range of landform, land type, topography and other influencing factors. It is in a constant state of change.

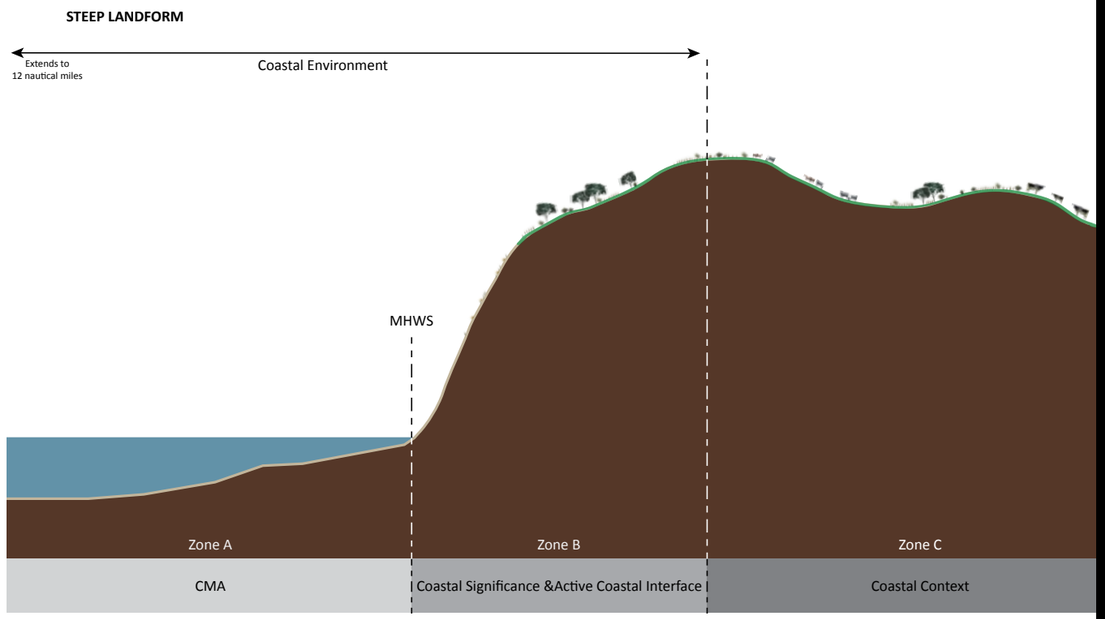

Figure 5: Steep Coastal Scarp Landforms

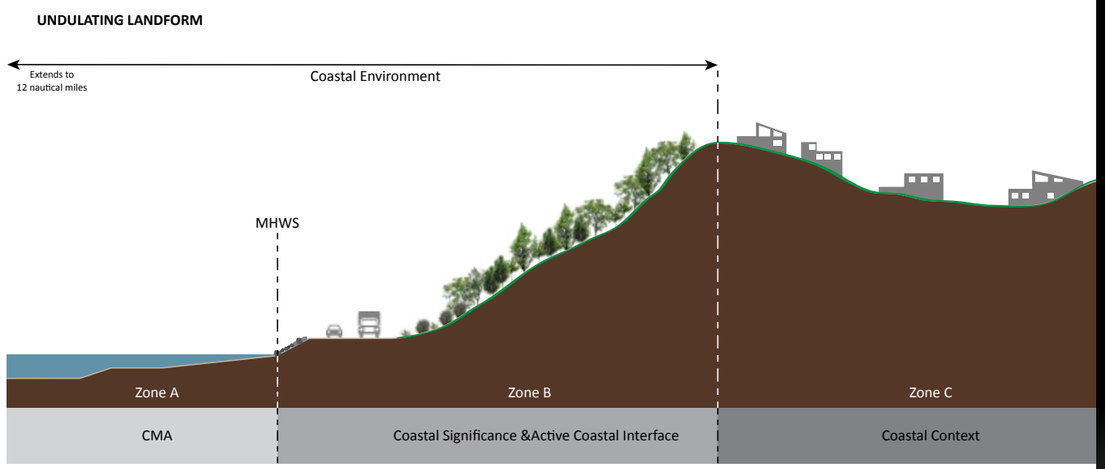

Figure 6: Undulating Landforms

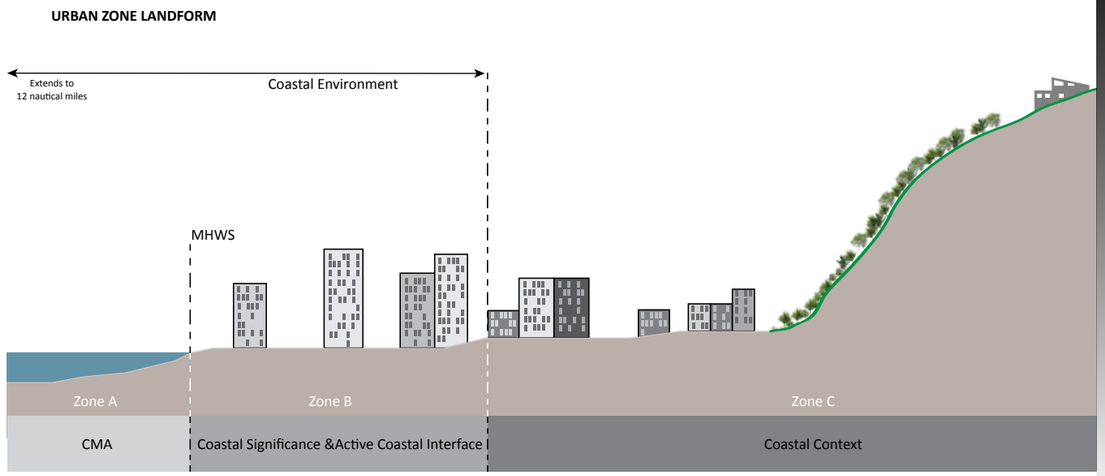

Figure 7: Urban Landscapes

Coastal Natural Character

Definition of Natural Character

The environments with the greatest natural character are those with comparatively low levels of human modification. Areas of high natural character are composed of natural elements appearing in natural patterns and underpinned by natural processes.

Natural character is not defined in the RMA or in the NZCPS 2010. There are various working definitions of the concept which are broadly similar and have been used in a number of Environment Court cases. In light of the NZCPS 2010, the definition of natural character adopted in this study and confirmed at a workshop convened by DoC in August 2011, states:

Natural Character is the term used to describe the natural elements of all coastal environments. The degree or level of natural character within an environment depends on:

1. the extent to which the natural elements, patterns and processes[7] occur and;

2. the nature and extent of modification to the ecosystems and landscape/ seascape.

The degree of natural character is highest where there is least modification.

The effect of different types of modification upon natural character varies with context and may be perceived differently by different parts of the community.[8]

Policy 13 of the NZCPS recognises that natural character is not the same as natural features and landscapes or amenity values and identifies that natural character may include (but is not limited to):

a. natural elements, processes and patterns;

b. biophysical, ecological, geological and geomorphological aspects;

c. natural landforms such as headlands, peninsulas, cliffs, dunes, wetlands, reefs, freshwater springs and surf breaks;

d. the natural movement of water and sediment;

e. the natural darkness of the night sky;

f. places or areas that are wild or scenic;

g. a range of natural character from pristine to modified;

h. experiential attributes, including the sounds and smell of the sea; and their context or setting.

