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Greater Wellington Regional Council
PO Box 41
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24 April 2009

Attention: Grant Kneebone

Dear Grant

South Wairarapa District Council Resource Consent Application and Assessment of Effects on the Environment, Coastal Protection Works

Please find attached an application for a coastal permit, made on behalf of the South Wairarapa District Council (SWDC). The application relates to coastal protection works along sections of the coast at Cape Palliser Road.

The proposed activity is a discretionary and restricted coastal activity in terms of Rule 1, 16, 18, 37 and 46 of the operative Regional Coastal Plan for the Wellington Region. Having considered the existing environment we consider that these coastal protection works are necessary and appropriate to achieve the desired outcome of minimising erosion of land along this section of the coast and safeguarding important roading infrastructure.

Having considered the existing environment we consider that the proposed works can be undertaken in a way that avoids, remedies or mitigates any significant adverse effects.

The application will be notified in accordance with Section 117 (3) of the Resource Management Act 1991 as it contains works that are considered to be restricted coastal activities.

A cheque for \$5,625 (including GST), being the required deposit for a notified application, is also attached. Please provide a receipt in due course.

If you require any additional information, or wish to discuss any aspect of the application, please do not hesitate to contact the undersigned.

Yours sincerely

Greg Pollock

Business Director - Planning

A handwritten signature in blue ink, appearing to read "Greg Pollock", written over a faint blue line.

on behalf of

Beca Carter Hollings & Ferner Ltd

Direct Dial: +64 4 496 2635
Email: greg.pollock@beca.com

Copy

Ian Richards, South Wairarapa District Council, PO Box 6, Martinborough

Report

South Wairarapa District Council Resource Consent Application and Assessment of Effects on the Environment, Coastal Protection Works

Prepared for South Wairarapa District Council (Client)

By Beca Carter Hollings & Ferner Ltd (Beca)

24 April 2009



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South Wairarapa District Council Resource Consent Application and Assessment of Effects on the Environment, Coastal Protection Works

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By Beca Carter Hollings & Ferner Ltd (Beca)

24 April 2009

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Revision History

Revision N°	Prepared By	Description	Date
A	Sarah Garty	Draft for Client Review	19/03/2009
B	Sarah Garty	Final Application	22/04/2009

Document Acceptance

Action	Name	Signed	Date
Prepared by	Sarah Garty		22/04/09
Reviewed by	Cushla Loomb		22/04/09
Approved by	Greg Pollock		
on behalf of	Beca Carter Hollings & Ferner Ltd		

APPLICATION FOR RESOURCE CONSENT

SECTION 88, RESOURCE MANAGEMENT ACT 1991

To: **Greater Wellington Regional Council**

South Wairarapa District Council, PO Box 6, Martinborough applies for the following types of resource consent:

- Discretionary and Restricted Coastal Activity in terms of Rule 1
- Controlled Activity in terms of Rule 16
- Discretionary and Restricted Coastal Activity in terms of Rule 18
- Discretionary and Restricted Coastal Activity in terms of Rule 37
- Discretionary and Restricted Coastal Activity in terms of Rule 46

of the Greater Wellington Regional Council: Regional Coastal Plan for the Wellington Region.

The names and addresses of the owner and occupier (other than the applicant) of any land to which the application relates are as follows:

Crown Land (coastal marine area)

The location of the proposed activity is as follows:

Cape Palliser Road from Hurupi Stream to the Cape Palliser Lighthouse (as shown in the maps attached as Appendix A of this report).

No additional resource consents are needed for the proposed activity.

In accordance with the Fourth Schedule of the Resource Management Act 1991, an assessment of effects on the environment in the detail that corresponds with the scale and significance of the effects that the proposed activity may have on the environment is attached.

Any information required to be included in this application by the district plan, the regional plan, the Resource Management Act 1991, or any regulation made under that Act.

No additional information (not encompassed in the assessment of environmental effects) is required to be included in this application.



.....
Signature of applicant (or person authorised to sign on behalf of applicant)

Date: 24 April 2009

Address for service of applicant:

Beca Carter Hollings & Ferner Limited

PO Box 3942

WELLINGTON

Attention: Greg Pollock

Telephone No.: **04 496 2635**

Fax No.: **04 471 5501**

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1 Introduction

This application for coastal permit is made on behalf of the South Wairarapa District Council (SWDC) to undertake coastal protection works in the form of the installation and maintenance of boulder beaches along sections of Cape Palliser Road. Coastal permit is required from the Greater Wellington Regional Council (GWRC) and the Minister of Conservation under the Resource Management Act 1991 (RMA).

The purpose of this report is to provide a description of the proposed activity, an assessment of the effects on the environment and an assessment of the relevant provisions of the RMA, the Operative and Proposed New Zealand Coastal Policy Statement (NZCPS), the Operative and Draft Wellington Regional Policy Statement (RPS), the Regional Coastal Plan for the Wellington Region (WRCP) and the Proposed Wairarapa Combined District Plan. An assessment is also undertaken of the Wairarapa Coastal Strategy as a other matter for consideration in the management of the coastal environment.

1.1 Need for the Project

The purpose of undertaking coastal protection works is to address the erosion problem occurring along the coastline at Cape Palliser Road. The need for the project in terms of the coastal erosion problem, the previous works undertaken and SWDC responsibility to minimise coastal hazards is discussed in detail below.

1.1.1 The Coastal Erosion Problem

Erosion along the Cape Palliser Road has been monitored since 1944 and there is therefore a good understanding of the issue. As identified in the 2000 Beca report (attached as Appendix F), the erosion problem is cyclic with the rate of erosion in the years preceding 2000 assessed as being more severe than the assessment made in 1996. The aerial maps of the coastline (attached as Appendix A) show the coastline in 1996 and 2002 and illustrate the rapid rate of erosion that can occur over a short period of time.

The coastal erosion is occurring due to the littoral drift of beach material to the north, combined with a lack of sufficient sediment supplied to the coastal zone to allow continual replenishment of the beach in this location. Wave run-up during large tides, and storm events have also contributed to the erosion problem over the years. The lithology along this portion of the coastline comprises principally of mudstone, which is easily eroded by wave action.

The erosion problem therefore results from the high coastal sediment transport capacity in the area caused by south and south-west waves, combined with a limited supply of sands and gravels to the coast south of the area concerned, and the soft, easily eroded mudstones of this particular section of the coastline. Localised failure occurs as waves undercut a section of the cliff, eventually causing it to slump, creating a noticeable scallop effect. The amount of erosion experienced for various stretches of the coastline will depend on the alignment of the shore in relation to the wave climate and geotechnical properties of the mudstone.

1.1.2 Coastal Hazard

Coastal erosion becomes a hazard when people, property or infrastructure is at risk. In this case, the erosion of the coast is a coastal hazard because of the roading infrastructure at risk from failure from continued erosion of the shoreline.

Cape Palliser Road provides a crucial vehicle access link to other roads in the North Island for people and communities living along this section of the coast. As the coast in this location is largely unprotected, the erosion is significantly impacting on the ongoing safety and sustainability of these roads. The SWDC are proposing to undertake coastal protection works through the construction of boulder beaches along sections of Cape Palliser Road in order to provide protection for these key roads in the future and minimise the coastal hazard in this location. The works are to be staged over a number of years, with priority works being undertaken in sections where the road is at greatest threat from the erosion. The priority areas and need for works will be determined at the discretion of the SWDC.

1.1.3 Previous Coastal Protection Works

The SWDC have been dealing with the erosion of Cape Palliser Road for a number of years. To date, the main erosion management response has been to realign the roads to avoid areas where the erosion has cut away the road and made it unsafe for vehicles. This response is no longer considered an appropriate course of action due to land constraints and properties located on the landward side of the road.

There are currently a number coastal permits in place, including:

- WAR 020113 - "to construct a boulder beach to protect the road from accelerated erosion", on Cape Palliser Road, just north of Putangirua Stream or about NZMS260 S28 from 2695426-5970977 (northern end) to 2695455-5970944, effective from 18 September 2002 and expiring 30 September 2022
- WAR 010024 - "to protect Whatarangi Road from coastal erosion", approximately 150 metres north of the Putangirua Stream, effective from 28 February 2001 and expiring 1 December 2026
- WAR 020055 – "To construct coastal erosion protection (a boulder beach)", Cape Palliser Road, at or about NZMS260 S28:2695384-5959369 (1.4km north of the Otakaha Stream), effective from 15 May 2002 and expiring 30 June 2022
- WAR 020141 – "To construct a boulder beach for coastal protection purposes", at Cape Palliser Bay, at or about NZMS 260, S28 (from northern end) 2695540-5970559, (to southern end) 2695438- 5969668, effective from 4 November 2002 and expiring 30 October 2012
- WAR 060041 – "Coastal Permit to: (1) Occupy the coastal marine area with structures for coastal protection purposes, (2) Install structures within the coastal marine area, (3) Disturb the coastal marine area in association with the physical works; (4) Deposit materials within the coastal marine area, effective from 11 May 2006 and expiring 30 September 2016
- WAR 010336 – "To construct a boulder beach for coastal protection purposes", on Cape Palliser Road, Whatarangi Cliffs, at or about NZMS260 S28:2695300-5969200, effective from 12 December 2001 and expiring 1 December 2011
- WAR 000272 – "To construct and locate a 130 metre long gabion basket wall within the coastal marine area for erosion protection", adjacent to the Cape Palliser Road, approximately 1.4km north-west of the Otakaha Stream mouth

The areas of these coastal permits are shown on the maps attached as Appendix D. The proposed resource consent would cover and replace all these resource consents.

1.1.4 South Wairarapa District Council (SWDC)

The SWDC under the Local Government Act 2002 is responsible for providing for the wellbeing of people and communities under their jurisdiction. The roading infrastructure along this section of the coastline is crucial to the wellbeing of communities and people living and using this section of the coast. The SWDC therefore has a responsibility to address the erosion threat posed to these roads.

1.2 Reasons for the Application

Consent for this activity is required under Section 12 (1)(a), 12(1)(b), 12(1)(c), 12(1)(d) and 12(2)(a) of the RMA as the proposal involves the infilling of foreshore and seabed to achieve the batter slope (reclamation), erection of a new structure (i.e. the boulder beach), disturbance and deposition of material on the foreshore and seabed associated with erection of a new structure and occupation of the coastal marine area by the structure.

A number of consents are required from GWRC and the Minister of Conservation for the works under the Regional Coastal Plan for the Wellington Region. Consents required are listed below.

Rule 1: Reclamation of land outside the commercial port area is a Discretionary and Restricted Coastal Activity.

Rule 16: Lawful structures occupying Crown land is a Controlled Activity.

Rule 18: Structures more or less parallel to mean high water springs extending more than 1000m in length outside of any Area of Significant Conservation Value is a Discretionary and Restricted Coastal Activity.

Rule 37: Major disturbance of foreshore and seabed is a Discretionary and Restricted Coastal Activity.

Rule 46: Deposition of large volumes of substances is a Discretionary and Restricted Coastal Activity.

Overall the application will therefore be processed as a Discretionary and Restricted Coastal Activity, with a number of Restricted Coastal Activity approvals required from the Minister of Conservation.

1.3 Consent Duration

The SWDC are seeking to provide a long term option for protecting Cape Palliser Road. Therefore the SWDC seek that the duration of the required coastal permits be the maximum allowable under the RMA, 35 years.

2 Existing Environment

2.1 Description of the Existing Environment

The study area for the coastal protection works extends from Te Kopi and the Hurupi Stream valley in the north to the Cape Palliser lighthouse in the south. By road, the project area has a distance just over 25 kilometres, or around 29 kilometres along the coast. The site is located 45 kilometres from Wellington as the crow flies.

The coastline along Cape Palliser Road is described by travel brochures and in the Landscape assessment (Appendix E) as 'rugged', 'wild' and 'remote'. Despite this description, it is noted that parts of the coast in this location have been heavily modified over the years, particularly by existing coastal protection structures and housing and roading infrastructure. The Landscape assessment (Appendix E) notes that the section from the Hurupi Stream to Whatarangi displays the highest level of modification, with the section of coast between Ngawi to the Cape Palliser lighthouse being the most natural (as it has very few baches or outbuildings present, other than the collection of buildings at Mangatoetoe).

Four settlements exist on this section of road – Te Kopi, Whatarangi, Ngawi and Mangatoetoe – with a scattering of small dwellings and baches between these. The settlements are occupied by both permanent residents and seasonal residents.

In addition to the settlements, Cape Palliser Road itself and associated curtilage (drainage, electricity, slope protection and contouring) have also influenced the character of the landscape, particularly around Whatarangi, where the coastal terrace is at its most narrow, and erosion has caused the road to be realigned landward on several occasions.

There are a number of boulder beaches along the coast, which have been constructed between 2001 and 2006; these boulder beaches are shown on the maps attached as Appendix A.

The coast in this location is enjoyed by both recreational and commercial users of the ocean off the coast in Palliser Bay, users of the Cape Palliser Road and owners of the bach residences scattered along the coast. The Cape Palliser lighthouse at the southern end of the study area is a popular tourist destination.

Photos of the existing environment are contained in Appendix C of this report.

3 The Proposed Activity – Boulder Beaches

3.1 Location

This proposal seeks consent for the ability to construct, as necessary, a number of boulder beaches along the coast from the Hurupi Stream to the end of Cape Palliser Road, an area covering approximately 25km.

	Easting (NZMG)	Northing (NZMG)
Starting Point (after the Hurupi Stream)	2695145.5154	5971585.7598
End of Cape Palliser Road	2701753.1636	5952542.1275

The extent of the works is demonstrated on the maps, included in Appendix A.

3.2 Sites and Staging of Works

Although SWDC are seeking consent for the entire coastline from Hurupi Stream to the end of Cape Palliser Road; only certain sections of the subject coastline require protection works. The SWDC proposes the concept of ‘trigger points’ to allow flexibility in the approach to protecting the coastline. This will provide the ability to assess the need and urgency for protection works and minimise disturbance to the coast.

Priority 1	Areas where erosion is immediately undermining infrastructure
Priority 2	Areas where there is potential for erosion to undermine infrastructure in the future
Priority 0	Areas where no works to occur due to ecological significance of site and/or lack of coastal hazard risk

Works would be staged according to this criteria along the stretch of coastline between Hurupi Stream and the end of Cape Palliser Road (area defined above). Priority 1 areas would be addressed immediately following approval of consent, with Priority 2 areas addressed within the next 10 to 35 years, depending on the necessity of works. Other areas of the coast would be addressed as required throughout the duration of the coastal consent. On-going monitoring of the coastline by the SWDC will provide information on the urgency for coastal protection works and will allow an update of the assessed priorities. Priority 0 areas are those areas where no works will occur as they are not under threat from erosion, or contain areas of ecological importance.

There are a number of sites that have been identified by the SWDC as needing urgent protection (i.e. Priority 1 Areas) and are therefore considered appropriate for the immediate installation of boulder beaches. These sites are shown on the maps in Appendix A of this application. Priority 1 areas include approximately 0.8km, priority 2 include approximately 20km and priority 0 include approximately 4km of coastline.

3.3 Description of the Activity

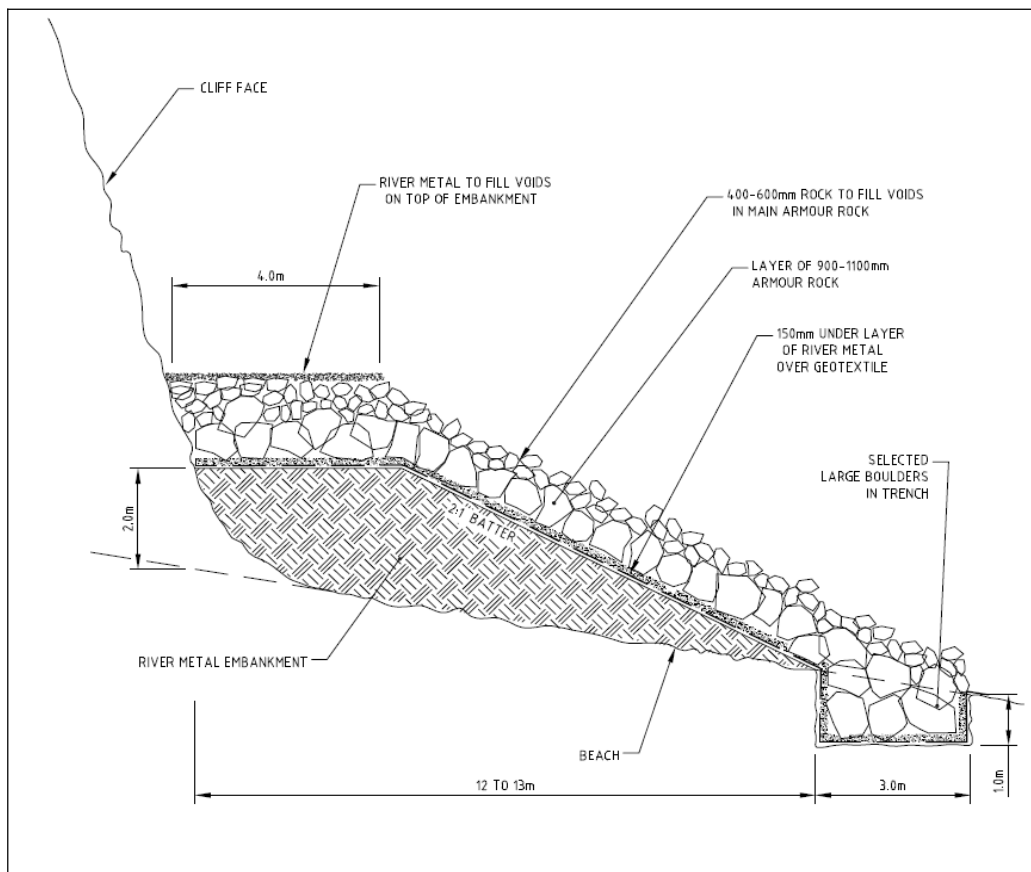
3.3.1 General Description

It is proposed to erect boulder beaches as required depending on their priority status between the stretch of coast between Hurupi Stream to the end of Cape Palliser Road on the South Wairarapa coast. The construction of the boulder beaches involves infilling of the coastal marine area behind the structures to achieve the required batter slope, the placement of rock material of different sizes to construct the boulder beach and disturbance/deposition of foreshore and seabed associated with the structure.

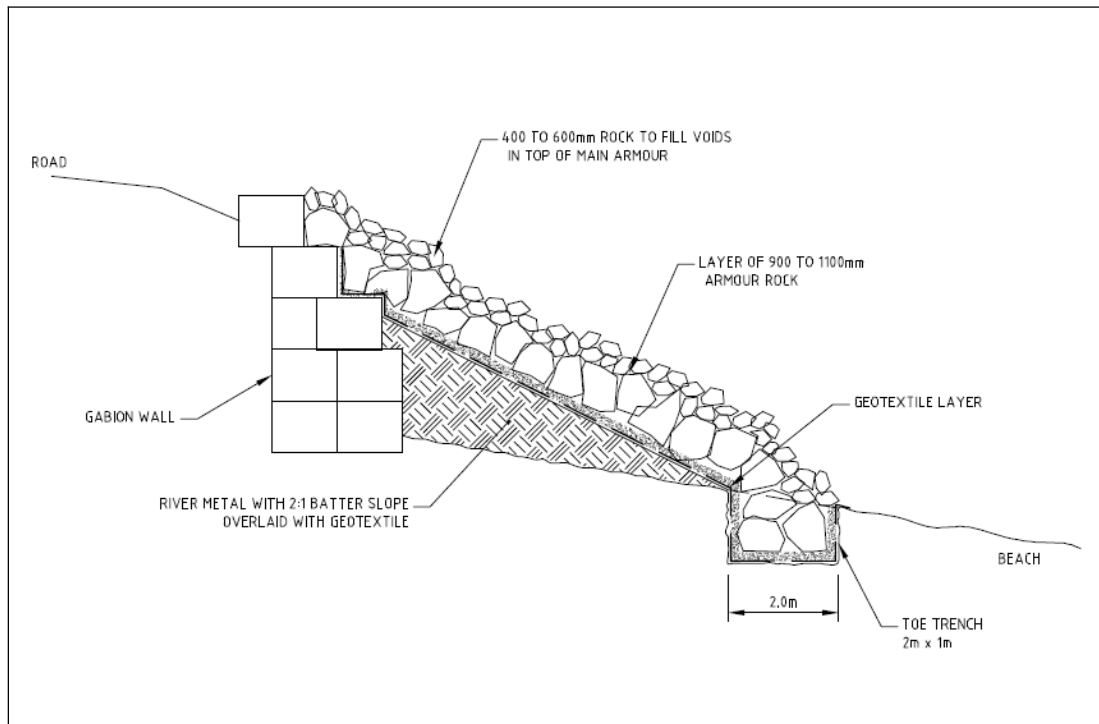
3.3.2 Boulder Beach Design and Construction

There are typically three types of boulder beach arrangements that have been constructed in the past and proven to be successful. The boulder beach design has been prepared by the SWDC. The three types are:

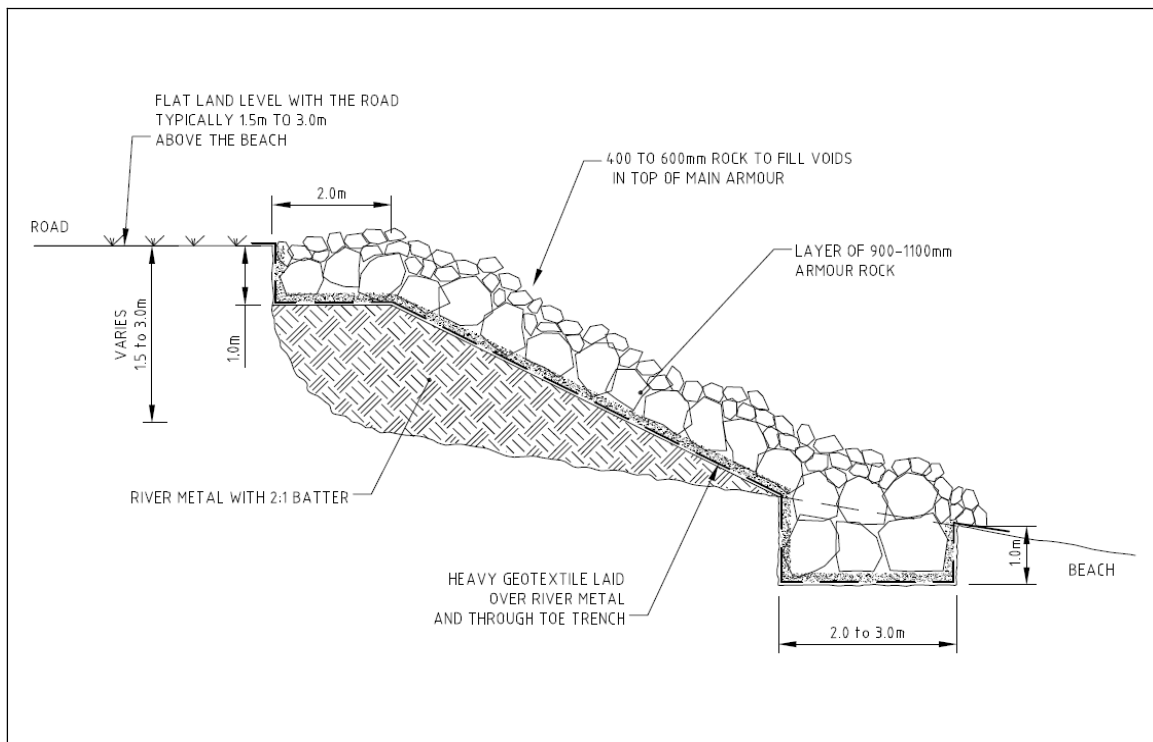
- A boulder beach to protect cliff areas (refer Figure 1)



- A boulder beach to protect Gabion Walls (refer Figure 2)



- A boulder beach to protect the road edge close to the beach (refer Figure 3)



These figures are also shown in Appendix B of this application.

The construction of the three boulder beach arrangements involve preliminary site earthworks to establish a working profile and backwall support, and the placing of river metal from the seaward footing to the cliff, road or gabion wall edge. This foundation will be overlaid by a heavy-duty geotextile fabric, which will extend from the seaward footing to the cliff face.

The boulder beaches will comprise of a single layer of angular, quarried boulders, with diameters ranging from 900 to 1100mm diameter and the voids filled with 400 to 600mm diameter rock. Although this is a lower standard than the two layers which is normally used for protection of ports, marinas or other vulnerable coastal facilities, SWDC has reported the boulder beaches utilising this design have functioned satisfactorily in the past in these types of coastal locations. Stones and boulders for the construction of the boulder beaches will be placed directly by heavy earthmoving equipment. It is not proposed to place imported material in the coastal marine area unless it is contained within, or is a part of the proposed structure.

The boulder beach will be recessed at the seaward margin with the toe trenched at least 1 metre into the underlying beach to prevent failure of the structure through undermining. The rock protection will be placed at a slope of 2H to 1 V so the total height above sea level will build to approximately 1 to 3m in height depending on the nature of the affected coast line (i.e. height of adjacent land to be protected). The slope of the face of the boulder beach structure (2:1) is such that access to the coast by able bodied persons is not prevented. Additionally as the boulder beaches are not continuous along the coastline, then access to the coast is feasible through unprotected parts of the shoreline. Access points will however be designed for boulder beaches that extend longer than 500 metres (the design of these access points is attached as Appendix I).

During construction, an even foundation will be excavated for the boulder beach structure. This will require the removal of gravel from the foreshore close to the base of the erosion area. The material that is removed will be spread out adjacent to the excavation area and therefore deposited back into the same coastal compartment it was originally located within.

The Landscape Assessment, contained in Appendix E of this report, recommends that 'feathering out' the boulders at the base of each slope and creating some variation in boulder beach profile and height will aid the integration of the boulder beaches into the wider coastal landscape. SWDC will incorporate these recommendations in the boulder beach construction.

The boulder beaches will be inspected on a regular basis, and after storm events. The extent of maintenance required would be assessed during these inspections. In most cases it may be deemed appropriate to replace some of the boulders that may have become dislodged from the structure.

Rock for the existing boulder beaches has been sourced from; the Belmont Hills in Lower Hutt, Linton and Taipo (near Castle Point). The source of future rock supply is likely to come from these sources, and will be determined by pricing.

3.4 Kupe's Sail

Kupe's Sail has been included in the subject area due to concerns of erosion raised during consultation with Kahungunu ki Wairarapa. The area of Kupe's Sail (shown in the planning maps in Appendix A) is identified as 'priority 2', however the 'boulder beach' method of coastal protection will not be used in this area, due to the geology of the site, and separate resource consent will be applied for. If works are deemed to be necessary in this location in the future, protection methods will be designed, with consultation with the public, the Department of Conservation, Iwi and GWRC.

It is recommended that a condition be placed on the consent that states that any coastal protection works that occur at Kupe's Sail, require consultation with the public, the Department of

Conservation, Iwi and GWRC and a landscape assessment be undertaken prior to the commencement of any works.

3.5 Boulder Storage Areas

There will need to be a number of boulder storage areas along the coastline in relatively close proximity to the areas requiring immediate works so that construction can be undertaken efficiently and to minimise truck movements along the road. There are currently a number of SWDC owned storage areas for construction materials; these are shown in Appendix A of this application. These existing storage areas will be utilised for this application.

3.6 Assessment of Alternative Options

The SWDC have considered a number of erosion protection alternatives to boulder beaches. These have included:

- 'Do nothing' option
- Relocation of the road to an inland route
- Beach nourishment
- Other 'hard structures' (i.e. sea walls)

The 'do nothing' option would mean maintaining the status quo. This would result in erosion of the shoreline and the continuation of threat to the road; thereby necessitating the continual shifting and servicing of the roads. Road repair works can have unpredictable delays for road users. If erosion is allowed to continue unabated, the result may be road closure and the loss of an important road connection. This is not considered a viable long-term solution.

The relocation of the roads to avoid the erosion threat would require an alternative inland road option to maintain access for people and communities to this area. This would be substantially more expensive and difficult, as it would require excavation and rebenching the full height of the cliff face, with significant adverse effects.

Beach nourishment would mean depositing sediment in the coastal marine area in an effect to provide a natural 'buffer' to coastal erosion. Beach nourishment is likely to be ineffective in this high wave energy area of the coast as any fine or medium grained beach nourishment material added is likely to be quickly lost off the beach through littoral drift and wave action. To be a long-term option material would be constantly required to be added to the beach at great financial cost and structures such as groynes would likely be required to minimise sediment movement off the beach. Due to the financial costs and requirements for additional structures this is therefore not considered a viable long-term solution.

Other 'hard' structures, such as sea-walls, are less preferred than boulder beaches as they are more visually and physically intrusive on the coastal marine area and many designs would result in end effect or beach lowering due to wave reflection.

Based on the expectation that historical erosion rates are likely to continue remedial action is required now to avoid more slumping of the road. Boulder beaches involve the placement of structures in the coastal marine area which are not naturally there. However, boulders are natural materials present along the South Wairarapa coast and they can be placed and removed on a reasonably flexible basis. The installation of the boulder beaches is not a lengthy process, and can be done in stages as required. This will minimise environmental effects.

SWDC considers that the boulder beaches would result in the least disruptive, more effective, and the most financially viable long-term option available.

Section 3.1 of the Landscape Assessment (included in Appendix E) assesses these alternative options and concludes that the boulder beach option is a practical and visually unobtrusive option.

4 Statutory Assessment

The following section provides an assessment of the relevant legislation, policy statements and plans for this application.

4.1 Resource Management Act 1991 (RMA)

4.1.1 Part II

Section 5 of the RMA sets out the overall purpose of the Act that promotes the sustainable management of natural and physical resources. Sustainable management is defined in section 5 (2) and includes managing the development of natural and physical resources in a way that enables people and communities to provide for their economic, social and cultural well being and for their health and safety while *inter alia* avoiding, remedying or mitigating adverse effects.

The proposed coastal protection works (boulder beach installation and maintenance) seek to ensure that the economic, social and cultural wellbeing of people and communities is provided for, in terms of allowing people to have continued access to the coast, as well as ensuring that access to the rest of the North Island through the important road link is maintained.

Section 6 of the RMA sets out matters of national importance that must be recognised and provided for. This list includes;

- “ (a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development... ”*
- (d) The maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:.*
- (e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga... ”*

Boulders occur naturally in the environment, and given the topography and lithology of the subject area, the boulder beaches would not detract from the natural character of the area to a significant degree. Public access is discussed under section 6.3 of this report.

Tangata whenua have been consulted as part of the preparation of this consent application to seek their views consistent with Section 6(e) of the RMA (see Section 7 of this report).

Section 7 of the RMA provides a list of further matters that particular regard must be given to. Those of relevance are:

- “... (b) The efficient use and development of natural and physical resources... ”*
- (c) The maintenance and enhancement of amenity values,*
- (d) Intrinsic values of ecosystems... ”*
- (f) Maintenance and enhancement of the quality of the environment... ”*

The proposed activity provides for the installation and maintenance of boulder beaches on an already eroding coastline. By developing the boulder beaches other physical and natural resources can be preserved (for example the road connection). The boulder beaches are considered to be a more suitable approach to protecting the coast than other methods (see Section 3.6) and are designed to allow for continued use of the coast in this area.

4.1.2 Section 12 - Restrictions on use of coastal marine area

Consent for the proposal is required under Section 12(1)(a), (b), (c) and (d) and 12(2)(a) of the RMA.

- “(1) No person may, in the coastal marine area, -
- a) Reclaim or drain any foreshore or seabed; or
 - b) Erect, reconstruct, place, alter, extend, remove, or demolish any structure or any part of a structure that is fixed in, on, under, or over any foreshore or seabed;
 - c) Disturb any foreshore or seabed (including by excavating, drilling or tunnelling) in a manner that has or is likely to have an adverse effect on the foreshore or seabed
 - d) Deposit in, on, or under any foreshore or seabed any substance in a manner that has or is likely to have an adverse effect on the foreshore or seabed; or
 - e) Destroy, damage, or disturb any foreshore or seabed (other than for the purpose of lawfully harvesting any plant or animal) in a manner that has or is likely to have an adverse effect on plants or animals or their habitat; or
 - f) Introduce or plant any exotic or introduced plant in, on, or under the foreshore or seabed; or
 - g) Destroy, damage, or disturb any foreshore or seabed in a manner that has or is likely to have adverse effect on plants or animals or their habitat;
- (2) No person may, in relation to land of the Crown in the coastal marine area, or land in the coastal marine area vested in the regional council, -
- a) Occupy any part of the coastal marine area;
 - b) Remove any sand, shingle, shell or other natural material from the land

Unless expressly allowed to do so by a rule in a regional coastal plan.”

4.1.3 Section 104 – Matters to be Considered

Section 104 Consideration of applications

- “(1) Subject to Part II, when considering an application for a resource consent and any submissions received, the consent authority shall have regard to
- (a) Any actual and potential effects on the environment of allowing the activity; and
 - (b) Any relevant regulations; and
 - (c) Any relevant national policy statement, New Zealand coastal policy statement, regional policy statement, and proposed regional policy statement; and
 - (d) Any relevant objectives, policies, rules or other provisions of a plan or proposed plan; and
 - (e) Any relevant district plan or proposed district plan, where the application is made in accordance with a regional plan; and
 - (f) Any relevant regional plan or proposed plan, where the application is made in accordance with a district plan; and

- (g) *Any relevant water conservation order or draft water conservation order; and*
 - (h) *Any relevant designations or heritage orders or relevant requirements for designations or heritage orders; and*
 - (i) *Any other matters the consent authority considers relevant and reasonably necessary to determine the application.*
- (2) *When forming an opinion for the purposes of subsection (1)(a), a consent authority must have regard to the value of the investment of the existing consent holder.*
- (4) *Without limiting subsections (1) and (3), when considering an application for a coastal permit, a consent authority shall have regard to –*
- (a) *Any relevant policy stated in a New Zealand coastal policy statement in respect of the crown’s interests in land of the Crown in the coastal marine area; and*
 - (b) *Any relevant provision included in the appropriate regional coastal plan to implement that policy”.*

The remainder of this section considers the relevant policies and objectives of relevant plans and Section 6 of this report contains an assessment of environmental effects.

Section 104B – Determination of applications for discretionary or non-complying activities

Overall the application for resource consent will be assessed as a Discretionary Activity in terms of matters listed in section 104B. Section 104B of the RMA states that when considering an application for resource consent for a Discretionary Activity, a consent authority –

- “(a) May grant or refuse the application; and*
- (b) if it grants the application, may impose conditions on the consent under section 108.”*

4.1.4 Section 117 – Application to carry out a Restricted Coastal Activity

The proposal involves the reclamation, erection, occupation, disturbance, and deposition of the CMA. In accordance with Rules 1, 18, 37 and 46 of the Wellington Regional Coastal Plan, the proposal is considered a Restricted Coastal Activity. Therefore Section 117 of the RMA is relevant to this application.

4.2 New Zealand Coastal Policy Statement

The New Zealand Coastal Policy Statement (NZCPS) guides local authorities in the day-to-day management of the coastal environment. The NZCPS identifies national priorities for the preservation of the natural character of the coastal environment. It is noted that the NZCPS is currently under review. The following section considers both the operative (1994) and proposed (2008) NZCPS in regards to this application for resource consent. However, it is noted that weight should be given to the operative NZCPS in assessing the application.

4.2.1 The Operative NZCPS 1994

The current NZCPS was made operative in 1994.

Chapter 1 of the NZCPS states that it is a national priority to preserve the natural character of the coastal environment, including protection from inappropriate subdivision, use and development. Policy 1.1.4 and 1.1.5 are of particular relevance to this application.

Policy 1.1.4 seeks to protect the integrity, functioning, and resilience of the coastal environment. The boulder beaches will impact on the natural movements and dynamics of the coast, however the boulder beaches will act as a barrier to wave attack of the coastline, thereby minimising the erosion hazard.

Policy 1.1.5 identifies that it is a national priority to restore and rehabilitate the natural character of the coastal environment where appropriate. The boulder beaches have been selected as the most appropriate coastal protection option that also have relatively minor adverse effects on the natural character of the environment as they are constructed using a natural material and are visually consistent with other coastal protection structures along this stretch of coastline.

Chapter 1 of the NZCPS advocates for appropriate use of the coastal environment, protection of significant habitats and indigenous fauna. The application avoids a number of areas that are ecologically significant. Boulder beaches will only be constructed where deemed necessary, and where erosion is threatening infrastructure (such as the road).

Chapter 2 of the NZCPS seeks to protect the characteristics of the coastal environment of special value to the tangata whenua. Through consultation with tangata whenua this application seeks to protect and make provision for the characteristics of the coastal environment of special value to minimise the effects on their cultural, spiritual and traditional value. Section 7 of this report discusses consultation with tangata whenua.

Chapter 3 of the NZCPS outlines policies for activities involving the subdivision, use or development of areas of the coastal environment. These policies outline how the use of the coast should not be allowed to have significant adverse effects on the coastal environment, amenity values, nor on the safety of the public nor on the enjoyment of the coast by the public. Chapter 3 outlines that where complete avoidance of adverse effects is not practicable, the adverse effects should be mitigated. Chapter 3 also discusses the cumulative effects of activities and requires that they are not adverse to a significant degree. As discussed in Section 3.5 this report, an assessment of alternative options has been undertaken and it is deemed that works to decrease the effects of coastal erosion on roading infrastructure are necessary and that the boulder beach option would have less significant effects on the environment than some other options could have. Section 5 of this report discusses the potential environmental effects from the proposal and methods to mitigate any significant adverse effects.

Schedule 1 of the NZCPS states the circumstances in which activities that will have a significant or irreversible adverse effect on the coastal marine area will be made restricted coastal activities. The proposed activity is a **restricted coastal activity** in terms of;

- S1.1(c) Reclamation; as the reclamation of the coastal marine area will exceed 1 hectare, will extend more than 100 metres;
- S1.3(c) Structures in the coastal marine area more or less parallel to mean high water springs; as the structures are solid and once constructed will extend 300 metres or more in length more or less parallel to the line of mean high water springs;
- S1.6(b) Disturbance of the foreshore and seabed; as the removal of sand, shingle and sand could exceed volumes of 50,000 cubic metres, could be extracted from areas greater than or equal to 4 hectares, and could potentially extend 1000 metres or more over foreshore and seabed once all works have been completed;
- S1.7(c) Depositing substances in the coastal marine area; as deposition could involve the deposition of material on the foreshore and seabed in quantities greater than 50,000 cubic metres in any 12 month period.

4.2.2 Proposed NZCPS 2008

The proposed NZCPS sets out objectives and policies which provide for the protection of natural and physical resources, sustainable management of the coastal environment, preservation of the natural character of the coast, Treaty of Waitangi considerations, characteristics of special value to tangata whenua, recognition of the coastal marine area as a public space. It is noted that policies relating to the 'Subdivision, Use, and Development' of the coastal marine area are largely delegated to local authorities through provisions in policy statements and plans.

Schedule 1 of the proposed NZCPS also states the circumstances in which activities that will have a significant or irreversible adverse effect on the coastal marine area will be considered **restricted coastal activities in terms of;**

- S1.1 (a) and (b) Reclamation; as the reclamation of the coastal marine area will exceed 1 hectare, will extend more than 100 metres;
- S1.3(a) Structures in the coastal marine area more or less parallel to mean high water springs; as the structures are solid and will extend 100 metres or more in length more or less parallel to the line of mean high water springs;
- S1.6(a) Disturbance of the foreshore and seabed; as the removal of sand, shingle and sand could exceed volumes of 50,000 cubic metres, could be extracted from areas greater than or equal to 4 hectares, and could potentially extend 1000 metres or more over foreshore and seabed;
- S1.7(a) Depositing substances in the coastal marine area; as deposition could involve the deposition of material on the foreshore and seabed in quantities greater than 50,000 cubic metres in any 12 month period.

In this regard the proposed provisions are the same as the operative NZCPS except for the length of structures parallel to the shore that trigger an RCA (i.e. 100 metres as opposed to 300m currently provided for in the NZCPS). The proposed NZCPS has been publicly notified for submissions and a board of inquiry appointed to provide a recommendation to the Minister on the proposed NZCPS.

4.3 Wellington Regional Policy Statement

4.3.1 Operative Regional Policy Statement (1995)

The Wellington Regional Policy Statement (RPS) became operative in May 1995. The RPS contains policies on the region's environment.

The RPS is consistent with the NZCPS. There are a number of policies within the RPS relating to the natural character, use, development and access to the coast. These policies paraphrase the relevant Part II provisions of the RMA. The policies that are considered most relevant are those in Chapter 7 "The Coastal Environment".

Relevant objectives relate to preserving natural character, managing subdivision, use and development, enhancing public access and having opportunities for the aspirations of tangata whenua to be met.

Relevant policies relate to protecting nationally or regionally significant indigenous vegetation and significant habitats for indigenous fauna, nationally or regionally outstanding landscapes, seascapes, geological features, landforms, sand dunes and beach systems and sites of historical or cultural significance. Policies also relate to the protection of sensitive, rare or unusual natural and physical resources, habitats, amenity values and ecosystems, coastal wetlands, mangroves and dunes.

“Cape Palliser (Haurangi State Forest Park)” is listed as a site of “regional significance for indigenous vegetation or significant habitat for indigenous fauna”. This area will not be affected by the boulder beaches.