7. For the purposes of interpreting the NZCPS 2010 Policy 13.2, 'elements, patterns and processes' means: biophysical, ecological, geological and geomorphological aspects; natural landforms such as headlands, peninsulas, cliffs, dunes, wetlands, reefs, freshwater springs and surf breaks; and the natural movement of water and sediment.

8. *Department of Conservation Natural Character Workshop Minutes; 2 August 2011(DoCDM-795012)*

Evaluation of Natural Character

The assessment approach is based upon an agreed interpretation of key terminology, as well as the development of an evaluation matrix and calibration for identifying at least 'high' natural character (as required by Policy 13 (1)(a) and (c) of the NZCPS 2010).

Specifically, the following main points are adopted for this study:

- the methodology can be adapted to suit different types and scales of coastal landscapes and ecosystems;
- an understanding of natural character requires input from terrestrial, freshwater and marine ecologists and other natural scientists (e.g. geomorphologists), as well as the input of landscape architects and planners;
- that natural character can be assessed on a continuum of modification that describes the expression of natural elements, patterns and processes (or the 'naturalness') in a coastal landscape/ ecosystem where the degree of 'naturalness' depends on:
    - The extent to which natural elements, patterns and processes occur and are legible;
    - The nature and extent of human modifications to the landscape, seascape and ecosystems;
    - The fact that the highest degree of natural character (greatest naturalness) occurs where there is least modification/ uncluttered by obvious or disruptive human influence; and
    - Recognition that the degree of natural character is context-dependent and can change over time.

The degree or level of natural character has been assessed on a seven-point scale:

VERY HIGH	HIGH	MODERATE - HIGH	MODERATE	LOW - MODERATE	LOW	VERY LOW

In accordance with the requirement outlined within Policy 13 of the NZCPS 2010, by mapping or otherwise identifying at least areas of high natural character. Following this, a separate exercise has considered whether any areas of high or very high natural character qualify as Outstanding Natural Character and where appropriate, these have also been mapped.