“Cape Palliser, including the lighthouse, “Kupe’s Sails” and views of the South Island” is listed as a landscape/seascape of National or Regional Significance. Section 3.4 of this report discusses Kupe’s Sail.

The proposed boulder beaches seek to protect the roading infrastructure and thus the ability for the public to access these sites of regional significance.

4.3.2 Draft Wellington Regional Policy Statement (2008)

The Greater Wellington Regional Council has released their draft Regional Policy Statement. Public consultation closed on May 16 2008.

The Coastal Environment section (2.2) is the most relevant to this application. The objectives of that section seek to protect nationally and regionally significant areas, preserve the natural character of the coastal environment, restore degraded areas, protect physical and ecological processes, and enhance public access.

The subject area includes four sites of regional significance:

- Hurupi Miocene transgressive sequence diverse macrofauna (site 42) which has geological significance; *“The Hurupi Miocene transgressive sequence (nonmarine Putangirua conglomerate, Hurupi formation fossiliferous shelf sandstone and siltstone, and Bells Creek bathyal mudstone) is well exposed at Putangirua. These sediments were eroded from the flanks of the Aorangi Ranges and eventually submerged beneath rising seas. Uplifted and once again exposed to sub-aerial weathering and erosion, especially with anthropogenic vegetation removal, ‘badlands’ erosion as resulted. The finer sediments are easily removed by erosive rainfall and runoff, but the larger sediments or resistant layers provide a cap protecting sediment beneath. Erosion proceeds to either side, leaving prominent pinnacles, also known as ‘hoodoos’. The fluting patterns on the side of many of these pinnacles are the result of rainwater running down their sides. This phase of gulying began some 1,000 years ago, and the main gully here is some 80–90 m deep and has almost incised to the level of the underlying greywacke.”*
- Whatarangi Bluff Miocene sandstone (site 43) which has landscape values and geological values; *“Landscape values: Whatarangi Bluff is a very prominent and distinctive coastal landform because of the strong contrast with its setting. Its prominence is enhanced due to the road that passes through it — the steep eroding bluffs towering above the road and down to the sea. The bluffs provide a threshold between the uplifted marine platforms above Lake Ferry and the more expansive wide coastal platform that extends from Whatarangi settlement to Ngawi. Geological values: The Whatarangi Bluff is an extensively eroded 80,000 year old marine terrace. The Whatarangi Bluff Miocene sandstone — fossiliferous massive grey muddy sandstone is capped by gravels. Where these gravels have been removed, fluvial erosion has been able to rapidly incise the soft and erodable sandstone. Fossils include Glycymerita (Manaia) hurupiensis, Eumarcia (Atamarcia) thomsoni, Dosinia cottoni, Lamprodomina neozelanica, Cominella hendersoni, Zeacolpus taranakiensis, Dentalium solidum, Crepidula radiata, and Struthiolaria (Callusaria) callosa.”*
- Te Humenga Point (includes dune system) (site 44) which has ecological values; *“The point is an area of extensive gravel dunes and sandfields with complex variety of grasslands, shrublands, and vinelands dominated by uncommon indigenous vegetation species. Just south of Te Humenga Point is a mosaic of dune blowouts with areas of spinifex, pingao, and unusual rushland species. This dune system is considered nationally significant. The wider area is considered a regionally representative example of uncommon vegetation communities on a wide range of relatively unmodified dune systems, sandfields, and gravelfields amongst rock outcrops. A range of threatened plant communities of the Wellington region can be found on the beaches,*

dunes, and coastal escarpments of Te Humenga Point. The area provides habitat for threatened fauna, including the endangered katipo spider, the rare moth *Notoreas* "Wellington", green gecko, and the spotted skink."

- Cape Palliser coastline from Mangatoetoe stream mouth to Te Rakauwhakamataku Point (site 45) which has landscape, ecology, geology and historic heritage values; "Landscape values: This is a visually dramatic stretch of coastline characterised by near vertical bluffs backing narrow beaches and rock platforms. The distinctive bluff known as 'Kupe's sail', Ngapotiki Fan, Nga ra A Kupe dune system, and the Cape Palliser Lighthouse are significant landscape features. The landscape has a high degree of distinctiveness and diversity including variation in rocky land cover, and the colour and texture associated with the seasonal change of vegetation. The area around the lighthouse has a high level of natural character with few built structures and a predominance of natural processes and elements. The Aorangi Ranges form a distinctive backdrop to the lighthouse and Kupe's Sail.

Ecological values: The cape here is a diverse rocky coastline with regionally significant sand dune systems and nationally important stands of two rare plants, the rare endemic grass *Rytidosperma petrosum* and pingao. The Te Kawakawa Rocks near Cape Palliser are also home to *Muehlenbeckia ephedroides* and the wider area is a substantial fur seal haulout. Common geckos and common skinks also occur in the area. The area is contiguous with Aorangi Forest Park and associated Matakītiki Trust covenant, and forms an important coastal component of this larger protected area with a range of coastal vegetation associations on varying landforms. The area includes good examples of regionally uncommon vegetation communities, including rockland with indigenous herbfIELDS, reedland on coastal terraces, and stonefields with unique successional examples of ground herbs. Habitat for rare flora and threatened fauna.

Geological values: Cape Palliser is comprised of volcanic 'pillow lava', formed in an undersea eruption more than 100 million years ago. It remains because it is harder than the older greywacke that forms the hills. The lava incorporates a rock called chert, formed from microscopic *Radiolaria*. These organisms have silicate skeletons, which can be used to establish the age of the rocks. The narrow coastal strip comprises gravels delivered by streams draining the Aorangi Ranges or from nearby marine terraces, with only occasional basement outcrops. Comparison of elevations of terraces (marine benches) on the eastern flank of Cape Palliser (White Rock) with elevations of similar age terraces elsewhere implies that folding is occurring. Kupe's Sail is a slab of sandstone, lying uncomfortably against much older greywacke. The fossiliferous sandstone was deposited over the greywacke in a shallow marine environment, some 15 million years ago. Subsequently, the strata have been faulted, tilted, and eroded to leave the steeply inclined fossiliferous sandstone exposed. Ngapotiki Fan is a superb and dramatic example of an alluvial fan. Coarse sediments, easily eroded from the steep coastal catchment, are deposited at the mouth of the stream, forming a conical landform known as a fan. The Ngapotiki Fan is actually an amalgamation of several of these depositional features. With its huge volume of sediment, the fan has extended some distance from the base of the hills. However, there is insufficient accommodation space on the narrow coastal fringe and the sea is actively eroding the base of the fan, implying that contemporary sediment supply may be lower than it has been in the past. The large volume of sediment is partly attributable to the highly erodible nature of the rocks. While anthropogenic removal of vegetation may have been a contributing factor, it cannot have been an ultimate cause as the fan is 1800 years old.

Historic heritage values: Cape Palliser features prominently in Maori history and the legends of Kupe. The area also features in the colonisation of New Zealand and the Wellington region — the rugged coast and notorious Cook Strait gales contributing to many early shipwrecks. In 1897, a ship was wrecked within 4 miles of the new tower and 12 of the 21 crew drowned. The light was lit for the first time in 1897, and the keepers were withdrawn in December 1986.

In terms of the effects on these environments; Site 42 and 43 are classified as 'priority 0'; meaning that no boulder beaches will be constructed on these sites. Site 44 and site 45 comprise of both 'priority 1' and 'priority 2' areas. Section 5 of this report discusses the potential effects on this application and mitigation measures.

4.4 Regional Coastal Plan for the Wellington Region (WRCP)

Policies from the RMA, NZCPS and the RPS are implemented through the WRCP (and other Wellington Regional and district plans). This plan applies to the CMA. The following provides an assessment of the relevant rules and an assessment of the application against the relevant provisions of the WRCP.

4.4.1 Assessment of Rules

The WRCP became operative in June 2000 and is the only Regional Plan of relevance to the proposed works. The following tables assess the relevant rules to this application.

It is noted that the area of Kupe's Sail in Planning Map 2K is an area of Important Conservation Value¹. Appendix 3 of the WRCP states that Cape Palliser, Kupe's Sail has value in terms of Geological formations of regional significance. Cape Palliser includes a regionally significant seal rookery and a red billed gull breeding colony.

Rule 1: Large Reclamations outside the Commercial Port Area

Standard	Comment/Compliance
<p>Any activity reclaiming foreshore or seabed outside the Commercial Port Area which:</p> <p>(1) equals or exceeds 1 hectare; or</p> <p>(2) extends 100 or more metres in any direction; or</p> <p>(3) is an incremental reclamation connected to or part of another reclamation which:</p> <ul style="list-style-type: none"> ■ was commenced or received a resource consent after 5 May 1994; and ■ the sum of the existing and proposed reclamations are equal to or exceed the dimensions in (1) and (2); and <p>(4) is proposed for an area of the coastal marine area outside any Area of Significant Conservation Value.</p>	<p>Construction of the boulder beaches requires reclamation as it is required to fill behind the structure to achieve the batter slope.</p> <p>The reclamation of the foreshore and seabed outside the Commercial Port Area will exceed more than 100 metres in any direction once boulder beaches are constructed.</p> <p>The proposed area is outside any Area of Significant Conservation Value.</p>

Therefore the reclamation associated with the works is classified as a Discretionary and Restricted Coastal Activity.

Rule 16: Occupation by structure of land of the Crown of any related part of the coastal marine area

Standard	Comment/Compliance
<p>The occupation by any lawful structure of any land of the Crown or any related part of the coastal marine area, is a Controlled Activity provided that activity complies with the terms listed below.</p> <p>Terms</p> <p>(1) The person responsible for the structure shall at all times throughout the period when the structure occupies land of the Crown or any related part of the coastal marine area, pay to the consent authority, on behalf of the Crown, any sum of money required to be paid by regulations made under section</p>	<p>The structures will be lawful once consented.</p> <p>The South Wairarapa District Council will comply with the required standards of Rule 16.</p> <p>Details on compliance with 14.2 are detailed in Section 6 of this application.</p>

¹ Area of Important Conservation Value means any area specified in Appendix 3.

360(1)(c) of the Act;
 (2) The activity shall comply with the general terms listed in section 14.2.

Therefore the on-going occupation of the CMA by the boulder beaches classified as a Controlled Activity.

Rule 18: Structures more or less parallel to mean high water springs

Standard	Comment/Compliance
<p>Any activity involving the erection of a structure or structures, other than a submarine or subaqueous cable:</p> <p>(1) which is solid (or presents a significant barrier to water or sediment movement); and</p> <p>(2) when established on the foreshore or seabed would extend more than 1000 metres in length, more or less parallel to the line of mean high water springs (including separate structures which incrementally total 1000 metres, or more contiguously); and</p> <p>(3) is proposed for an area of the coastal marine area outside any Area of Significant Conservation Value</p>	<p>The boulder beaches will be permanent structures that will provide a barrier to water and sediment movement.</p> <p>When the boulders are established they could extend for more than 1000 metres in length, more or less parallel to the line of mean high water springs.</p> <p>The proposed area is outside any Area of Significant Conservation Value.</p>

Therefore the proposed boulder beaches are classified as a Discretionary and Restricted Coastal Activity.

Rule 37: major disturbance of foreshore and seabed (excavate, drill, move, tunnel etc.), including any removal of sand, shall or shingle outside the Lambton Harbour Development Area, Commercial Port Area, Harbour Entrance or Hutt River Mouth

Standard	Comment/Compliance
<p>Any activity involving, in any 12 month period, disturbance, other than for maintenance dredging, of foreshore and seabed, including any removal of sand, shell or shingle, or other material:</p> <p>(1) in volumes greater than 50,000 cubic metres; or</p> <p>(2) extracted from areas equal to or greater than 4 hectares; or</p> <p>(3) extending 1000 metres or more over foreshore or seabed; and</p> <p>(4) proposed for an area of the coastal marine area outside any Area of Significant Conservation Value or outside the Commercial Port Area, Lambton Harbour Development Area, Harbour Entrance Area, or Hutt River mouth.</p>	<p>The installation of the boulder beaches will require disturbance of the foreshore and seabed, particularly for the excavation of an adequate foundation for the structure. This disturbance could extend for more than 1000 metres over the foreshore and seabed once all boulder beaches are constructed.</p> <p>The proposed area is outside any Area of Significant Conservation Value or outside the Commercial Port Area, Lambton Harbour Development Area, Harbour Entrance Area, or Hutt River mouth.</p>

Therefore the disturbance associated with construction of the boulder beaches is classified as a Discretionary and Restricted Coastal Activity.

Rule 46: Deposition of large volumes of substances

Standard	Comment/Compliance
Any activity involving the depositing of any material on any foreshore or seabed, (other than for beach nourishment as provided for by Rule 45) which is: (1) in quantities greater than 50,000 cubic metres in any 12 month period; and (2) is proposed for an area of the coastal marine area outside any Area of Significant Conservation Value;	The boulder beach installation could require the deposition of more than 50,000 cubic metres of boulder material in any 12 month period (depending on assessed urgency of works). The proposed area is outside any Area of Significant Conservation Value.

Therefore the deposition of materials for the boulder beaches is classified as a Discretionary and Restricted Coastal Activity.

4.4.2 Assessment of Objectives and Policies

The following section provides an assessment of the application against the objectives and policies in the WRCP that are of relevance to the proposed activities. Relevant objectives are considered to be Environmental 4.1.1-4.1.10, Tangata Whenua 4.1.13-4.1.17 and Management 4.1.18, 4.1.19, 4.1.21-4.1.25 and relevant policies are 4.2.1-4.2.5. The relevant objectives and policies are listed in full in Appendix G.

The matters raised in the objectives and policies are addressed in greater detail in the Assessment of Effects on the Environment, in Section 6 of this report.

In terms of the Environmental objectives; the boulder beaches seek to protect the roading infrastructure, which is an essential transportation route for people and communities along this section of the coast. By their nature, the boulder beaches will have some impact on the environment as they are intended to slow the natural coastal process of erosion of land behind. Public access and usage of the coast will be adversely impacted, particularly during the construction of the boulder beaches when access to the site by public is restricted completely as a safety precaution. However, it is noted that the boulder beaches will be designed to provide for public access wherever possible and will also have a positive effect on public access along the coast through the protection afforded to the road. The short-term adverse effect of public access restriction is therefore outweighed by the overall long term positive effect of protection of the road that provides public access along the shore and access points over the structure to the shore.

In terms of the Tangata Whenua and Management Objectives; consultation with tangata whenua and the public has been undertaken and this proposal has been tailored to address these groups. More details of the consultation that has been undertaken is given in section 7 of this report.

The boulder beaches are proposed to only be placed in areas of the coast where the erosion is significantly affecting the safety of the roads. Other areas of the coastline will remain unprotected and retain their natural state until such time that monitoring identifies coastal protection work is required due to risk to roading infrastructure or public safety.

The boulder beaches will affect the ecology of the coastal marine area in the immediate area of the structures. However as the coastal marine area is currently eroding away, ecology of the coast would be impacted anyway. It is noted that sections of the coast with significant ecology are not proposed for coastal protection (i.e. are Priority 0).

The purpose of protecting the coast is to ensure that the safety and wellbeing of communities along this section of the coast is safeguarded. The boulder beaches seek to protect the coast from

erosion, therefore it is deemed that the boulder beaches would be an appropriate use of the coastal marine area.

4.5 Wairarapa Coastal Strategy

The Wairarapa Coastal Strategy (“the Strategy”) provides a long-term vision for the Wairarapa coast and recommends actions that the community can take to achieve that vision. The Strategy, which was released in April 2004, is a non-statutory document that was developed in conjunction with the community. The Wairarapa Coastal Strategy Group (WCSG) prepared the strategy and consisted of a joint initiative between the Masterton, Carterton and South Wairarapa District Councils, Rangitaane o Wairarapa and Ngati Kahungunu o Wairarapa iwi, and Greater Wellington Regional Council.

In the Vision and Qualities section, the Strategy states;

“The Wairarapa Coast has a special feeling of wildness and naturalness due, in part, to the lack of seawalls and other protective structures. The presence and health of natural dune systems provide protection from erosion and can avoid the cost of hard engineering solutions.”

The “Land Use and Development” section of the strategy encourages appropriate development and recommends that the community be engaged in the decision making processes associated with coastal issues. Consultation has been undertaken as part of the preparation of this application and details are outlined in Section 6 of this report.

In the ‘Hazards’ section of the Strategy, coastal erosion is identified as a hazard, and the use of ‘soft’ engineering solutions is encouraged. Policy 2 states: “Adopt a hierarchical approach to manage the risk from natural hazards so that taking into consideration the social, economic, cultural and environmental costs, we: iii) Use “soft” engineering solutions such as dune restoration to mitigate against hazards, and, finally, iv) Limit the use of coastal “hard” protection measures to those areas where all other options have been exhausted and it is necessary to protect community infrastructure and/or public health and safety.”

This section includes a recommendation section that states; “Identify infrastructure that is at risk from natural hazards and alternative locations for this infrastructure. This land should be secured so that ‘retreat’ is available as a first option.”

The installation of the boulder beaches seeks to protect the key roading infrastructure for people and communities to access this coastal area. The ‘priority area’ approach seeks to address the areas which are at greatest need first. The use of boulder beaches are considered to be a ‘softer’ engineering option that some other options such as seawalls, or moving the roads inward from the coast. Soft options have been considered (see Section 3.6 of this report) and discounted in favour of the boulder beaches as they are considered the most appropriate coastal erosion protection in this location.

4.6 Proposed Wairarapa Combined District Plan

The Proposed Wairarapa Combined District Plan (the ‘District Plan’) is between the Masterton, Carterton and South Wairarapa District Councils. This District Plan was notified in August 2006.

Section 9 ‘Landscape’ includes the following relevant objective:

“Objective Lan1 – Outstanding Landscape & Natural Features To identify and protect the Wairarapa’s outstanding landscapes and natural features from the adverse effects of inappropriate subdivision, use and development.”

The proposed works seek to retain the natural features of the coast by decreasing the rate of erosion. It is considered that the works are seeking to protect the coast and land in this area.

Section 13 'Coastal Environment' sets out a number of objectives and policies for the coastal environment, including the following which are of relevance to this application;

"Objective CE1 – Natural Character- To protect the natural character of the coastal environment by ensuring use, subdivision and development maintains the comparatively undeveloped nature of the Wairarapa Coast..."

Policy (b) Manage the design, location and scale of subdivision and development in the identified coastal environment to ensure the special qualities and natural character of the coast are retained and adverse effects are avoided, remedied or mitigated, with priority given to avoiding effects....

(g) Ensure the provision of adequate infrastructure, services and onsite mitigation measures as subdivision, land use and development occurs."

"Objective CE2 – Coastal Settlements- To provide for further development at coastal settlements in a manner that maintains the distinctive character and amenity values of each settlement....

Policy (f) Ensure public facilities and infrastructure are provided to serve the needs of residents and visitors while being located and designed to retain the character of the settlements..."

"Objective CE3 – Public Access & Enjoyment- To facilitate public access to, and enjoyment of, the Wairarapa's coast and its margins in a manner that protects its natural character....

Policy(a) Recognise and provide for existing recreational activities on the coast and its margins that do not cause detrimental effects to the coastal environment."

The roading infrastructure in this area provides vital access for those living and visiting this coastal area. As previously stated the proposed boulder beaches provide a less intrusive method of coastal protection than some other alternatives (see section 3.6 of this report). Therefore the proposal seeks to preserve the natural character of the coast.

5 Assessment of Effects on the Environment

This assessment of effects on the environment looks at the aspects of the environment that will and could potentially be impacted through the installation of the boulder beaches.

5.1 Natural Character

Natural character is not defined in the RMA or in the NZCPS, however both recognise that preserving the natural character of the coast is a matter of national importance. Natural character can be thought of as the extent to which the naturally occurring ecology and/or physical processes of a place or resource remain intact. The degree of natural character will vary on a spectrum of naturalness from indigenous and pristine through to an extremely built environment. Although structures on the coast and other human induced changes can potentially reduce the natural character of an area, a place may retain some of its natural character even with structures in place.

Natural character is not an absolute concept, absolute preservation is not required in every case. When assessing the impacts on natural character it is important to consider the degree to which natural character is being compromised. The boulder beaches will alter the natural character of the coastline through the addition of an engineered structure to the coast. However, the use of naturally occurring materials (the boulders) and the use of a design to minimise effects on natural coastal processes will mitigate the natural character effects.

Boulders are natural features and while the proposed boulders for the boulder beaches do not naturally occur on this stretch of coast, the subject coastal section is already characterised by rocky beaches and cliffs and there are a number of existing boulder beaches in place. The overall effect of the boulder beaches on natural character of the area is therefore considered to be no more than minor.



Figure 1: Photograph showing rocky beach material, an existing boulder beach and cliffs along the coastline

Section 3.4.1 of the Landscape Assessment (Appendix E) covers Natural Character. The Landscape Assessment states that parts of the subject area have been significantly modified, but some parts of the coast still retain significant natural character and amenity value. The Landscape Assessment concludes that the given the obvious need for the project, and having assessed alternative coastal protection options, the boulder beaches would be the least visually significant method of achieving this.

5.2 Visual Amenity

The boulder beaches will potentially effect visual amenity as boulders do not naturally occur in this part of the coast and the structures will be visible from the coast, the top of cliffs and the adjacent road. The boulder beaches would also be visible from neighbouring residential properties.

Although boulder beaches comprise of natural materials, they are non-natural features in this location. However, it is noted that the boulder beaches will look similar to those already in place along the coastline and therefore provide for some visual consistency.

Over time, the proposed rock weathers to a grey colour, which will have the effect of appearing less conspicuous in the existing beach environment. The boulder beach structure will not be visually prominent or obtrusive in the overall landscape at this location, particularly in the areas backed by high cliffs.

The overall effect of the boulder beaches on the visual amenity of the coast is therefore considered to be no more than minor.



Figure 2: Photograph showing existing boulder beach material

The Landscape Assessment included as Appendix E includes a section on amenity under section 3.4.3. The Landscape Assessment also includes an Assessment of Visual Effects section (under section 4) which assesses areas in terms of how they will be visually affected by the boulders. The landscape architect has suggested a greater range of boulder beach profiles and heights that respond to the variable nature of the existing coastline, a 'feathering out' of the edges of the boulder beaches (included in section 5 of the assessment) which the SWDC will deploy in constructing the boulder beaches.

5.3 Public Access

The Landscape Assessment (included as Appendix E) outlines 4 'audiences' or users of the area of the proposed works. These audiences include:

- Recreational and commercial users of the ocean off the coast in Palliser Bay
- Users of the beaches along the coastline
- Those using Cape Palliser Road
- The owners of the bach residences scattered along the coast.

It is noted that the proposed boulder beaches will protect an important road connection and, in the absence of coastal protection, these road links may be threatened to the point of closure by on-going erosion. In this respect the boulder beaches have a positive effect on maintaining public access along the coast.

Structures placed along the coast have the potential to impede public access if not designed in a way that allows for access over the structure and if the structure extends into the CMA (reducing high tide access along the beach). The boulder beaches are designed in a way that the batter slope will allow access by able bodied persons access over the face of the structure to the coast. Climbing over rocks to access the coastline is common practice at many New Zealand beaches and the structures are therefore not considered a significant impediment to access to the coast. In addition, where the boulder bank extends further than 500m in any one direction, access points which will be made up of smaller boulders, will be included in the design of the structure to facilitate safe public access to the coast. An example of the design of these access points is contained in Appendix I.

The proposed staging and construction of boulder beaches in areas where there is a high risk caused by the erosion will mitigate, to some effect, the adverse effects on public access as there will be sections of the coast still accessible by the public. Access restrictions during construction will be temporary and are necessary to provide for the health and safety of the general public and to comply with OSH.

Overall it is considered that the beneficial effects on public access of protecting an important road connection is considered to outweigh the adverse effects of impeding public access to and along the coast in the locations of the boulder beaches, particularly noting the low level of existing public use of the coast in this location and the mitigation measures proposed.

5.4 Construction Impacts

Potential effects associated with construction relate to construction noise from machinery operating on the foreshore for periods of time, machinery movements on the foreshore damaging fauna and flora, potential contamination of coastal waters from construction machinery and construction traffic impeding access to the coast for periods of time. These effects are discussed in more detail below.

5.4.1 Construction Noise

Noise created during the construction is expected to be no more significant than that created during normal roadworks activity on the adjacent road. Noise will be limited to the construction periods and will comply with the standards for noise from activities located outside the Commercial Port Areas given in Section 14 of the WRCP.

It is therefore considered that there will be a no more than a minor noise effect from the proposed works.

5.4.2 Machinery Movements

Machinery movements in the CMA have the potential to disrupt and destroy biota living in the foreshore environment (particularly benthic fauna). The machinery will mostly work from the areas immediately adjacent to the proposed structures and therefore any effect on biota will be limited in extent. The proposed site for works is not identified as an Area of Conservation Value under the Wellington Regional Coastal Plan and there are no significant ecological habitats of note where boulder beaches are proposed to be constructed. The erosive and dynamic nature of this portion of the coast is such that there is limited opportunity for species to become established and this is the reason for a lack of significant fauna or flora in the location of the proposed structures. The disturbance caused by installation of the boulder beaches is limited to construction and therefore any disruption that may be caused would be short lived. It is noted that the boulder beaches themselves, once established, may support ecological communities by providing a sheltered habitat.

Overall it is therefore considered that there will be no more than minor effects from machinery movements in the CMA.

5.4.3 Construction Traffic

Construction traffic could create some disruptions to traffic flows on the adjacent roads. Standard safety procedures and traffic management will be undertaken to mitigate effects of construction traffic movement as far as is practicable.

5.4.4 Maintenance

Maintenance of structures may have potential effects similar to construction. The boulder beaches, once constructed, will require on-going maintenance. The placement of rock will require some maintenance to prevent the geotextile from being damaged. In the event that the geotextile does become damaged, replacement of the rock will be necessary to ensure maximum coastal erosion protection.

It has been SWDC experience that maintenance of the structures is infrequent and only required on a minor scale. Most maintenance is expected to involve the replacement of dislodged rocks back onto the face of the structure only. The effects of maintenance are therefore considered to be no more than minor.

5.5 Storage and Use of Hazardous Substances

The use of machinery within and adjacent to the CMA creates the potential for contamination to occur from fuel, oil and other compounds. To reduce the potential for these effects to occur, machinery will be refuelled at least 20 metres away from the CMA. If spills occur, remedial action will be taken immediately to contain the spill and clean up the site.

5.6 Coastal Processes

As boulder beaches create a physical barrier to the effects of waves and currents on land, they have the potential to cause a number of adverse effects on coastal processes. These are detailed below.

5.6.1 Foreshore Disturbance

During construction, an even foundation will be excavated for the boulder beach structure. This will require the removal of gravel from the foreshore close to the base of the erosion area. The material will be spread out adjacent to the excavation area to keep it within the same coastal compartment it was sought from. However, it is very likely that this material will be redistributed by storm wave action and/or entrained by littoral drift over time. This is a natural process and is not considered to be a more than minor effect. On-going monitoring of beach levels in front of the boulder beach will be undertaken to identify if there is significant lowering of the beach as a result of the structure.

5.6.2 Mitigation of Wave Action

The composition and batter slope of the boulder beach structure is likely to dissipate much of the wave energy at the coast. However, it is possible that there may be accelerated erosion at the lateral ends of the boulder beach, known as 'end effects'. The proposed design of the boulder beaches will include provision for 'tying in' of the ends of the structure with the coast to minimize end effect erosion. Regular maintenance checks will be necessary to monitor the need for repair of the structures to minimize end effect erosion. Maintenance and repair of structures in the coastal marine area is a permitted activity under Rule 6 of the Wellington Regional Coastal Plan provided the structure is not enlarged by more than 5% of its plan or cross-section area; or 5 metres in horizontal projection and 1 metre in vertical projection, or does not substantially change the external appearance of the structure. Therefore opportunity exists for slight modification to the structure if necessary as a permitted activity. Given the structure will be 'tied in' to the shoreline, it is not envisaged that any more than minor modifications to the structure would be necessary to minimize end effect erosion.

5.6.3 Coastal Dynamics (the following section has been taken from the Beca Report on Erosion 2000, attached as Appendix F)

Boulder beaches are a common feature of many rocky coastlines. They generally form at the base of sea cliffs and provide a protective buffer against wave attack. In essence, the potential energy carried away by the water that percolates into the beach results in a situation where the return flow of the backwash will be less competent flow than the up-rush of the swash. The main role of the backwash on a boulder beach is to remove finer material, thereby maintaining an armoured beach face characterized by high porosity. These dynamic characteristics of a boulder beach buffer the back-shore environment from direct wave attack, with consequent stability enhancement of the sea cliff or land behind.

Wave competence refers to the size of the largest entrained boulder as related to the wave hydraulics that caused the entrainment. The entrainment of boulders on a boulder beach is likely to arise during two regimes of wave energy. The first is a relatively low wave energy regime that occurs during periods of low wave height, and long wave period. For this regime, only a small proportion of the boulders comprising the beach are selectively entrained.

The main processes include:

- Erosion of the fine material
- Some boulder rounding due to impact fragmentation
- Some boulder smoothing due to abrasion.

The second regime occurs at a higher energy level associated with storm wave conditions. This high energy regime is characterized by a dynamic beach state where most, or all of the boulders shift position, or move in place, with the smaller boulders being rolled over or pushed-up slope. It is

possible that under breaking wave conditions, large over-turning movements develop on the blocks composing a quarry-stone structure, thereby resulting in the movement of individual stones.

The transformation from deep-water waves to final run-up of wave swash on the beach face is a complex process. As storm energy increases, incident waves continually break further offshore. On many gravel, cobble and boulder beaches, storm waves never reach the beach face during low tide. The energy is dissipated in the wide surf zone over the wave-cut terrace that exists at that tide level. In contrast, during high tide, and under similar storm intensity, waves initially break near the beach face separated by maybe one or two surf bores.

The existing beach will likely be altered completely post construction in several key respects:

- The textual composition of the boulder beach will be radically coarser than is the case for the existing beaches
- The boulder beaches will extend seawards into the active swash zone at low tide, and the breaking wave zone at high tide, thereby denying the seasonal summer accretion and winter recession which is an integral part of the beach sediment budget process
- Increments to the sediment budget obtained from accelerated erosion of the cliff face will be lost through rock armouring of this locality. It is possible that a consequence of this may be an acceleration of the erosion process elsewhere to compensate for losses to the sediment budget arising from ongoing littoral drift. Clearly there is already a net deficit of sediment supply to this section of the coastline from rivers and streams (See Section 1.1.1 of this report).
- A new equilibrium in terms of coastal dynamics post construction will be established, with the probability of transfer of accelerated erosion from this location to a point of lesser resistance beyond the protection works, possibly at the lateral ends of the structure (end effects).

It is important to note that coastal protection measures can affect adjacent or down-drift areas, and can worsen erosion problems in other areas. For this reason, the boulder beaches are proposed over a large section of the coastline and are designed to 'tie in' with unprotected sections of shoreline to minimize end effect erosion (see Section 5.6.2). Monitoring will occur along and beyond the specified area of this application to identify any effect and allow early remediation if necessary.

5.7 Cultural

Tangata whenua have been consulted as part of the preparation of this application. Consultation with Iwi has resulted in the extension of the subject area, due to the support of the application. Details of consultation with Iwi is outlined in greater detail in section 7 and Appendix H of this application.

5.8 Archaeological

There are a number of significant archaeological sites in the vicinity of the proposed works. There has been significant occupation in the Palliser Bay area as indicated by archaeological evidence consisting of pits, terraces, pa, stone walls, garden soils, karaka groves, middens and urupa. The area is highly significant to local Iwi and the archaeological community of New Zealand due to its history and the remains of pre European Maori horticulture. These sites are shown on the maps contained in Appendix J². It is recommended that a condition of consent be included that detailed

² We note that these maps provide an indication of archaeological sites only

archaeological assessments be undertaken prior to works commencing at each site of works, and if necessary archaeological authorities³ will be applied for.

5.9 Flora and Fauna

Potential effects on flora and fauna relate mainly to the construction of the boulder beaches. It is considered that there may be some disturbance of the benthic fauna/flora during construction works as the rock material is placed and machinery moves on the foreshore in the vicinity of the construction site. However, it is noted that the environment is naturally high energy and as a result, there is little significant flora or fauna present that would be impacted by construction activities.

Where considered necessary by the Greater Wellington Regional Council, specific management plans will be prepared to manage the effects on flora and fauna.

5.10 Water Quality

Any works in the CMA have the potential to cause water quality effects from disturbances of sediment and/or the release of contaminants. There is also the potential for construction material to enter the coastal marine area if the proposed structure has not been completed, particularly if storm conditions (with high wave run-up) are encountered when fill material is exposed or if litter and debris is left following construction activities.

To mitigate effects on water quality, the construction of the boulder beaches will be undertaken in a way that finer fill material is not left exposed during high tide periods. Geotextile material will be secured in place to minimise any release of material or sediments to the CMA. All litter, debris and other such waste or extraneous material used during construction will be disposed of in an appropriate manner outside of the CMA.

Wherever possible, construction and maintenance works will be undertaken within the CMA during low tide periods to minimise water quality effects. In any case, as it is a high energy environment, any contaminants that may reach the water will be quickly dissipated through natural tidal flushing.

It is therefore considered that water quality effects will be no more than minor.

5.11 Navigation Effects

Structures in the CMA have the potential to impact on navigation, particularly if they extend past the low tide mark or into channels.

Although the proposed boulder beaches will extend down to the low tide mark, they will not impact on any navigational movements and will not impede any boat launching access to the CMA.

If Greater Wellington Regional Council consider it necessary, the Hydrographer of the Royal New Zealand Navy will be notified of the reclamation at the time consent is granted, at commencement of the work, and when the reclamation is completed.

It is therefore considered that there will be no adverse effects on navigation.

³ An Archaeological Authority is from the New Zealand Historic Places Trust, which must be obtained if work that may affect an archaeological site is going to occur.

5.12 Summary of Effects on the Environment

As discussed above, the main adverse effects expected from the proposed works is the impact on public access and natural character/amenity effects. In this respect, the boulder beaches have been designed to minimise effects as far as practicable, including providing for public access points along strategic sections of the coast and where the structure extends for more than 500 metres in any one direction.

In general, the above assessment of environmental effects show that the proposed coastal protection works can be undertaken in a way that the adverse effects on the environment are avoided, remedied or mitigated.

6 Consultation and Public Notification

Section 117(3) of the RMA states that applications for Restricted Coastal Activities will be publicly notified by the Regional Council. This application will therefore be publicly notified as it contains aspects that are considered to be Restricted Coastal Activities.

The consultation for this application has therefore been focused to the key stakeholders only. Consultation that has been undertaken and the results of that consultation are discussed further below. Appendix H contains some of the consultation material.

6.1 Greater Wellington Regional Council (GWRC)

Meetings have been held with GWRC, who are aware of this proposal, and the need for this proposal. GWRC staff have confirmed the consents required for the proposed works. Grant Kneebone has undertaken a site visit with both SWDC and Beca representatives to assess the areas in need of works and also the staged approach that this proposal is seeking.

6.2 Department of Conservation

The Department of Conservation has expressed some concerns with particular areas of ecological significance. To mitigate the Department of Conservation's concerns these areas have been allocated "priority zero" status, and no works will occur in these areas. The maps in Appendix A show areas identified by DoC as having ecological significance.

6.3 Tangata Whenua

Consultation has been undertaken with the relevant Iwi, being Rangitane O Wairarapa and Kahungunu ki Wairarapa. Both Iwi groups supported the proposal. The consultation feedback form of Rangitane O Wairarapa and minutes from the meeting between representatives from Beca, SWDC and Kahungunu ki Wairarapa are included in Appendix H. Consultation with Kahungunu ki Wairarapa was held on Monday 1 December 2008, and resulted in an extension of the proposed area of works, around past Kupe's Sail to the end of the Road. The reason for the extension is Kahungunu ki Wairarapa's desire to protect significant cultural sites in that location. As previously stated in this report, the area of Kupe's Sail has been allocated 'priority 2' status and the method of coastal protection will be different to the proposed boulder beaches to minimize visual effects, a condition is recommended on the consent stating that a landscape assessment would be required for any future works proposed in this area.

6.4 New Zealand Historic Places Trust

Preliminary discussions have occurred with New Zealand Historic Places Trust (NZHPT), who have recommended that archeological assessments be undertaken along the coast. Archeological authorities may also be required along the coast. The NZHPT will be contacted and informed of works prior to the commencement of any works along any section of the coast, and a full archaeological assessment undertaken of any works proposed. This assessment will be submitted to NZHPT, and a resource consent condition will be proposed to define this process.

6.5 Land Owners

A meeting was held with landowners of properties along this section of the coast at the SWDC chambers on Monday the 6th of October 2008. Representatives from Beca and SWDC presented information and answered questions at this meeting. This meeting was held to inform landowners of what was being proposed and also to gather opinions on the proposal. The landowners that

attended meetings were in general support of this application. A number of landowners were seeking to protect their properties by way of boulder beaches anyway.

Minutes from the meeting are included in Appendix H.

6.6 General Public

A meeting for the 'general public' was held on Saturday the 11th of October 2008 at the Ngawi Fire Station. This meeting consisted of Beca and SWDC representatives. The purpose of the meeting was to provide information to interested members of the general public. 1 person attended the meeting and no significant concerns were raised regarding the proposal.

7 Conclusion

This application for coastal permit for boulder beaches along sections of Cape Palliser Road seeks to address the coastal erosion problem occurring along this 25km long section of the coast. The proposed boulder beaches will not stop the coastal erosion problem occurring, however they can assist in decreasing the effect of erosion of land behind. By minimising erosion of the land the erosion hazard is avoided and the cost of remedial works of key infrastructure (e.g. the roads) is reduced. The protection of the key road also provides for the long-term access along this stretch of the coast.

The proposed activity is a discretionary and restricted coastal activity in terms of Rules 1, 18, 37 and 46 and a controlled activity in terms of Rule 16 of the WRCP. Having considered the existing environment we consider that these coastal protection works are necessary and would have a significant positive impact on decreasing the rate of erosion occurring along this section of the coast. The proposal is generally consistent with the objectives and policies of all relevant statutory considerations.

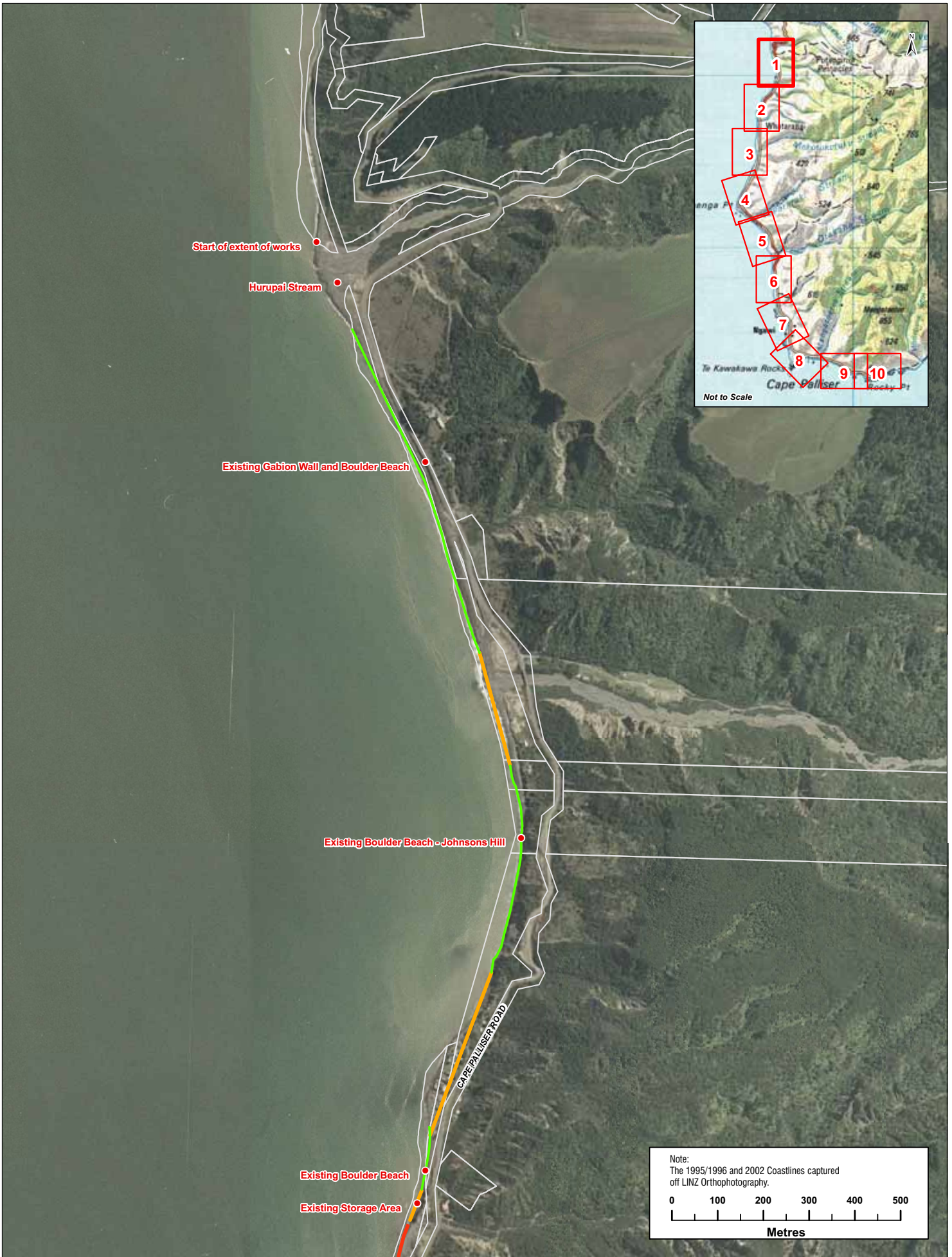
The assessment of effects on the environment for the boulder beaches along sections of the coast at Cape Palliser Road has shown that the potential effects can be avoided, remedied or mitigated. Consultation with the public and Iwi groups has indicated a positive response to the proposal. Concerns raised by the Department of Conservation have been mitigated through avoidance of areas of ecological significance.