Based on similar natural character assessments undertaken throughout the country, an understanding of natural character has been initially identified within separate coastal terrestrial areas and coastal marine areas. The extent of each coastal terrestrial area and coastal marine area has been primarily determined based on differences in biophysical condition as appropriate for the study scale and it also takes account of the previous assessments of landscape character undertaken for Hutt City Council (Boffa Miskell Ltd, 2012) and Wellington City Council (Boffa Miskell Ltd, 2014).

On the basis of separating marine and terrestrial areas, NIWA and BML team members have captured the necessary data which has helped inform the judgement of natural character ratings. This includes aspects for delineation of coastal terrestrial areas including landform composition, freshwater catchments, land management and land cover. For coastal marine areas, aspects include continuity of biotic patterns parallel to the shore, along the intertidal and subtidal zones, and influences of exotic species and water quality. Overall, a generally similar level of natural character homogeneity is sought and the evaluation matrices that were developed to ensure calibration between terrestrial and marine values have been confirmed through a collaborative workshop exercise.

When assessing natural character of the coastal environment, several key attributes need to be considered. The list of attributes that natural character may include (NPCS 2010 13 (2) have been grouped into biotic, abiotic and experiential attributes to provide a systematic way to consider the different aspects of the natural patterns, processes and elements of the coastal environment and the degree of modification present.

The attributes are described for each coastal marine area and each coastal terrestrial area identified in Section B and were assessed for their degree of natural character by way of the evaluation matrix which has been calibrated to become specific to the Wellington coastal environment context (refer to Table 4: Terrestrial Natural Character Evaluation Matrix and Table 5: Marine Natural Character Evaluation). This has been used to inform and summarise the findings identified for each coastal terrestrial and coastal marine area.

The list of attributes has been developed to avoid double-counting and to ensure that the indicators for each attribute are mutually exclusive. They expand on the coastal environment diagrams on Table 2: Coastal Marine Attirbutes and Table 3: Coastal Terrestrial Attributes. The indicators of natural character for each attribute differ between the terrestrial and marine areas. Perceptual and experiential attributes for each have a small degree of overlap, however, the descriptive approach allows for those overlaps to be clearly articulated.

The division of attributes between the coastal marine areas and coastal terrestrial areas is used as a way of organising the data, where activities within the water can be quite different from what is occurring on the land. Notwithstanding this, the relationship between terrestrial and marine systems has also been taken into account. Each attribute is described specific to the particular area (rather than using standard descriptions) so that variations in the attributes between different areas are recorded and taken into account when assessing the degree of natural character. An overall value judgement as to the degree of natural character is then made for each coastal terrestrial area and each coastal marine area.

In evaluating the degree of natural character, NIWA have described the abiotic and biotic characteristics for the coastal marine areas and BML have described the abiotic and biotic characteristics for the coastal terrestrial areas. BML also described the experiential characteristics for both the coastal marine areas and coastal terrestrial areas with assistance from NIWA. Experiential descriptions for the marine areas have been generally restricted to ‘above-water’ experiences or activities. Where specific dive sites or notable underwater experiences are recognised, these have been recorded. However, no community engagement or consultation has been undertaken in this phase of the project. Experiential characteristics and values are therefore those determined by the study team.

It is important to recognise that for an area to rate ‘high’ or ‘very high’ for experiential aspects of natural character, their intactness of biotic or abiotic factors needs to be high with no or little human modification. This means that, for example, a popular beach near a populated area, is likely to rate lower in terms of the experiential attributes of natural character due to the lack of wildness and high level of modification, despite the extensive range of available recreation opportunities in the area. The shared and recognised aspects of available recreation infrastructure and activities are generally factored into landscape assessments as a positive contributor, but this is considered a detractor in terms of an assessment of natural character.

Not all human intervention within an environment has the effect of reducing natural character. For example, modifications associated with restoration and management to keep pest and weed levels low, such as on Matiu/Somes Island, is intervention that enhances natural character of a place.

Understandably, it has only been possible to capture marine or terrestrial data where that data exists. Accordingly, the mapped areas illustrate the existing knowledge.

Tables 2 and 3 below details the aspects of each attribute used to describe and assess the level of natural character of the terrestrial and marine areas.

TABLE 2: COASTAL MARINE ATTIRBUTES

COASTAL MARINE AREAS – ZONE A

ATTRIBUTES	DESCRIPTORS	SPECTRUM OF NATURALNESS*
MARINE ABIOTIC SYSTEMS	• Geomorphology or seascape - the shape, slope, relative composition and texture of the seafloor. • Water depth - the depth of the water column. This strongly influences the amount of light reaching the seafloor, the influence of waves on the seafloor, and the strength of currents. • Physical substrates on the seafloor - the texture and composition of sea floor sediments (gravel, sand, mud) and the presence of exposed rocky reefs strongly affect biotic characteristics. • Currents - the direction and magnitude of water flows caused by the influence of lunar tides, surface winds and waves, and in some places by river outflows (e.g., Hutt River, Wainuiomata River, Orongorongo River). • Wind and waves - the Wellington coastal area varies greatly in exposure to winds and waves, with the hills surrounding Cook Strait (Raukawa) funnelling strong winds and the south coast affected most markedly by southerly storms. • Water quality - including temperature, salinity, suspended sediments, and levels of pollutant contamination (e.g., heavy metals, pesticides).	The degree (very high to very low) to which physical modifications (e.g. trawling and dredging, major port structures, port dredging and dumping, reclamation, jetties, sea defences, groynes, aquaculture and land-derived sedimentation) affect this abiotic attribute
MARINE BIOTIC SYSTEMS	The natural distribution, abundance diversity and continuity of species, communities, habitats and ecological processes intertidally and sub-tidally including: • Pelagic community - the microalgal, bacteria, zooplankton and larval fish community in the water column • Seafloor communities - the invertebrate fauna, and macro-algae living on or in the seafloor • Fish - reef, bottom associated, and pelagic fish • Marine mammals - fur seals, sea lions, dolphins and whales • Birds - shore birds (e.g. oyster catcher, herons) and seabirds (penguins, petrels, albatross)	The degree of natural character assessed (very high to very low) included the presence/ absence of species expected to occur in the modern period, changes in abundance or biomass, changes in the size or age distribution of populations, the numbers and impact of exotic species present, and the degree of ecosystem functionality remaining.
EXPERIENTIAL	• The degree that human modification of the area has occurred through the construction of structures, the numbers of people engaged in recreational or commercial activities, and/or the magnitude of human-made light, noise, and smell. • Sense of wildness and ecological intactness	The degree (very high to very low) to which biotic and abiotic factors and their intactness (or conversely their modification) are experienced Experiential values may be reduced by factors such as structures (e.g. ports, marinas, jetties, moorings, aquaculture), exotic species, and the presence of human activity including recreational pursuits (e.g. diving, swimming, boating, jet skis)and commercial operations (e.g. commercial fishing vessels and servicing boats); Recognise that different people experience naturalness differently. For example, for some people natural drifts of kelp decomposing on a beach may reduce their experiential value and demand that it is removed so they can 'enjoy' the beach. Others have an opposing view.

** Each coastal marine area is measured on the spectrum of naturalness (degree of human modifications) to each attribute from Very High to Very Low, then an overall judgement is made. The degree of physical and experiential naturalness is related to the location's context.*

TABLE 3: COASTAL TERRESTRIAL ATTRIBUTES

COASTAL TERRESTRIAL AREAS – ZONE B

ATTRIBUTES	DESCRIPTORS	SPECTRUM OF NATURALNESS*
Abiotic Systems	• Geology and geomorphological aspects including identification of different types of landforms (i.e. headlands, peninsulas, cliffs, dunes, wetlands); • Terrestrial coastal processes, including erosion, river mouth processes including sedimentation (within the terrestrial zone); • Freshwater processes. • Climatic influences (wind, rain, exposure);	The evident intactness of the abiotic systems. The degree (very high to very low) to which physical modifications such as built structures, road cuts, earthworks and reclamation works affect this abiotic attribute.
Terrestrial Biotic systems	• Land cover and associated land use, including the composition, distribution, and condition of land cover, and the presence of indigenous/exotic species; • Presence of indigenous fauna; • The margins of estuaries, wetlands and terrestrial areas including the intactness of their natural ecological processes, patterns and elements; • Extent of freshwater communities.	The degree (very high to very low) to which modifications affect this biotic attribute. Influences include the presence of exotic species on native communities, physical structures such as infrastructure, housing, roading, tracking, reclaimed land, stop banks, as well as commercial forestry, agricultural and viticulture land use that reduce the naturalness of the biota; This attribute also includes modifications to freshwater systems, including channelizing watercourses, stop banks, culverts, dams etc. which affect freshwater biota.
Experiential	• The experience in seeing, feeling and perceiving the coast; • Aromas, visual and scenic, auditory, sense of wildness, remoteness, isolation, natural darkness of the night sky; • Ephemeral biotic activity (i.e. seasonality of flora, presence of birds); • Ephemeral human activity affecting the naturalness (such as recreation, commercial activities); • Note, this attribute does not include heritage elements.	The degree (very high to very low) to which physical and biotic modifications affect the naturalness experienced. Influences reducing naturalness include the presence of physical structures including ports, reclaimed land, infrastructure, roading, lighting, industrial noises and non-natural aromas; Presence of exotic species; Presence of humans, including recreational activities (driving, walking, camping, settlements); Recognise different people experience naturalness differently.