It is therefore considered appropriate for the Greater Wellington Regional Council to grant coastal permit for coastal protection works to occur in accordance with this proposal along Cape Palliser Road.

Appendix A

Maps





Note:
The 1995/1996 and 2002 Coastlines captured
off LINZ Orthophotography.

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Metres

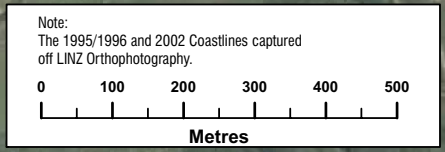
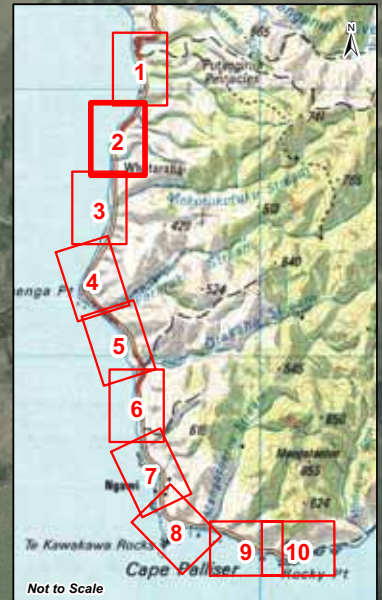
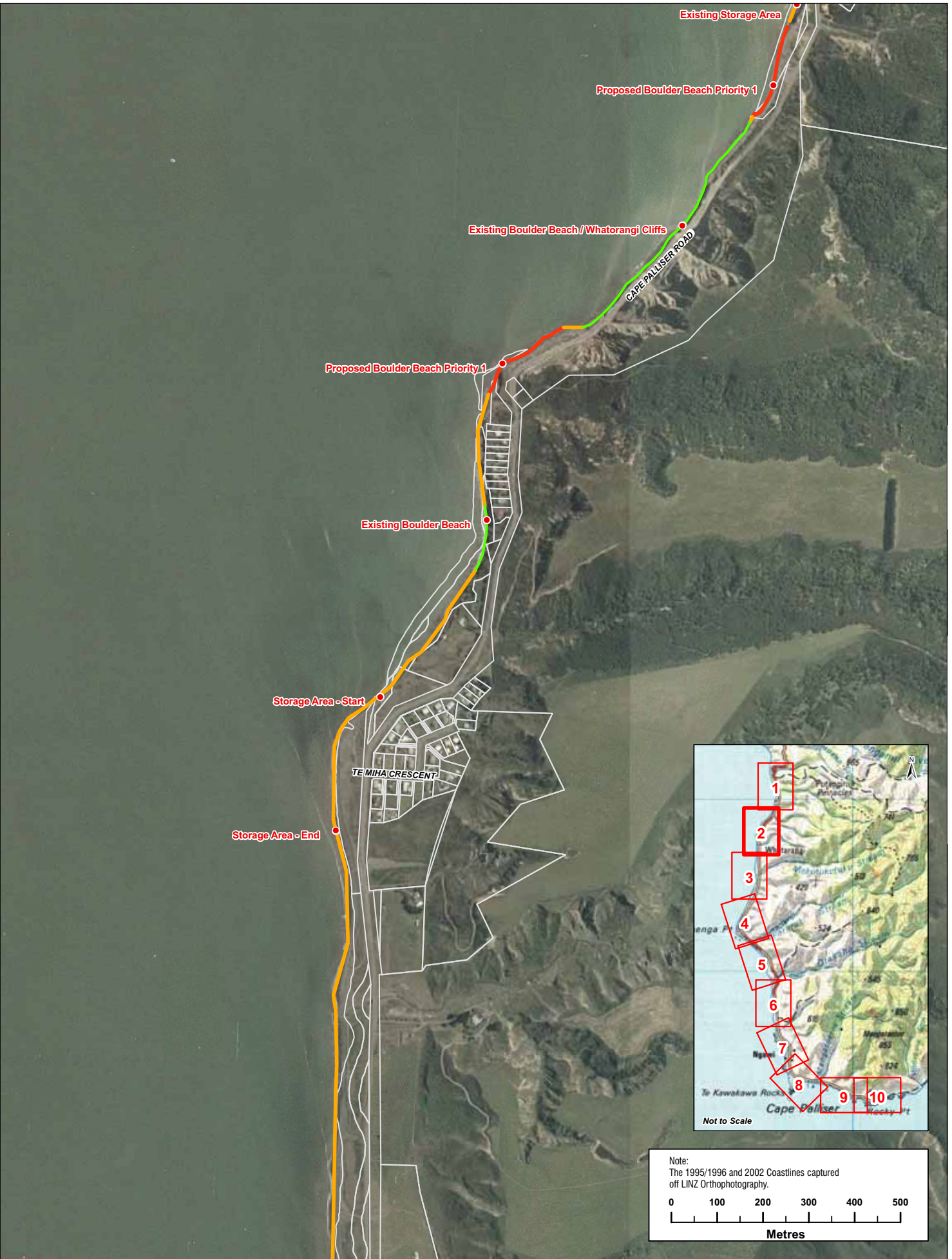
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Scale may be incorrect when printed.



**SWDC Coastal Consents
Priority Rating
Map 1 of 10**

- Legend**
- Existing Boulder Beach
 - Priority 0
 - Priority 1
 - Priority 2
 - Parcel Boundary





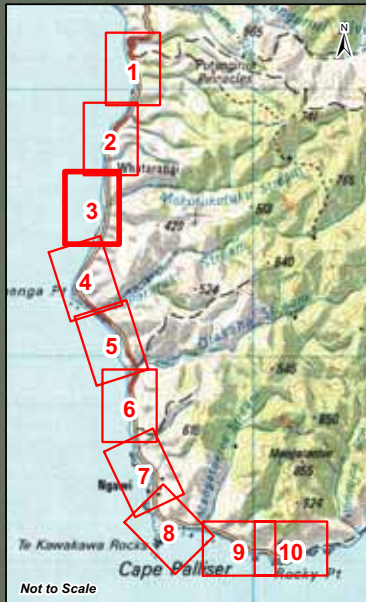
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SWDC Coastal Consents Priority Rating Map 2 of 10

- Legend**
- Existing Boulder Beach
 - Priority 0
 - Priority 1
 - Priority 2
 - Parcel Boundary





Note:
The 1995/1996 and 2002 Coastlines captured
off LINZ Orthophotography.

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Metres



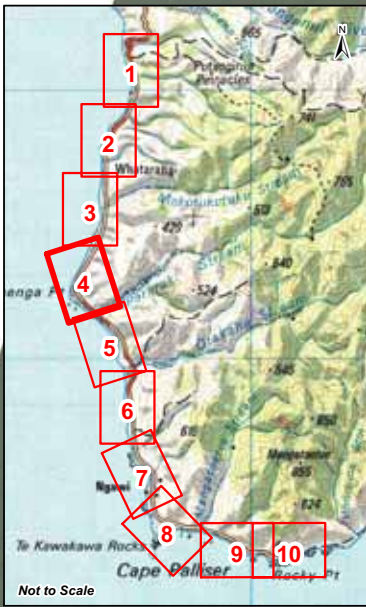
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**SWDC Coastal Consents
Priority Rating
Map 3 of 10**

- Legend**
- Existing Boulder Beach
 - Priority 0
 - Priority 1
 - Priority 2
 - Parcel Boundary





Not to Scale



Note:
The 1995/1996 and 2002 Coastlines captured off LINZ Orthophotography.

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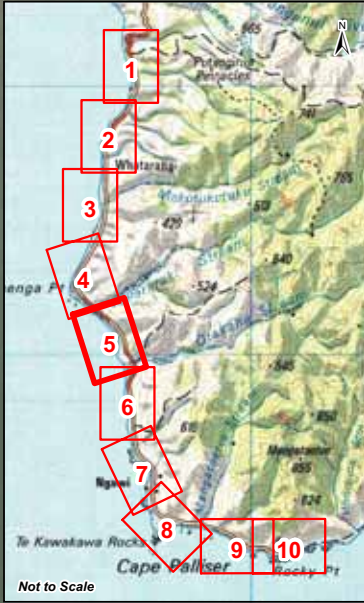


**SWDC Coastal Consents
Priority Rating
Map 4 of 10**

Legend

- Existing Boulder Beach
- Priority 0
- Priority 1
- Parcel Boundary





Note:
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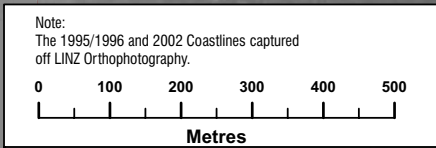
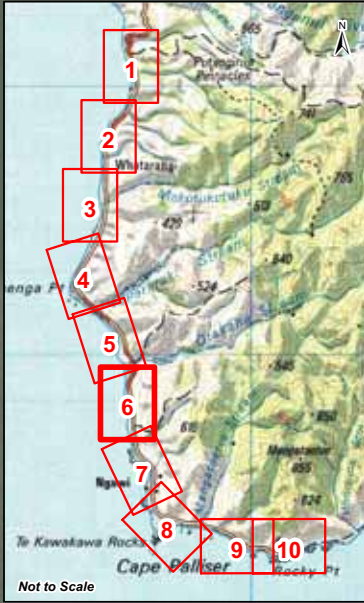
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SWDC Coastal Consents Priority Rating Map 5 of 10

- Legend**
- Existing Boulder Beach
 - Priority 0
 - Priority 1
 - Priority 2
 - Parcel Boundary





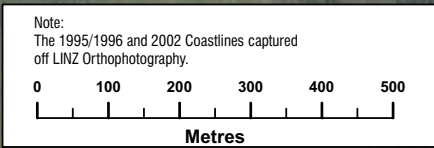
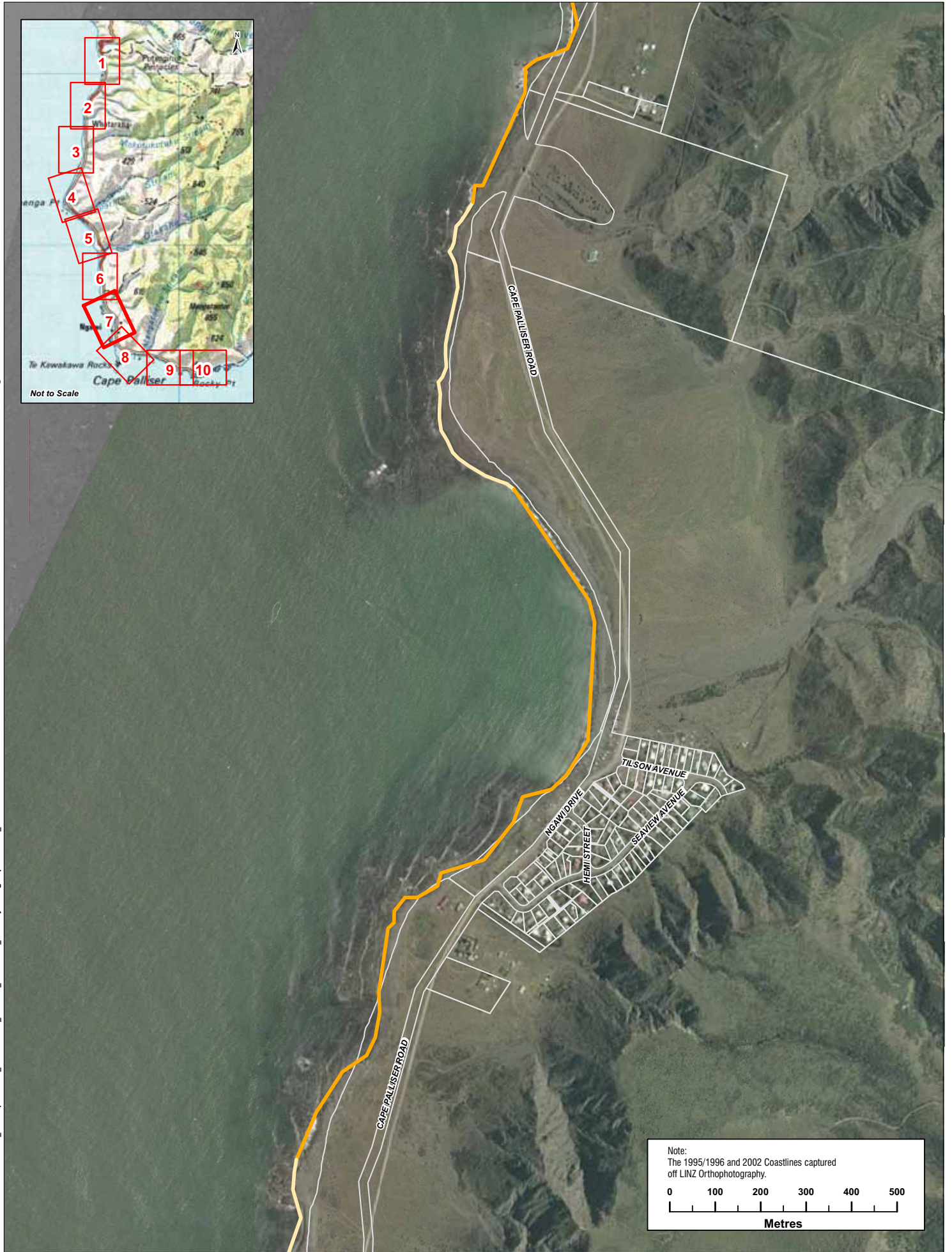
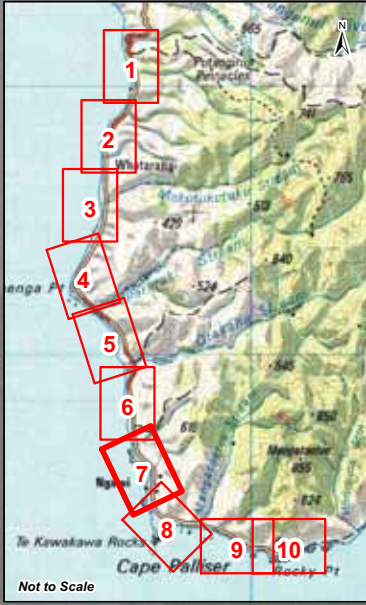
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SWDC Coastal Consents
Priority Rating
Map 6 of 10

- Legend**
- Existing Boulder Beach
 - Priority 0
 - Priority 1
 - Priority 2
 - Parcel Boundary





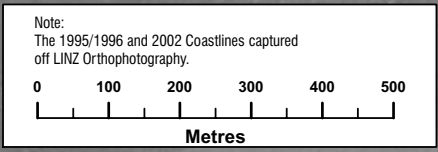
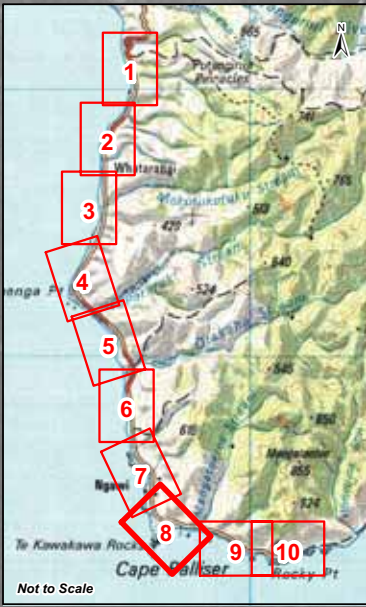
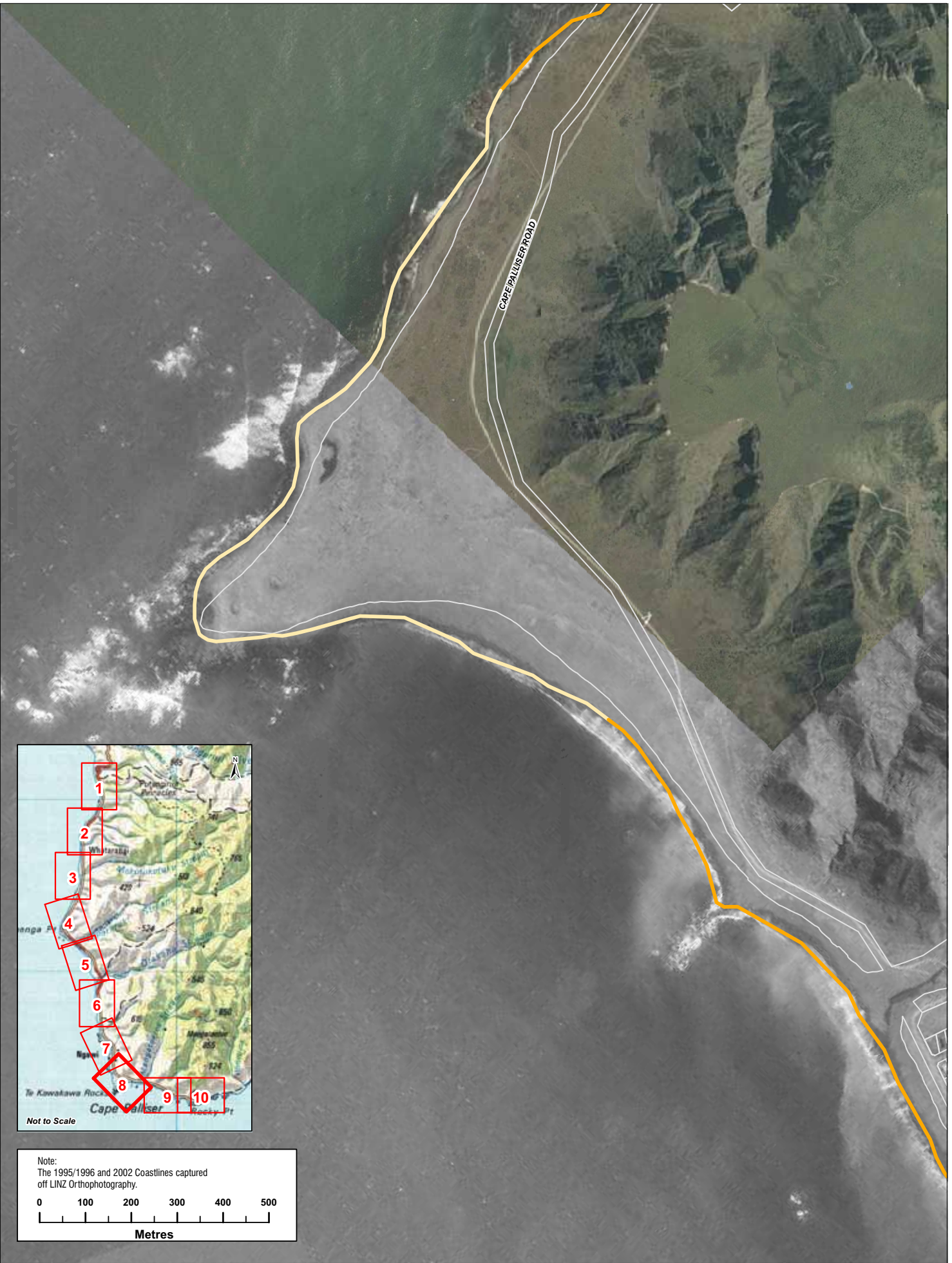
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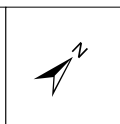
**SWDC Coastal Consents
Priority Rating
Map 7 of 10**

- Legend**
- Existing Boulder Beach
 - Priority 0
 - Priority 1
 - Priority 2
 - Parcel Boundary





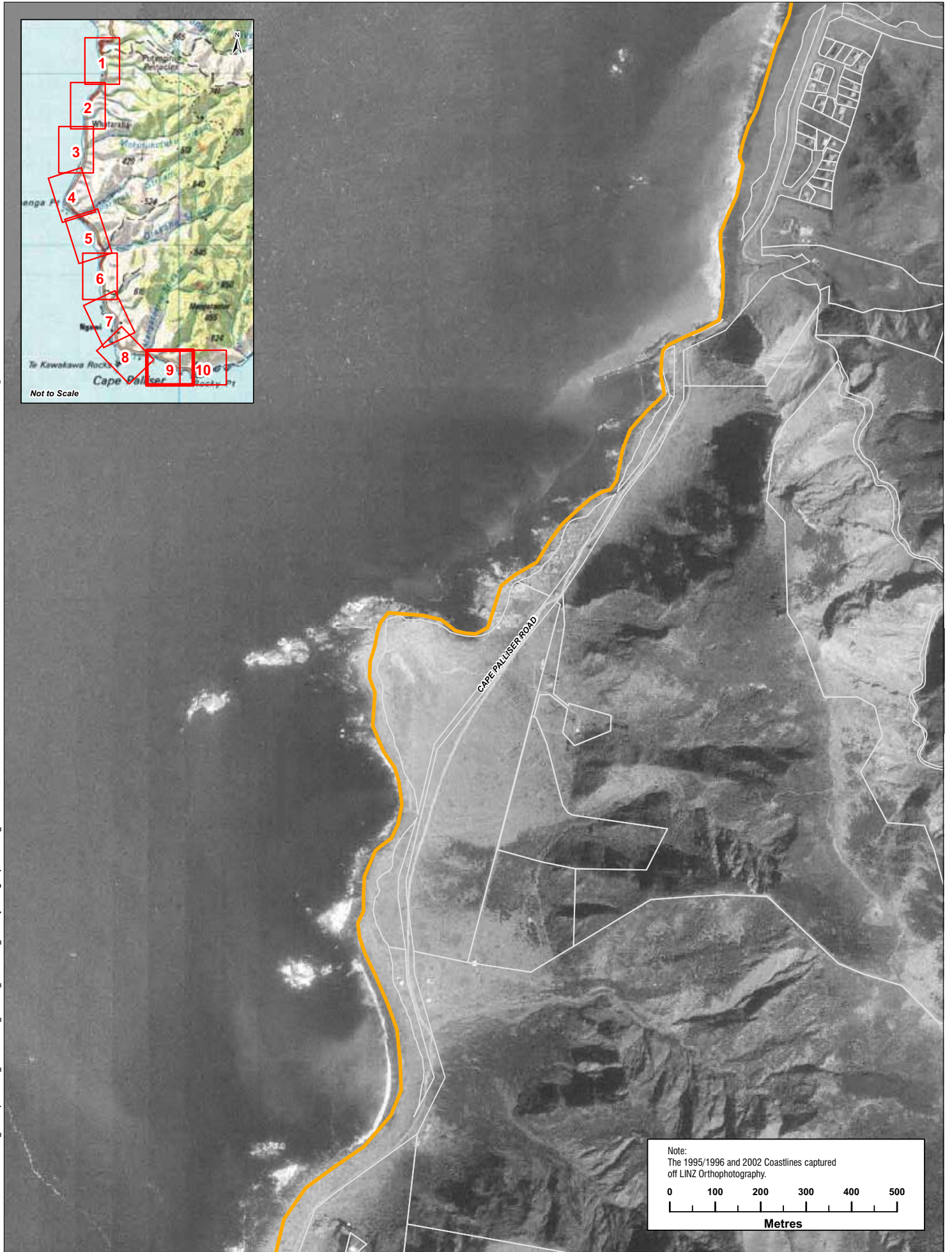
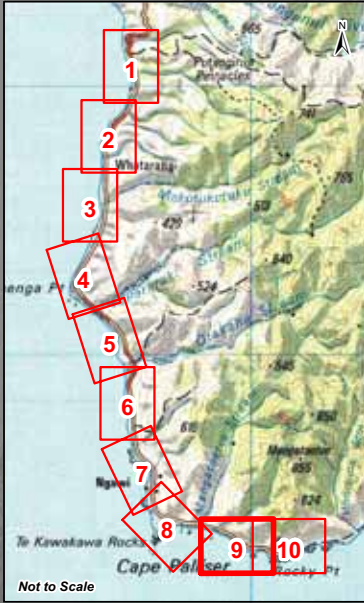
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SWDC Coastal Consents
Priority Rating
Map 8 of 10

- Legend**
- Existing Boulder Beach
 - Priority 0
 - Priority 1
 - Priority 2
 - Parcel Boundary





Note:
The 1995/1996 and 2002 Coastlines captured off LINZ Orthophotography.

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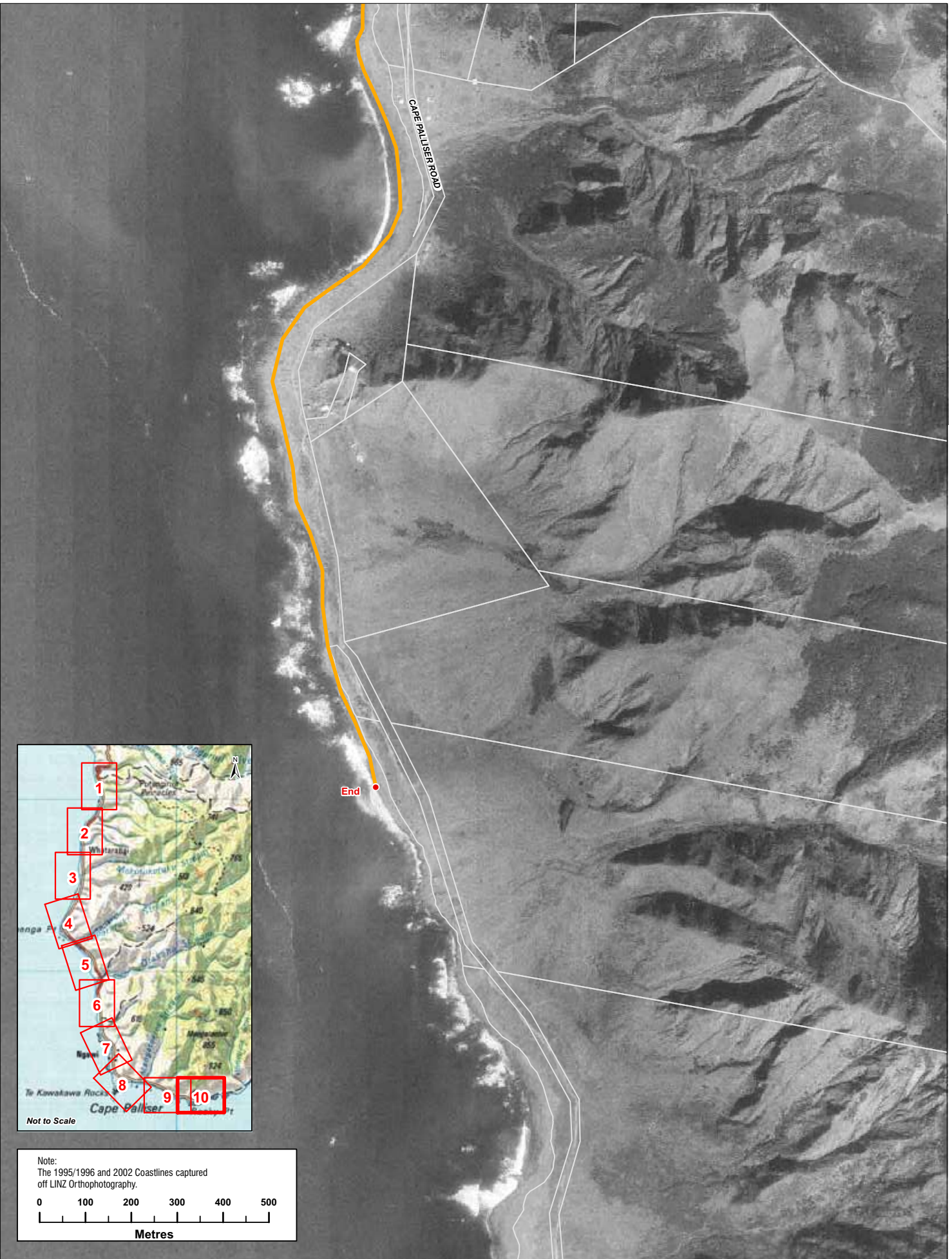
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**SWDC Coastal Consents
Priority Rating
Map 9 of 10**

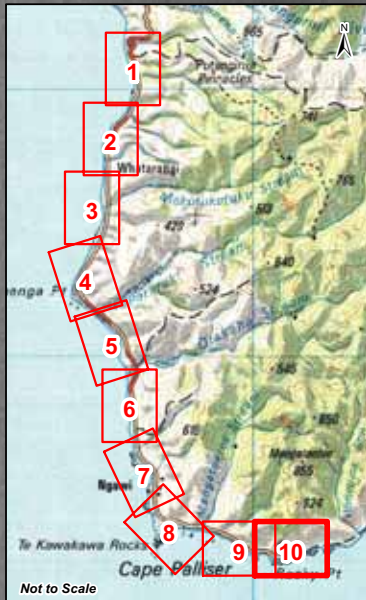
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 - Priority 2
 - Parcel Boundary



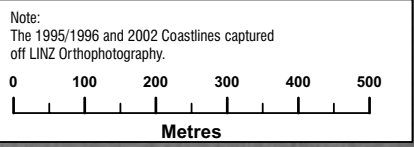


CAPE PALLISER ROAD

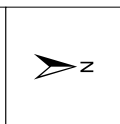
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Not to Scale



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**SWDC Coastal Consents
Priority Rating
Map 10 of 10**

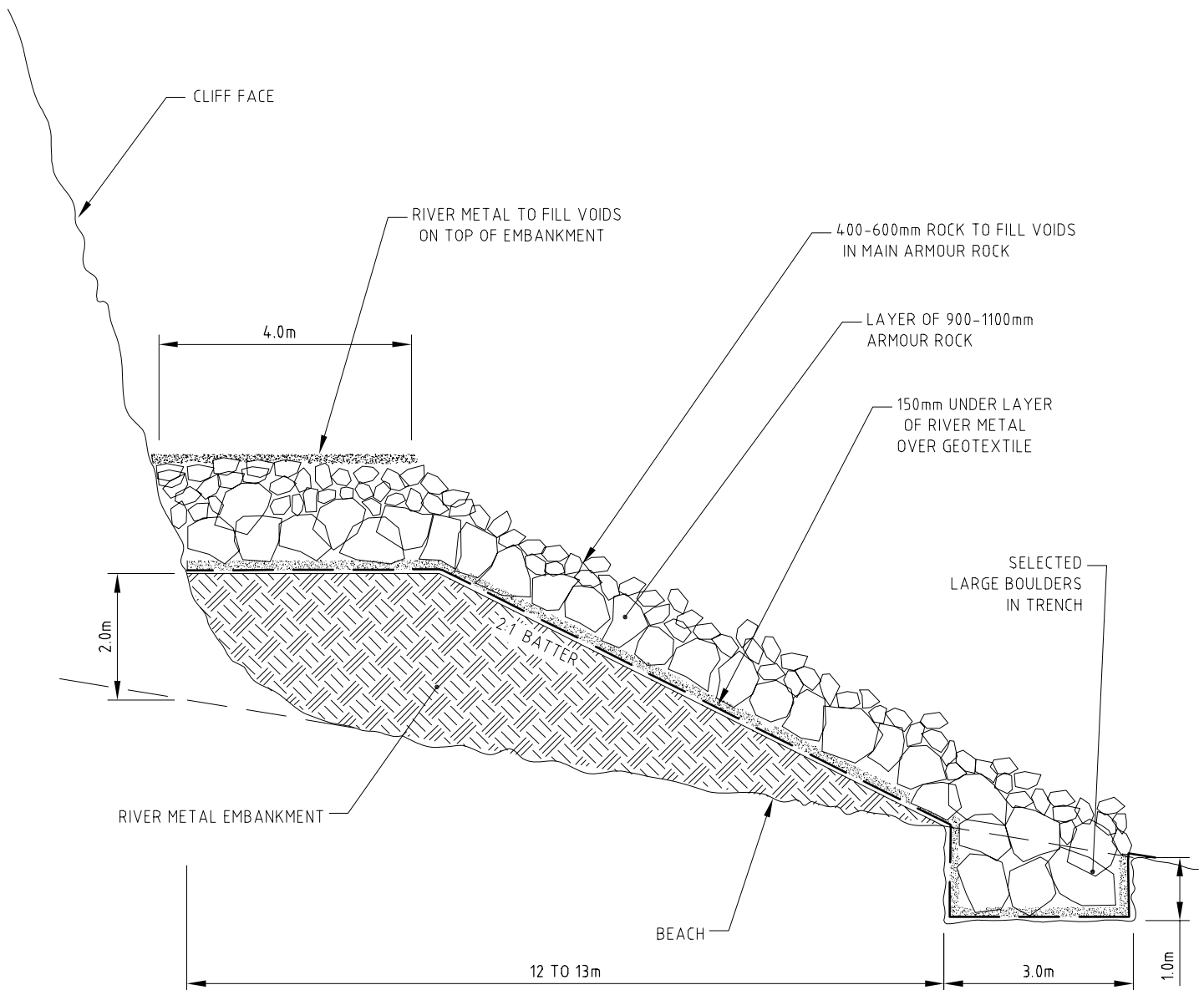
- Legend**
- Existing Boulder Beach
 - Priority 0
 - Priority 1
 - Priority 2
 - Parcel Boundary



Appendix B

Boulder Beach Typical Sections

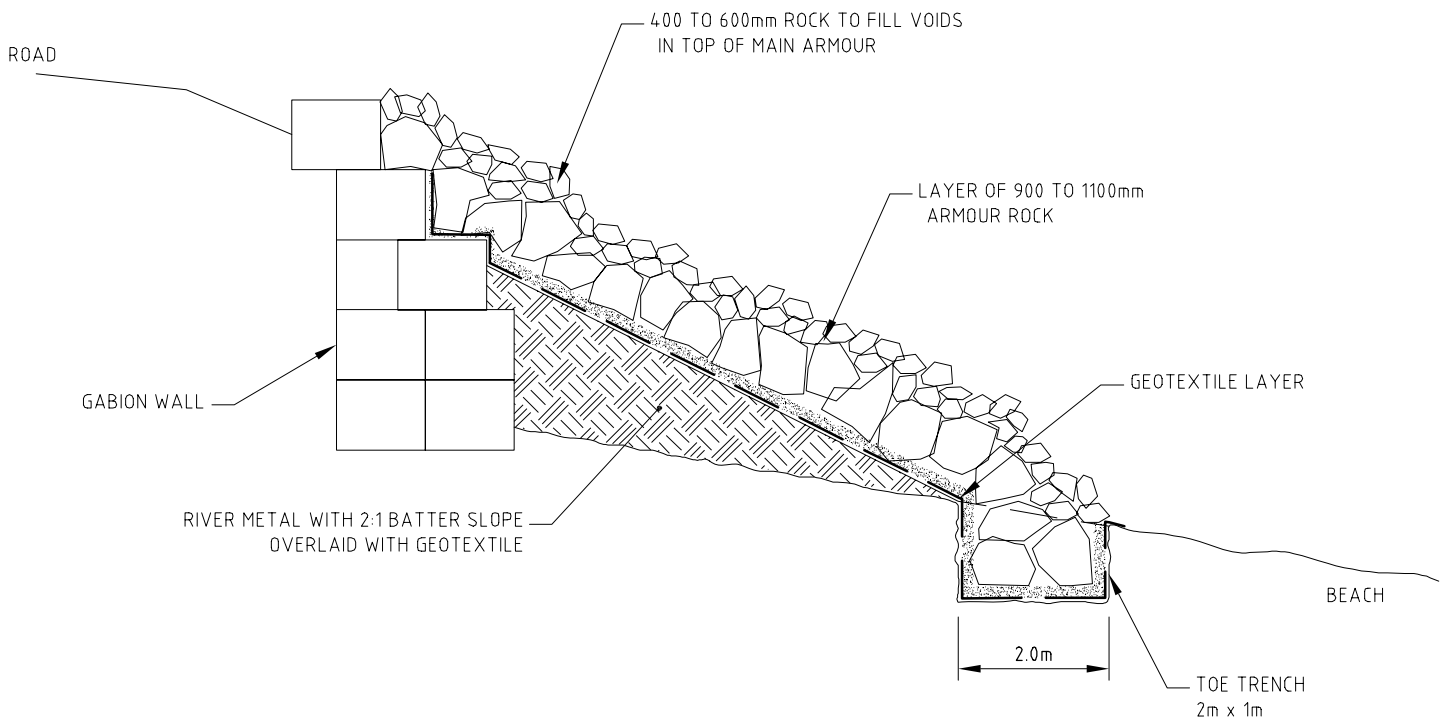




**PREPARED BY
SOUTH WAIRARAPA
DISTRICT COUNCIL**

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CLIFF AREAS**

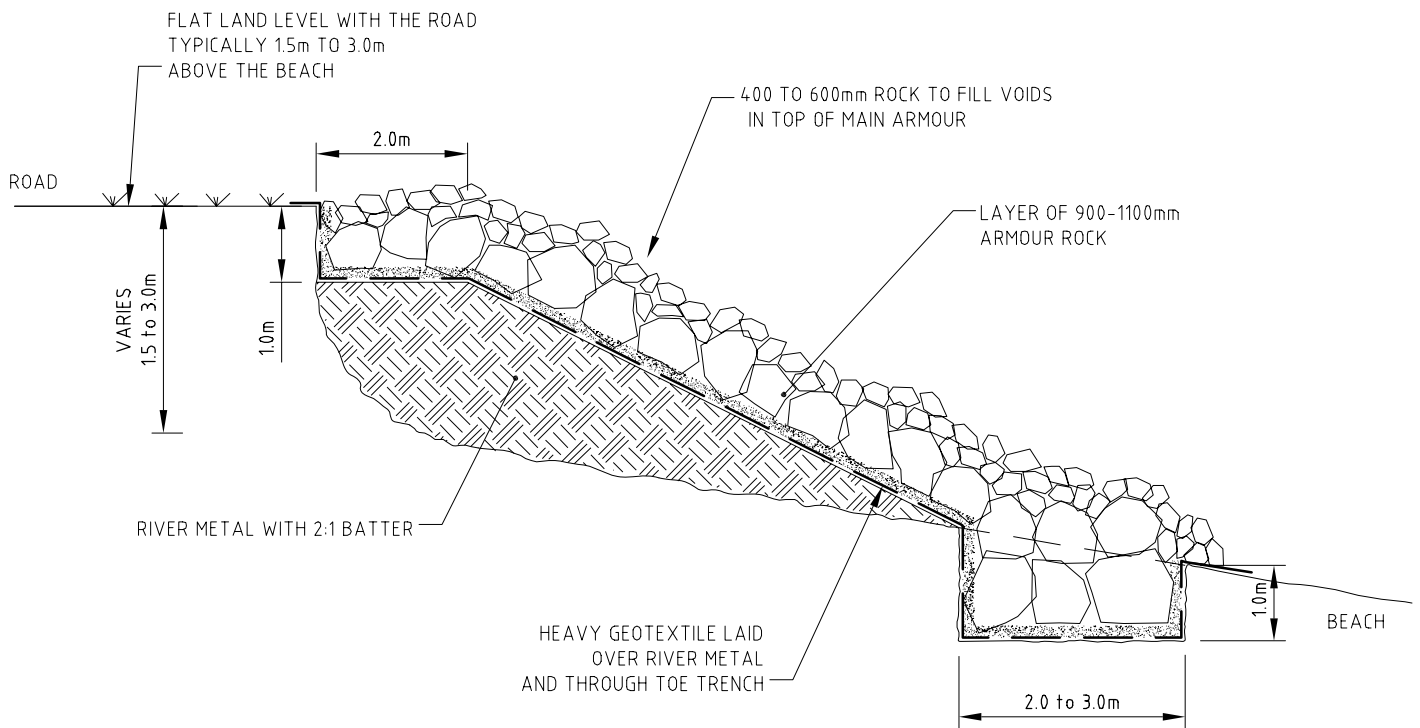
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**PREPARED BY
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DISTRICT COUNCIL**

**CONTRACT NO. C1168 TYPICAL CROSS SECTION OF
BOULDER BEACH TO PROTECT GABION WALLS**

SCALE A4: 1/100



**PREPARED BY
SOUTH WAIRARAPA
DISTRICT COUNCIL**

**CONTRACT NO. C1168 TYPICAL CROSS-SECTION
AT ROAD EDGE CLOSE TO BEACH**

SCALE A4:1/100

Appendix C

Site Photographs



Site Photographs



Figure 1: Existing Boulder Beach



Figure 2: Existing Boulder Beach



Figure 3: Example of Boulders



Figure 4: Existing Gabion Wall



Figure 5: Existing Storage Area

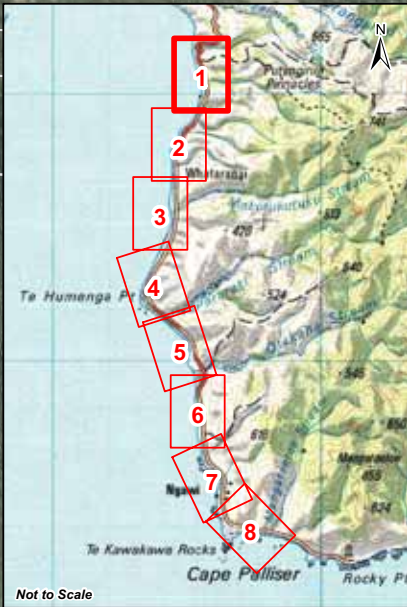
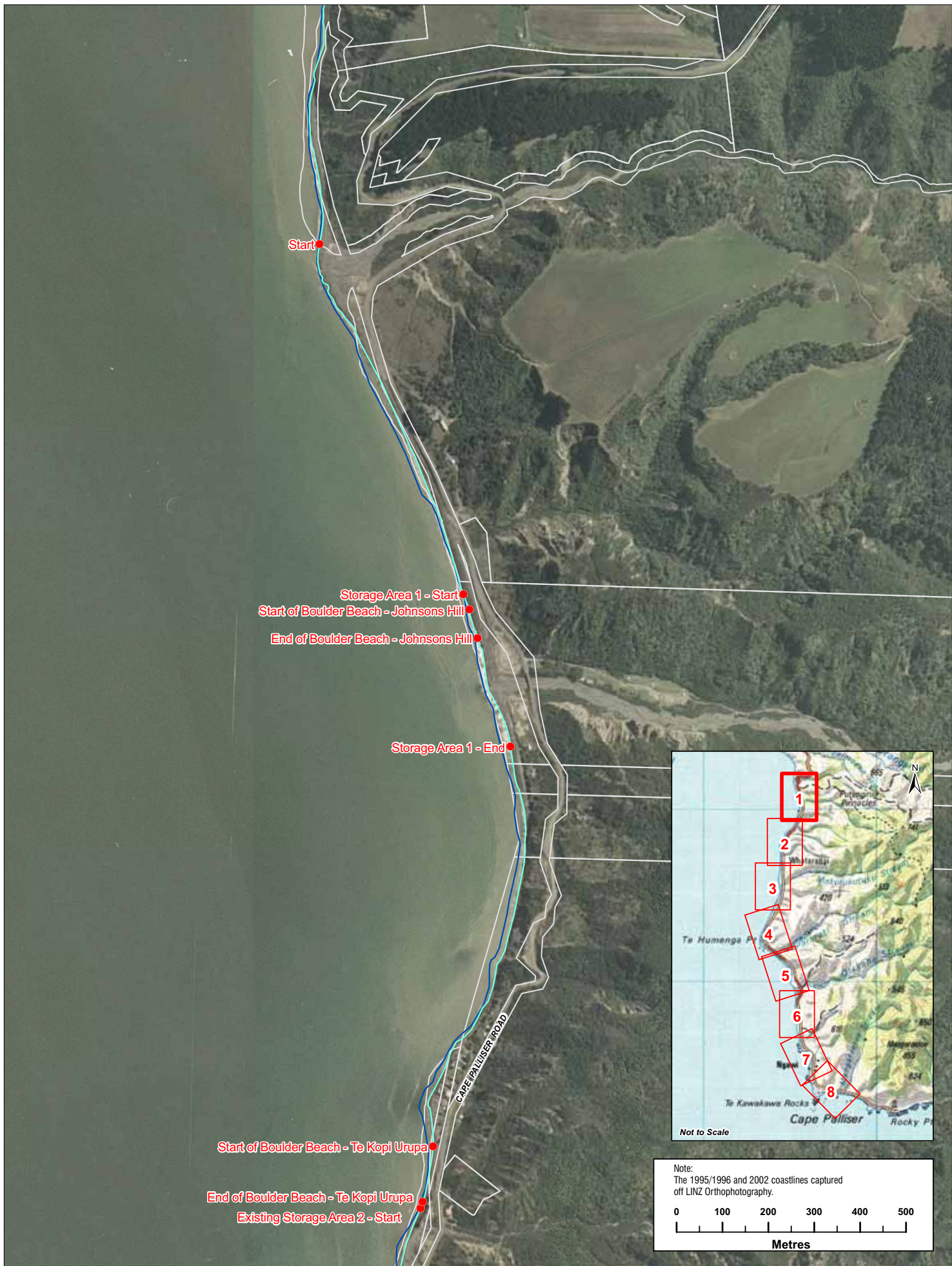


Figure 6: Existing Timber Protection Fence

Appendix D

Maps of the Greater Wellington Regional Council Coastal Permits





Note:
The 1995/1996 and 2002 coastlines captured off LINZ Orthophotography.

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Metres

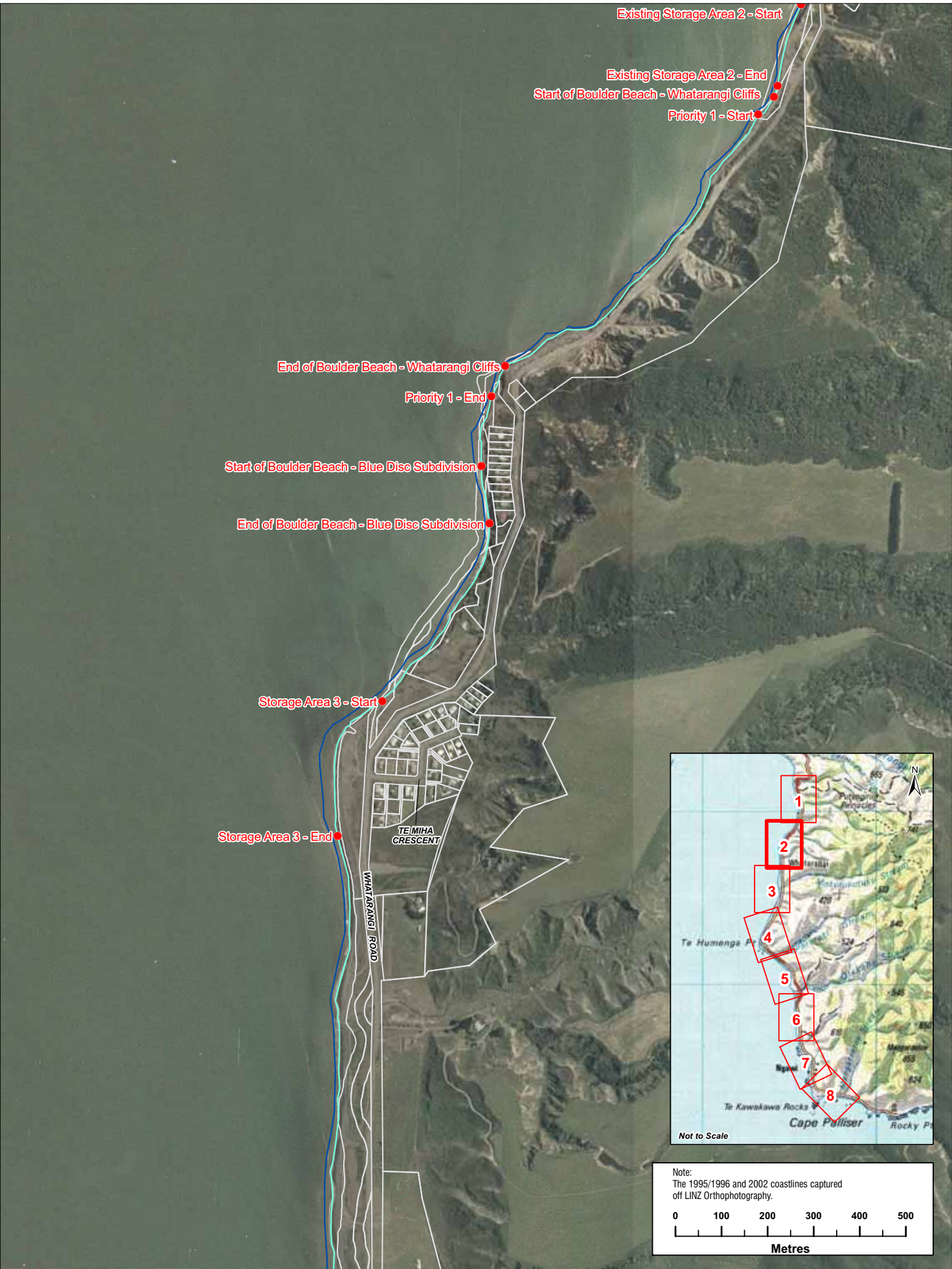
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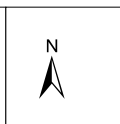
**SWDC Coastal Consents
Historical Coastline**
Map 1 of 8

- Legend**
- Significant Location
 - 2002 Coastline
 - 1995 / 1996 Coastline
 - Parcel Boundary





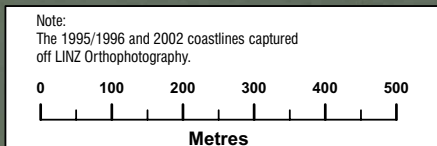
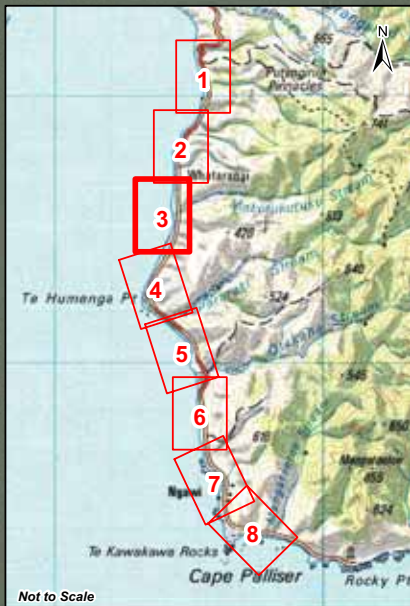
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SWDC Coastal Consents Historical Coastline Map 2 of 8

- Legend**
- Significant Location
 - 2002 Coastline
 - 1995 / 1996 Coastline
 - Parcel Boundary

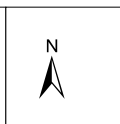




Note:
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off LINZ Orthophotography.



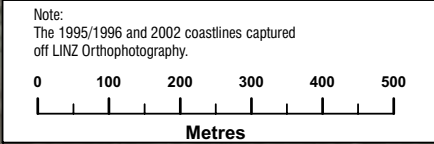
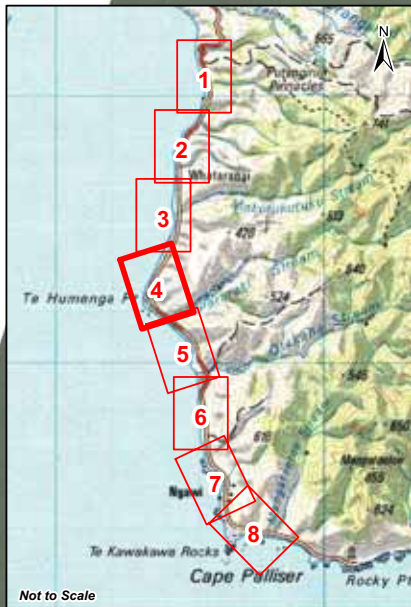
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SWDC Coastal Consents Historical Coastline Map 3 of 8

- Legend**
- Significant Location
 - 2002 Coastline
 - 1995 / 1996 Coastline
 - Parcel Boundary





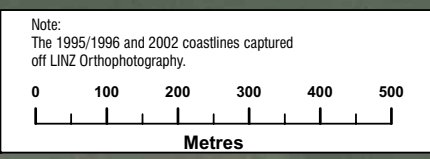
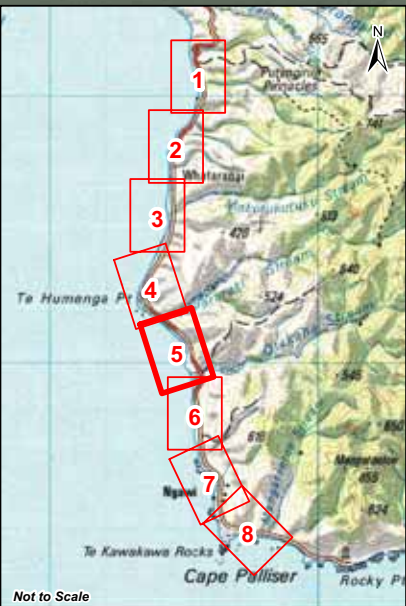
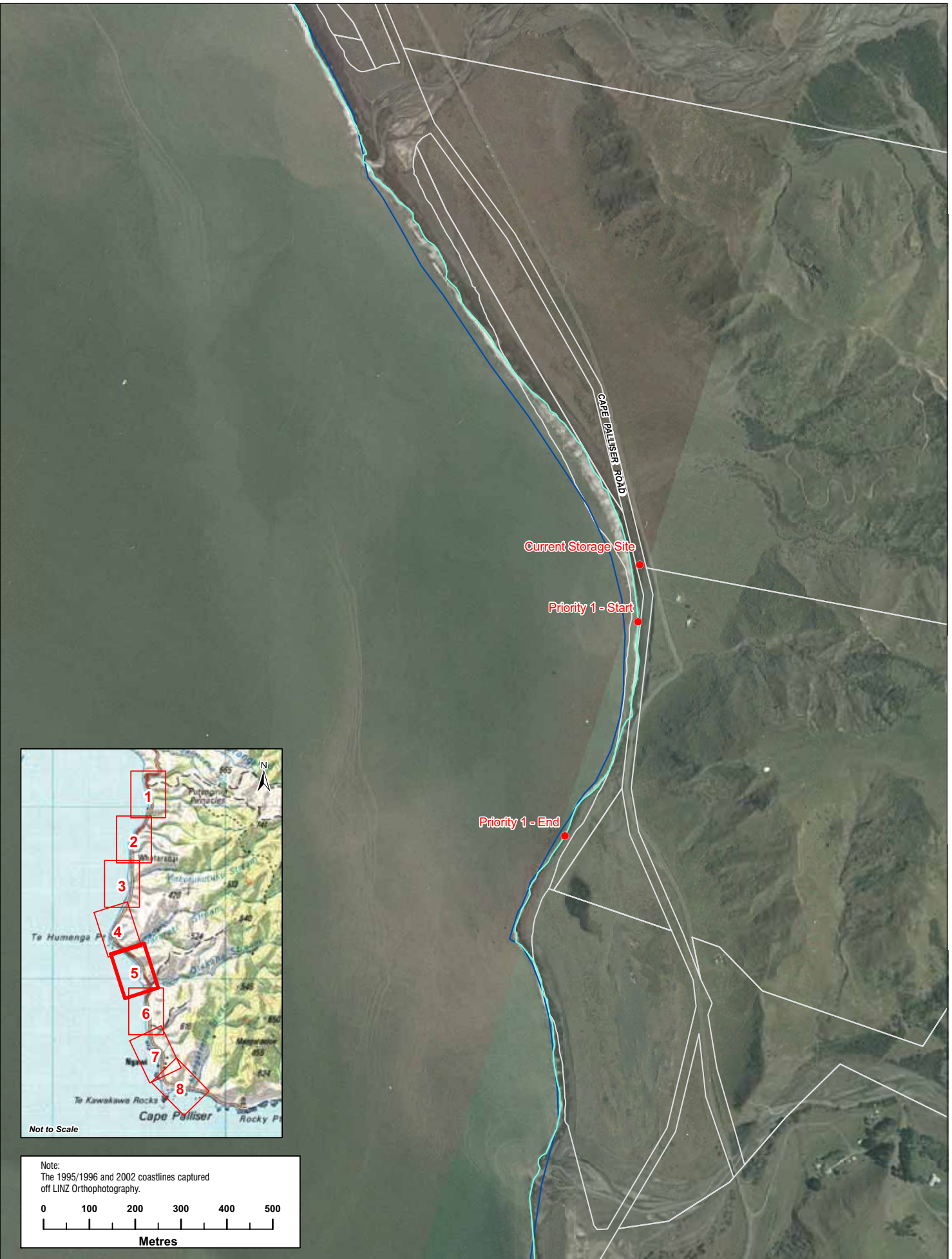
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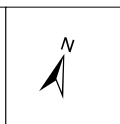
SWDC Coastal Consents Historical Coastline Map 4 of 8

- Legend**
- Significant Location
 - 2002 Coastline
 - 1995 / 1996 Coastline
 - Parcel Boundary





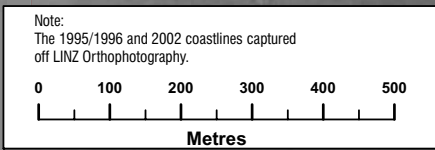
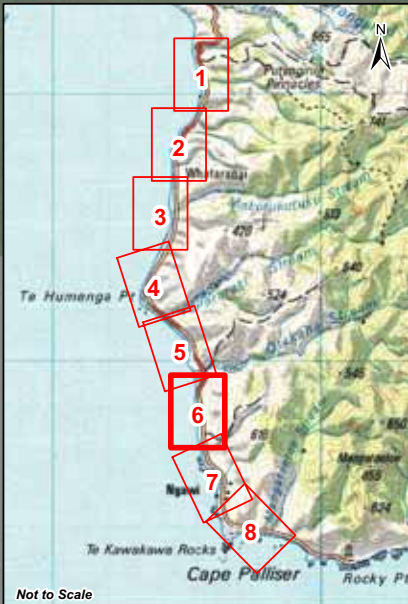
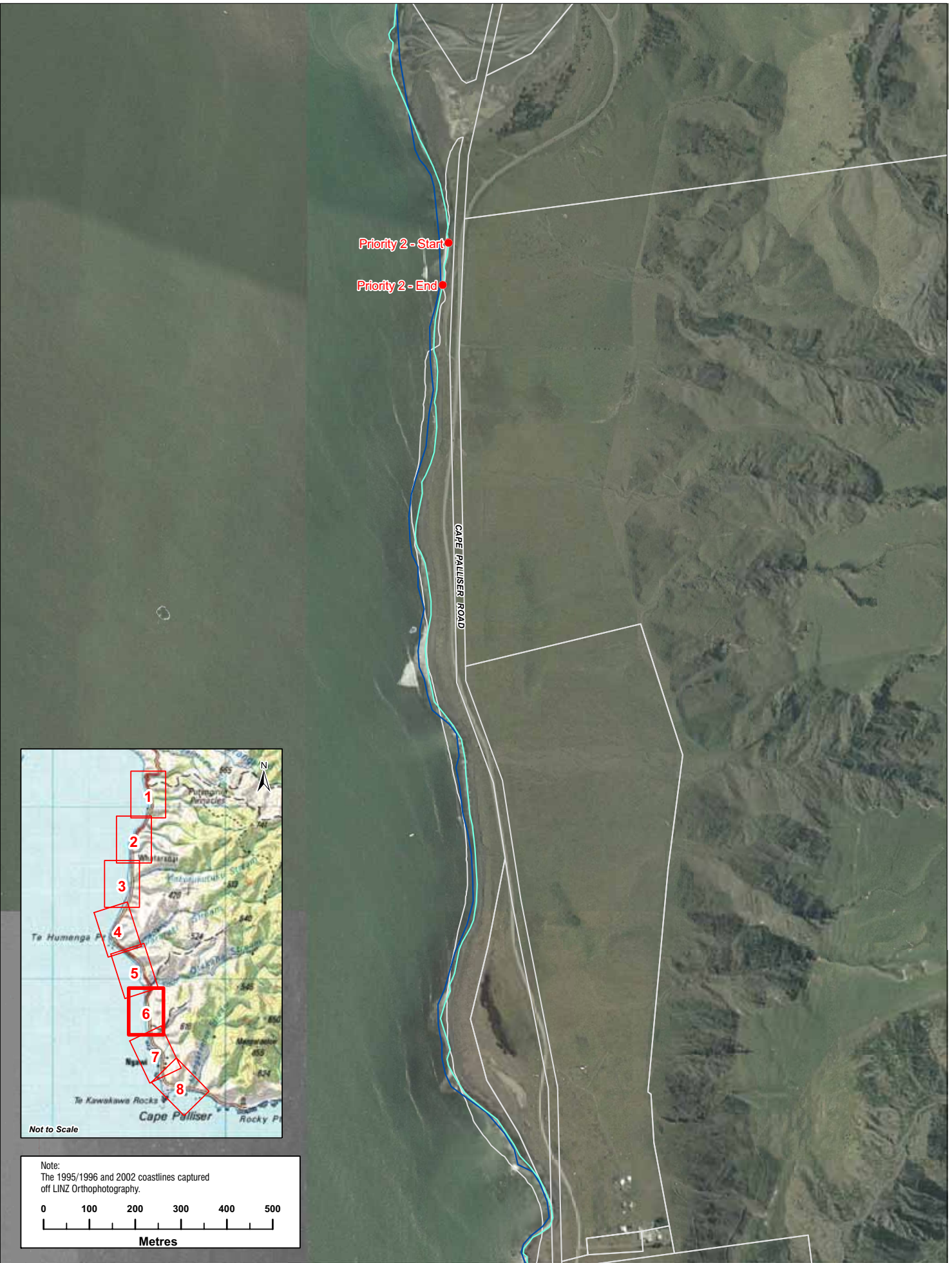
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SWDC Coastal Consents Historical Coastline Map 5 of 8

Legend	
●	Significant Location
- - -	2002 Coastline
—	1995 / 1996 Coastline
	Parcel Boundary





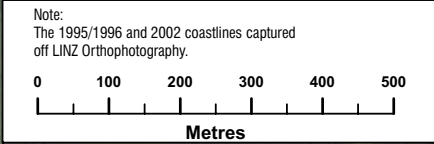
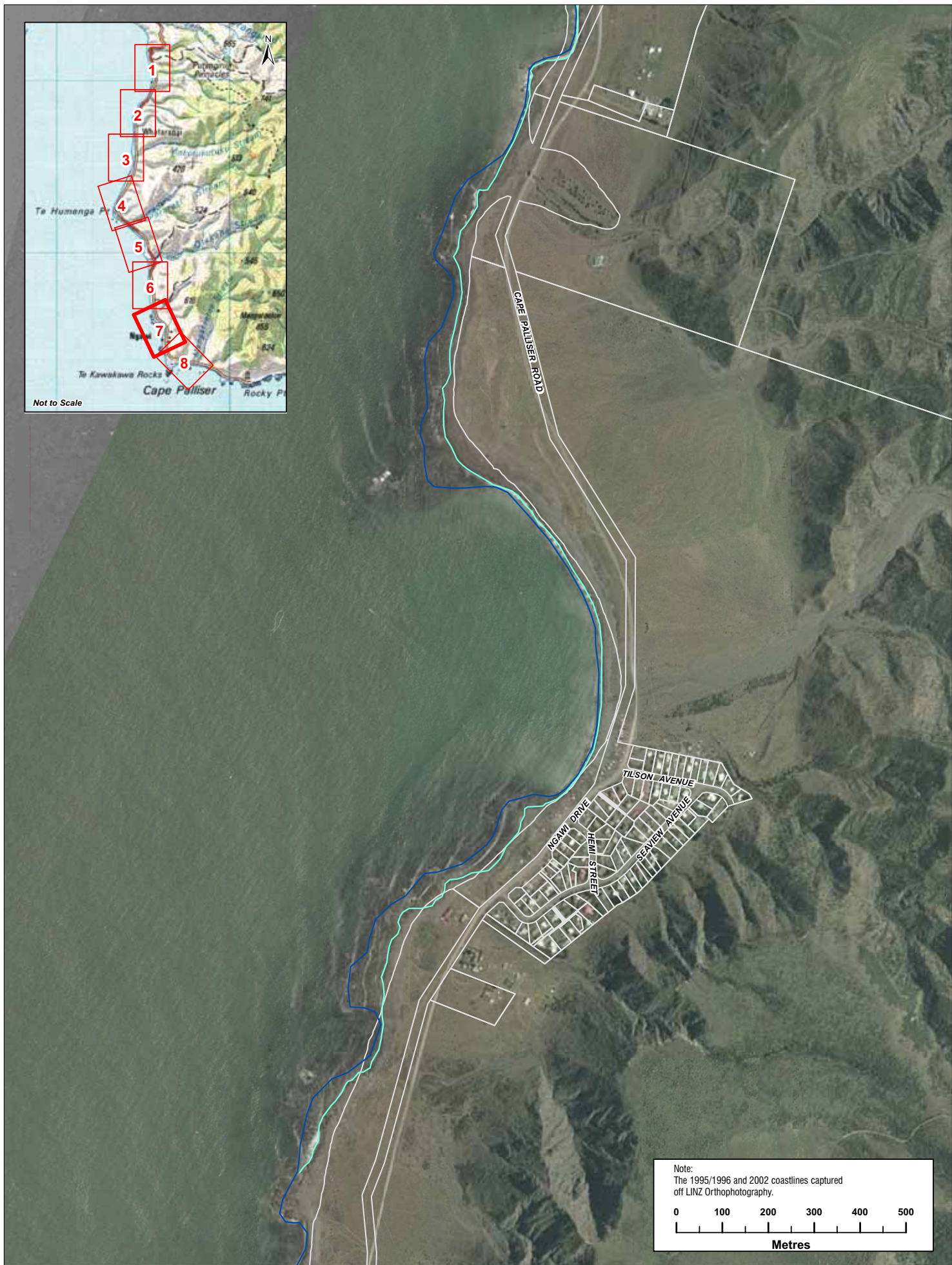
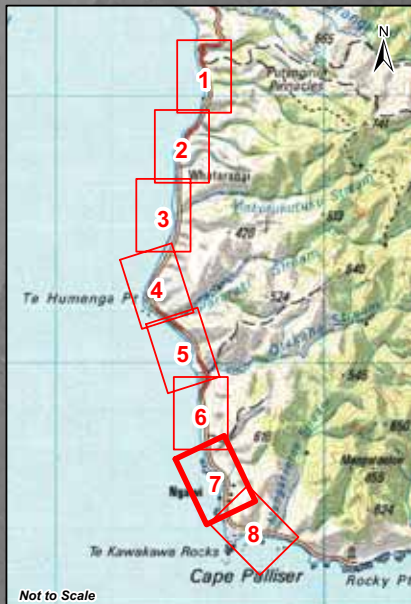
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SWDC Coastal Consents Historical Coastline Map 6 of 8

Legend	
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—	1995 / 1996 Coastline
	Parcel Boundary





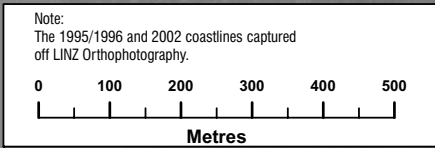
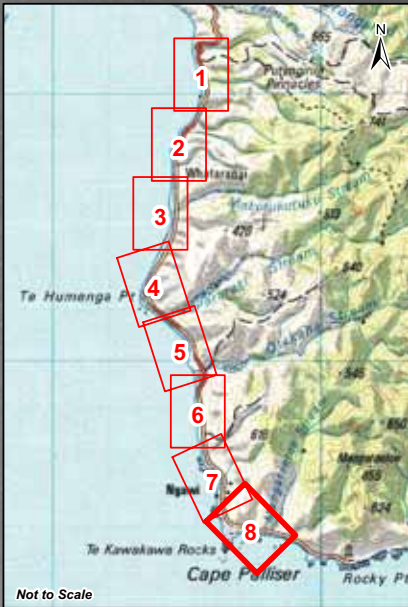
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**SWDC Coastal Consents
Historical Coastline
Map 7 of 8**

- Legend**
- Significant Location
 - - - 2002 Coastline
 - 1995 / 1996 Coastline
 - Parcel Boundary





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SWDC Coastal Consents Historical Coastline Map 8 of 8

Legend	
●	Significant Location
—	2002 Coastline
—	1995 / 1996 Coastline
	Parcel Boundary



Appendix E

Cape Palliser Road Coastal Protection Works (Landscape Assessment)





Cape Palliser Road Coastal Protection Works

Landscape Assessment



For South Wairarapa District Council

[April 2009]

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1. Introduction

This landscape assessment has been commissioned by Beca Carter Hollings and Ferner Ltd (Beca) to provide input into their Assessment of Environmental Effects (AEE) for proposed coastal protection works along Cape Palliser Road, between the Hurupi Stream and the Cape Palliser lighthouse. Consent is being sought to construct boulder beaches over a 35 year period, in order to maintain access to Cape Palliser and settlements (including Ngawi) along this stretch of coastline.

These works are prioritised according to necessity, with urgent 'priority 1' works needed immediately to protect the road, and more long term 'priority 2' works with no exact timeframe determined. The need for these 'priority 2' works would be monitored on an on-going basis, but the consent would allow them to be constructed as required. Some sections are also designated 'priority 0', with no works envisaged by this consent application.

This report looks in turn at:

- both the proposed 'priority 1' and 'priority 2' works;
- relevant statutory instruments that have to be considered in terms of any landscape, amenity and natural character effects; and
- the effects of the proposal in relation to landscape, amenity and natural character values.

In the course of discussing both the proposal and related effects, this assessment also addresses erosion control alternatives to the current proposal, together with related effects. In addition, the report contains recommendations to ensure that the effects of the proposed works - when fully complete - would be minimised for users of the coastline or Cape Palliser Road, as well as residents of that road, and those viewing the coast from Palliser Bay.

2. Project Overview

As described in their Assessment of Environmental Effects, BECA have been commissioned by the South Wairarapa District Council (SWDC) to prepare an application for a coastal permit to carry out coastal protection works along sections of the Cape Palliser coastline, in accordance with the relevant statutory guidelines for the area. These works comprise a series of 'boulder beaches' designed to strengthen the coastal edge in a manner that has a relatively low impact on the natural environment.

2.1 Site and Location

The boulder beaches are proposed along the seaward edge of Cape Palliser Road, at the southern extent of the South Wairarapa District. This route circumnavigates the Cape Palliser coast, initially meeting the coastline at the mouth of the Hurupi Stream, before heading south and around Cape Palliser.

The route is a popular tourist attraction, with local attractions including the Putangirua Pinnacles and Aorangi Forest Park immediately to the east, the small township of Ngawi with its striking collection of tractors and fishing vessels on the beach, and the Cape Palliser lighthouse - along with the drama and remote nature of the coastline itself. The area around the Putangirua Pinnacles was used for filming the 'Paths of the Dead' scenes in the Lord of the Rings trilogy, making it a special attraction for visitors. At its southernmost extent, after the lighthouse, the route becomes a four wheel drive track, effectively limiting access from this point on.

The study area for the coastal protection works extends from the Hurupi Stream valley in the north to the Cape Palliser lighthouse. Four settlements exist on this section of road – Te Kopi, Whatarangi, Ngawi and Mangatoetoe – with a scattering of small dwellings and baches between these. By road, the project area has a distance of some 25.5 kilometres, or around 28 kilometres along the coast.

Over the years, varying forms of coastal erosion control have been installed, and around 2.5 kilometres of this coastline have either existing boulder beaches or gabion walls, mainly in the short stretch between Te Kopi and Whatarangi. As part of this proposal, some 21 kilometres are proposed for works over the next 35 years (comprising a mix of 'priority 1' and 'priority 2' areas) with a further 4.3 kilometres designated as 'priority 0', where no works are proposed.

2.2 The Proposal

Erosion has been an issue along Cape Palliser Road for a number of years, and the causes of this are well covered in the BECA's AEE. SWDC have carried out measures in the past to protect these roads, and - in particular - access to the settlements of Whatarangi, Ngawi and Mangatoetoe. This work has typically entailed moving the road inland following storm events, but this has become progressively more difficult and expensive as the flat coastal terrace is eroded, forcing new road alignments to cut into the steeply sloping ranges flanking the Aorangi Forest Park. In more recent times, efforts have focused on protecting the coastline from erosion, including the present alignment of the coastal road link.

Between 2001 and 2006, a number of coastal erosion prevention measures were installed along this route, mainly boulder beaches between Te Kopi and Whatarangi, and there was also a short length of gabion wall installed in this section. The current study carried out by BECA identifies areas required for further coastal protection works over the next 35 years, and groups these into priority areas.

Some 830 metres are designated 'priority 1' works, where erosion is currently undermining the roading and services infrastructure, and protection works are to be carried out as soon as possible (following issue of consent). Approximately 20 kilometres are designated 'priority 2' works, where there is potential for erosion to undermine infrastructure in the near to foreseeable future. These areas are to be monitored, and consent is sought to allow works to progress over the coming years as required. The remaining 'priority 0' areas either pose no erosion threat or contain areas of ecological importance and therefore no works are proposed. A summary of the areas proposed for each stage of works is shown in Annexure A, and for further detailed refer to maps 1-10 in Appendix A of the Beca AEE report.

The proposed 'boulder beaches' comprise loosely stacked piles of large rocks, piled against the actively eroding section of coastal foredune. A detailed description of the design and construction considerations of these features is given in the AEE. Key components of the proposal from a landscape perspective comprise:

- Rock boulders of variable diameter, typically between 900-1100mm, in-filled with smaller rocks between 400-600mm in diameter. The rocks are to be sourced from the Belmont Hills in Lower Hutt, Linton and Taipo (near Castlepoint). Colour ranges are expected to be similar to those rocks used in previous erosion control measures, ranging from mid-greys through to orange with white highlights

- The rocks are to be placed at an angle of around 26 degrees above horizontal (approx. 2:1), with the seaward edge of each line of boulders trenched at least 1m below the existing level of the beach. The excavated material would be spread out along the beach adjacent to the proposed works. Depending on the profile of the surrounding landform, this would see the boulder beach rising between 1-3m above the current beachfront.
- A number of storage areas are required to house the rocks prior to placement.
- Heavy machinery would be used to lift the rocks into place, and in some areas this would require construction of a temporary access track.

A typical section of the proposed 'boulder beach' construction is shown in Figure 1. The design has been prepared by SWDC, and is the same as other protection works already constructed along the coastline (existing boulder beaches are mapped on Maps 1-10 in Appendix A of Beca's AEE). These have been monitored since installation, and are reported to provide effective prevention.

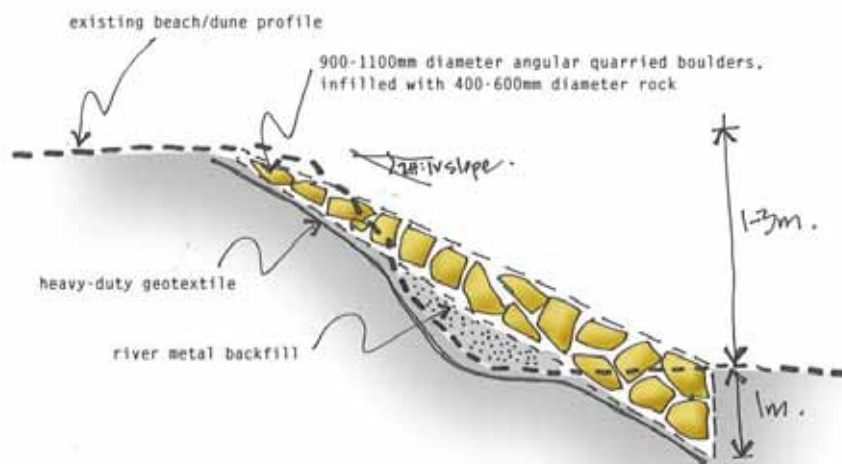


Figure 1: Indicative section of proposed boulder beach (from description in AEE)

The proposed erosion control measures trigger a number of consent applications related to:

- the permanent in-filling of the coastal foreshore (reclamation),
- erection of structures on Crown land, and
- the disturbance and deposition of material on the foreshore.

A detailed description of the consents required is given in Beca's AEE.

3. Context

3.1 Strategic Issues

As previously stated, the primary reason to carry out these works is to protect access to the coastal settlements along Cape Palliser Road (including Ngawi). The SWDC has an obligation to protect access to these settlements, as the only alternative route in from Martinborough to Ngawi is considerably longer, and requires four wheel drive access in places. Moreover, without the proposed erosion control works, the settlement of Whatarangi could be effectively isolated, as coastal erosion threatens road access both north and south of the township.

While it is clear that measures are needed to maintain access to settlements, the primary aim of the New Zealand Coastal Policy Statement (NZCPS) is to protect and – where appropriate – preserve the natural character of the coastal environment. ‘Boulder beaches’ of the kind proposed for the subject coastline are not a natural feature of the existing Wairarapa coastline and the proposed erosion control measures therefore represent non-natural structures that would be imposed on stretches of a coastline that remains largely natural at present. For this reason, an assessment of alternatives was carried out.

With the ‘do nothing’ approach not considered a viable a long term option because of concerns about access to existing settlements, three alternatives were presented in the AEE. These were:

- Relocation of the road to an inland route
- Beach nourishment
- Other ‘hard structures’, such as sea walls

Relocation of the road to an inland route has the potential for significantly more impact on the wider landscape, including Aorangi Forest Park and its margins. Given the contour of the inland foothills and the need to minimise the risk of ongoing erosion and realignment, this road would need to be relocated at least one ridgeline back from the coast. This would take it across a series of steep stream valleys flanking the Aorangi Forest Park, and the route would also have to deviate around the Putangirua Pinnacles Scenic Reserve at its northern extent. Building a road through such a steeply contoured and remote landscape adjacent to the Aorangi Forest Park would require significant engineering, including large areas of cut and fill, and would therefore have a significant impact on both the public and private domains, including the Putangirua Pinnacles Scenic Reserve. Such a road would also provide a very lengthy and circuitous access to Ngawi and beyond. Furthermore any sense of connection with the coast would be largely lost

for visitors. Furthermore, such a route would not protect existing houses along the coast, or sites of cultural significance, such as Kupe's Sail.

Another option, involving active beach nourishment has also been assessed by BECA in the AEE report. If the sand used is locally sourced, this option has the potential to have minimal visual landscape impacts as it involves the simple replacement of 'like for like'. According to the AEE report, however, this solution is not practical as the sand would be quickly lost to littoral long shore drift. Recent beach nourishment projects carried out elsewhere (for example Oriental Bay, Kohimarama, Mission Bay, etc) have involved the construction of sea walls to modify the coastal processes – including long shore drift – that were contributing to beach erosion. Without the expense and disruption to the landscape character that these structures (potentially including large groynes projecting out to sea) would inevitably cause, an ongoing programme of beach nourishment would be required on an on-going basis. As a result, the structural intrusion associated with new groynes or sea walls, and anchoring structures, would be compounded by ecological impacts at the source site.

Finally, the adoption of, and total reliance on 'hard structures', such as sea walls, to afford erosion protection would have an even greater landscape impact than the proposed 'boulder beach' option. These structures would be much more obviously 'man-made' and out of keeping with the remote coastal environment so apparent around Cape Palliser. According to the AEE, they would also cause 'beach squeeze' and would result in a lowering of the beach level due to wave reflection. The visual impact of such structures is already clearly evident in the area south of Te Kopi where they have been installed adjacent to the road (refer Figure 2). They stand out clearly against the more recessive boulder beaches that have been constructed in the background, and represent an even more obviously artificial means of trying to manage erosion. They are, effectively, a 'last resort' option in places where erosion has brought the shoreline extremely close to the road.



Figure 2: Existing section of sea wall (gabion baskets) south of Te Kopi

Even without detailed examination, the landscape and natural character effects inherent in these alternatives, together with more pragmatic concerns (cost, effectiveness and public / motorist convenience), mean that they are little more than measures of last resort. They do not represent a viable alternative to the 'boulder beach' proposal other than for extreme situations that lie beyond the scope of the current proposal and applications.

3.2 Statutory Context

The construction of structures in the coastal environment is a closely monitored activity, and this proposal is subject to the provisions of the Resource Management Act 1991 (RMA), the current and proposed New Zealand Coastal Policy Statement (NZCPS), the Wellington Regional Policy Statement (RPS), the Regional Coastal Plan for the Wellington Region (WRCP) and the Wairarapa Combined District Plan.

3.2.1 Resource Management Act 1991, the NZ Coastal Policy Statement 1994 and the proposed NZ Coastal Policy Statement 2008

As noted in the AEE, the proposal requires consent under section 12 of the RMA. Consequently, the current application and related AEE is required to consider those matters set out in section 104 and including:

1(a) Any actual and potential effects on the environment of allowing the activity

This landscape assessment examines the visual landscape effects of the proposal, and weighs them against the policies and objectives of the relevant policies, statements and plans in terms of section 104 of the Act. Section 6 of the RMA sets out matters of national importance that must be recognised and provided for, and includes;

- (a) "The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development"
- (b) "The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development"

Section 7 of the Act states that those exercising power under the Act shall have regard to (among other matters):

- (c) "The maintenance and enhancement of amenity values".

These values are defined as being "those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes".

In a related vein, and devolved from section 6(a) of the RMA, the NZ Coastal Policy Statement states that:

Policy 1.1.1

It is a national priority to preserve the natural character of the coastal environment by:

- (a) encouraging appropriate subdivision, use or development in areas where the natural character has already been compromised and avoiding sprawling or sporadic subdivision, use or development in the coastal environment;
- (b) taking into account the potential effects of subdivision, use, or development on the values relating to the natural character of the coastal environment, both within and outside the immediate location; and
- (c) avoiding cumulative adverse effects of subdivision, use and development in the coastal environment.

As a result, the effects of the proposed protection measures on the Natural Character, Landscape and Amenity values of the subject coast have to be assessed against relevant regional and district planning provisions (as shown in the following sections):

3.2.2 Regional Coastal Plan for the Wellington Region (WRCP)

The Greater Wellington Regional Council's Coastal Plan for the Wellington Region (WRCP) applies to the coastal marine area (CMA) - that being the area between the outer limits of the Wellington region and the line of mean high water springs. This plan recognises (Section 2.1.4) that:

There is a strong desire by people and communities to:

- maintain or enhance public access along and within the coastal marine area
- use and preserve coastal resources for social, economic and cultural purposes
- protect the natural character of the coastal marine area
- restore and improve areas where natural character has been adversely affected
- protect areas of high amenity values
- restore or improve areas where amenity values have been adversely affected.