** Each coastal terrestrial area is measured on the spectrum of naturalness (degree of human modifications) to each attribute from Very High to Very Low, then an overall judgement is made. The degree of physical and experiential naturalness is related to the location's context.*

Evaluation Matrices

Evaluation matrices where developed for terrestrial and marine areas to provide clarity and consistency for the assessment of the level of natural character for each attribute. Refer Tables 4 and 5

TABLE 4: TERRESTRIAL NATURAL CHARACTER EVALUATION MATRIX

DEGREE OF NATURAL CHARACTER	VERY HIGH	HIGH	MODERATE - HIGH	MODERATE	LOW - MODERATE	LOW	VERY LOW
ABIOTIC Geology / geomorphology Hydrology Climatic influences	• Rare modification / structures • Dynamic processes virtually intact	• Very small levels of modification / isolated structures • Dynamic processes largely intact	• Small scale modification / limited structures • Dynamic processes generally intact with some interference	• Moderate scale modification / several structures • Dynamic processes still apparent	• Frequent landform modification / several structures • Some natural processes capable of recovery	• Large areas of modification / reclamation and/or structures • Some key natural processes are no longer able to operate	• Very extensive modification / reclamation • Few or no natural elements, patterns, processes remain
BIOTIC Land cover (indigenous / exotic species) Indigenous biota Estuaries, freshwater communities	• Exotic biota may occur but virtually no invasive species • Virtually all expected species present and their population structure virtually unmodified • Contains species and habitats of high conservation value • All ecosystem functions virtually intact	• Exotic biota may occur and invasive biota rare • Virtually all expected species present and population structure is largely unmodified • Very likely to contain species and habitats of high conservation value • Almost all ecosystem functions intact	• Exotic biota common with few invasive species • Virtually all expected species present with slight modification to population structure • Some species and habitats of high conservation value • Most ecosystem functions intact	• Exotic and invasive biota regularly present • Some expected species absent with moderate modification to population structure • A few species and habitats of high conservation value • Some ecosystem functions varying outside natural range	• Exotic and invasive biota common • Many expected species absent with marked modification to population structure • Species and habitats of high conservation value rare • Most ecosystem functions varying well outside natural range	• Exotic and invasive biota very common • Most expected species absent with remnant population structure highly modified • Species and habitats of high conservation value absent • Few original ecosystem functions remain	• Exotic and invasive biota dominate • Expected species virtually absent • Only the most hardy or adaptable species occur • Original ecosystem functions rare or absent
EXPERIENTIAL Views, sounds and smells of the sea Sense of wildness and remoteness	• Overwhelming sense of wildness and remoteness • Rare human influence	• Predominantly wild and remote • Limited human interference	• Frequent sense of wildness and remoteness • Some human interference	• Opportunities to experience wildness and remoteness • Obvious human influence	• Limited sense of wildness or remoteness • Strong human influence	• Rare sense of wildness • Built environment clearly apparent	• No sense of wildness or remoteness • Built environment dominates
CALIBRATION	• Parts within Turakirae Head						• Wellington Container Terminal

TABLE 5: MARINE NATURAL CHARACTER EVALUATION MATRIX

DEGREE OF NATURAL CHARACTER	VERY HIGH	HIGH	MODERATE - HIGH	MODERATE	LOW - MODERATE	LOW	VERY LOW
ABIOTIC Wind, waves and currents Rocky reefs Seafloor sediments Water quality	• Rare modification / structures • Dynamic processes virtually intact • Sediment makeup and quality virtually unmodified • Water quality virtually unmodified	• Very low levels of modification / structures • Dynamic processes largely intact • Sediment makeup and quality very slightly modified • Water quality very slightly modified	• Small scale modification / limited structures • Dynamic processes generally intact with some interference • Sediment makeup and quality slightly modified • Water quality slightly modified	• Moderate scale modification/ several structures • Dynamic processes still apparent • Sediment makeup and quality moderately modified • Water quality moderately modified	• Modification / structures common • Dynamic processes markedly modified • Sediment makeup and quality markedly modified • Water quality markedly modified	• Large areas of modification / structures and /or reclamation • Dynamic processes highly modified • Sediment makeup and quality highly modified • Water quality highly modified	• Very extensive modification / large reclamation • Dynamic processes extremely modified • Sediment makeup and quality extremely modified • Water quality extremely modified
BIOTIC Pelagic community Seafloor communities Fish Marine mammals Seabirds, shore birds	• Exotic biota very rare • All expected species present and their population structure virtually unmodified • Contains species and habitats of high conservation value • All ecosystem functions virtually intact	• Exotic biota rare • All expected species present and population structure is largely unmodified • Very likely to contain species and habitats of high conservation value • Almost all ecosystem functions intact	• A few exotic biota occur • All expected species present with slight modification to population structure • Some species and habitats of high conservation value • Most ecosystem functions intact	• Exotic biota regularly present • Some expected species absent with moderate modification to population structure • A few species and habitats of high conservation value • Some ecosystem functions varying outside natural range	• Exotic biota common • Many expected species absent with marked modification to population structure • Species and habitats of high conservation value rare • Most ecosystem functions varying well outside natural range	• Exotic biota very common • Most expected species absent with remnant population structure highly modified • Species and habitats of high conservation value absent • Few original ecosystem functions remain	• Exotic biota dominate • Expected species virtually absent • Only the most hardy or adaptable species occur • Original ecosystem functions rare or absent
EXPERIENTIAL Views, sounds and smells of the sea Sense of wildness and ecological intactness	• Overwhelming sense of wild and intact ecosystem • Rare human influence	• Predominantly wild and intact ecosystem • Limited human interference	• Frequent sense of wild and intact ecosystem • Some human interference	• Opportunities to experience wild and • Obvious human influence	• Limited sense of wild or intact ecosystem • Strong human influence	• Rare sense of wildness or intact ecosystem • Built environment clearly apparent	• No sense of wildness or intact ecosystem • Built environment dominates
CALIBRATION	• Cook Strait Cable Exclusion Zone					• Wellington Waterfront	