Section 2.1.7 goes on to state that "The management of the coastal marine area needs to take into account the principles of the Treaty of Waitangi, including the active protection of Maori rights and interests and the involvement of the tangata whenua in decision making processes". More specifically, Section 4.1.13 states as an objective that "characteristics of special spiritual, historical or cultural significance to tangata whenua, including waahi tapu, tauranga waka, mahinga maataitai and taonga raranga, are protected". Local Iwi (Rangitane o Wairarapa and Kahungunu ki Wairarapa) have

been consulted with regards to this project and have stated a desire to see the area known as Kupe's Sail protected using the boulder beaches as part of this project. Accordingly, the investigative scope of this project was extended to include this area.

Section 4 of this Plan sets out general environmental objectives and principles, while Section 6 sets out the objectives and principles for structures within the CMA. These objectives and policies are then translated into a set of rules, and the compliance of this proposal against the planning context of these rules, as well as the objectives and policies of the Plan is given in the AEE.

3.2.3 Draft Wellington Regional Policy Statement 2008 (RPS)

The Greater Wellington Regional Council has released its draft RPS, and public consultation closed in May this year. This draft RPS follows the principles of the operative 1995 Statement, and gives effect to the NZCPS. Section 2.2 of this Statement deals with the coastal environment, and in particular, Objective 4 seeks the "preservation of natural character of the coastal environment". Section 2.2 states that this will be achieved through the following policies:

Policy 3: Protection of the values of nationally and regionally significant areas in the coastal environment.

District and regional plans shall include policies and rules to preserve the natural character of the coastal environment by protecting the values of the sites and areas listed in Appendix 1.

Policy 4: New subdivision, use and development in the coastal environment

District plans shall include policies that encourage new subdivision, use and development in the coastal environment to be located in areas where the natural character has already been compromised.

Policy 5: Identifying the landward extent of the coastal environment

District plans shall include policies and/or rules to identify the landward extent of the coastal environment using the following criteria:

- (a) any area dominated by coastal vegetation or habitat;
- (b) any landform affected by active coastal processes;
- (c) any landscapes or features, including coastal escarpments, that contribute to the natural character, visual quality or amenity value of the coast;
- (d) any site, structure, place or area of historic heritage value adjacent to, or connected with, the coastal marine area, which derives its heritage value from a coastal location;
- (e) those sites and areas of regionally significant values listed in Appendix 1
- (f) any land adjacent to the coast that is affected by, or could be affected by, storm surge or coastal inundation.

Policy 33: Coastal areas, features or landscapes

When considering an application for a resource consent, notice of requirement, or a change or variation to a district or regional plan, local authorities shall have particular regard to preserving the natural character of the coastal environment, by:

- (a) protecting the values of the sites and areas listed in Appendix 1
- (e) protecting the special values of beaches and dune systems, including the dynamic interface between land and sea that creates important recreation opportunities and amenity values, as well as being a natural defence against coastal hazards;
- (f) maintaining or enhancing amenity, open space and scenic values, including the use of setbacks from the coastal marine area and other water bodies;
- (h) maintaining or enhancing recreational areas and places or areas of historic or cultural significance;
- (l) encouraging new subdivision use and development in areas where natural character has already been compromised.

Policy 34: Landward extent of the coastal environment

When considering an application for a resource consent, notice of requirement, or a change or variation to a district plan, city and district councils shall have particular regard to whether the proposal is within the coastal environment using the [criteria in Policy 5]"

Many of these policies make reference to Appendix 1 of the Statement, which maps sites of regional significance in the coastal environment. These maps show four such sites within the proposal area, and these are mapped with their full description in Annexure B. Two of the sites are in areas proposed as 'priority 0' works (Site 42: the Hurupi Miocene transgressive sequence and Site 44: Te Humenga Point), with no work proposed for these areas. The other two sites (Site 43: Whatarangi Bluff Miocene sandstone and Site 45: Cape Palliser Coast) are proposed to receive boulder beaches as part of both 'priority 1' and 'priority 2' works. The landscape assessment and proposed restrictions described in this report around Site 45 (Cape Palliser Coast) are specifically proposed to protect Kupe's Sail, a site of cultural significance, and therefore are in line with Policy 33 (above).

3.2.4 Proposed Wairarapa Combined District Plan

The Wairarapa Combined District Plan has been prepared by the Masterton, Carterton and South Wairarapa District Councils. It provides the principal means of managing activities on the landward side of the MHWS, with management of the combined district's coastal areas identified as a key issue in the Combined District Plan.

The Plan contains three general coastal environment objectives, along with one general landscape objective and one amenity objective, which relate to the requirements of sections 6 and 7 of the RMA. The objectives applicable to this application are:

8.3.1 Objective TW1 – Recognition of Values & Traditional Relationships

To recognise and provide for the cultural values and relationship of Tangata Whenua in managing the natural environment and the effects of activities, while taking into account the principles of the Treaty of Waitangi.

9.3.1 Objective LAN1 – Outstanding Landscape and Natural Features

To identify and protect the Wairarapa's outstanding landscapes and natural features from the adverse effects of inappropriate subdivision, use and development.

13.3.1 Objective CE1 – Natural Character

To protect the natural character of the coastal environment by ensuring use, subdivision and development maintains the comparatively undeveloped nature of the Wairarapa Coast.

13.3.3 Objective CE3 – Public Access & Enjoyment

To facilitate public access to, and enjoyment of, the Wairarapa's coast and its margins in a manner that protects its natural character.

19.3.1 Objective GAV1 – General Amenity Values

To maintain and enhance those general amenity values which make the Wairarapa a pleasant place in which to live and work, or visit.

The landward coastal margin of most of the district has been identified as a 'foreshore protection area', which aims to manage development within a 50m strip landward of the high tide line. A 'Coastal Environment Management Area' has also been identified that lies between the MHWS and the inland coastal boundary (usually taken to mean the top of the first ridgeline). Management of development in these areas is generally by way of management plans or non-regulatory approaches such as the 'Caring for our Coast' (2004) coastal guidelines document prepared by the Greater Wellington Regional Council.

Furthermore, a series of 'outstanding landscapes' and 'outstanding natural features' have been identified as a result of Objective 9.3.1, and these are defined on the planning maps and described in the Plan's Appendix 1. These are reviewed in more detail under the 'natural character' section of this report.

3.3 The Surrounding Landscape

The site is located just 45 kilometres from Wellington as the crow flies, but enjoys a feeling of remoteness and wilderness as the intervening presence of the Wellington Harbour and Rimutaka

Ranges make the journey from there a circuitous trip taking in Lower and Upper Hutt, then Featherston and finally Martinborough - a route of some 110 kilometres.

The approach heading south from Martinborough takes in a rural pastoral valley with gently rolling pasture on which sheep and cattle are grazed, interspersed with vineyards and exotic woodlots. The elevated and forested hills of the Aorangi Forest Park contain the valley to the east, while the Rimutaka Ranges flank it to the west.

No views of the coast are visible on this approach until the road suddenly drops into the Hurupi Stream valley, through an area of exotic forestry currently being harvested around one kilometre from Te Kopi and the coast.

This pastoral valley has been formed by the Ruamahanga River, which drains Lake Wairarapa at the base of the Rimutaka Ranges. This lake is not visible on the main approach to Cape Palliser, but its extensive wetlands are a local attraction for fishermen and bird watchers, and it is one of a number of natural landscape features in the area. Lake Onoke, a tidal lake with associated wetlands, lies at the mouth of the Ruamahanga River, and is a popular fishing spot.

While these water bodies and wetland systems offer a significant ecological resource for the local area, the main landscape influence on Cape Palliser itself is undoubtedly the raised hill country of the Aorangi Forest Park that forms the main backdrop to the Cape. This land, known as the Aorangi Ranges, rises gently from the Ruamahanga River valley, and more steeply around the western edge of Cape Palliser, to approximately 900m (a.s.l). The eastern flank of the ranges drops away steeply and dramatically at the edge of the Forest Park, along a fault scarp. The ranges were formed by "uplift during the late Pliocene and Pleistocene Kaikoura Orogeny, when the major landforms of New Zealand were blocked out"¹. Uplift of early coastal gravels in this manner has enabled 'badlands' style erosion in this area, the most famous of which are the 40m high 'organ pipe' shaped Putangirua Pinnacles, located just inland of the start of the subject site, at Te Kopi.

The uplifted spine of the ranges is dissected by a number of steeply channelled streams, with around nine streams entering Palliser Bay across and through the project site. These streams are predominantly rocky-bottomed, with their rounded boulders spilling out onto the black sand beaches of Cape Palliser's west coast. They have cut a series of deep channels and valleys into the uplifted land that forms the backdrop to the coast and proposal site, giving the backdrop

¹ Waterhouse, J.B. (1957) Rock Fans in South-East Wellington. Transactions of the Royal Society of New Zealand, 85 (1) pp 101-111.

more visual complexity and drama than it may have otherwise had. The process of erosion and deposition created by these streams has also given the coastline a naturally sinuous shape, with a number of minor headlands and bays apparent as one traverses Cape Palliser Road.

Between the Aorangi Ranges and the ocean is a narrow area of coastal lowland that varies in width, but is never more than around 600m wide and is in many places, much less. It is this platform that is being actively eroded and placing pressure on the road link. Around the Whatarangi Bluff, this platform has completely disappeared and the road has had to be benched into the steep cliff face. As a result, the physical profile and integrity of the cliff-line, as a local feature, has already been appreciably compromised.

The adjacent coastline is lined by a narrow sequence of low dunes, typical of much of coastal Wairarapa, and erosion is reducing the width of the foredunes each year. The presence of erosion can commonly be seen in the form of a vertical drop between the line of dunes and adjoining beachfront (and littoral margin) with drops of between one and three metres common. This frequently makes access to the actual beachfront and Coastal Marine Area somewhat difficult.

The coastal margin is also notable for the preponderance of a series of black sand beaches of moderate slope, together with banks of shingle scattered at intervals along the entire length of beachfront between Hurupi Stream and the Cape Palliser Lighthouse. The beaches are framed and delineated by rocky outcrops on headlands, which become more common in the southern section of the coast, 'below' Whatarangi. In this area the underlying bedrock is clearly revealed along the beachfront, as well as a series of rocky shelves and promontories extending out into the sea. The sand / shingle nature of the beaches is further disrupted around each of the stream mouths already described, where an outwash of rocks brought down from the Aorangi Ranges is scattered across the local beachfront and the overall profile of the beach is slightly lowered.

This coastline, while appearing initially to be 'rugged', 'wild' and 'remote' – and commonly described this way by visitor brochures – has in fact been heavily modified. Cattle farming dominates the local landscape between Te Kopi and Cape Palliser, with the majority of elevated land inland of the coast still actively grazed, although regenerating scrub is also apparent in some of the stream valleys. The Aorangi Forest Park is hidden behind this grazed western sequence of foothills. Exotic forestry is also evident on the approach to the coast, as one descends through the Hurupi Stream Valley. As a result, the only section of the subject coastline that displays its original native forest cover is a short stretch of coast just south of Te Kopi, where

the Aorangi Forest Park extends out to meet the west coast and embraces the Putangirua Pinnacles.

Cape Palliser Road itself and its associated curtilage (drainage, electricity, slope protection and contouring) has also influenced the character of the landscape, particularly around Whatarangi, where the coastal terrace is at its most narrow, and erosion has caused the road to be realigned landward on several occasions. Each time this has occurred, a more invasive series of terraces and benches has been created to achieve the road platform – to the point where the entire headland around the Whatarangi Bluff now appears ‘engineered’ (refer figure 3).



Figure 3: View south towards Whatarangi Bluff, showing extent of terracing required to achieve road platform

The other significant influence over local landscape character is the pattern of settlement along the coastline. Whatarangi, Ngawi and Mangatoetoe - bach communities, with a very low resident population – are connected with the coastal road, while Te Kopi comprises a cluster of visitor accommodation. In addition, a number of other buildings are scattered along the length of the coastline - predominantly north of Ngawi - these being a mix of baches, farm outbuildings and visitor accommodation. While none of these are particularly visually dominant in their own right, their rather ad-hoc, strung out, pattern of development leaves a significant imprint on the coast and further diminishes both its naturalness and sense of remoteness. However, the construction styles and materials used in this sequence of dwellings and settlements typify the traditional kiwi bach – comprising one-storey buildings of weatherboard or fibrolite construction – that appear to date back to the 1970's or earlier. As a result, although such development is a pervasive feature of the subject coastline, most of it still remains reasonably discrete.

Indeed, perhaps fortunately, the Wairarapa coastline appears to have been passed over by the more recent coastal development undertaken around much of the North Island in recent times – hall-marked by far more grandiose beach houses of much larger scale that are even more dominant, both individually and collectively.

3.4 Natural Character, Landscape & Amenity Values

3.4.1 Natural Character Values

Court decisions over what comprises Natural Character have varied and the fact that the RMA refers to "...preservation of the natural character of the coastal environment" implies greater emphasis upon maintaining the environmental status quo than, for example, when addressing "Protection of outstanding natural features and landscapes" [Section 6(b)]. At the same time, the extent to which such 'preservation' should apply is complicated by the fact that there is no threshold for such management - it applies simply to the natural character of the coastal environment, lakes, rivers and their margins - presumably in a generic fashion, and is not only related to 'outstanding' areas or locations.

In 2004, the Greater Wellington Regional Council released the Wairarapa Coastal Strategy – being a joint initiative with the Masterton, Carterton and South Wairarapa District Councils, as well as the Rangitane o Wairarapa and Ngati Kahungunu o Wairarapa iwi. The strategy is designed to enable the community to establish a long-term integrated approach to protect, manage and develop the coastal environment, and in doing so, it provides the most current analysis of natural character and landscape values along the Wairarapa coastline. The strategy's vision is to "provide for the sensitive, sustainable development of the Wairarapa Coast, which recognises and retains its special qualities".

The 'landscape technical report' section of this strategy, carried out by Boffa Miskell identifies 12 landscape character areas along the Wairarapa coastline, within which 54 coastal landscape units were defined and assessed for natural character and landscape quality. Of these, 87% were ranked as high or moderately high for natural character - a result reflective of the 'wild' and 'unspoilt' nature of much of the coastline. The Cape Palliser coastal protection works study area takes in three of the landscape character areas (Whatarangi, Ngawi and Cape Palliser), along with seven of the coastal landscape units (W44-46, N42-43 and CP40-41).

The Coastal Strategy identified natural character as being dependent on:

- Natural Elements

... the products of natural processes such as landforms, waterforms, vegetation and landcover.

- Natural Patterns
...the visual expression and distribution of natural elements where a landscape appears to be a product of nature rather than human endeavour...
- Natural Processes
...the ecological processes that underlie the visual expression and character of the landscape. The processes that sustain natural appearance include vegetation succession, natural erosion and deposition
- Modification
...the physical changes to a landscape such as mining, reclamations, infrastructure activities, buildings, structures and other man made changes or additions...

From these overarching criteria, six key assessment criteria were distilled:

- Landforms
- Waterforms
- Indigenous Vegetation
- Landscape/Vegetation Pattern
- Buildings & Structures
- Infrastructure

In assessing natural character, the coastal unit was split into 3 sections: shoreline, coastal platform and coastal setting (as shown in figure 4). The values for each of these sub-areas was then combined to give an overall natural character score for each coastal unit.

The mapped results of this analysis are appended as Annexure C. Of the seven coastal units in the current proposal's study area, three units (two around Whatarangi and one at Ngawi) scored only 'moderate' natural character ratings, while three, between Whatarangi and Ngawi, and also around Kupe's Sail scored 'moderate / high'. The seventh unit, around and west of the Cape Palliser lighthouse scored 'high', although only a small part of the current proposal falls into this coastal unit. Assessed against the wider Wairarapa coastline, the study area scores only moderately in terms of natural character values. The Coastal Strategy makes it very clear, however, that areas with lower quality scores should not be treated any differently from those with higher scores.

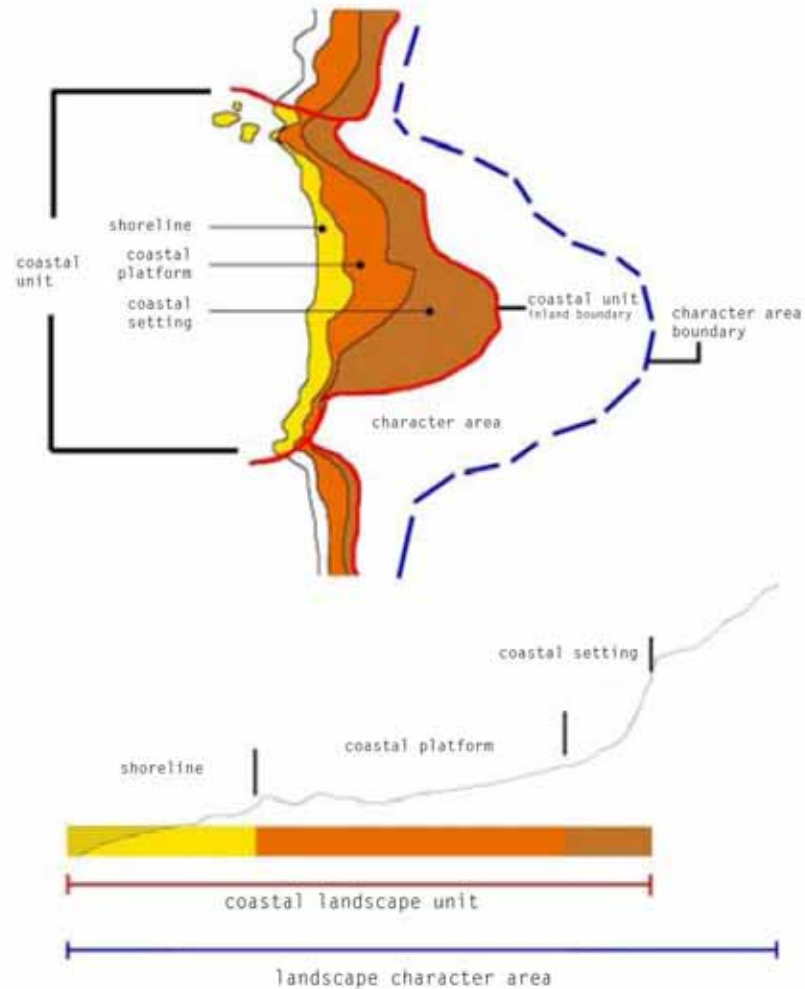


Figure 4: Coastal unit components, from the Wairarapa Coastal Strategy (2004)

The District Plan identifies only one significant landscape within the study area (Aorangi Forest Park), and this landscape's interface with the study area is confined to a relatively thin wedge around the Putangirua Stream, and another near Kupe's Sail. The coastal route also provides access to four outstanding natural features specifically identified in the plan – these being the Putangirua Pinnacles, Kupe's Sail, Cape Palliser as well as the Ngapotiki Fan, south of the study area.

Taking these assessments into consideration, it is my opinion that while human modification has clearly changed the nature of the Cape Palliser coastline and its overall naturalness very appreciably, it still retains some natural character elements / 'remnants'. Assessed against the Coastal Strategy criteria, it is clear that the environment around the proposal site reveals:

- An expressive and clearly legible landform, although this is modified heavily in places by Cape Palliser Road, most notably around the Whatarangi Bluff
- Heavily modified vegetation patterns: the wider landscape is still dominated by pasture, although pockets of regenerating native scrub and more mature bush are found around stream margins
- Awareness of a scattering buildings and development up and down the coast, particularly north of Ngawi, although the relatively small and recessive scale of most such development helps to limit its impact on the wider coastal landscape.
- A strong and dynamic interaction of the land with the sea
- Very marked presence of natural processes evident (again) at both the land / sea interface and also within the coastal hinterland with streams incising deeply into the Aorangi Range hill slopes.

These findings are backed up by the Coastal Strategy study, whose assessment values show that although the area has been subject to considerable human modification, it still retains appreciable 'natural' qualities.

3.4.2 Landscape values

The Wairarapa Coastal Strategy also provides an assessment of landscape quality values along the coastline, utilising the same coastal units as those identified in the natural character assessment. The criteria used in this assessment were:

- Naturalness
- Memorability
- Coherence
- Distinctiveness
- Remoteness
- Wildness

From this assessment, a rating of landscape quality was derived for each coastal unit, and a number of 'significant coastal landscapes' and 'landscape features' identified. Of the 54 coastal units, half were identified as being significant coastal landscapes. Ten

significant landscape features were identified, along with 12 sites of geological significance.

In the current study area, the landscape generally becomes more highly valued as one works south. The three coastal units north of Te Humenga Point were identified as being of moderate / low landscape quality, the area around Ngawi was rated 'moderate', and the two units between Ngawi and the Cape Palliser lighthouse rated 'moderate / high'. The final unit, east of the lighthouse was the most highly valued, achieving a 'high' rating. Notably, all coastal units south of Te Humenga Point and around Cape Palliser to White Rock were judged to comprise a 'significant coastal landscape'.

In general terms, the units comprising the Ngawi character area rate more highly for landscape values than those of the Whatarangi character area to the north. This is partially attributed to the presence of erosion control works in the northern area and, in particular, the rock gabion walls and terracing of the area around the Whatarangi Bluff. This has also affected that area's natural character scores. Even so, the report notes that there is still potential for landscape enhancement in this area to create a wider 'Palliser Bay significant landscape'. The Cape Palliser character area rates more highly again, and this appears due to the higher memorability and distinctiveness of the landscape, combined with less intensive human modification.

Significant Coastal Landscapes are noted as including important coastal landscapes, features and sites which should be "managed and protected in their particular landscape context, from inappropriate modification or destruction". That being said, the strategy also notes that this classification "should not restrict or penalise appropriate land uses or practices, nor should it affect the potential of the land for other appropriate activities that acknowledge and manage the landscape values associated with the particular area." In other words, any erosion works within the significant landscape area south of Te Humenga point would need to pay particular attention to the existing landscape values of that area.

The landscape assessment maps also identified two 'significant landscape features' within the study area, these being Kupe's Sail and the Cape Palliser Lighthouse, as well as three 'significant geological features' - the Whatarangi Bluff, Palliser Bay Miocene

Transgressive Sequence and the Cape Palliser Pillow Lavas. From a landscape point of view, this strengthens the argument that the southern section of the study area is more intact and highly valued than the north.

Another guide to landscape quality is provided by the Wellington RPS, which seeks to preserve or protect “any landscapes or features, including coastal escarpments that contribute to the natural character, visual quality or amenity value of the coast”. In other words, when dealing with regionally significant landscapes the emphasis shifts to protection of key components of the wider landscape. Appendix 1 of the RPS goes on to detail regionally significant areas, including the four within the proposal site:

- Site 42: the Hurupi Miocene transgressive sequence (geological significance)
- Site 43: Whatarangi Bluff Miocene sandstone (geological and landscape significance)
- Site 44: Te Humenga Point (ecological significance)
- Site 45: Cape Palliser Coastline (geological, landscape, ecological and heritage significance)

When the study area’s landscape is assessed against these characteristics, particularly those of ‘naturalness’ and ‘coherence’, the coastline can be seen to be split into three distinct character areas. The recent coastal protection works carried out have had a bearing on this, as has the development of housing and roading at the coastal edge.

These areas are:

- Section 1: The stretch from Hurupi Stream to (and including) Whatarangi
- Section 2: The section between Whatarangi and Ngawi
- Section 3: The area south of Ngawi to the Cape Palliser Lighthouse

The first section, from the Hurupi Stream to Whatarangi displays the highest level of modification. Here, Cape Palliser Road has been cut into steeply sloping hillside at Johnson’s Hill and along the Whatarangi Bluff. Both cuttings are clearly visible at a distance from both the road and the shoreline, and substantially modify the landscape. Further to this, the coastline itself in this section has been the most modified by coastal protection works – both boulder beaches and the more prominent gabion walls. These have been constructed in sections with clear gaps between them. This, coupled with the

visibility of the shoreline from the road, ensures that the erosion control measures are both apparent and contribute to the feeling of a modified coastline.

The second stretch of coast, between Whatarangi and Ngawi, traverses a much wider coastal terrace, with a narrow dune system often hiding the beach from the road and vice versa. This area, although dotted with small baches and farm outbuildings, has a more remote and unmodified feel to it than is found between Te Kopi and Whatarangi. Local beaches predominantly have natural shingle beds, and are contained / defined by a series of rocky headlands. The settlement of Ngawi terminates this section, giving the impression of being the last settled area along the coastal route.

The third section of coast, from Ngawi around to the Cape Palliser lighthouse, is traversed by a gravel road and clearly evokes the remote feel of the coastlines under review - with very few baches or outbuildings present, other than the collection of buildings at Mangatoetoe. The coastline is again hallmarked by shingle beaches and rocky headlands, with rocky outcrops becoming much more common than in the northern sections. In several places east of the Te Kawakawa Rocks, bedrock extends down into the ocean. As with the previous section of coast, a narrow strip of dunes frequently masks the beach from the road, although minor rock outcrops off the coast are often visible from the road corridor. This landscape is the most pristine found along the coastal route and is – commensurately – that which is most sensitive to change.

3.4.3 Amenity Values

Section 7(c) of the RMA states that those exercising power under the Act shall have regard to (among other matters) “The maintenance and enhancement of amenity values”. Such values are defined as being “those natural or physical qualities and characteristics of an area that contribute to people’s appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes”.

In practice, the concept of “amenity” is often bound up in the identification and maintenance of values that have more to do with local qualities and dynamics than “landscape”. For instance, whereas the concept of landscape may pertain to a wide ranging mixture of open pasture, remnant bush, rolling topography, shelterbelts and farm buildings that create a certain bucolic imagery and distinctive sense of place, amenity values may relate to the outlook to a single hill, ridge, stand of trees, stream

course or other feature that might be lost to most visitors, and also to a much more subtle array of local features and elements.

The concept of amenity has also been embraced over recent years (particularly in relation to the Wakatipu Environmental Society Incorporated v. Queenstown Lakes District Council decisions) to include landscapes that are less than outstanding, but still publicly noteworthy. This 'second tier' of 'Visual Amenity Landscapes' might also be considered to encompass the buffer or 'influential' landscapes that visually influence or affect truly Outstanding Natural Features or Regionally Significant Landscapes.

The Wairarapa Coastal Strategy landscape technical report did not individually assess amenity values, instead implying that they were picked up by the natural character and landscape assessments.

However, the essence of all amenity landscapes - regardless of their underlying nature (rural, coastal, montane, etc) and related audiences - is an existing character that is 'glued together' by a certain cohesion of expression and unity of elements that gives rise to it being 'pleasant', aesthetically cohesive and having cultural or recreational appeal. The essence of maintaining such values is usually the retention of the status quo, or at least the maintenance of the major 'building blocks' that contribute most to a locality's present-day appearance and imagery.

In these terms, the entire stretch of coastline from the Hurupi Stream to the Cape Palliser Lighthouse appears to exhibit high amenity value, built around the reasonably consistent image of a wild and rugged coastline that is flanked by a steep rural backdrop. The farming activity and pockets of residential settlement along the coast actually contribute to its amenity value, with the modest, rather characterful, nature of the buildings fitting in reasonably harmoniously with a stretch of coastline that is otherwise reasonably 'untamed'; almost giving it a sense of having been 'forgotten' by the outside world.

3.5 Visual Catchment and Audiences

The visual catchment of the proposed erosion control works has four discrete audiences;

- Recreational and commercial users of the ocean off the coast in Palliser Bay
- Users of the beaches along the coastline
- Those using Cape Palliser Road

- The owners of the bach residences scattered along the coast.

Recreational and commercial boaties viewing from Palliser Bay would be exposed to the full extent of the works, which may over time form a continuous boulder border to the beach from Hurupi Stream to Te Humenga Point, and from there on down to Ngawi.

Users of the beaches would be exposed to the works in much more detail but without the broad overview seen from offshore. The wider extent of the works can be seen in some areas where the arc of the coastline reveals more distant sections of coast. In terms of access, the boulder beaches could in places actually make it easier to get to the coast, over a pile of boulders rather than down an eroding vertical face.

Travellers on the Cape Palliser Road are likely to comprise the majority of potential viewers - both locals and visitors to the area. From here, the visual catchments range from elevated and extremely visible to not visible at all, where topography or residential development block views of the coast.

The final audience comprises permanent and seasonal residents of the bach communities along the route. This audience has been consulted through the AEE process, and it is apparent that for this audience, the erosion prevention outcomes of the boulder beaches are of a far higher priority than any potential visual effects. While these viewers provide a stationary and sometimes extensive view of the proposed changes, their perception is tempered by the fact that these structures might be improving their chances of long term occupation of their coastal property.

4. Assessment of Visual Effects

4.1 General Effects

Visual effects from off-shore would be reduced by the viewing distance to navigable parts of Palliser Bay, by the waves close to both their boats and the shoreline, by sea spray generated at the coastal edge, and by the fact that the proposed boulder beaches are to be constructed from naturally occurring materials similar in colour and tones to those found in the surrounding coastal landscape. In this respect, the works proposed would inevitably have less of an impact on the character and perception of the coast than alternatives, such as coastal walls, or by realigning the road as a response to further erosion. Having said this, a solid line of boulders strung in front of all the varied features and natural landforms of the coast could still create the appearance of a somewhat 'engineered' structure from this standpoint.

From closer to the actual beaches, the colours and shapes of the rocks would become more pronounced, and their orange and white colours are unlikely to entirely match the predominantly grey tones found in the rock formations that naturally occur along the coast. However, they may 'grey off' over time. Even so, from this viewpoint, more of the detail of the erosion control works would be apparent and the underlying geotextiles might well be exposed in some locations, while the shape and well-defined edges of the new 'rock formations' could also appear somewhat less than wholly natural.

From the coastal road views tend to be more fleeting and experienced at higher speed, so much detail is lost and viewers gain more 'general impressions' of the coastline. The most visible sections of the study area, in this instance, would comprise:

- the entire coastal edge, including most beachfronts, within Section 1, between Te Kopi and Whatarangi; and
- the seaward – outer – edge of some bays that arc out into Palliser Bay, viewed from parts of Section 2, although such exposure would be over a greater viewing distance.
- The road around the base of Kupe's Sail, where the road runs very close to the shoreline

4.2 Visual Effects on Section 1: From Hurupi Stream to Whatarangi

This section is already the most heavily modified portion of the coastline, with over half of its length already modified by some form of coastal protection measure. Two of the study area's three regionally significant landscapes occur in this section:

- the 'badlands' erosion features of the Hurupi Miocene sequence (RPS site 42) around the Putangirua Pinnacles; and
- the steep eroding cliff faces of the Whatarangi Bluff (RPS site 43).

The 'badlands' erosion features of RPS site 42 are well inland, and are never viewed concurrently with the coastline, although a 'priority 2' boulder beach is proposed at the mouth of the Putangirua Stream, adjacent to the carpark near the Stream. By contrast, Whatarangi Bluff rises directly up from the coast, so that any coastal protection works have the potential to affect this feature visually.

Three areas of coastal protection works are proposed for this section of the road: at the mouth of the Putangirua Stream, near a small collection of houses just north of the Whatarangi Bluff, and around the headland at the southern end of the Whatarangi Bluff.

Putangirua Stream is a rocky-bottomed watercourse; consequently boulders are already a naturally occurring feature at the edge of the beach near the stream mouth. Carefully positioned boulders to assist with erosion management would not necessarily appear incongruous in this location although, as mentioned earlier, the colouring of the boulders themselves would not exactly match that of the natural rock formations and boulders in the vicinity of such works. However, the new 'boulder beaches' could be made to appear more natural by 'feathering them out' at the edges, rather than ending the works with a straight line of rocks, as is currently the case.

The works near the houses north of the Whatarangi Bluff lie between two existing boulder beaches, and awareness of the 'artificial' nature of these works is in fact heightened by the existing gaps between them. Consequently, closing these gaps appears likely to actually have a positive effect on the coastal landscape, as it would generate more visual coherence and consistency, helping the boulders to read as a more unified and natural feature. Furthermore, around the same houses (north of Whatarangi), the beach is recessed well below the road level, and large sections of the proposed and existing works are not, and would not be, visible from the road - thus further reducing their potential visual impacts.

South of this point however, sweeping views of the coast at the base of Whatarangi Bluff (RPS site 43) become visible, and it is in this location that the existing boulder beaches appear more visible and out of character with the surroundings. The rocky boulders used in those previous works conflict with the softer 'clay' appearance of the sandstone faces above them, and appear quite unnatural. They also establish an unnaturally dark horizontal band at the base of the Bluff when viewed from more distant viewpoints offshore and on Cape Palliser Road.

Given the landscape significance of Whatarangi Bluff, the exposed nature of views towards it and the incongruity of the existing boulder beaches in this location, it appears likely that the proposed coastal protection works in this area would be both more visible and would be more readily differentiated from the shoreline features and elements that comprise their natural coastal setting. That said, the majority of protection measures are already installed, and the current 'gap' between the existing 'boulder beaches' below the headland draws attention to the man-made nature of the works. It also appears somewhat unfinished. Furthermore, it is clear that past realignment of the coastal road in response to erosion has already scarred and adversely affected the character of the Bluff. Any further road realignment back into it would seriously compromise Whatarangi Bluff's value as a natural coastal feature and landmark.

On balance, therefore, taking into account the already modified nature of the base of the Bluff, it is considered that continuing the existing erosion control measures around the headland would have the less impact on its natural character than either leaving the erosion to continue or altering the road course in anticipation of further erosion.

As a result, in terms of natural character, landscape and amenity values, the net effect of 'filling the gaps' between the existing boulder beaches along this first section of Cape Palliser Road would not have an appreciable effect on this already heavily modified landscape. Although this section includes areas of regional landscape significance, stretches of 'boulder beach' are already in existence, and filling in the existing sections would actually reduce the prominence and artificial nature of such measures.

Indeed, a short section of gabion wall has already been erected adjacent to the road at Te Kōpi: its very obviously different and unnatural profile offers a salutary warning about the 'risks' associated with adopting some alternative erosion control measures.

4.3 Visual Effects on Section 2: Whatarangi to Ngawi

This section of the route is scheduled primarily for 'priority 2' works, with no new erosion control works proposed around the regionally significant 'Te Humenga Point' landscape (RPS site 44) and the first headland north of Ngawi. A small section of 'priority 1' works is proposed between two existing stretches of boulder beach in this section, on BECA map 5. These works would replace an existing iron and timber sea wall (Figure 5), and this replacement is seen as a positive change, as the resultant boulder beach would merge much more seamlessly and naturally with the coastal surrounds.

In general, this section of coastline has not been significantly modified and displays a high level of natural character, although the elevated pastoral backdrop providing part of the coast's backdrop and visual context is clearly modified. This has resulted in the area's moderate and moderate-high natural character ratings, as depicted in the Wairarapa Coastal Strategy.



Figure 5: Existing erosion control measures to be replaced as "priority 1" works



Figure 6: Taller erosion scarp profiles around the settlement of Whatarangi

As described earlier, views from Cape Palliser Road to the actual coastal edge are limited along this stretch of coast due to intervening topography. Additionally, when viewed from Palliser Bay

itself the recessive colours and materials of the boulder beaches would merge into a single horizontal band along the coastal edge – within a landscape that is already marked by a series of such bands at, and near, the coast.

Consequently, visual effects of the boulder beaches on these audiences would be limited, with the majority of effects experienced right at the sea's edge by those recreating or living near it. The landward edge profile of the foreshore varies in this section: from eroded scarps of consolidated gravels some 5m high around Whatarangi, to eroding dunes that are 1-2m high generally elsewhere, and gently sloping foredunes with no visible erosion scarp at more intermittent locations. A 'one size fits all' approach to the design of boulder beaches within this section of coast may therefore not be appropriate for such situations, and could actually create a sense of incongruity in some locations.

To address this issue, it might be appropriate to place more substantial boulder fill where works are proposed at the base of the steeply eroded profiles around the settlement of Whatarangi. This would help to avoid creating the appearance of a relatively small 'necklace' of unnatural of rocks along the base of the scarp (refer Figure 6). Elsewhere, however, in areas where low eroding dunes and scarps are more prevalent, the currently proposed method of construction appears to fit in more naturally with its coastal setting. At the same time, it would minimise the visual exposure of the proposed boulder beaches when viewed from above the beach, from the road, adjacent housing or Palliser Bay. At locations with a gently sloping beach and no evident erosion, however, creation of a boulder beach would effectively form a wall, rising above the level of the adjacent dune system that intrudes into views from both Cape Palliser Rd and the coastal edge. It could also create unnecessary access problems for beach users. In these locations boulder beaches should be sufficiently low and contoured so as to more effectively marry with the natural profile of the backshore area.

Figure 7 (overleaf) shows a summary of suggested profiles for the boulder beaches under each of these scenarios.

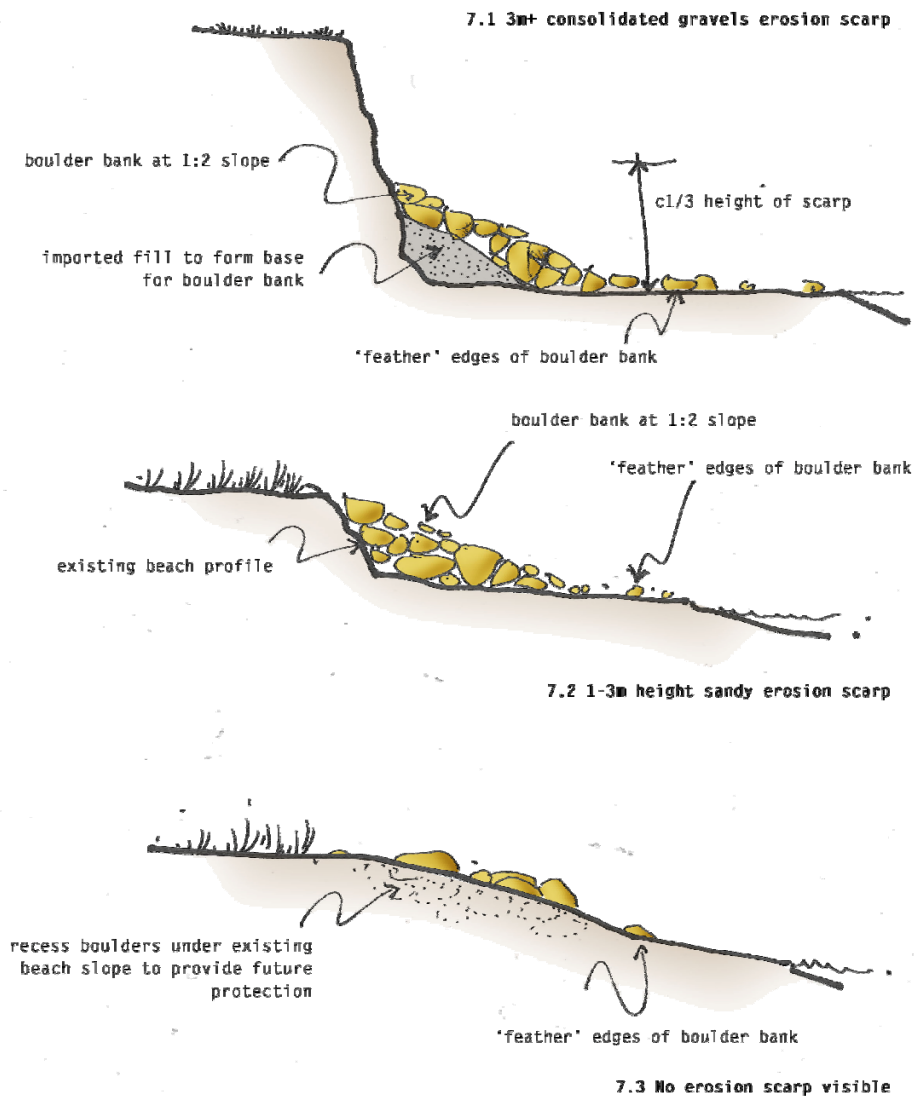


Figure 7: Suggested boulder beach construction for differing foredune profiles

Protection of the rocky headlands within this stretch of coast may also need some further thought. Presently, most of the headlands do not appear to be eroding as they are already naturally protected by boulders. In these locations, a continuous line of boulders would appear quite out of character with the surrounding, rather random, collection of rocks, and would appreciably diminish the natural character of the coastline. As shown in Annexure E, it is therefore considered that new boulder beaches should be avoided wherever possible in this section and, where still implemented, should be 'feathered out' at their edges so as to merge – as much as possible – with the adjacent terrain and beach detritus.

Of note in this section is the regionally significant landscape around Te Humenga Point. From reading the RPS map at the scale given, it is difficult to determine the extent of this area. While it

appears from the maps that no erosion control works are proposed in this area, it would be worth double checking with the project ecologist that they are satisfied with the extent of works. The RPS identifies this area as habitat for the katipo spider, rare moth *Notoreas* 'Wellington', green gecko and spotted skink, and it will be important to ensure that their habitat is not compromised.

At the southern extent of this section lies the settlement of Ngawi which is to be subject to 'priority 2' coastal protection works. This beach is heavily used for access by the local fishermen, who use a variety of earth moving machinery to lower their boats on trailers into the water. The boulder beaches proposed for this part of the coast would have an impact, but it is likely to be minimal due to the current nature of activities and the array of structural elements already found within it.

4.4 Visual Effects on Section 3: Ngawi to Cape Palliser Lighthouse

The relative lack of development and rugged nature of this section of coastline contributes to the general feeling that it is imbued with quite high levels of natural character, landscape and amenity value as a whole. This becomes more pronounced once past the minor settlement of Mangatoetoe, where the study area takes in the striking geological formation of Kupe's Sail, and the wider, regionally significant Cape Palliser Coast landscape (RPS site 45). In broader terms, Kupe's Sail is also a site of cultural significance to Iwi, and is therefore protected under the provisions of the RMA as well as local policy documents. As noted earlier, local Iwi were consulted as part of this application, and concerns were raised about the possibility of erosion around Kupe's Sail resulting in the need to relocate the road, and the accompanying disruption of the landform that could result.

In terms of visibility, throughout much of this section, the beach margin is hidden from views from the road by the intervening dune system, although views of the coast are afforded from the road between Mangatoetoe and the western edge of Kupe's Sail. Views of any proposed erosion control works would also be visible from offshore, from the beaches themselves and from the settlement of Mangatoetoe. Perhaps most significantly, an elevated overview of the southern extent of this section is also afforded from the Cape Palliser Lighthouse – a popular tourist destination. Any change to the nature of the shoreline would be highly visible from this location, particularly as it could be easily compared with the unmodified shoreline past this point (refer Figure 8).



Figure 8: Overview of the southern coastline, looking west from the Cape Palliser Lighthouse.

Given the visibility and visual sensitivity of the landscape, as well as the greater distance from the road to the shoreline in this section, the entire extent from Ngawi to the Cape Palliser Lighthouse has been designated as ‘on hold’ ‘priority 2’ works. It appears likely that the predominantly rocky shoreline in this area will provide a ‘buffer’, reducing the need for any further erosion control works, and thus no works are proposed for this area, with monitoring instead to be carried out over the coming years. It is suggested that a condition be placed on the consent for this area stating that in the event that this area requires protection, consultation with the public, Iwi and the Greater Wellington Regional Council will be undertaken on design aspects, and a visual assessment by a landscape architect will be undertaken prior to the commencement of any works.

This assessment has given special consideration to Kupe’s Sail. This outstanding natural feature is described in the draft Regional Policy Statement for the Wellington Region as being “a slab of sandstone, lying uncomfortably against much older greywacke.” The underlying strata have been faulted, tilted and eroded, and are subsequently exposed – forming a very dramatic backdrop to the settlement of Mangatoetoe (refer Figure 9). At the coastline, the Kupe’s Sail formation rises out of the water as a series of tilted rock slabs, with the natural processes of upthrust and tilting very much apparent. Although somewhat modified by the introduction of the coastal road, the natural character, cultural and landscape values of this feature remain high.



Figure 9: Kupe's Sail, looking east from the beach at Mangatoetoe

It is in fact the steepness and upthrust nature of the exposed bedrock in this formation that increases its sensitivity to any proposed erosion control works. The natural slope of the bedrock here is such that any loose stones fall straight into the ocean, and rarely collect on the face of the slope. For this reason, any proposal to place a 'boulder beach' along the flat ledges of the formation would not only stand out immediately as being artificial, but in doing so would also detract from the appreciation of the natural processes that formed the landscape. Results of this can already be seen at the western edge of the formation, where a thin line of rocks have been placed on top of a large bedrock sheet (Figure 10), appearing an artificial and somewhat 'ad-hoc' remedy to potential erosion.



Figure 10: Section of road along the base of Kupe's Sail, with existing 'boulder beaches' highlighted by the red box.

Given the likely visual impacts then of continuing this approach around the entire base of the Kupe's Sail formation, it is clear that this should be regarded as a 'last resort', and the proposed 'on hold' 'priority 2' staging in this area with its 'wait and see' approach is appropriate. The risk inherent in this approach is that if erosion were to occur,, the most vulnerable section is the narrow stretch of road between the western face of Kupe's Sail and the coast, shown in Figure 10. Any further terracing of this landform to reinstate the road in this event would greatly diminish its natural character and landscape values, in a manner similar to that seen at the Whatarangi Bluff. For this reason, and although outside the scope of this report, it should be stressed that no further terracing of this exposed face is to occur in any event, and any road restoration caused by potential future erosion is dealt with via bridging or other appropriate engineering solutions.

By placing all 'priority 2' works in this area 'on hold', and dealing with any erosion problems on a case by case basis, it is clear that this consent application will not create any negative visual impacts on the highly valued coastal landscape south of Ngawi.

5. Mitigation & Suggested Amendments to the Proposal

From this assessment it is clear that although the landscape around Cape Palliser has been substantially modified, it retains significant natural character and amenity value. It also contains four regionally significant landscapes. While boulder beaches appear to be the least visually significant of the proposed erosion control techniques, it remains important to ensure that their visual impacts are minimised.

5.1 Mitigation Techniques

Where boulder beaches are proposed for both 'priority 1' and 'priority 2' works, consideration should be given to creating a profile that is as natural as possible. This should include 'feathering out' boulders at the base of each slope, particularly around stream mouths and rocky headlands, as well as at the end of each stage of works. The construction technique used to date has created a rather austere, 'engineered profile' that contrasts with the existing, naturally occurring terrain and rock formations along the coast – which are less clearly defined and articulated. Efforts taken to scatter the boulders around the edges and base of the works would assist in tying the construction in with the surrounding landscape.

Further to this, a slightly more flexible approach to design of the boulder beach profile is suggested. It needs to be appreciated that the coastal profiles vary along the route, especially within Section 2 from Whatarangi to Ngawi, and some variation in the boulder beach profiles and height would accommodate the most seamless integration of the works with the wider coastal landscape.

The introduction of boulder beaches may in places make it more difficult to access the coast from the road, and it is suggested that 'access points' are created wherever the proposed works cross an existing path to the beach. It is recommended that these access points are formed from smaller rocks, of a similar colour, shape and parent source to the adjacent larger rocks, with the larger rocks 'feathered out' at the edge to create a natural profile.

These mitigation techniques have been discussed and agreed with Council and would be implemented during construction of the works.

5.2 Suggested Amendments to the Proposal

While the boulder beach proposal would have fewer visual impacts than the erosion control alternatives presented, it nonetheless requires the introduction of an 'artificial' element into the

landscape. In a number of areas along the coastline, coastal protection works are proposed where the justification does not appear adequate to warrant disruption of the coast's natural character, landscape and amenity values. These are shown in Annexure E, and include a number of rocky headlands and foreshore areas that appear to be functioning as natural 'boulder beaches' and protecting the coastline from erosion.

The introduction of non-local rocks to these areas would significantly diminish the natural character and amenity of these locations, and it is recommended that the proposal be amended accordingly.

6. Conclusions and Recommendations

While the landscape along Cape Palliser Road is undoubtedly modified - by a series of erosion control works along the foreshore, as well as the more widespread land use change from forest cover to pastoral farming in its elevated backdrop - it still retains appreciable natural character, and often feels remote and 'wild'. Additionally, there are four regionally significant landscapes along the proposed route, and the area has a high overall amenity value.

Having said this, it is clear that some form of erosion control works in this area are necessary in order to maintain the road link to Ngawi and Cape Palliser beyond. An assessment of the alternatives has shown the proposed 'boulder beaches' to be the least visually significant method of achieving this. In order to reduce the visual impacts further, a number of mitigation measures and amendments to the proposal are suggested in Section 5. These include:

- A greater range of boulder beach profiles and heights that respond to the variable nature of the existing coastline, thereby making the boulder beaches appear more 'natural'. Indicative sections are given in Figure 7.
- A 'feathering out' of the edges of the boulder beaches, particularly adjacent to stream mouths and headlands to ensure that the end of the boulder beach appears to merge more naturally with the natural terrain – without a defined end point.
- The introduction of 'access points' formed from smaller rocks at locations where an existing track crosses any proposed boulder beach.

Due to the increased importance of the landscape south of Ngawi, it is also proposed that all proposed works in this section (section 3) are put 'on hold', and monitored to assess the need for erosion control works. In the advent that works are needed to specific locations, any proposal shall include consultation with Iwi, the Greater Wellington Regional Council, and require a visual assessment to be carried out by a landscape architect.

Furthermore, and while outside the scope of this report, it is also recommended that in the event of the road at the western base of Kupe's Sail being lost to erosion, that bridging or other engineered structures are used to remove the need for further terracing of the landform.

If these considerations are taken into account, it is clear that the effects of this proposal on the Cape Palliser landscape would achieve the result of protecting the coastal road and access to settlements, while not significantly disrupting the natural character, landscape or amenity values of the area.



notes:

1. Study area start point at the mouth of the Hurupl Stream
2. Priority one works, boulder beach c200m length
3. Priority one works, boulder beach c250m length
4. No works proposed around Te Humenga Point
5. Priority one works, boulder beach c300m length
6. "On hold" priority two works south of Ngawi
7. End of study area, at the Cape Palliser Lighthouse

key:

- Existing coastal protection works - mixed approaches
- Proposed coastal protection works (priority one & two)
- No coastal protection works proposed
- | Ngawi township
- | Hurupl stream
- | Landscape feature
- "on hold" priority two works





● start/finish of coastal protection works study area

NATURAL CHARACTER ASSESSMENT

W40	W45	W44	W41
High	High	High	High
Medium	Medium	Medium	Medium
Low	Low	Low	Low
Very Low	Very Low	Very Low	Very Low

WATER QUALITY

W40	W45	W44	W41
High	High	High	High
Medium	Medium	Medium	Medium
Low	Low	Low	Low
Very Low	Very Low	Very Low	Very Low

NATURAL CHARACTER ASSESSMENT

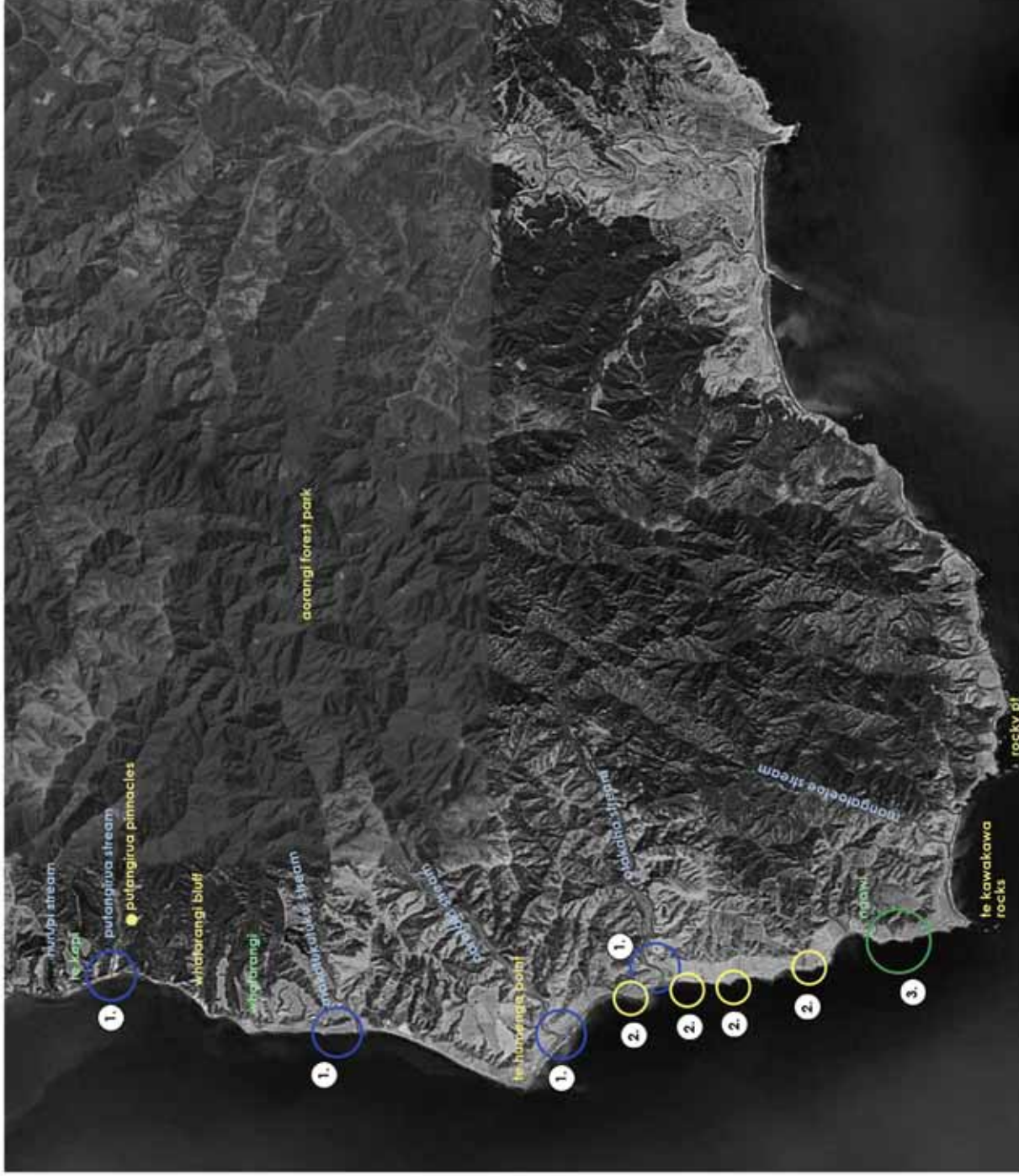
CP40	CP45	CP44	CP41
High	High	High	High
Medium	Medium	Medium	Medium
Low	Low	Low	Low
Very Low	Very Low	Very Low	Very Low

WATER QUALITY

CP40	CP45	CP44	CP41
High	High	High	High
Medium	Medium	Medium	Medium
Low	Low	Low	Low
Very Low	Very Low	Very Low	Very Low

[from the wairarapa coastal strategy: landscape technical report]



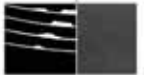


notes:

1. Care to be taken to 'feather out' edge of boulder beaches around the mouth of significant waterways along the coast.
2. Rocky headlands and foreshore, functioning as natural boulder beach, suggest 'priority zero' works in these areas.
3. No works to be carried out south of Igawi.

key:

- igawi township
- mungaloelae stream
- aerangi landscape feature



Appendix F

Beca Report on Erosion, 2000



D

R

Report

**Palliser Bay Road -
Options for Continued
Access**

Prepared for
South Wairarapa District Council

June 2000



Report

D

**Palliser Bay Road - Options
for Continued Access**

R

Prepared for

South Wairarapa District Council

A

Beca Carter Hollings & Ferner Ltd

F

T

June 2000



South Wairarapa District Council
PO Box 6
MARTINBOROUGH

2 June 2000

OUR REF: 2810840

W2:45380-W2R45380.DOC

Attention: Mr Ravi Mangar

D
Dear Ravi

Palliser Bay Road - Options for Continued Access

As discussed, we have pleasure in enclosing our final Report on options for continued access to Palliser Bay. We have identified short term and medium term issues which need to be progressed further and before we can complete a cost benefit analysis of the options and full recommendation supporting a particular option.

The critical short term issue is to initiate a measurement survey of Johnson's Hill to ascertain whether there are any suitably stable areas that might be considered for a relocated road section.

Based on all the work completed to date our recommended strategy is coastal protection of Whatarangi Cliffs, maintain and/or bypass of Johnson's Hill.

Yours sincerely
Beca Carter Hollings & Ferner Ltd

F

Peter Steel
Director of Civil Engineering

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PBS:lad

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Appendix 2 Cost Estimates

(i) Coastal Bypass

(ii) White Rock – Cape Palliser Lighthouse

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Executive Summary

The Cape Palliser Road extends from just north of Lake Ferry, south to Cape Palliser. The road services the communities of Te Kopi, Whatarangi, Ngawi, and Managatoetoe, as well as some farms and smaller communities. Total population served is over 500 with a normal daily vehicle count of 200 vehicles per day, in addition to which there is significant tourist and week-end traffic.

The road, which extends along the coastal strip for much of its length, is the only 2-wheel drive route for access to all properties and communities along its length. A 4-wheel drive track exists between Cape Palliser lighthouse and White Rock Station but is not normally available for public use. The topography of the country inland of the coastal strip is extremely rugged, and presents extreme challenges for the establishment of any alternative route.

The coastal section of the road route between the Hurupi Stream and the Whatarangi subdivision, south of the Blue Disc subdivision, has experienced severe erosion over periods in the past. The current erosion cycle has continued since 1992. The duration of the current period of high erosion cannot be predicted. Over the period, 1992-2000 it has been necessary to reconstruct a number of sections of road, (repeatedly in some instances), and one section of coastal rock protection has been placed. From 1995 to 2000 over \$3.5 million has been spent between Johnson's Hill and Whatarangi Cliffs (about 3 km) on relocation works and routine maintenance

The purpose of this Report is to examine solutions for sustainable access to Cape Palliser and the communities along this route. The four options considered in this report are;

- Maintaining the existing road along with coastal protection
- Coastal Bypass from Pinnacles Bridge to Whatarangi Subdivision
- Alternative route from White Rock Road to Cape Palliser Lighthouse (and abandon the existing road from Pinnacles Bridge to Whatarangi subdivision).
- Do nothing and abandon the existing road south of the DOC Field Station (Pinnacles Bridge).

Another option previously investigated (BCHF report of March 1997) was an alternative inland route. Due to the mountainous terrain inland of the coastal route, no feasible low cost road was identified, and the only suitable inland option identified at that time was 17 kilometres long when the existing route was only 4 kilometres long. The significant additional travel time with steep gradients and maximum altitude similar to the summit of the Rimutuka Hill, and sharp curves meant this option was put aside as being unlikely to receive endorsement by end-users.

The report seeks to compare options for addressing the erosion problem and the feasibility of the alternatives to allow the South Wairarapa District Council and Transfund to consider options for the access to this area. Cost assessments of all options are presented and compared. The varying levels of design analysis that have been undertaken mean that

there are differing levels of certainty on these costs, and this variation needs to be considered in evaluating options.

The options comparison is not conclusive at this stage because there are still too many uncertainties to be better defined before the preferred option can be determined. The recommendations detail both short and medium term matters requiring action and include:

- Determine the actual erosion rate since 1996 by taking new aerial photographs
- Review the rate of movement of Johnson's Hill
- Refine estimates
- Carry out cost benefit comparison of options once estimates revised
- Prepare programme and budget of short and medium term actions required.
- Carry out a preliminary geotechnical assessment of the coastal bypass route if this option appears likely to be selected as the preferred option
- Carry out a preliminary risk analysis of the 4 options (including the "do nothing" option).

The coastal section of this road has experienced cyclic erosion of soft mudstone for many years and severe erosion has occurred since 1992. The rugged, mountainous topography immediately inland of the existing coastal route means that any bypass route will be steep with minimum design geometry standards. Until a preliminary geotechnical assessment and estimate revision have been completed the suitability of the coastal bypass option cannot be confirmed.

As well as significant geotechnical issues, there are a number of other risks/issues that should be quantified (before finalising the preferred option) including erosion forecasts, roading standards for bypass options land, purchase (including Maori land issues) and planning/resource consents.

The difficult topography and aggressive coastal wave environment mean that all of the proposed options (except "do nothing") would cost several million dollars. As over \$3 million has been spent in the past 5 years maintaining and relocating the existing coastal route, it is important that the ultimate selection of the preferred option for this road should be carried out to a high standard, and the recommended option hopefully supported by all interested parties, and able to stand close scrutiny regarding the selection of the preferred option. This report must be considered to be only a part of the work required for a project of this scale and complexity.

1 Background

There is limited information on historical records of erosion along this coastline. The shoreline in the area would have been uplifted by the 1855 earthquake and this uplift as well as slips caused by the earthquake would have been expected to have provided additional protection to an eroding coast.

In the 1930's, measured rates of erosion at the Whatarangi woolshed were some 1,270 mm/year over a six year period (King 1930). As described in Section 3, the erosion rate appears to have reduced over the decades of the 1940's to the 1960's and it was not until 1976-1977 that a further cycle of severe erosion was recorded. Erosion has been severe over the 1992-2000 period causing the loss of a number of batches at Te Kopi and requiring substantial expenditure on the road. No estimate can be made as to how long the current erosion cycle will continue.

The erosion problem is cyclic, and it is likely that regular periods of erosion have been experienced over many centuries prior to European records of the problem. The erosion results from the high coastal sediment transport capacity in the area caused by south and southwest waves, combined with a limited supply of sands and gravels to the coast south of the area concerned, and the soft, easily eroded mudstones of this particular section of coastline. The amount of erosion experienced for various stretches of the coastline will depend on the alignment of the shore in relation to the wave climate and the relative hardness of the mudstone along the different parts of the coast.

The 1994 document "Study Report - Palliser Bay Erosion" was prepared to summarise the understanding of the erosion situation at that time and outline options for mitigation of erosion. Recommended options were to relocate the road and other affected developments where this was considered appropriate, and to provide coastal protection by means of a boulder beach in areas where this was impractical. Coastal protection did not proceed at that time due to high costs of boulder supply and placement. Recent years have seen reducing costs for the supply of rock, and in 1999 a section of coastline opposite the Te Kopi Urupa had rock protection installed. Protection options considered in this report are based on these 1999 supply and installation costs.

A further report in September 1996 reviewed erosion for the period 1994-1996 and adjusted the forecast erosion rates.

Contract activities on road relocation have been undertaken since 1994:

- Johnson's Hill with two areas reconstructed, and both areas now needing further reconstruction.
- Reconstruction of the road adjacent to the Te Kopi Urupa, prior to the placing of the rock armour.

- Three reconstructed lengths of the road along the Whatarangi Cliffs. These reconstructions have involved removal of the benches formed when this road was constructed in 1968. Further reconstruction of these areas will require cutting and benching the full height of the cliffs up to 80-100 m in height, involving very substantial earthworks volumes.

In March 1997, a report was presented to Council describing an inland route option to bypass the eroding coastal section of road. This report proposed a 16.8 km route which was routed inland of the siltstone/conglomerate which forms the eroding coastal area and the Putangurua Pinnacles DOC Reserve.

The route identified would be winding and narrow, and climb effectively to the same altitude as the summit of the Rimutaka Hill. Construction of an unsealed road in accordance with typical forestry road standards, and allowing for sidecasting of all excavated material was estimated as costing \$1.5 million and would provide a low speed, maintainable forestry quality road that could be progressively upgraded to a similar standard to the existing route. This estimate would substantially increase to achieve construction to normal Transit New Zealand design standards, provision of constructed fills rather than sidecasting. This estimate did not allow for the cost of consents or environmental mitigation measures. This option was considered to be of too low a standard, and involve excessive length in comparison with the existing route and has not been considered further.

With continued erosion and expenditure on road reconstruction, in 1999 it was decided to re-examine an inland route option within the siltstone/conglomerate coastal area identified as one bypass option in the 1994 report. This route would start immediately south of the DOC Reserve, and return to the coast near the Whatarangi subdivision. Alternatively a new by-pass from Cape Palliser via White Rock Station and White Rock Road to Martinborough is investigated. At the present Cape Palliser and White Rock are connected via a 4 wheel drive track.

This report presents the preliminary design that has been developed for these routes and compares the costs of these alternatives with options involving the status quo of reactive relocation of short distances of road or the alternative of providing additional coastal protection.

2 Erosion History and Forecasts

The processes causing erosion and erosion rates have been described in detail in the 1994 and 1996 reports.

2.1 Erosion Mechanism

The materials which make up the shoreline cliffs along this section of coast are soft, easily eroded mudstones. Most of the shore is unprotected by beach deposits and active cutting back of the cliffs in these areas occurs from the effects of south and southwest waves. A supply of sand and fine gravel increases the erosion capacity of the waves against the mudstone.

Erosion does not progress at a steady rate but varies depending on the hardness of the mudstone, the cliff height and the shoreline alignment at a particular location. This variability occurs not only between areas but also within a particular area.

Localised failures occur as waves undercut a section of cliff, eventually causing it to slump and creating a noticeable scallop effect. Erosion in neighbouring sections of cliff then occurs at a faster rate as these are weakened by collapse of the adjacent section and become exposed to wave action. Eventually these sections will also be slumping, extending the area affected by erosion. Localised erosion measurements can be affected by the scalloping, so that individual areas can suffer significantly worse than average erosion over any particular period, but then experience reduced erosion while the neighbouring areas are eroded. This means that a reasonable margin must be provided to structures or facilities such as the road to allow for this effect.

2.2 Historical Erosion Records

Historical erosion rates were recorded in 1996 as follows:

Erosion over the 1993-1996 period has been assessed at the Whatarangi Subdivision, Whatarangi Cliffs, Te Kopi, Johnson's Hill and DOC Station areas. Historical erosion levels over the period 1944-1993 have also been assessed for the Johnson's Hill and DOC Station areas as these were not reviewed in detail in the previous study. Historic erosion levels for the Whatarangi Subdivision, Whatarangi Cliffs and Te Kopi areas have been taken directly from the previous study.

Cliff top erosion rates have been quantified in Table 2.1 and presented in Figure 2.1.

Table 2.1
Experienced Erosion

Area	Period	Average Erosion (mm/Year)	Total Erosion Over Period (m)
Te Kopi North	1944-1973	153	0.9-6.8
	1973-1979	641	1.7-9.4
	1979-1993	371	0.3-8.9
	1993-1996	750	1.5-4.0
Te Kopi Central	1944-1973	30	0-1.7
	1973-1979	30	0-1.7
	1979-1993	30	0-1.7
	1993-1996	50	0.1-0.3
Te Kopi South	1944-1973	50	0.9-2.6
	1973-1979	492	1.7-5.9
	1979-1993	212	2.1-6.4
	1993-1996	1200	1.5-5.0
Whatarangi Cliffs	1968-1993	80	0.4-4.5
	1993-1996	200	0.3-1.3
Whatarangi (Blue Disc) Subdivision	1944-1973	91	1.3-6.3
	1973-1979	1440	5-11.3
	1979-1993	166	0.6-3.8
	1993-1996	1000	2.0-4.0
Johnson's Hill	1944-1973	150	3.0-7.0
	1973-1979	650	2.0-6.0
	1979-1993	200	2.0-5.0
	1993-1996	500	1.0-2.5
DOC Station	1973-1979	60	0.3-1.5
	1979-1993	40	0-1.2
	1993-1996	150	0.2-1.0

It is clear from Figure 2.1 and the historic evidence of erosion that the occurrence of erosion is quite cyclic with high levels of erosion experienced for a period, followed by periods of reduced erosion.

The current erosion cycle is resulting in high rates similar to those experienced in the 1930's and 1970's. While the 1930's cycle is reported to have continued for several years, the 1970's cycle was shorter. The current cycle has now continued for approximately 7 to 8 years and can be expected to continue until the beaches naturally rebuild to protect the cliffs from wave erosion. There is no sign of this occurring, and a visual assessment is that the beaches are as low or lower than they have been at any time over the past eight years.

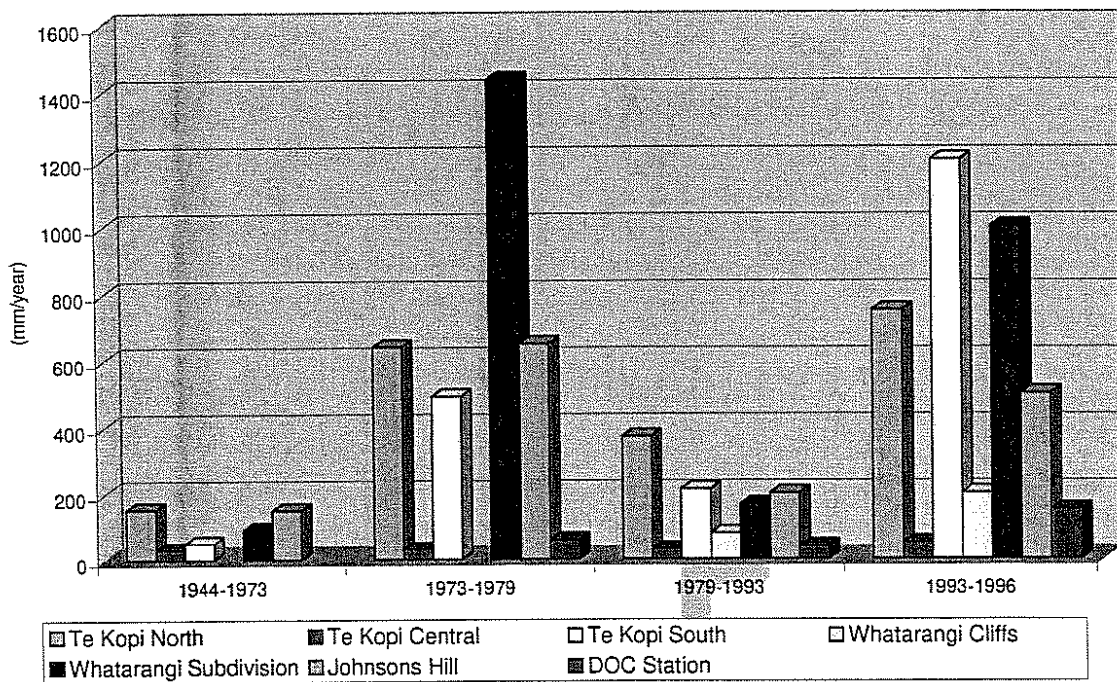
There are records of severe erosion in the 1920's-1930's along this coastline, with a description of 35 feet or 7.5 metres of erosion over a five year period during this time.

The erosion rate reduced in the 1940's, 1950's and 1960's, during which time much of the existing development occurred along this coastline. In 1968 when the Whatarangi Cliffs road was constructed, there was an awareness of erosion risks and provision was made for a 10 foot/3 metre margin between the cliff edge and the road pavement, which was expected to provide a 25 year period before the road became at risk.

Erosion resumed in 1976/1977 then appeared to stop until 1992. Since 1992 there has been steady erosion at moderate to high rates. This has resulted in the erosion margins and rates assessed in 1994 being exceeded since that date.

D

Figure 2.1
Average Erosion



T

The current situation is that beaches from north of the DOC Field Station and extending over the full length of the eroding coast to south of the Whatarangi subdivision are low, allowing erosion. The length of low beach and hence the area suffering erosion appears to be increasing. This situation leads to the conclusion that there is little prospect of a reduction in the erosion rate within the next few years. The erosion rate for the period 1996-2000 assessed from visual observation is equal to or greater than that for 1993-1996.

We recommend that actual erosion for the period 1996-2000 is assessed in a similar manner to the work done in 1996 by comparison of measured data and aerial photographs.

2.3 Potential Future Erosion

The potential for future erosion that was assessed in previous reports has been evaluated as a medium term average rate which allowed for the historical situation when a period of

severe erosion was followed by a period of reduced erosion. The 1996 erosion assessments were based on the assumption that a 25 year period would have a 10 year severe erosion cycle and 15 years of reduced erosion. In order to examine the potential for ongoing severe erosion, we have added to this an erosion assessment for 25 years of continuous severe erosion:

Table 2.2
Erosion Assessment

Area	1996 Assessed Erosion 25 Years Potential	Severe Erosion 25 Years Potential
DOC Station	4.0 m	10 m
Johnson's Hill	10.1 m	18 m
Te Kopi North	12.3 m	21 m
Te Kopi Central	9.0 m	16 m
Te Kopi South	15.2 m	26 m
Whatarangi Cliffs	5.0 m	9 m
Blue Disc Subdivision	19.8 m	34 m

The severe erosion scenario will involve loss of the road in practically all areas except the DoC Station.

It was recommended in 1996 that the assessment of erosion at that time should be reviewed around the year 2000. The above assessment is based on 1996 figures and should be reviewed on the basis of the current situation.

The potential effects of erosion were considered in the 1996 report and can be further reviewed against experience over the past 3 ½ years, since 1996. However at this point we have no data on which to do this comparison. Our assessment is that the rates of erosion are currently more severe than the 1996 assessments..

3 Maintaining Existing Road

3.1 Description

For the past eight years, the road has been maintained by progressive inland reconstruction of the existing road by 4-8 metres inland of its eroded location. Reconstruction has taken place at individual sites when the road starts to fall into the sea, or on Johnson's Hill when the slip movement becomes excessively fast.

Work undertaken on relocation of the road has been described in Section 2.

The predictions of future erosion and road loss is difficult, but based on the rates of movement currently experienced we consider that the following is a likely scenario.

3.2 Johnson's Hill

Road relocation work on Johnson's Hill has involved reconstruction of individual road lengths of 100-150 m as the movement of the underlying slide debris increases to an unacceptable level. To date the road relocation has involved acceptable increases in grade for the approach sections as the road over the hill is moved higher up and into the hill face to avoid the slide.

The last reconstruction of part of this road was undertaken in 1995/96 and 1997/98 and reconstruction is now being carried out again. We consider that reconstruction can be expected to be required at intervals no greater than three years.

Costs for the last reconstruction were \$70,000 (1995/96) and \$120,000 (1997/98). Future costs can be expected to increase for each reconstruction, reflecting the increasing difficulty and expense of maintaining a road platform across this hillside.

There is potential for the full slip area to become reactivated if erosion removes enough toe support to trigger this. In this situation, the road across this hill could be completely lost. Reinstatement across an active slip face in this situation would present considerable difficulties, and access could be restricted to a single lane unsealed track which would require very regular reforming, and which would be considered as quite hazardous for users.

3.3 Whatarangi Cliffs

As noted above, the road relocation work carried out to date along the Whatarangi Cliffs road has involved the removal of the benches formed during construction of the road in 1968. Future relocation will be substantially more expensive as it will be necessary to excavate and rebench the full height of the cliff face.

The southern part of this road section is less exposed to wave action and is experiencing reduced erosion in comparison with the northern part.

Costs for the last reconstruction were \$900,000 for a 350 m section in 1995/96, \$242,000 for a 160 m section in 1998/99, and \$200,000 for a 200 m section in 1999/2000. Further reconstruction cost of a similar length involving the full cliff height is estimated on the average to be \$200,000 per year.

Additional costs can also be expected to be incurred for underpinning and closure of any outflanking for the existing culvert headwalls. If reconstruction of headwalls is required, these will cost up to \$10,000 each.

3.4 Cost Assessment

Annual maintenance average cost for the 5 km section to include Johnson Hill, Te Kopi and Whatarangi during the last 5 years works out to be about \$300,000 per year.

Maintenance and Relocation Costs 1995-2000
(Supplied by South Wairarapa District Council)
Johnson's Hill – Te Kopi – Whatarangi Section

Maintenance Costs			
Year	Routine Maintenance	Relocation Work	Total
1999-2000	\$196,000	\$445,000	\$641,000
1998-1999	\$315,000	\$526,000	\$741,000
1997-1998	\$340,000	\$200,000	\$540,000
1996-1997	\$400,000	-	\$400,000
1995-1996	\$200,000	\$370,000	\$1,170,000

Relocation Cost Details						
Location		1995/96	1996/97	1997/98	1998/99	1999/00
Whatarangi						
■ Central Section	(350 m)	900,000	-	-	-	-
■ South side	(160 m)	-	-	-	242,000	-
■ North side	(200 m)	-	-	-	-	200,000
Te Kopi						
■ Urupa	(175 m)	-	-	80,000	-	-
Johnson Hill						
■ South side	(110 m)	70,000	-	-	-	-
■ North side	(212 m)	-	-	120,000	-	-
■ North/South	(350 m)	-	-	-	-	195,000

3.4.1 Johnson's Hill

Relocation costs are assessed as being at \$200,000 every third year. Coastal protection at the toe of slip may not be possible but tree planting may help to slow down the slip rate.

These costs capitalise at a 10% interest rate to a net present value of \$410,000 over 10 years, \$605,000 over 25 years.

3.4.2 Whatarangi Cliffs

Relocation costs are assessed at \$200,000 per year on the average. This cost may reduce if coastal protection works as outlined in Section 5 are provided.

These costs capitalise at a 10% interest rate to a net present value of \$1,229,000 over 10 years, \$1,815,000 over 25 years.

4 Coastal Protection

4.1 Description

This was examined in detail in the 1994 report, which examined options for coastal protection of:

- Seawalls
- Beach Replenishment
- Rock Armouring
- Groyne/rock combinations.

A contract for beach replenishment with river stone was tendered in 1996. Costs for this tender were \$5,800 per metre. The design of this type of protection system requires significant lengths of rock on either side of the protected area, making protection of short lengths significantly more expensive than this.

Design work was undertaken on a groyne/rock option in 1998 with costs estimated at less than \$4,000 per metre. This stopped when it became apparent that Iwi concerns would prevent a consent being obtained.

In 1999, the Council proceeded on construction of a rock protection system at the Te Kopi Urupa. This area is regarded as being of cultural importance by iwi, and they had signalled their view that the road should not be allowed to be constructed on Urupa land.

The rock protection system used formed a fillet of rock overlying gravels at the base of the cliff below the road. A single layer of rock armour has been provided, which is a lower standard, and hence has a higher risk of failure than the two layers which are normally used for protection of ports, marinas or other vulnerable coastal facilities. D=100 - 200

4.2 Cost Assessment

The cost of the 1999 coastal protection at Te Kopi was \$2100 per metre.

Costs for coastal protection of further areas will depend primarily on the cost for armour supply, and ease of access to the area requiring protection. The need for two layers of armouring is assessed as being necessary over 350 metres length and single armour over the remaining 350 metres and that a new armour supply contract be at rates of 20% higher than the 1999 costs. Access to the beach for installation of the armour is reasonable for the Whatarangi Cliffs area, but extremely difficult for the Johnson's Hill area. The exact extent of armouring required can be determined after the 1996/2000 rate of erosion has been examined.

A double layer thickness of armour is usually provided for this type of rock armouring. The reason for this is the manner in which failure occurs in high wave conditions, where a small 'hole' forms where the waves have removed armour and this hole expands rapidly

outwards allowing the smaller rock underneath to be quickly removed. The second layer of armour functions to reduce the speed of this failure mechanism.

We have allowed construction of armour in two stages over a 5 year period. A more detailed assessment of recent rates of erosion will be necessary to confirm the staging and extent of work at each stage.

In areas where failure of the protection will not lead to the immediate damage or failure of the facilities being protected, and where there is the ability to respond rapidly to a failure by placing more armour rock on the failing area, it may be appropriate to consider a single armour layer system. This single layer option will have a higher risk of failure and require more care and expenditure in maintenance than a double layer system. We consider that these risks may be acceptable to Council, and the maintenance requirements may be able to be achieved for the Whatarangi Cliffs area provided that rock is stored in a nearby area, or otherwise available at short notice and that measures are put in place to allow a rapid response in repairing wave damage on the single armour layer. If Johnson's Hill is subject to mass movement it may not be suitable for protection using coastal protection. At this stage no allowance has been made for coastal protection in this area.

Costs for rock armour protection, of a type similar to the existing Te Kopi Urupa area are:

- Whatarangi Cliffs/Te Kopi, a 350 metres of double layer protection @ \$4,200/m, plus 350 metres of single layer protection at \$2,100/m giving a grand total of \$2.21 million.

5 Coastal Bypass Road

5.1 Description

The potential for a coastal bypass road was identified in 1993 and presented as part of the 1994 Study Report. This option was examined at that time without any consideration of the specific issues of geotechnical stability and feasibility that must be addressed for a road in this area, or a site visit to inspect the route.

The inland deviation described in the March 1997 Report "Cape Palliser Road – Inland Option" focussed on the development of a road route that avoided the difficult geotechnical conditions of the coastal hills in this area, and addressed the potential for loss of access along the coast past the DOC Putangirua Pinnacles Reserve. The 18 km length of this alignment, difficult geometry, and the altitude (similar to the Rimutaka road summit) to which this inland route climbed were issues of potential concern. The cost estimate presented (which allowed only for development of a forestry standard road), is considered to be significantly lower in cost than the desired standard of a two lane sealed rural road, similar to the existing route.

This Coastal Bypass option is being assessed on the basis that the geotechnical issues resulting from the underlying geology can be either resolved during design and construction or are acceptable in terms of the effects on operation and maintenance of the road deviation.

5.2 Route Description

The total length of the coastal bypass will be 6.72 km as compared to the existing road length of 3.0 km. This option can be considered as two separate but potentially linked sections of road, the northern section providing a route around Johnson's Hill while the southern section provides a route around the Whatarangi Cliffs. These sections both have the potential to join into the existing coast road at the Twin Creeks culvert just south of Te Kopi, or to link together to form a complete bypass which is at least 300 m from the existing coastline at all points.

Starting from the north, the new route uses the existing Putangirua Stream bridge, then climbs up the south (true left) side of the stream through 1.2 km of very rugged siltstone country which has openly eroding faces in a number of areas. The route has to pass through this area to avoid the DOC reserve on the true right of the stream and to climb up to the plateau area inland of Johnson's Hill. Grades vary up to 12.5% as the road climbs 165 m in altitude over 1.25 km.

At distance 675 m (from the northern end), a deeply incised valley, which runs steeply up the full height of the hill face, requires specific attention to allow the road to pass. At this stage a bridge has been allowed but options for retaining structures may also be economic and should be considered as part of further investigation if this option proceeds.

At distance 1,250 m, a 40 m radius bend has been provided to turn around across the crest of the first hill, which is the ridge inland of Johnson's Hill. At this point, the new route is 1 km inland of the existing road, and 600 m inland of the seaward face of Johnson's Hill. The road gradually descends at grades of up to 8% up to distance 2,200 m. The topography is still relatively difficult and there are some short bends of radius 30-40 m required to avoid substantial earthworks.

Between distance 2,200 m and 2,850 m, the road descends into the northern of the Twin Creeks. Grades are typically 13.3% descending to 24 m above sea level, and there are two bends, one of which has a 30 m radius.