When determining the overall natural character evaluation at the area scale, greater weighting has been given to natural science attributes, which encompass abiotic and biotic values, compared with experiential values. This recognises that natural character is a condition rather than a quality or value; it exits regardless of experiential attributes. While the NZCPS 2010 includes experiential attributes in its definition of natural character, they are not identified such matters as the primary or principles determinants of natural character. Therefore, in this report they have been given a weighting of 20% in defining the overall judgement with each area. Conversely, the abiotic and biotic attributes have each been given an equal weighting of 40%.

The priority ascribed to natural science attributes in the NZCPS 2010 recognises that natural character is primarily based on a condition that can be described with natural scientific methods. Experiential attributes are important contributing factors to a natural character assessment. However, they are more subjective and can be perceived differently by different people and over different timescales. Therefore, it is necessary to base assessments of natural character primarily on natural science methods which may be more enduring and also more transparent.

At the component scale abiotic, biotic and experiential attributes have been evaluated. Either the abiotic or biotic attributes have to score at least high for the component to be identified as having to be identified as having a high level of natural character. Similarly, if either the abiotic or biotic attributes are scored as very high, the component will be scored very high. This also recognises the primacy of such natural science attributes which determine natural character condition. Notwithstanding this, the scoring for abiotic, biotic and experiential attributes have been recorded for each component to ensure transparency in this assessment.

Table 6 shows the matrix approach used to rank the level of natural character in relation to the natural character attributes for a particular location.

TABLE 6: EVALUATION OF NATURAL CHARACTER ATTRIBUTES

	NATURAL CHARACTER ATTRIBUTES		
DEGREE OF NATURAL CHARACTER	ABIOTIC	BIOTIC	EXPERIENTIAL
VERY HIGH			
HIGH			
MODERATE TO HIGH			
MODERATE			
MODERATE TO LOW			
LOW			
VERY LOW			
OVERALL NATURAL CHARACTER RATING		Rating (e.g. High)	

Evaluating Outstanding Natural Character

Areas of Outstanding Natural Character have been identified through an assessment process and mapped in Section C of this study. Under RMA s6(a) it is necessary to determine the existing attributes and extent of natural character and assess how these may be affected by a specific planning regime or proposal. This approach is also required under the NZCPS 2010. However, Policy 13 of the NZCPS 2010 also specifically requires that an evaluation is made as to whether the natural character in the existing coastal environment is at least 'high' - in order to then be able to determine whether Policy 13(1)(a) or 13(1)(b) is triggered. Policy 13(1) of the NZCPS 2010 states:

1. To preserve the natural character of the coastal environment and to protect it from inappropriate subdivision, use and development:

a. avoid adverse effects of activities on natural character in areas of the coastal environment with outstanding natural character; and

b. avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on natural character in all other areas of the coastal environment;

An area with outstanding natural character may be an area within the coastal environment that is considered to have 'high' or 'very high' levels of natural character, although it is important to note that the 'high' or 'very high' ratings do not in themselves equate to 'outstanding', as clarified by the following Boffa Miskell definition:

'Outstanding' is a comparative evaluative term meaning; to stand out, exceptional, pre-eminent.

It was determined by the study team that outstanding natural character should be assessed separately from and subsequent to the main assessment which determines areas holding 'very low' to 'very high' levels of natural character. This decision to separate out this assessment from the main natural character study stems from Policy interpretation in the NZCPS 2010. Policy 13 (1)(a) requires avoidance of adverse effects of activities on natural character in the coastal environment with outstanding natural character. For all other areas in the coastal environment Policy 13 (1) (b) requires that significant adverse effects are avoided, remedied or mitigated. The high threshold is outlined within Policy 13 (1)(c), where areas with at least 'high' natural character be identified.