At distance 2,800 m, the road has another 30 m radius bend to carry it across the stream, from which point it can descend a further 400 m and 17 m in level to join the existing route immediately north of the Whatarangi Cliffs. Alternatively the full deviation route commences, climbing back up the southern (true left) side of the valley, following an existing track through an area which has generally easier existing slopes than elsewhere and which avoids a deeply incised "pinnacle" valley further inland. This section of the road passes through an area of regenerating bush, which opens into a grassland. Grades are relatively steep at 12-16% following the existing track, levelling off once the grassland area is reached.

South of the grassland, the new route passes one of the most difficult areas of terrain along the alignment, where two streams are separated by a 35 m high razorback ridge. In order to traverse this area, the design provides for two fills of 20-30 m and 10 m depth and cuts of up to 25 m in height as the road descends from the north and climbs up towards the plateau area to the south. Grades through this length vary up to 12%, and apart from one short length 30 m radius bend the horizontal alignments also reasonably easy.

The road reaches the plateau area inland of the Whatarangi Blue Disc subdivision at distance 4,350 and altitude 100 m. From this point it climbs inland along this plateau to cross the next valley to the south at a point where the valley narrows. This location has been used as a full area to handle the excess cut volume for the new route and has fill depths of up to 45 m. After crossing to the southern plateau, the road sidles down the valley immediately north and inland of the Whatarangi subdivision, following an existing farm track for the upper part of this route. This last section has relatively flat side slopes and the design options grades of 16.6% to minimise the length of road requiring significant cut. Reduction of this grade to 12.5% would increase earthworks volumes by approximately 143,000 cubic metres and costs by \$1,044,000.

For the construction of the road section around the Whatarangi Cliffs, an alternative route exists which joins with the existing road at the Twin Creeks culvert. This runs down the northern (true right) back of the southern of the Twin Creeks, over a distance of 500 m before it joins the alignment of the full length route. This route is more direct but in a valley that results in larger earthworks volumes than the comparable section of the full length route.

5.3 Design Standards

The following criteria have been used as target design standards, based on AUSTRROADS standards:

- Design speed is based on an average of 60 km/hr. However it has not been possible to achieve the required parameters for all alignment options and all have some areas with reduced geometric standards.
- Sag and hog curves are designed to provide the best sight distance and comfort conditions given the difficult topography along the alignments.
- Horizontal radii is a minimum of 30m
- The desirable maximum grade is 1 in 8 (12.5%). However due to the steep topography, grades of up to 1 in 6 (16.6%) has been used for options preliminary design.
- Formation width is 2 sealed lanes of 3.0m with unsealed shoulders of 1.0m outside lane and 0.5m inside lane.. No verges have been allowed.
- Cut Batters are 1 horizontal to 2 vertical
- Fill Batters are 1 horizontal to 0.5 vertical
- Cut and Fill Batter slopes could be steepened to match " angle of repose" of existing eroded faces in order to minimise cut volumes further. This will require further examination and would be included in detailed design.

AUSTRROADS allows lower standards to be adopted for lightly trafficked rural roads of 500 vehicles per day or less. Aspects affected are:

- Co-ordination of horizontal geometry to achieve consistent special parameters. This is aimed at assisting drivers by providing adequate vision of the road ahead to give early indication of required responses. Achieving this requirement is extremely difficult in this terrain.
- Minimum horizontal curve radius is smaller than recommended. The radius of 30 m provided in some areas related to a 25-30 km speed rather than the 60 km target.
- Widening on horizontal curves to assist visibility can not be provided for all areas without a substantial increase in earthworks cut volumes.
- Horizontal stopping sight distances recommend by AUSTRROADS also can not be achieved for all areas without a substantial increase in earthworks cut volumes.
- Headlight sight distances recommend by AUSTRROADS can not be achieved because of the winding geometry and tight curves.
- Lengths of vertical curves and the transitions between these do not meet the AUSTRROADS standards for comfort criteria, and would also require a substantial increase in earthworks cut volumes to achieve.

AUSTROADS states that where it is not feasible to achieve overall compatibility of the speed environment, then careful consideration may be given to traffic management and signage to alert drivers to the changes in the operating conditions.

While the AUSTROADS guidelines can not be achieved for a number of aspects without a substantial increase in earthworks volumes to ease the geometry of the road, the standards achieved by the current design of the road are considered to be consistent with existing rural roads in a number of the hillier parts of the Wairarapa. The AUSTROADS guidelines should be used for guidance during detailed design and issues can be considered for their cost impact at that stage if required by Council, but wide ranging adoption of higher standards for the issues noted above can be expected to involve considerable cost penalties.

5.4 Design Refinement

The road route described above has evolved through a process of design refinement aimed at minimising earthworks volumes, developing an overall earthworks balance and which has recognised the potential for larger route options with lower earthworks requirements to be lower in overall cost than shorter, higher cut fill options. The initial route alignment, based on 12 and 8 metre formation widths involved total earthworks of 1.2 million and 0.8 million cubic metres. A site inspection and process of design refinement has reduced the total earthworks value to 365,000 m³ for the full route option presented in this report, which indicates the sensitivity of earthworks volumes and resulting costs to geometric and other design standards.

5.5 Cost Assessment

Costs have been estimated for the full route and northern/southern sections of the alignment as follows. The costs for the two parts total to more than the full route cost due to the additional earthworks involved in constructing the connections to the existing Coast Road. Details of the cost estimates are appended.

The costs include provisional items for undercutting, retaining structures and slope stability assistance or additional earthworks to cover areas with unforeseen additional excavation. In addition to these provisions, a 7% P&G allowance and 25% contingency has been included.

Earthworks rates have been estimated after discussion with two contractors with experience in this area and in similar materials elsewhere. As a conservative provision, the higher rates given have been used for this estimate.

The critical schedule rate is cut to fill which represents 40% of the cost (prior to adding the 25% contingency). The contractors submitted rates of \$6.80 and \$7.30 per cubic metre and the higher rate has been used in the estimate. There are no comparable rates in existing contracts where approximately \$3.00 per cubic metre is an appropriate rate for straight forward cut to fill projects in easier country. Ian Richards of South Wairarapa District

Council believes the cut to fill rate should be \$10.10 per cubic metre. As we have independently sought rates from two different contractors and used the higher rate submitted, we consider the \$7.30 per cubic metre to be adequate at this stage (especially as the rate rises to \$9.13 with the 25% contingency). However, before making a final option recommendation the accuracy of the cut to fill rate (and total quantities) should be refined further possibly by paying a minor lump sum to two contractors to submit a detailed written cost estimates for the coastal bypass option.

Haul distances are based on an overall average of 3 km. A reduction to 1.5 km is estimated to reduce the cut to fill rate by approximately \$1.50 per cubic metre.

The estimates of construction costs are summarised in Table 5.1. A detailed cost breakdown is presented in Appendix 2.

Table 5.1
Cost Estimate Coastal Bypass Road

	Full Route	Northern Section	Southern Section
Length	6,720 m	3,200 m	3,900 m
Earthworks Cut to Fill Volume	436,000 m ³	266,000 m ³	170,000 m ³
Cost Estimate	\$ 8,800,000	\$ 4,900,000	\$ 3,900,000

5.6 Issues to be Addressed

There have been few, if any, new roads constructed in New Zealand in the past 10-20 years in areas that are as rugged and geologically unstable as the route for this alignment, and completion of design, consenting, and construction activities will involve addressing a number of issues, including some which we expect to exist, but not to have been identified during the low cost/minimum input investigations and feasibility study undertaken to date.

Key issues to be addressed are as follows:

5.6.1 Geotechnical Investigation

The route appears to traverse at least three distinct material types, being the mudstone substance visible at the coast, an erodable conglomerate material very similar to that forming the "Pinnacles" in the adjacent DoC reserve, and possible areas of sandstone overlaid by soils developed from weathering of this material. The performance of these materials in earthworks construction and required design criteria can be expected to vary considerably and will need to be addressed during detailed. We have assumed that there will be some benefit in this material variety by usage of the conglomerate as roading subbase material.

In our letter of 10 September we have described an initial geotechnical evaluation, with a cost of \$13,500 plus contractor costs.

This should be considered to be the first stage of geotechnical work should Council wish to proceed further. Given the difficult terrain, varying geology and international guidelines for geotechnical investigation budgets, we would consider that a project budget provision of 1.5% to 2% of the earthworks cost should be included for detailed geotechnical and engineering geological site investigation and evaluation at this stage.

We consider that the new route once constructed can be expected to experience a number of slips and dropouts/washouts, during the years of its use, and to incur very high maintenance costs, in a similar manner to the high costs experienced for the Whatarangi Cliffs road after relocation.

5.6.2 Rading Standards

This road provides standards of service which are lower than normally expected for new roads, and lower than normal envisaged by the AUSTRROADS standards for rural road design. Higher standards can be achieved, but at a substantial cost penalty due to the additional earthworks required to ease the geometry. The new road is relatively consistent with the standards achieved by existing roads in Wairarapa hill areas, and with appropriate signage can be expected to experience a safety record similar to these existing roads.

5.6.3 Further Coastal Erosion in Adjacent Areas

There is potential for coastal erosion to the north and south of the new road section to effect parts of the existing road. The road to the north passes between the sea and the Putangirua Pinnacles reserve. There is a reasonable margin of land at present to allow relocation of the existing road although the road is supported by a gabion retaining wall which can be expected to be difficult to maintain and potentially lost if subject to severe wave attack after further erosion. Relocation of the road through the DoC field station area is possible, to give a margin of approximately 40 metres from the current shoreline, but further relocation inland would be difficult. It may be possible to find a route which joins the coastal bypass described above with the inland bypass route described in our report of March 1997, but this has not been examined at this stage, and the potential for effects on the Pinnacles Reserve would be an important issue to be resolved in considering such a route.

To the south, the hill terrain inland of the coastal plain is similar to the area traversed by the coastal bypass route, while the geology appears to be more stable than this area. Extension of the relocated road through the hills to the south may be possible if severe erosion continues in the area of the Whatarangi subdivision, but this has not been considered in any detail at this stage.

5.6.4 Johnson's Hill Slip

The Johnson's Hill slip is a mass slide, which extends an uncertain distance up the coastal hill face. Investigation work to date has not provided any exact location for the inland extent of this slip. At this stage, it has been assumed that the bypass route avoids any potential extension of the slip, but this needs to be confirmed as part of any investigation programme before proceeding to detailed design.

5.6.5 Land Ownership and Consents

This report has not addressed land ownership or consent issues.

In order to proceed on a new road, issues related to land ownership and consents will need to be addressed.

Parts of the land over which the bypass road will pass are understood to be in Maori ownership and access/purchase can be expected to be an issue that needs to be addressed before the road can be constructed. These issues for land in multiple ownership can require substantial time for resolution and the cost of resolving these may be highly variable.

Obtaining consents for a project of this type requires interaction of consent processes with investigation and design work, as the consents would cover a road to defined standards designed and constructed as low cost as possible, rather than a road constructed along a specified alignment, and acceptance of the resulting costs. We consider that undertaking this design and consenting process with investigation, design input, addressing environmental issues, preparation of an AEE, and consultation and consent processes will require a minimum of one year and potentially significantly longer. We understand that consents will be required from the South Wairarapa District Council, and that the scope of the development is likely to require a notified consent.

6 White Rock Alternative

6.1 Description

Upgrading the existing road and 4 wheel drive track between Cape Palliser and Martinborough via White Rock has been investigated as an alternative all weather, sealed road access to Ngawi. This was a preliminary feasibility study, which has not included the examination of potential geometry and detailed route assessment undertaken for the coastal bypass option and described in Section 5.

The route can be subdivided into five lengths. For ease of identification within this report approximate route kilometrages are given starting from Ngawi (km 0).

- km 0 - km 7 - Ngawi to Cape Palliser Lighthouse. Upgrade existing gravel road, realign at stream crossings, provide new bridges and culverts, provide beach protection at km 5.
- km 7 - km 12 - Significant realignment generally along the line of the existing track and road reserve. Gently sloping terraces with new bridges and culverts.
- km 12 - km 16 - Realignment generally inland and rising to considerable elevation to avoid unstable scree and bluffs. Steep slopes with new bridges, culverts and some retaining walls for sidling fills. High expense and high maintenance length.
- km 16 - km 19 - Similar to km 7 - km 12.
- km 19 - km 54 - Realignment and sealing of existing road required.

A visit to the site was carried out on 23 February 2000 and a number of photographs taken which are reproduced in this report (see Appendix).

6.2 Design Standards

- Target design would be to AUSTRROADS standards applicable to lightly trafficked rural roads.
- Road formation consisting of 2 sealed lanes of 3.0 m width each with 1.0 m unsealed shoulders each side. Fill batters at 2 horizontal to 1 vertical.
- Road formation comprising 2 coat chip seal on 150 thick basecourse on 150 thick subbasecourse on subgrade or fill.
- Road formation width is carried through at culverts.
- Bridging consists of single lane structures with 3.7 m between kerbs and 500 mm wide safety kerbs each side. Safety rails would be fixed to the outer edges of deck.
- Rip-rap rock protection and/or gabions would be required at bridge sites to protect abutments and approach embankments.

- As well as the major culverts identified normal side drains (in some locations these would need to be lined) with minor culverts at regular intervals would be required. A minimum size culvert of 1.0 m diameter is recommended to minimise blockages and ease cleaning.
- From Palliser Lighthouse (km 7) to km 17.3 it is proposed to construct the road mainly in embankment. This will entail fill retaining structures over some lengths where the route will need to go inland to avoid bluffs and unstable alluvial scree notably in the length km 12 to km 16.
- Due to the fill required for embankments it will be necessary to identify and gain consents to operate borrow pits at regular intervals along the route from km 7 to km 19 to minimise haulage costs. Borrow pits would thus be located on privately owned land (either single or multiple ownership) or Department of Conservation administered land. Obtaining consents to operate these borrow pits would likely be a protracted exercise.
- There is an existing designated road reserve from km 7 to km 17 which the existing track generally follows. Significant deviation from this reserve is proposed over this length which would require the agreement of affected land owners. As for borrow pits the obtaining of consents and amended titles would likely be a protracted exercise.
- From Ngawi (km 0) to Palliser Lighthouse (km 7) only minor road realignment is proposed apart from culvert and bridge locations. Filling would be required at culvert and bridges approaches otherwise the proposal is to add 150 mm thickness of basecourse and seal. At km 5 the road is cut into the cliff face and reduced width will probably need to be accepted in this area while it is proposed to protect the cliff toe/beach interface with heavy rip-rap rock to inhibit future erosion.
- From about km 17 to km 19 it is proposed to add 150 mm thickness of basecourse, widen if necessary and seal. The road will require raising locally at culvert locations.
- From km 19 to km 54.3 apart from sealing and fencing realignment is required. Refer to Route Commentary.
- From km 54.3 to Martinborough no works are proposed for this study.

6.3 Land Ownership

A legal road reserve 20.12 m wide exists along the proposed route from km 7 to km 18.9. The existing track which is approximately 3 m wide is generally within this road reserve which is in close proximity to the coast from Cape Palliser Lighthouse (km 7) to White Rock Station (km 18.9). Coastal erosion has in places forced the track inland and away from the road reserve.

Adamson Land Surveyors in February 1997 produced a drawing titled Cape Palliser Road Redefinition which covered the length from approximately km 7.7 to Waitetuna Stream

(km 10.6). This plan records deviations between the existing track centreline and the road reserve centreline. The track has deviated inland by up to 60 m over 650 m of this 2.9 km length. At approximately km 8.4 the road reserve has been partially eroded by the sea.

Aerial photographs show that immediately south of Te Rakauwhakamataku Point (km 14.5) a 350 m length of road reserve has been completely eroded by sea action. Coastal erosion in this area is very active with indications that Te Rakauwhakamataku Point which is now about 500 m out to sea was joined to the land about 40 years ago.

Land ownership titles have been searched from Cape Palliser Lighthouse (km 7) to White Rock Station (km 19). Kilometrages are approximate only. Refer to the following cadastral map for property references (A to J).

- | | |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| A. km 7 - km 7.05 | Crown Land (for Lighthouse) |
| B. km 7.05 - km 7.5 | Matakitaki A Kupe A1 |
| C. km 7.5 - km 7.7 | Matakitaki 1C2
Hariata Ngaruekiterangi Tahana |
| D. km 7.7 - km 8.3 | Matakitaki 4
Hariata Ngaruekiterangi Tahana |
| E. km 8.3 - km 10.5 | Matakitaki 2
Anne Abum
Victoria Robinson
Haami Te Whaiti |
| F. km 10.5 - km 13.0 | Section 1 Block X Kaiwaka SD
Trynko Koers
June Agnes Irene Koers
Jennifer Viola Alicia Koers |
| G. km 13.0 - km 14.0 | Pt Haurangi State Forest Park
Crown Land |
| H. km 14.0 - km 15.7 | Section 28 Block XI Kaiwaka SD
Trynko Koers
June Agnes Irene Koers
Jennifer Viola Alicia Koers
Karen Leslie Johanna Koers |
| I. km 15.7 - km 16.6 | Lot 1 and Lot 2 DP 13325
Trynko Koers
June Agnes Irene Koers
Karen Leslie Johanna |
| J. km 16.6 for about 6 km | Lots 3, 4 and 5 DP72173
White Rock Station 1990 Ltd |

6.4 Costs

Our Rough Order of Cost Estimate for upgrading this route to a reasonable geometric standard all weather sealed road is \$18 million which includes \$2 million provisional sums for consents, land purchase, investigation, design and contract administration. Also included is a contingency sum of \$2.3 million. This estimate is based on one days site visit, a study of maps, aerial photographs and legal plans and we would expect it to have an accuracy between - 10% and + 30%. If this appraisal was progressed to a feasibility/preliminary design phase this would result in a more accurate estimate.

The estimates of construction costs are summarised in Table 6.1. A detailed cost breakdown is presented in Appendix 2.

Table 6.1
Cost Estimate Upgrade Track via White Rock

	Full Route	Coastal Section	Inland Section
Length	54 km	16 km	38 km
Earthworks Cut to Fill Volume	202,600 m ³	148,000 m ³	54,600 m ³
Cost Estimate	\$ 18.5 M	\$ 8.9 M	\$ 9.6 M

The total route has been split in a Coastal Section (km 0 – km 16) and a Inland Section (km 16 – km 54) to separate costs due to Cap Palliser Access and costs for upgrading the road access to the area of White Rock.

6.5 Issues to be Addressed

It is concluded that upgrading this route to a reasonable standard all weather sealed road is technically feasible although there are three lengths identified where maintenance costs would be significant. These are at km 5 (beach erosion); km 13 (loose alluvial scree slope - refer to photograph 8); km 14.4 (road at considerable elevation to avoid unstable bluff - refer to photographs 12, 13 and 14).

Further investigations of the coastal areas under attack of erosion is required to provide information on stability and required measures to be undertaken. At the moment no provisions have been included in the cost estimate.

Obtaining planning and resource consents for the length between Palliser Lighthouse (km 7) to White Rock Station (km 18.5) could be a protracted process. We have allowed provisional sums in our Rough Order of Cost Estimate for those items.

7 Comparison of Options

7.1 General

Maintaining the existing road requires continuous repair works with unpredictable delays for road users and the risk that the Cape Palliser will be blocked of from 2 wheel drive road access from the rest of the North Island for a certain amount of time. Furthermore, the section at Johnson's Hill presents some real risk that the road will be lost and there may be difficulty in reforming a new route.

For a reliable road connection one of the three alternative options has to be considered. The least rigorous option in consent terms is to protect the shoreline from coastal erosion. In this way the stability of the coast can be guaranteed, without major road construction works through the mountains inland as required in the coastal bypass option. At Johnson's Hill if geological assessment and survey measurements confirm mass instability it may still be necessary to construct the northern section of the coastal bypass.

However although the coastal bypass creates a sustainable connection, it has to be considered that travel time will increase due to the longer windy route and steep grades.

The White Rock alternative results in a sustainable but high cost solution. The stability of a part of the shoreline has to be investigated in further detail to conform the route as adequately secure against erosion. Obtaining planning and resource consents for the length between Palliser Lighthouse and White Rock Station could be a protracted process and there will be significant increases in travel time from Ngawi, and particularly from the Whatarangi subdivision.

7.2 Cost Assessment

A summary of the cost estimates for the various alternatives is presented in Appendix 2.

Table 8.1
Summary Cost Estimates

Option	Capital Costs (\$)	Maintenance Costs (\$/year)	Total Costs Net Present Value over 25 years	Comments
Maintaining Existing Road including relocation work	\$2.27 million	\$300,000	\$2.27 + \$2.55 = \$4.82 million	Relocation work estimated at \$200,000 per annum
Coastal Protection (Whatarangi Cliffs only)	\$2.21 million	\$44,200	\$2.21 + \$0.40 = \$2.61 million	
Coastal Bypass (northern section 3.2 km)	\$4.9 million	\$50,000 (estimate)	\$4.9 + \$0.45 = \$5.35 million	
Coastal Bypass (southern section 3.4 km)	\$3.9 million	\$50,000 (estimate)	\$3.9 + \$0.45 = \$4.35 million	
Upgrade 4WD Track	Coastal Section \$8.9 million (16km) Inland Section \$9.6 million (38 km)	\$80,000 (estimate)	\$18.5 + \$0.73 = \$19.2 million	Existing 4WD track Existing 38 km unsealed road

7.3 Key Points Comparing Various Options

7.3.1 *Coastal Bypass Northern and Southern Sections*

The costs for this option are high and there are both resource consent issues and Maori land issues which would require resolution. This may be time consuming and/or expensive. This option has a greater chance of land stability problems being encountered. The issues of appropriate design standards and community acceptability require resolution.

This option would resolve the current erosion problems along the full length except at the DoC field station where the potential for future problems would still remain. This could be resolved by relocation of the road inland and/or coastal protection and a margin of 40 m exists for relocation of the road into the DoC driveway if required.

7.3.2 *Coastal protection*

At the Whatarangi Cliffs this option is significantly cheaper than the southern coastal deviation. Maintenance costs have been assessed at 2% of capital costs per annum. This option is preferred for cost reasons but may not be suitable in all areas. Coastal protection is not considered to be viable for Johnson's Hill which has poor access and possible mass movement of the slope.

We recommend that more information on the stability of Johnson's Hill be obtained by carrying out a measurement survey to ascertain the rate of erosion since 1996 and geological assessment to ascertain how much of the hill is liable to move.

7.3.3 *Maintaining Existing Road*

This involves substantial cost for excavation of the cliffs when relocating the road due to coastal erosion.

At Johnson's Hill survey measurements are required to identify if the whole hill is moving or only a small section.

Maintaining the existing road is unlikely to be a viable long term option for Whatarangi cliffs due to the increasingly large earthwork volumes required to relocate the road.

The White Rock Station to Cape Palliser Lighthouse option has a high cost with eroding areas on route along with consent risks. With this option we need to improve/seal existing White Rock road as part of the project. The substantial increase in length means that this option has substantial disadvantages and need not be considered further unless substantial additional costs or difficulties or difficulties are experienced for options involving the existing route.

8 Recommendations

Preliminary recommendations are as follows:

8.1 Short Term

- An evaluation be undertaken to determine the erosion rate since 1996 for comparison with earlier data. This will involve new aerial photographs (cost estimate \$6,000) of the area and comparing these with earlier photographs.
- Further actions will depend on the preferred options and the cost benefit comparison of options. We believe that Johnson's Hill presents some real risk that the road will be lost and there may be difficulty in reforming a new route. We therefore recommend that a geological assessment be undertaken to determine the rate of movement at different distances up the hill, to ascertain the potential location of areas that are suitably stable to allow consideration of a relocated road section across Johnson's Hill.
- Given that only part of the Whatarangi Cliffs road section is experiencing erosion, we believe that placing of rock protection along the northern, eroding section of the Whatarangi Cliffs is likely to be cost effective in comparison with construction of the southern section of the coastal bypass road. The rate of which the Blue Disc area is currently eroding will also affect this decision, and would be determined by the erosion evaluation noted above.
- The ability to maintain a road across the Johnson's Hill slip in future is an important consideration in option selection. We believe that coastal protection of this area presents significant safety issues for construction work on the beach below the slip, and the prospect that the hillside would continue to move for an extended period after the completion of coastal protection. Preferred options for this area are the status quo, with further progressive relocation of severely affected parts of the existing road, and the coastal bypass route around this area.
- The preliminary design work undertaken to date has been based on mapping data from existing aerial photography, with an accuracy of approximately ± 2.5 m. More accurate data from new aerial photography is recommended should detailed design of a coastal bypass road section become required and this work is estimated to cost \$25,000 to complete.
- The preliminary results of the White Rock Alternative is based on a one day site visit and study of maps, aerial photographs and legal plans and hence the cost estimates presented have lower accuracy than for other options. The technical and financial feasibility of this option has to be investigated in further detail, including geological conditions and the stability of the shoreline that is under attack of coastal erosion needs to be clarified. This option is of sufficiently higher cost than other options that additional expenditure to put it onto a similar level of accuracy is not recommended.

8.2 Medium Term

- Statutory planning work for a relocated route can proceed on the basis of designation of a suitable route corridor or alternatively the obtaining of resource consents for a section of road that is required in the near future. Planning comprises a substantial element of the lead time before any major bypass route construction can be undertaken, and consents are expected to be required from both the District Council and Regional Council. We recommend that if the coastal bypass route is a preferred option, a planning scoping study be undertaken to develop a recommended consent process and strategy for proceeding on part or all of the coastal bypass option.
- We recommend that all estimates be refined and that the accuracy of the coastal bypass estimate be checked by negotiating a minor lump sum payment to two contractors to submit a detailed written cost estimate.
- We recommend that if the coastal bypass route is a preferred option, the preliminary geotechnical investigation described in our letter of 10 September 1998 be implemented. We also recommend that Institute of Geological and Nuclear Scientists be commissioned to provide an engineering geological report on the Johnson's Hill slip, to include advice on changes in the slip observed since their last report in 1994 October 1995, which is appended together with a WRC letter of June 1998 regarding land management for the slip.
- We recommend that once the estimates are revised that a cost benefit comparison be carried out on the different options.
- As there are a number of potential high risk areas we recommend a preliminary risk analysis be carried out on the four options.

Report Prepared By: Peter Steel/Terry Catley

Signed.....

Report Reviewed By: Alex Gray

Signed.....

**Appendix 1 -
Route
Commentary
White Rock
Upgrade**

Route Commentary White Rock Upgrade

Route kilometrage commences at Ngawi (kilometre 0).

Photographs are orientated to the route ahead unless noted otherwise.

Bridges and culvert sizes proposed are indicative only and would be subject to specific design if this study was progressed further.

- Km 0.1:
Catchment approx 0.5 km²
Proposed crossing 2 m x 1.3 m box culvert or CSP multiplate pipe arch culvert
- Km 0.5:
Catchment approx 0.8 km²
Proposed crossing 3 m x 2 m box culvert or CSP multiplate pipe arch culvert
- Km 2.0:
Catchment approx 0.5 km²
Proposed crossing 2 m x 1.3 m box culvert or CSP multiplate pipe arch culvert
- Km 2.5:
Catchment approx 0.7 km²
Proposed crossing 3 m x 2 m box culvert or CSP multiplate pipe arch culvert
- Km 4: Photograph 1 Mangatoetoe Stream
Catchment approx 15 km²
Proposed crossing - single lane 20 m span bridge on realigned elevated approach embankments. Embankment will require rip rap rock protection on seaward toe and face.
- Km 4.5: Photograph 2 Little Mangatoetoe Stream
Catchment approx 5 km²
Proposed crossing - single lane 10 m span bridge on realigned elevated approach embankments. Embankments will require rip rap rock protection on seaward toe and face.
- Ahead at km 5 there is an elevated section of road cut into the cliff face which will require a 100 m (approx) length of heavy rip rap rock protection at the toe
- Km 5.3:
Catchment approx 0.5 km²
Proposed crossing - 2 m x 1.3 m box culvert or CSP multiplate pipe arch culvert.
- Km 6.9: Kirikiri Stream
Catchment approx 1 km²
Proposed crossing 3 m x 2 m box culvert or CSP multiplate pipe arch culvert.
- Km 7.0: Cape Palliser Lighthouse
- Km 7.4:
Catchment approx 0.9 km²
Proposed crossing - 3 m x 2 m box culvert or CSP multiplate pipe arch culvert.

- Km 8.1: Te Roro Stream
Catchment approx 2 km²
Proposed crossing 2/3 m x 2 m box culverts or CSP multiplate pipe arches
- Km 9.1:
Catchment approx 0.9 km²
Proposed crossing 3 m x 2 m box culvert or CSP multiplate pipe arch
- Km 9.6:
Catchment approx 0.4 km²
Proposed crossing 2 m x 1.3 m box culvert or CSP multiplate pipe arch
- Km 10.2: Photograph 3
Coastal terrace with existing track winding around large boulders, some swampy areas. Proposed works realign and upgrade road with cross drainage structures. Heavy earthmoving equipment required with the possibility of some blasting of larger boulders. Road should generally be built in fill to raise the level above terrace surface. Generally follow the alignment of the existing track.
- Km 10.2: Photograph 4
Looking back. Refer to comments for Photograph 3.
- Km 10.6: Photograph 5 Waitetuna Stream
Catchment approx 12 km²
Proposed crossing - single lane 20 m span bridge located about 30 m upstream of present ford.
- Km 11.0:
Catchment approx 0.8 k m²
Proposed crossing 3 m x 2 m box culvert or CSP multiplate pipe arch culvert.
- Km 11.2: Photograph 6
Proposed works - upgrade road generally on existing track alignment with new cross drainage structures.
- Km 12.0: Photograph 7 Un-named stream
Catchment approx 1 km²
Proposed crossing - single lane 10 m span bridge on a new alignment about 70 m upstream from present track. Culverts not suitable at this site due to steep stream gradient.
- Km 12.9: Photograph 8
Looking back down loose alluvial outwash scree slope. This will be a difficult area to construct and maintain a new road. Road to be constructed in fill above the slope surface with particular attention to drainage works.
- Km 13.0: Photograph 9 Mataopera Stream
Catchment approx 1 km²
Proposed crossing - single lane 20 m span bridge on a new road alignment approx 70 m upstream of existing track. Refer to Photograph 8 for southern approach and

Photograph 10 for northern approach. A culvert is not considered appropriate at this site.

- Km 13.4: Photograph 10 Northern approach to Mataopera Stream
Proposed route will be further uphill from existing track.
- Km 13.9: Photograph 11 Ngapotiki Hut
Proposed route is through the bush about 50 m behind the hut. This will be necessary to gain height in the approach to the bluff showing in Photographs 12, 13 and 14.
- Km 13.9: Photograph 12
Proposed route is inland up the slope to provide reasonable gradient to track in the distance where it goes over the bluff. Refer also to Photographs 13 and 14.
- Km 14.1: Photograph 13
Refer to notes for Photograph 12.
- Km 14.5: Photograph 14
Looking back to the unstable bluff in Photographs 12 and 13. Proposed route at this point will be sidling across hill face at a higher level as it descends from crossing the bluff. Within the bluff crossing is a stream with a steep catchment of about 1 km² where a 10 m span bridge is proposed. A culvert is not considered appropriate at this site.
- Km 15.7: Photograph 15, 16
Proposed route is up hill with a single lane 10 m span bridge across the stream ahead.
- Km 16.6: Waiarakeke Stream
Catchment approx 4 km²
Proposed crossing - single lane 10 m span bridge.
- Km 17.0:
Catchment approx 0.5 km²
Proposed crossing 2 m x 1.3 m box culvert or CSP multiplate pipe arch culvert.
- Km 17.3:
Catchment approx 1.2 km²
Proposed crossing 3 m x 2 m box culvert or CSP multiplate pipe arch culvert.
- Km 17.4: Photograph 17, 18
General photographs behind and ahead.
- Km 17.5:
Catchment approx 2 km²
Proposed crossing 2/3 m x 2 m box culverts or CSP multiplate pipe arch culverts.
- Km 18.0:
Catchment approx 1 km²
Proposed crossing 3 m x 2 m box culvert or CSP multiplate pipe arch culvert.
- Km 18.9: White Rock Station; Whawanui River
Catchment approx 30 km²
Proposed crossing - single lane 2 N^o x 20 m span bridge on elevated approach embankments.

- Km 19.0 to km 24.0 (5 km length):
Proposal is to upgrade gravel road on existing alignment and provide 6 m seal width. Provide new cross drainage where appropriate.
- Km 24.1:
100 m length of road on hill side slope is susceptible to slumping and slipping. Proposal is to stabilise slope with tree planting.
- Km 30.3:
Slip/slumping on right hand side. Proposal is to stabilise with tree planting.
- Km 32.3:
Road runs beside stream bed which is a grading. Proposal is to raise road level by about 1.5 m for a length of approx 100 m.
- Km 33.3 and km 34.3:
Slip on right hand side. Proposal is for minor retaining works and planting.
- Km 20 to km 39.3:
Road is not fenced. Proposal is to provide new fencing both sides of the road which we understand will be a cost to the Council.
- Km 40.3:
A length of about 1 km of road has been unstable in the past. Banks have been planted with willows and the situation is being monitored. Significant retaining works may be necessary in the future.
- Km 44.3 to km 54.3:
This section contains some lengths of seal that are two lane width with centreline marked but it is mostly unsealed. Proposal is to upgrade where necessary and provide two lane seal width.
- Km 54.3 to Martinborough (approx km 75):
The existing road is two lane width and sealed.

**Appendix 2
Cost
Estimates**

**(i) Coastal
Bypass**

**(ii) White
Rock - Cape
Palliser
Lighthouse**

CAPE PALLISER - Coastal Deviation - Full Route

Site Clearance	LS	200,000	1	200,000
Strip Topsoil	m2	118,000	2.5	295,000
Cut to Fill	m3	436,000	7.3	3,182,800
Sub-basecourse from selected cut	m3	11,400	29	330,600
Basecourse M4	m3	8,600	40	344,000
Chipseal	m2	51,000	2.8	142,800
Concrete edge channel	m	4,700	50	235,000
Guard Rail	m	750	70	52,500
Culverts - Main 1200 diam.	m	380	700	266,000
Culverts - 0.3 x 8.0	No	29	840	24,360
Outlet erosion control	LS	29,000	1	29,000
Road marking and furniture	m	7,100	14	99,400
Bridge	m2	160	2000	320,000
(Provisional) Undercutting including replacement	m3	2,650	10	26,500
(Provisional) Retaining walls	m2	1,600	180	288,000
(Provisional) Slope stability measures	LS	750,000	1	750,000
Preliminary and General	%	7		461,017
				7,046,977
Contingency	%	25		1,761,744
TOTAL				8,808,722

CAPE PALLISER - Coastal Deviation - Northern Section

Site Clearance	LS	100,000	1	100,000
Strip Topsoil	m2	53,000	2.5	132,500
Cut to Fill	m3	266,000	7.3	1,941,800
Sub-basecourse from selected cut	m3	5,100	29	147,900
Basecourse M4	m3	3,900	40	156,000
Chipseal	m2	26,000	2.8	72,800
Concrete edge channel	m	2,300	50	115,000
Guard Rail	m	375	70	26,250
Culverts - Main 1200 diam.	m	80	700	56,000
Culverts - 0.3 x 8.0	No	13	840	10,920
Outlet erosion control	LS	13,000	1	13,000
Road marking and furniture	m	3,200	14	44,800
Bridge	m2	160	2000	320,000
(Provisional) Undercutting including replacement	m3	1,350	10	13,500
(Provisional) Retaining walls	m2	800	180	144,000
(Provisional) Slope stability measures	LS	375,000	1	375,000
Preliminary and General	%	7		256,863
				3,926,333
Contingency	%	25		981,583
TOTAL				4,907,916

CAPE PALLISER - Coastal Deviation - Southern Section

Site Clearance	LS	100,000	1	100,000
Strip Topsoil	m2	65,000	2.5	162,500
Cut to Fill	m3	170,000	7.3	1,241,000
Sub-basecourse from selected cut	m3	6,300	29	182,700
Basecourse M4	m3	4,700	40	188,000
Chipseal	m2	25,000	2.8	70,000
Concrete edge channel	m	2,400	50	120,000
Guard Rail	m	375	70	26,250
Culverts - Main 1200 diam.	m	300	700	210,000
Culverts - 0.3 x 8.0	No	16	840	13,440
Outlet erosion control	LS	16,000	1	16,000
Road marking and furniture	m	3,900	14	54,600
Bridge	m2	-	2000	0
(Provisional) Undercutting including replacement	m3	1,300	10	13,000
(Provisional) Retaining walls	m2	800	180	144,000
(Provisional) Slope stability measures	LS	375,000	1	375,000
Preliminary and General	%	7		204,154
				3,120,644
Contingency	%	25		780,161
TOTAL				3,900,805

Cape Palliser - White Rock Alternative

Cost Estimate Total Length

Description	Assumptions	Quantity	Unit	Unit Price	Estimate
Sub Clearance	12 km x 12 m @ 150 mm	21600	m3	10	216,000
Fill from local borrow	12 km x 10 m @ 1 m	120000	m3	10	1,200,000
Subbasecourse	12 km @ 1335 m3/km	16020	m3	25	400,500
Basecourse	21 km @ 1245 m3/km	26145	m3	40	1,045,800
Chip seal	54 km x 8 m	432000	m2	4	1,728,000
Major culverts	17# x 20 m	340	m	2000	680,000
- Additional fill	17 # @ 1680 m3/#	28560	m3	10	285,600
- Rock protection or gabions		1	LS	300000	300,000
Minor culverts	13 km @ 5#/km x 14 m	910	m	500	455,000
Bridges	10# total 150 m x 4.7 m	705	m2	2000	1,410,000
- Additional fill	10# @ 5400 m3/#	54000	m3	10	540,000
- Rock protection or gabions		1	LS	600000	600,000
Rip Rap Rock	100 m x 20 m x 1.5 m	7500	t	80	600,000
Side Drainage	10 km	10000	m	10	100,000
Retaining Walls	500 m x 3 m	1500	m2	600	900,000
Crib Walls	2000 x 2 m	4000	m	250	1,000,000
Guardrail	10 km	10000	m	50	500,000
Fencing	30 km x 2 sides	60000	m	10	600,000
Road Marking					
- Edge & Centre Line	3 x 54 km	162000	m	2	324,000
- Marker Posts & Signs		1	LS	220000	220,000
Sub-Total					13,104,900
Preliminary & General		13104900		8%	1,048,392
Contingency		14153292		17%	2,406,060
Total Construction Cost Estimate					16,559,352
Borrow Pit Charges		1	PS	100000	100,000
Land Purchase Costs		1	PS	100000	100,000
Consent Costs for Borrow, Pits & Roading		1	PS	100000	100,000
Investigation, Design and Contract Adm.		10%			1,655,935
Total Rough Order of Cost Estimate					18,515,287

Cape Palliser - White Rock Alternative

Cost Estimate Coastal Section

Sea	Assumptions	Quantity	Unit	Unit Price	Estimate
Sub Clearance	9 km x 12 m @ 150 mm	16200	m3	10	162,000
Fill from local borrow	9 km x 10 m @ 1 m	90000	m3	10	900,000
Subbasecourse	9 km @ 1335 m3/km	12015	m3	25	300,375
Basecourse	16 km @ 1245 m3/km	19920	m3	40	796,800
Chip seal	16 km x 8 m	128000	m2	4	512,000
Major culverts	12 # x 20 m	240	m	2000	480,000
- Additional fill	12 # @ 1680 m3/#	20160	m3	10	201,600
- Rock protection or gabions		1	LS	150000	150,000
Minor culverts	4 km @ 5#/km x 14 m	280	m	500	140,000
Bridges	7# total 100 m x 4.7 m	470	m2	2000	940,000
- Additional fill	7# @ 5400 m3/#	37800	m3	10	378,000
- Rock protection or gabions		1	LS	300000	300,000
Rip Rap Rock	100 m x 20 m x 1.5 m x 2.5	7500	t	80	600,000
Side Drainage	5 km	5000	m	10	50,000
Retaining Walls		0	m2	600	0
Crib Walls		0	m	250	0
Guardrail	5 km	5000	m	50	250,000
Fencing		0	m	10	0
Road Marking					
- Edge & Centre Line	3 x 12 km	36000	m	2	72,000
- Marker Posts & Signs		1	LS	50000	50,000
Sub-Total					6,282,775
Preliminary & General		6282775		8%	502,622
Contingency		6785397		17%	1,153,517
Total Construction Cost Estimate					7,938,914
Borrow Pit Charges		1	PS	50000	50,000
Land Purchase Costs		1	PS	50000	50,000
Consent Costs for Borrow, Pits & Roading		1	PS	50000	50,000
Investigation, Design and Contract Adm.		10%			793,891
Total Rough Order of Cost Estimate					8,882,806

10/1/2018

Cape Palliser - White Rock Alternative

Cost Estimate Inland Section

Description	Assumptions	Quantity	Unit	Unit Price	Estimate
Sub Clearance	3 km x 12 m @ 150 mm	5400	m3	10	54,000
Fill from local borrow	3 km x 10 m @ 1 m	30000	m3	10	300,000
Subbasecourse	3 km @ 1335 m3/km	4005	m3	25	100,125
Basecourse	5 km @ 1245 m3/km	6225	m3	40	249,000
Chip seal	38 km x 8 m	304000	m2	4	1,216,000
Major culverts	5# x 20 m	100	m	2000	200,000
- Additional fill	5# @ 1680 m3/#	8400	m3	10	84,000
- Rock protection or gabions		1	LS	150000	150,000
Minor culverts	9 km @ 5#/km x 14 m	630	m	500	315,000
Bridges	3# total 50 m x 4.7 m	235	m2	2000	470,000
- Additional fill	3# @ 5400 m3/#	16200	m3	10	162,000
- Rock protection or gabions		1	LS	300000	300,000
Rip Rap Rock		0	t	80	0
Side Drainage	5 km	5000	m	10	50,000
Retaining Walls	500 m x 3 m	1500	m2	600	900,000
Crib Walls	2000 m x 2 m	4000	m	250	1,000,000
Guardrail	5 km	5000	m	50	250,000
Fencing	30 km x 2 sides	60000	m	10	600,000
Road Marking					
- Edge & Centre Line	3 x 42 km	126000	m	2	252,000
- Marker Posts & Signs		1	LS	170000	170,000
Sub-Total					6,822,125
Preliminary & General		6822125		8%	545,770
Contingency		7367895		17%	1,252,542
Total Construction Cost Estimate					8,620,437
Borrow Pit Charges		1	PS	50000	50,000
Land Purchase Costs		1	PS	50000	50,000
Consent Costs for Borrow, Pits & Roading		1	PS	50000	50,000
Investigation, Design and Contract Adm.		10%			862,044
Total Rough Order of Cost Estimate					9,632,481

Appendix G

Regional Coastal Plan for the Wellington Region: Objectives and Policies



Appendix G: Objectives and Policies

The following objectives and policies are from Section 4: General Objectives and Policies of the Regional Coastal Plan for the Wellington Region.