This separation of outstanding natural character from the baseline follows best practice outlined within Environment Court decisions on natural character, where everything in the coastal environment fits on the continuum from very low to very high (or pristine). The avoidance therefore of effects under Policy 13(1)(a) for outstanding requires a reassessment of the highest rated areas. This approach is also consistent with studies identifying outstanding natural landscapes.

It was also determined that outstanding natural character should combine both terrestrial and marine components so that important sequences of ecological naturalness (such as from the top of a ridge above sea level to the bottom of the adjacent sea and interconnected systems) are considered.

An assessment to establish whether all or parts of a coastal area contain outstanding natural character needs only be undertaken when all of the attributes, when appraised at an adequate scale (in this case the component level) and using adequate data, are assessed as being of 'high' or 'very high' levels of natural character. A further analysis of the areas determined as having 'high' or 'very high' are contained within Section C of this study.

Under the methodology, an area of outstanding natural character must:

Exhibit a combination of natural elements, patterns and processes that are exceptional in their extent, intactness, integrity and lack of built structures (the 'clutter' factor) and other modifications compared to other areas in the Wellington Region. (Boffa Miskell)

GIS Data Sources

GIS sources used by the study team included the following information:

- Topographic Maps, Charts (LINZ)
- Bathymetry (NIWA)
- New Zealand Land Cover Database v4 (Landcare Research)
- Ecological Districts (DoC)
- QE II Covenants
- Geopreservation Sites (Geological Society of New Zealand)
- Land Resource Inventory (Landcare Research)
- Wellington Ecosites (Wellington City Council)
- Significant Natural Resources (Hutt City Council)
- Key Native Ecosystems (GWRC)
- Proposed Natural Resources Plan (GWRC, 2015)
- Regional Parks (GWRC)
- Public Conservation Areas (DoC)

New Zealand Land Cover Database

To assist in understanding the land cover and biotic modification for each coastal terrestrial area, the New Zealand Land Cover Database (LCDB v4) has been used as a primary source of information. In addition to the helicopter reconnaissance, there has also been some ground-truthing carried out to confirm vegetation types. However, no additional detailed ecological survey has been conducted as part of this natural character assessment. LCDB v4 is based on a digital map of New Zealand which has been derived from recent satellite imagery. The current version LCDB v4 contains 33 classes and has been designed to be compatible in scale and accuracy with Land Information New Zealand's 1:50,000 topographic database. Accordingly, the use of LCDB v4 has been limited to a broad scale assessment tool and has not been relied upon to confirm any more detailed assessment scale.

Appendix 2: Glossary

Name	Description
Active Coastal Interface	Part of the Coastal Significance Zone (CSZ) (or Coastal Terrestrial Zone) that is generally a slender component of the CSZ where the sea is the dominant element and the primary or significant influence on landform, vegetation and perception.
alluvium / alluvial	Sediments such as sand, silt or gravel that have been deposited by streams, rivers and other running waters.
benthic	The surface of the seabed.
brackish	Water which is a mix of freshwater and saltwater; e.g. estuarine water.
coastal environment	An environment in which the coast is a significant part or element taking account of an assessment of Policy 1 of the NZCPS 2010 and includes: • The coastal marine area; • Islands within the coastal marine area; • Areas where coastal processes, influences or qualities are significant, including coastal lakes, lagoons, tidal estuaries, saltmarshes, coastal wetlands, and the margins of these; • Areas at risk from coastal hazards; • Coastal vegetation and the habitat of indigenous coastal species including migratory birds; • Elements and features that contribute to the natural character, landscape, visual qualities or amenity values; • Items of cultural and historic heritage in the coastal marine area or on the coast; • Inter-related coastal marine and terrestrial systems, including the intertidal zone; and • Physical resources and built facilities, including infrastructure, that have modified the coastal environment
dunes	Dunes: an accumulation of sand built by wind or water. Fore dune: the more active part of dunes located closest to the sea. Back dune: the backshore areas of a beach.
ephemeral	Water ways or waterbodies that are not permanent. Their surface expression changes depending on rainfall events or groundwater levels.
estuarine	Pertaining to or formed or living in an estuary, especially said of deposits and the sedimentary or biological environment of an estuary.
fans	Gently sloping, fan-shaped masses of material formed along the margins of hills and mountain ranges by streams that drain their slopes. A fan commonly occurs where there is a marked decrease in gradient, for example where a stream meets the gentler floodplain or river terrace.
herbfields	A plant community where herbs are the dominant life-form. Herbs are defined as non-woody plants other than grasses, sedges and rushes, and are usually small-leaved and prostrate.
intertidal	The area of the shore which is covered and uncovered by the rise and fall of the tide.
lagoon	A shallow body of water separated from a larger body of water by a barrier.
macroalgae	Large seaweeds.
Macrocystis	A very large brown seaweed also known as giant kelp or giant bladder kelp.

Name	Description
natural character	Term used to describe the natural elements of all coastal environments within the NZCPS 2010. Refer to Section A of this report.
Pleistocene	An epoch of the Quaternary period, after the Pliocene of the Tertiary and before the Holocene. It began 2 to 3 million years ago and lasted until the start of the Holocene some 8000 years ago.
prograding (progradation)	The building forward or outward toward the sea of a shoreline or coastline (as a beach , delta, or fan) by near-shore deposition of river-borne sediments or by continuous accumulation of beach material thrown up by waves or moved by long-shore drifting.
rhodoliths	Unattached, branching, benthic red algae that superficially resemble coral.
rocklands	A plant community where exposed rock is the main cover over which plants are sparsely scattered, such as bluff faces and escarpments.
shrublands	A plant community where shrubs are the dominant life-form. Shrubs are defined as woody plants less than 5m high, and are usually multi-stemmed. Dense shrubland is also called scrub.
subtidal	The area below the intertidal zone which remains permanently covered in water.
tombolo	A deposition landform in which an island is attached to the mainland by a narrow piece of land, such as a spit or bar.
wave-cut platform	Narrow flat area of rock often found at the base of a sea cliff, created by the erosion of waves.

Appendix 3: Common Plant Names

Common Name	*Latin Name*
akeake	*Dodonaea viscosa*
akiraho	*Olearia paniculata*
black beech	*Fuscospora solandri*
broom*	*Cytisus scoparius*
cabbage tree	*Cordyline australis*
coastal buttons	*Cotula coronopifolia*
coastal peppercress	*Lepidium banksii*
coastal porcupine shrub	*Melicytus aff. crassifolius*
coastal shrub daisy	*Olearia solandri*
crack willow*	*Salix fragilis*
danthonia	*Rytidosperma spp.*
fescue, hard tussock	*Festuca novae-zelandiae*
fierce lancewood	*Pseudopanax ferox*
glasswort	*Sarcocornia quinqueflora*
gorse*	*Ulex europaeus*
gossamer grass	*Anemanthele lessoniana*
gum*	*Eucalyptus sp.*
harakeke, swamp flax	*Phormium tenax*
hard beech	*Fuscospora truncata*
hīnau	*Elaeocarpus dentatus*
inaka	*Dracophyllum urvilleanum*
jointed rush*	*Juncus articulatis*
kahikatea	*Dacrycarpus dacrydioides*
kaikōmako	*Pennantia corymbosa*
kānuka	*Kunzea ericoides agg.*
karaka	*Corynocarpus laevigatus*
kohekohe	*Dysoxylum spectabile*
kōwhai	*Sophora microphylla*
lake clubrush	*Schoenoplectus tabernaemontani*
lowland ribbonwood	*Plagianthus regius*
macrocarpa	*Cupressus macropcarpa*
māhoe	*Melicytus ramiflorus*
mānuka	*Leptospermum scoparium*
māpou	*Myrsine australis*
marram*	*Ammophila arenaria*
marsh ribbonwood	*Plagianthus divaricatus*
matagouri	*Discaria toumatou*
mataī	*Prumnopitys taxifolia*
narrow-leaved lacebark	*Hoheria angustifolia*
native ice plant, horokaka	*Disphyma australe*
ngaio	*Myoporum laetum*
nikau	*Rhopalostylis sapida*
red beech	*Fuscospora fusca*
Phoenix palm*	*Phoenix canariensis*
pigeonwood	*Hedycarya arborea*
pine*	*Pinus radiata*
pīngao	*Ficinia spiralis*
poplar*	*Populus sp.*
poroporo	*Solanum aviculare var. aviculare*
prostrate pohuehue	*Muehlenbeckia ephedroides*
puka	*Griselinia lucida*

pukatea	*Laurelia novae-zelandiae*
raupō	*Typha orientalis*
remuremu	*Selliera radicans*
rimu	*Dacrydium cupressinum*
sand daphne	*Pimelea villosa*
sand tussock	*Poa billardierei*
scrambling pōhuehue	*Muehlenbeckia complexa*
sea celery	*Apium prostratum*
sea holly	*Eryngium vesiculosum*
sea rush	*Juncus kraussii var. australiensis*
shore convolvulus	*Calystegia soldanella*
shore primrose	*Samolus repens*
silver beech	*Lophozonia menziesii*
silver tussock	*Poa aff. cita*
spinifex	*Spinifex sericeus*
tawa	*Beilschmiedia tawa*
tauhinu	*Ozothamnus leptophyllus*
taupata	*Coprosma robusta*
three square	*Bolboschoenus pungens*
tītoki	*Alectryon excelsus*
toetoe	*Austroderia fulvida, A. richardii*
tōtara	*Podocarpus totara*
whararikI, coastal flax	*Phormium cookianum*

* = adventive species