1 Objectives

Environmental

4.1.1 The intrinsic values of the coastal marine area and its components are preserved and protected from inappropriate use and development.

4.1.2 People and communities are able to undertake appropriate uses and developments in the coastal marine area which satisfy the environmental protection policies in the plan, including activities which:

- rely on natural and physical resources of the coastal marine area; or
- require a coastal marine area location; or
- provide essential public services; or
- avoid adverse effects on the environment; or
- have minor adverse effects on the environment, either singly or in combination with other users; or
- remedy or mitigate adverse effects on the environment and provide a net benefit to the environment.

4.1.3 The adverse effects that new activities may have on existing legitimate activities in the coastal marine area are avoided, remedied or mitigated as far as is practicable.

4.1.4 Land, water and air in the coastal marine area retains its life supporting capacity.

4.1.5 The natural character of the coastal marine area is preserved and protected from inappropriate use and development.

4.1.6 Important ecosystems and other natural and physical resources in and adjacent to the coastal marine area are protected from inappropriate use and development.

4.1.7 Public health is not endangered through the effects of previous, present or future activities in the coastal marine area.

4.1.8 Public access along and within the coastal marine area is maintained and enhanced.

4.1.9 Amenity values in the coastal marine area are maintained and enhanced.

4.1.10 Important views to and from the coastal marine area are retained.

Tangata Whenua

4.1.13 Characteristics of special spiritual, historical or cultural significance to tangata whenua, including waahi tapu, tauranga waka, mahinga maataitai and taonga raranga, are protected.

4.1.14 The values of the tangata whenua, as well as their traditional uses, are, where practicable, recognised and provided for.

4.1.15 Opportunities for iwi and hapu to exercise kaitiakitanga in the coastal marine area are increased.

4.1.16 Tangata whenua are consulted on resource consent applications which may affect their interests and values.

4.1.17 Tangata whenua are able to initiate appropriate uses and developments in the coastal marine area.

Management

4.1.18 There is sufficient information available to make informed decisions on resource management in the coastal marine area.

4.1.19 In addition to the requirements of objective 4.1.16, opportunities are provided for people and communities to be involved in any decision-making about significant activities in the coastal marine area, and in the management of natural and physical resources in that area.

4.1.21 Coastal marine area users are aware of the community expectation that land of the Crown in the coastal marine area shall generally be available for free public use and enjoyment.

4.1.22 There is good communication between all agencies with management responsibilities in the coastal environment.

4.1.23 Conditions placed on resource consents are used as a means of avoiding, mitigating or remedying adverse effects.

4.1.25 Activities which span the line of mean high water springs are managed in accordance with the provisions of both this Plan and any requirements in the relevant district plan.

2 Policies

4.2.1 To recognise that the intrinsic values of the coastal marine area and its components are the heritage of future generations and are worthy of protection in their own right, while allowing for appropriate use and development.

Explanation. Policy 4.2.1 acknowledges the special recognition given in the Act to the importance of protecting the natural and physical resources in the coastal marine area, while acknowledging the need to allow for appropriate use and development.

4.2.2 To recognise and distinguish between those parts of the coastal marine area which retain natural character, and those areas where natural character has already been compromised, and to encourage appropriate new developments only in the latter areas.

Explanation. Generally the natural character of the coastal marine area has been compromised in areas adjacent to urban areas, such as in Wellington Harbour, and is preserved adjacent to rural areas, such as along most of the Wairarapa coast. New development should generally be located in the former areas, and avoided in the latter areas.

4.2.3 When considering the significance of adverse effects of activities on the coastal marine area, to recognise and distinguish between:

- those activities which require occupancy on a "permanent" basis, and those which can effectively relinquish coastal space at a future date;
- those activities which have irreversible adverse effects and those for which adverse effects are reversible; and
- those activities which have short term adverse effects and those which have on-going or long term adverse effects.

Explanation. *Activities in the coastal marine area vary in the degree to which they can be removed, the degree to which any adverse effects could be reversed at some future date, and the duration of the adverse effects. Reclamations are essentially permanent and irreversible, and remove foreshore, seabed, and water from the coastal marine area. Other activities such as the construction of large wharf structures can be considered permanent, although technically they can be removed. These activities contrast with other activities, such as swing moorings, which can be removed relatively easily. The effects of activities can also be considered on a time scale. For example, some activities displace fauna and flora, but in many cases the site will be recolonised in a relatively short time, so the adverse effects are less severe than where the displacement results in a permanent change. Policy 4.2.3 requires decision makers to take appropriate account of the differences in the effects of activities when considering whether to allow them to proceed, and when considering the duration of a consent.*

4.2.4 To recognise and give appropriate weight to the potential for cumulative adverse effects resulting from two or more activities in the coastal marine area.

Explanation. *Ecosystems can only tolerate a certain amount of disturbance. It is necessary to guard against permitting unsustainable use and development. In some cases a proposed activity, when viewed in isolation, may not have significant adverse effects. However, when viewed in a broader context which takes into account other uses and developments of the area, the proposed activity may become "the straw that breaks the camel's back".*

4.2.5 To adopt a precautionary approach to resource management decisions in the coastal marine area, particularly in those situations where it is difficult to predict adverse effects with any certainty.

Explanation. *Hey (1991) notes that the precautionary approach makes explicit that preventative or remedial action does not have to await the presentation of conclusive scientific evidence of significant adverse effects on the environment. Rather, preventative or remedial action should be taken if scientific and cultural evidence makes it plausible that significant adverse effects on the environment will occur.*

Appendix H

Information on Consultation



Information on the Proposed Coastal Protection Works at Cape Palliser Road and Whatarangi Road

The South Wairarapa District Council have been dealing with the problem of coastal erosion along Cape Palliser Road and Whatarangi Road for a number of years. To date, the main erosion management response has been to realign the roads to avoid areas where the erosion has cut away the road and made it unsafe for vehicles. This response is no longer considered an appropriate course of action due to land constraints and properties located on the landward side of the road. A number of boulder beaches have also been constructed, and have proven to have success in terms of decreasing the rate of erosion.



Existing boulder beach along Cape Palliser Road

South Wairarapa District Council are proposing to install a number of additional boulder beaches along this stretch of coast from the Whatarangi Road by Hurupi Stream to the area of Mangatoetoe Stream on Cape Palliser Road. These works will be staged over a number of years, subject to funding availability, and priority of works. A number of priority areas have already been identified by the South Wairarapa District Council, as shown in this brochure.

The South Wairarapa District Council are interested in getting your feedback.

You are invited to attend either or both of:

- A workshop for landowners with members of the South Wairarapa District Council and Beca team to be held at the South Wairarapa Council Chambers, 9 Kitchener Street, Martinborough, from 10.30am-12pm on Monday 6th October;
- A public display that will be available at the Social Room adjacent to the Ngawi Fire Station on Saturday and Sunday 11th and 12th October, from 9am-4pm, members of the South Wairarapa District Council and Beca team will be available to answer questions, drop-in anytime between 11am-1pm on Saturday 11th October.

Feedback can be sent to: Beca Carter Hollings & Ferner, PO Box 3942, Wellington 6140 Attention: Sarah Garty, or email sarah.garty@beca.com

Information on the Proposed Coastal Protection Works at Cape Palliser Road and Whatarangi Road





Start of Extent of Works ■

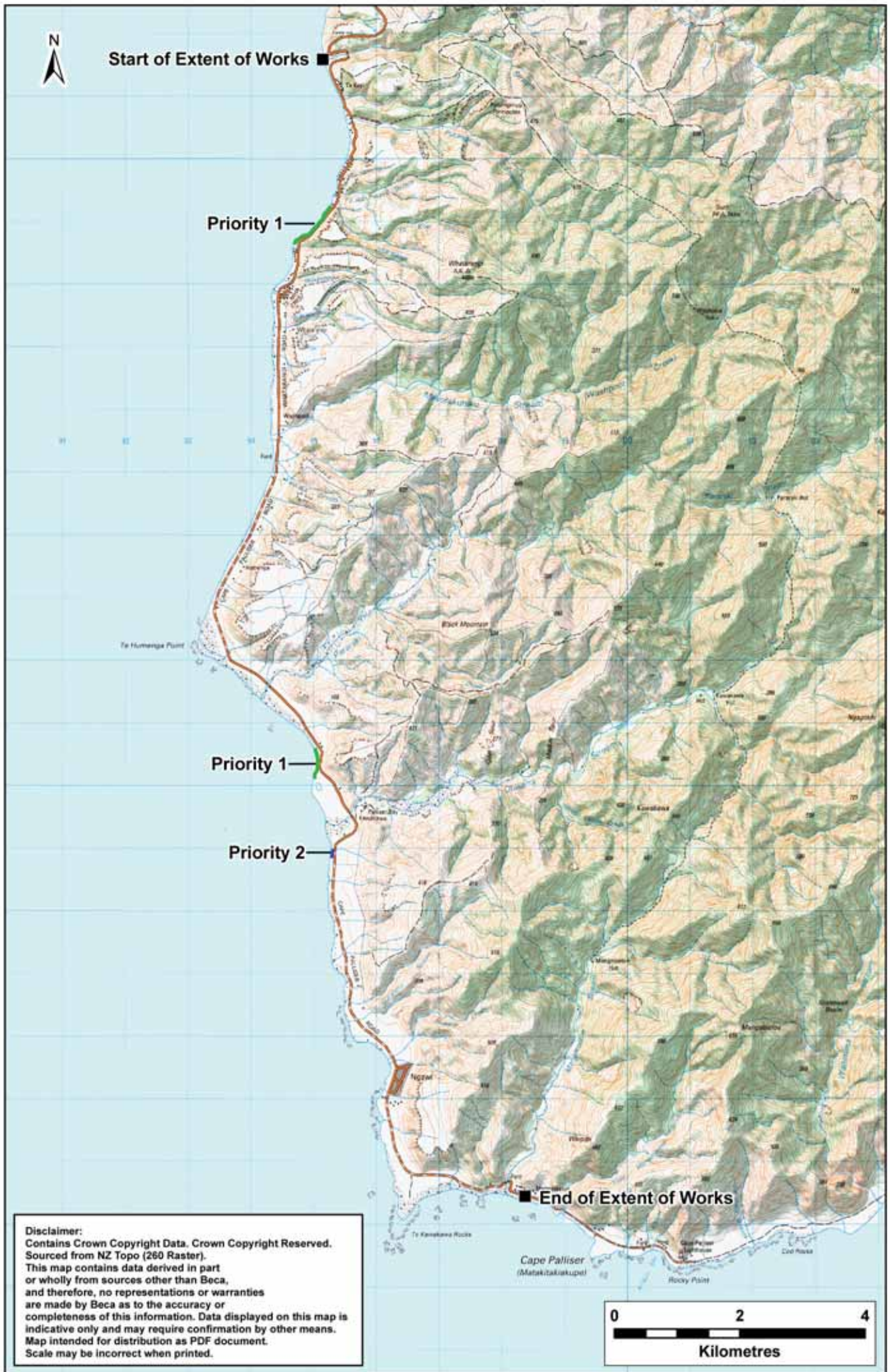
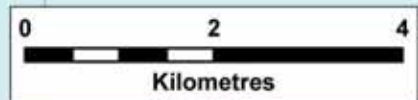
Priority 1

Priority 1

Priority 2

■ End of Extent of Works

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Map intended for distribution as PDF document.
Scale may be incorrect when printed.



Minutes from Land Owner Meeting

Attendees: Ian Richards (SWDC), Greg Pollock (Beca), Sarah Garty (Beca), 5 landowners

Issues Raised:

- Landowners would like to install boulder beaches in conjunction with the Council to protect their properties
- It was noted that the funding for the boulder beaches was from Transfund, who were funding the project to protect the roading infrastructure
- Partnership between Transfund and landowners could potentially be explored
- Concerned with ownership of the foreshore and seabed, what happens to people's property once it becomes part of the seabed?
- Concern with sensitive ecological areas
- Some concern that the boulder beaches did not decrease the rate of erosion, but rather made erosion problems worse in some other areas
- General consensus was that the boulder beaches were a good idea and had worked well on areas of the subject coastline.

Sarah Garty

From: Haami Te Whaiti [haami@kahungunuwairarapa.iwi.nz]
Sent: Wednesday, 21 January 2009 10:13 a.m.
To: Sarah Garty
Cc: Ravi Mangar - Works & Services Manager; Greg Pollock; Ian Richards - Contracts Manager; Kahungunu Wairarapa
Subject: RE: Consultation with Kahungunu te Wairarapa

Kia ora Sarah

I agree that this is an accurate record of decisions made at our meeting on 1 December 2008. Please note that the correct name is 'Kahungunu ki Wairarapa'.

Best wishes

Haami Te Whaiti
Resource Consent Officer
Kahungunu ki Wairarapa

From: Sarah Garty [mailto:Sarah.Garty@beca.com]
Sent: Wednesday, 3 December 2008 5:01 p.m.
To: Haami Te Whaiti
Cc: Ravi Mangar - Works & Services Manager; Greg Pollock; Ian Richards - Contracts Manager
Subject: Consultation with Kahungunu te Wairarapa

Hi All,

Minutes from the Meeting with Haami on Monday 1st December:

Kahungunu te Wairarapa support the proposal to construct a number of boulder beaches along sections of Whatarangi Road and Cape Palliser Road, agreeing there is a need for the project and that boulder beaches are a good way to manage coastal erosion. Furthermore boulder beaches are a more natural solution than other possible erosion protection methods.

The issues that Kahungunu te Wairarapa have are concerning:

- the ability and safety of people accessing the coast where the boulder beaches are located
- concerned with the potential placement of the boulder storage areas (however are happy with the current siting of boulder storage areas)

Kahungunu te Wairarapa requests that:

- the placement of the boulder beaches need to be assessed on a case by case basis; and for lwi to be involved at an early stage
- the proposal be extended around past Kupe's Sail to the Cape Palliser lighthouse. Kupe's Sail needs to be protected from erosion and also from the need for further cutting/explosives

Kahungunu te Wairarapa suggests the following solutions:

- possibly having training available for staff working on boulder beaches for potential archaeological or cultural sensitive sites
- in terms of longer boulder beaches, possibly having ramps or signposts for access

Kind Regards,

19/03/2009

Sarah Garty

Planner

Beca

Phone +64-4-473 7551 Fax +64-4-471 5501

sarah.garty@beca.com

www.beca.com

Please consider the environment before printing this email.

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_____ Information from ESET NOD32 Antivirus, version of virus signature database 3662
(20081203) _____

The message was checked by ESET NOD32 Antivirus.

<http://www.eset.com>

Feedback on the proposed coastal protection works at Cape Palliser Road and Whatarangi Road

Please fill in the following:

Personal Details:

Full Name: _____

Address: _____

Address for Service (if different from above): _____

Feedback on Proposal:

(1) Do you agree with what is being proposed on Cape Palliser and Whatarangi Road? Yes/No

Please explain why:

(2) Are there any specific parts of the proposal you are concerned with? Yes/No

Please explain why:

(3) Do you have any other comments on the proposal?

Feedback on the proposed coastal protection works at Cape Palliser Road and Whatarangi Road

Please fill in the following:

Personal Details:

Full Name: RANGITANE O WAIRARAPA
Address: 12 KOKIRI PLACE - MASTERTON
Address for Service (if different from above): PO BOX 354

Feedback on Proposal:

(1) Do you agree with what is being proposed on Cape Palliser and Whatarangi Road? Yes/~~No~~

Please explain why:

(2) Are there any specific parts of the proposal you are concerned with? Yes/No

Please explain why:

(3) Do you have any other comments on the proposal?

No

Please send feedback to: Beca Carter Hollings and Ferner Ltd, Po Box 3942, Wellington 6140, Attention: S Garty

Appendix I

Access Point Design



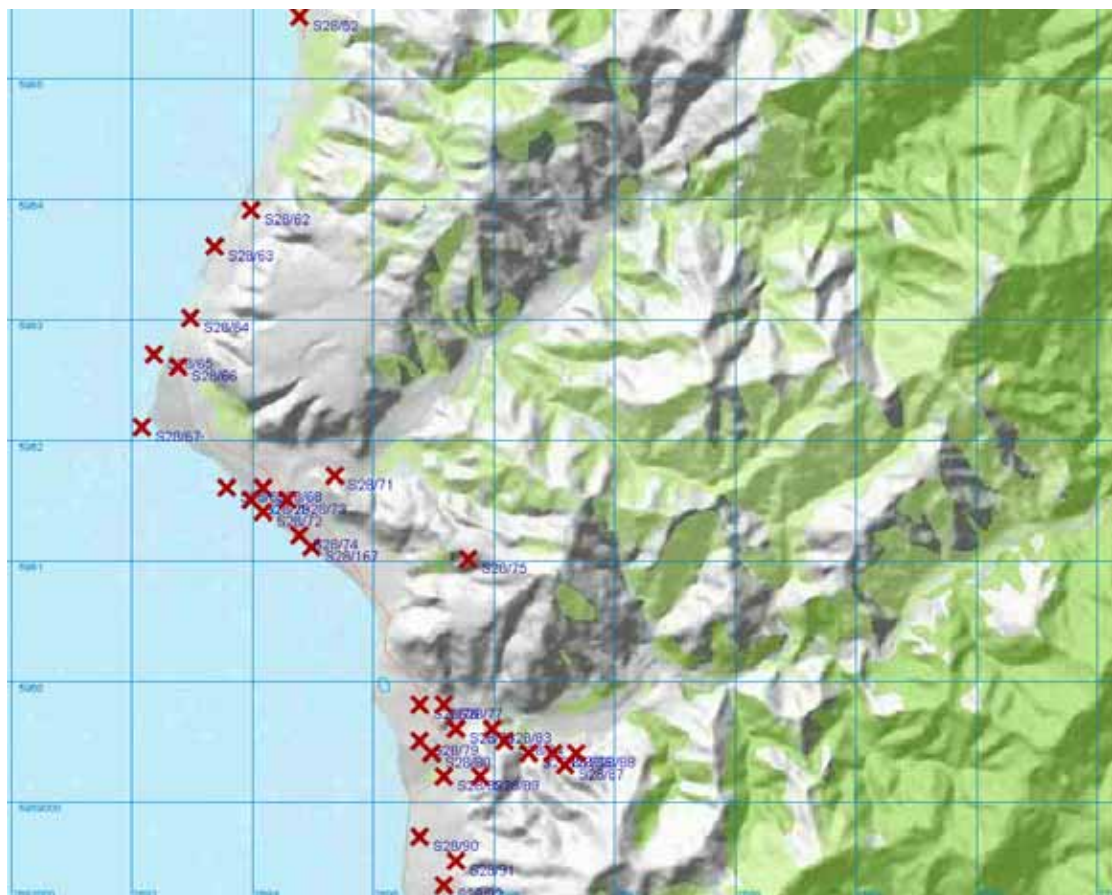
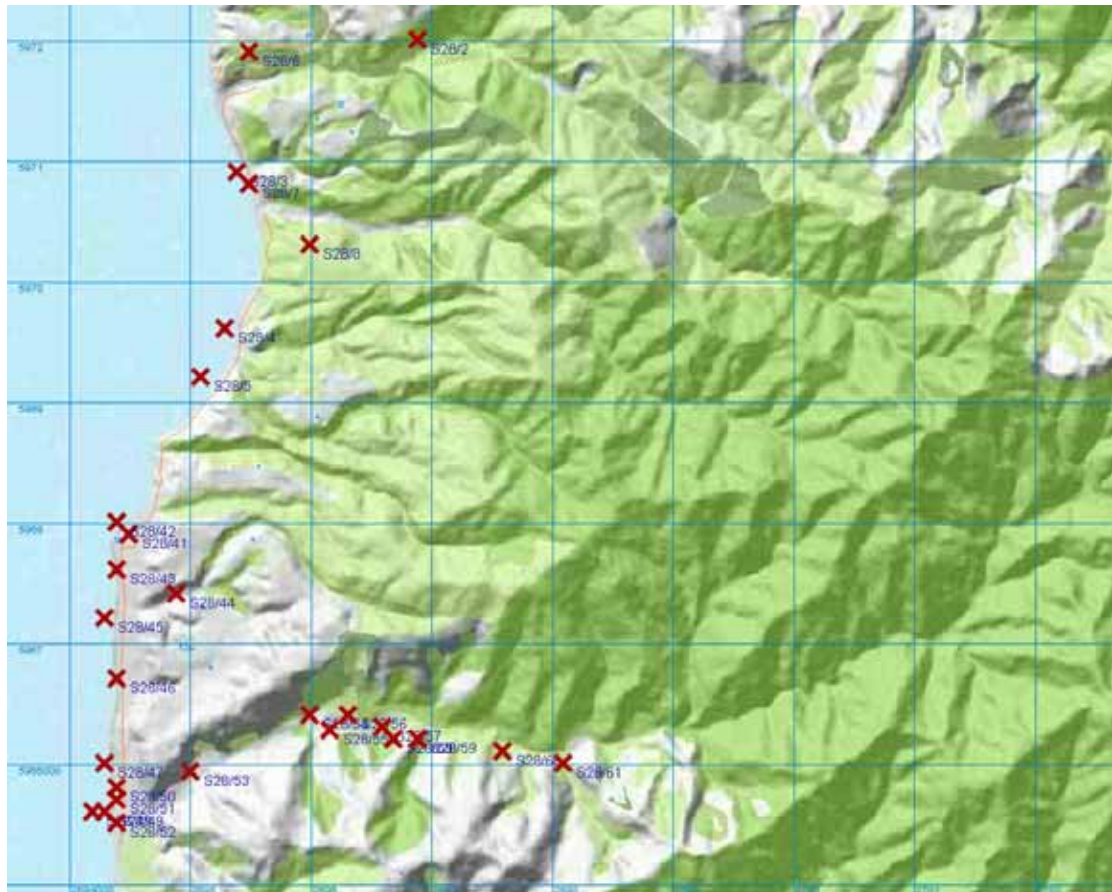
Appendix J

Archaeological Site Maps





Any person wishing to rely on the information shown on this map must independently verify the information
 Scale 1:97626 Topographical and Cadastral map derived from LINZ data. Printed: 14 Apr 2009 09:32.







APPLYING FOR AN ARCHAEOLOGICAL AUTHORITY



FOR INFORMATION ABOUT ARCHAEOLOGICAL SITES:

For enquiries about archaeological sites and applications to damage, destroy or investigate sites contact the Regional Archaeologist in your nearest New Zealand Historic Places Trust office:

- ▶ **Northern Regional Office, Auckland**
(Northland, Auckland) PH: 09 307 0413
- ▶ **Lower Northern Area Office, Tauranga**
(Bay of Plenty, Waikato, Gisborne) PH: 07 578 1229
- ▶ **Central Regional Office**
(Lower North Island, Nelson-Tasman, Marlborough) PH: 04 494 8038
- ▶ **Southern Regional Office, Christchurch**
(rest of South Island) PH: 03 379 3251
- ▶ The Senior Archaeologist
NZ Historic Places Trust, PO Box 2629, Wellington
Toll free 0800 HERITAGE (0800 437 482)
Email: archaeology@historic.org.nz

For further information about the New Zealand Archaeological Association database of archaeological sites and a list of consultant archaeologists, visit their website; www.nzarchaeology.org



Archaeological sites are an irreplaceable part of our heritage. Before you apply for an authority, it is worthwhile considering if there may be an alternative that will not adversely affect the archaeological site.

For example, if you are planning a subdivision of land for residential development, could the building platforms and accessways be designed to avoid archaeological sites? Could the archaeological sites be part of land for reserve contribution?

Protecting archaeological sites from damage helps preserve our heritage for future generations. The Trust, New Zealand Archaeological Association and archaeological consultants can advise on ways to preserve archaeological sites.

IMAGES

Inside spread, clockwise from top left: Pā at One Tree Hill/Maungakiekie, Auckland Kevin Jones (DOC); Native village and cowdie [sic] forest 1828, Augustus Earle (ATL, PUBL-0015-08); Alexandra Redoubt, Pirongia, Waikato Kevin Jones (DOC); Gold tailings, Northburn, Otago (NZHPT); Archaeologists recording information about archaeological features uncovered during construction of the Natural Gas pipeline Pūpūaruhe, Whakatane (NZHPT)



Front cover: Trypots behind the beach at Te Awaiti whaling station, Tory Channel Nigel Prickett (DOC); Whaling harpoon (TE PAPA, GH003395); Matau/fishing lure (TE PAPA, ME014173) | *Inside cover:* Remains of gold mining town, Nenthorh, Otago; Remains of Māori garden system, Waikiteho, Wairarapa Kevin Jones (DOC) | *Back cover:* Albert Barracks excavation, Auckland Rod Clough

WHEN DO I NEED AN ARCHAEOLOGICAL AUTHORITY?

If you are going to do work that may affect an archaeological site you must obtain an archaeological authority from the New Zealand Historic Places Trust before you start work. This could be earthworks for subdivision, forestry operations, mining, road construction, building, landscaping or fencing.

HOW DO I APPLY FOR AN ARCHAEOLOGICAL AUTHORITY?

You need to fill out an application form. To obtain a copy, contact your local Trust office (see overleaf) or visit the website www.historic.org.nz.

The Trust will consider your application and advise you in writing of its decision.

WHAT INFORMATION DO I NEED TO APPLY?

- A description of the activity that will affect the site.
- A description of the archaeological site.
- An assessment of the archaeological values of the site and the effect of the work on those values. You may need to engage an archaeologist or cultural heritage specialist to describe the site and undertake this assessment. To obtain a list of consultant archaeologists, contact the NZ Archaeological Association.
- An assessment of any Māori values of the site and the effect of the work on those values. This assessment is best provided by tangata whenua. The Trust can assist with contacts.
- A statement about consultation. If you have consulted with tangata whenua or other affected people, what are their views? If you have not consulted, you must inform the Trust of the reasons why consultation has not taken place.
- The consent of the landowner (if the landowner is not the applicant).

If this information has already been prepared for a resource consent application, it may be able to be reused.

HOW LONG DOES THE PROCESS TAKE?

Once the Trust has received a completed application, a decision is usually made within four to six weeks. The Trust must make a decision within three months. A charge may be made for urgent applications.

WHAT HAPPENS WHEN I RECEIVE MY AUTHORITY?

If the Trust decides to grant an authority, some mitigation may be required for the loss of or damage to the site. This may involve an archaeologist monitoring the work that affects the site and recording any information, or an archaeological investigation of the site.

WHO WILL DO THE ARCHAEOLOGICAL WORK REQUIRED?

The Trust must approve in writing any person who will carry out the archaeological work. It is useful to nominate this person when you apply for your authority.

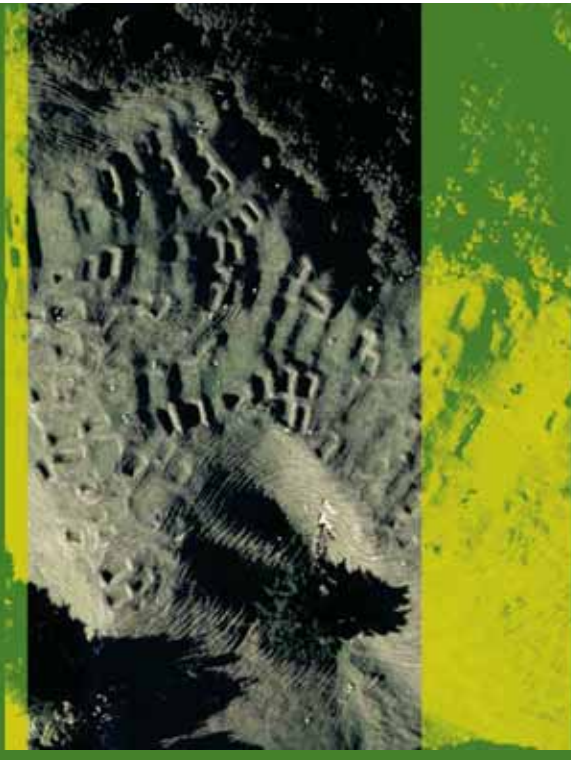
HOW LONG IS THE AUTHORITY VALID?

Authorities are non-transferable and expire five years after the date of issue. If you have not completed the work within this period, you will need to reapply.





ARCHAEOLOGICAL REMAINS OF NEW ZEALAND'S FIRST GARDENS



FURTHER READING

Davidson, J. 1987 2nd Edition. *The Prehistory of New Zealand*.
Longman Paul, Auckland.

Leach, H. 1984. *1,000 Years of Gardening in New Zealand*.
Reed, Wellington.

PROTECTING ARCHAEOLOGICAL SITES

Gardens and stone field sites are an irreplaceable part of our heritage. They are protected by the *Historic Places Act 1993*. If you wish to do any work that may affect an archaeological site you must obtain an authority from the New Zealand Historic Places Trust before you begin. It is an offence to modify, damage or destroy an archaeological site without the written authority of the Trust.

FOR INFORMATION ABOUT ARCHAEOLOGICAL SITES

For information about archaeological sites, applying for an archaeological authority or the *Historic Places Act 1993* contact:

New Zealand Historic Places Trust
Toll free 0800 HERITAGE (0800 437482)
Email archaeology@historic.org.nz
NZ Historic Places Trust, PO Box 2629, Wellington

New Zealand Archaeological Association's website
www.nzarchaeology.org

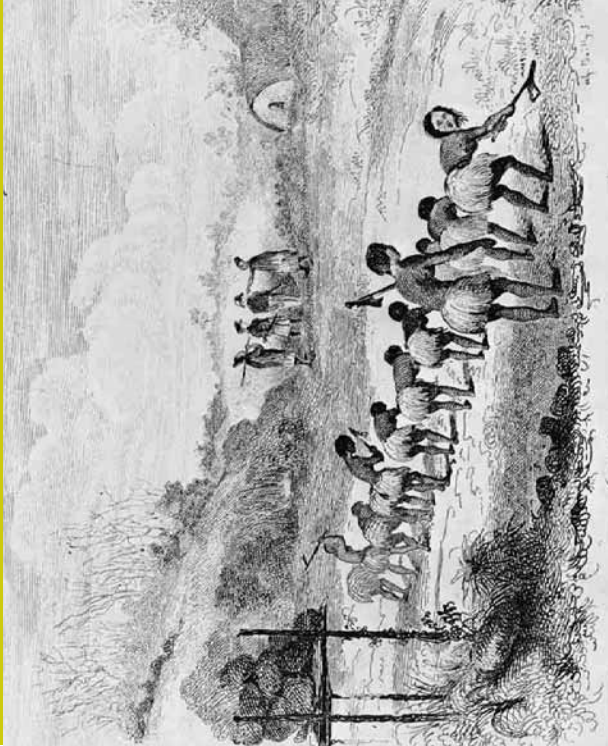
www.historic.org.nz

OTUATAUA STONEFIELDS

A combined project between the Department of Conservation, Manukau City and Auckland Regional Councils enabled the purchase of 100 hectares of land to protect the Otuaataua Stonefields as a reserve. Less than two hundred years ago over 8,000 hectares of stonefields around Auckland's volcanic cones were part of a complex system of gardens and settlements. Almost all the remains of these places have been overrun by modern day Auckland or quarried away. The 100 hectares of land making up Otuaataua is one of only two major remnants left. The reserve contains evidence of a wide range of Māori garden practices and also more recent European garden systems from one hundred years ago. The Otuaataua Stonefields is a historic reserve which can be freely visited. Contact the Department of Conservation or Auckland Regional Council for further information.



NEW ZEALAND
Lottery Grants Board
TE PUNA TAHAUA
Funded from the profits of Lotto



IMAGES
Inside spread, clockwise from top left: Māori women digging land for a kumara garden, 1839. Louis Auguste de Sainson (Alexander Turnbull Library, Wellington, New Zealand, pub-00342-387); Traditional Māori kumara, *Pomoea batatas*, Graham Harris (Open Polytechnic of NZ); Pukaroro garden systems, Kevin Jones (doc);

Pātaka – provision house – at Otumatua Pā, 1840. Charles Heaphy (Alexander Turnbull Library, Wellington, New Zealand, A-146-009) | *Front cover:* Kumara pit remains, Pukematre, Kevin Jones (doc) | *Inside cover:* Otūataua Stonefields (doc) | *Back cover:* Storage pits, Piarere, Waikato (NZHP)



(above) Archaeological remains of gardens are usually part of a complex landscape that may contain a range of garden features, garden soils, quarries, storage pits and pā. The complex at Pukaroro on the Wairarapa Coast includes storage pits above the beach terraces, stone mounds and rows and small gravel quarries (borrow pits).

THE FIRST GARDENERS

When people from tropical Polynesia came to New Zealand around 800 years ago they brought with them a range of plants from their homeland. Those we know to have survived are kumara, yam, taro, gourd, a tropical cabbage tree and paper mulberry. Unfortunately most of these plants could only be grown in the warm climate of the upper North Island. Techniques were developed to enable some plants, particularly kumara, to survive as far south as Banks Peninsula. Some of the gardening techniques and innovations have left behind archaeological remains that show how Māori successfully adapted their Polynesian ancestors' style of gardening to New Zealand.

ARCHAEOLOGICAL REMAINS OF GARDEN SYSTEMS

Archaeologists have found evidence for a variety of gardening techniques used to improve plant yields. Changes to the soil were made to optimise fertility, water retention and warmth. Elevating the soil temperature by adding a layer of sand or gravel meant plants could be planted earlier and harvested later, therefore extending the growing season.

Large “stone-field” garden systems can contain many different features, including stone rows made from stones cleared from plots. These were

used to mark boundaries and form places to grow plants. Other features include stone mounds, additions of gravel, shell, charcoal and ash to soils and levelled terraces on slopes for gardens. Archaeologists have studied this type of garden system in detail at Pouerua, Northland, the volcanic cones of Auckland and the south-east Wairarapa coast.

In many areas soils were modified to improve fertility, particularly in the Waikato, South Taranaki and Nelson regions. Large areas of garden soils, sometimes over hundreds of hectares, have been identified from the addition of gravels and coarse sand not naturally found in the area. Sand and gravel quarries or “borrow pits” are often found near these soils. They are large, irregularly shaped hollows in the ground from which this additive material was obtained.

Archaeologists have also studied the gardening implements used by Māori. Ko or digging sticks were made from wood and were used to prepare the ground. Sometimes these implements have been preserved in swamps and have been later uncovered.

In the wetter parts of Northland and the Bay of Plenty, water was controlled through complex systems of ditches and drains. Some of

the better known of these systems are found at Motutangi in Northland and Kawerau in the Bay of Plenty. This use of water control to increase plant production is a widespread and ancient Pacific tradition brought to New Zealand by the Māori people's Polynesian ancestors.

Although many gardening traditions were brought from the Pacific, Māori also developed new techniques more suitable for gardening in a temperate climate. Storage pits were invented to protect kumara “seed” stock and food supplies from the cold and wet winters. The archaeological remains of these storage pits can often be found on ridges and river terraces above gardens throughout the North Island and northern South Island. There are two common forms: rua, or bell-shaped, and rectangular. There is some regional variation, with rectangular pits with raised rims being found mainly on the east coast of the North Island and bell-shaped underground pits in Taranaki.

As well as gardening, Māori also obtained plant foods from wild plants. The use of wild food is harder to detect from archaeological remains, however, archaeologists have found evidence of the use of bracken fern root, hinau, tawa and karaka berries as food.



ARCHAEOLOGICAL REMAINS OF MIDDENS AND RUBBISH DUMPS



DIFFERENT TYPES OF MIDDEN

Shell middens are usually found within 10 km of the sea. If close to mud-flats or estuaries they usually contain mostly pipis or cockles; paua, mussels and oyster are found in middens near rocky shores and tuatua predominate near sandy beaches. Near lakes and rivers small middens of freshwater mussels are sometimes found.

Some shell middens also contain fish, bird and sometimes dog and seal bone mixed in with the shells. Middens that contain bone, mixed with charcoal and cooking material but no shells are very rare. They are mainly found on the east coast of the South Island and in Central Otago where they are made up of mainly moa bones and stone tools used for butchering moa.

Middens dating from the early European period of New Zealand's history are often very similar to earlier middens. They will also contain glass, crockery, metal or the bones of sheep, cattle and pigs. These historic middens are found wherever there has been a historic settlement (Māori, European or other group), but the largest are often in places where hotels or army barracks once stood.

PROTECTING ARCHAEOLOGICAL SITES

Middens are an irreplaceable part of our heritage. They are archaeological sites and are protected by the *Historic Places Act 1993*. If you wish to do any work that may affect an archaeological site you must obtain an authority from the New Zealand Historic Places Trust before you begin. It is an offence to modify, damage or destroy an archaeological site without the written authority of the Trust.

FURTHER READING

Davidson, J., 1987. *The Prehistory of New Zealand*. 2nd Edition. Longman Paul, Auckland.
Anderson, A., 1990. *Prodigious Birds: Moas and Moa-hunting in New Zealand*. Cambridge University Press, Cambridge.

FOR INFORMATION ABOUT ARCHAEOLOGICAL SITES

For information about archaeological sites, applying for an archaeological authority or the *Historic Places Act 1993* contact:

New Zealand Historic Places Trust
Toll free 0800 HERITAGE (0800 437482)
Email archaeology@historic.org.nz
NZ Historic Places Trust, PO Box 2629, Wellington

New Zealand Archaeological Association's website
www.nzarchaeology.org



NEW ZEALAND
Lottery Grants Board
TE PUNGA TA HOKA
Investment in the making of legends

www.historic.org.nz



IMAGES
*Inside spread, clockwise from top left: Midden, Ninety Mile Beach, Northland, (NZHP); Taupo Pā located at present day Pilmerton 1844 George F. Angas (Alexander Turnbull Library, Wellington, New Zealand, publ-0014-48); Midden showing moa bones, Kaupokonui, Taranaki (NZHP); Moa: *Dinornis ingens*, 1906.*

Frederick W. Frohawk (Alexander Turnbull Library, publ-0044-42) | Front cover: Shell midden and ovens, coastal Nelson (NZAA) | Inside cover: Archaeological excavation of midden at Pauatahanui, (Kāpiti Māta News) | Back cover: Shell midden, Pauatahanui (NZHP)



WHAT IS A MIDDEN?

'Midden' is an old English word for a household rubbish dump and this is the meaning used by archaeologists. Middens are places where food remains, such as shellfish and animal bones, ash and charcoal from fires, and broken or worn out tools were thrown away, dumped or buried. Middens can be of Māori, European or other origin. Middens are one of the most common kind of archaeological site found in New Zealand.

HOW TO RECOGNISE A SHELL MIDDEN

Shell middens can be found almost anywhere in coastal New Zealand and are usually made up of layers of shell and bone mixed with charcoal, ash and burnt stone. They can be seen as low mounds and heaps or eroding from sand dunes, river banks or road cuttings. Some middens contain Māori artefacts such as fish hooks, adzes and sharp stone flakes made from a variety of stone including volcanic glass.

It is sometimes difficult to distinguish shell middens from natural heaps or layers of shells along the coast. Close inspection will usually reveal charcoal, artefacts, blackened soil or burnt stone that shows that the site was formed by people rather than natural processes.

WHAT CAN WE LEARN FROM STUDYING MIDDENS?

DATING THE PAST

Archaeologists are able to recover charcoal, bones or shells that can be analysed using radiocarbon dating techniques to provide ages estimates for when sites were occupied. Sometimes by comparing archaeological specimens with modern samples it is possible to establish what season of the year a site was occupied.

MAKING A LIVING

Studying the contents of middens can show where people went to get their food, what proportions of different foods made up their diet, its nutritional quality and how it may have changed in different seasons or over long periods of time. For example, the study of middens in southern New Zealand has shown that early Māori first concentrated their hunting on moa and seals which were rich in protein and fat, but later on as these resources became scarce they turned to fish and shellfish, supplemented by mutton birds and weka to maintain their diet.

RECONSTRUCTING THE ENVIRONMENT

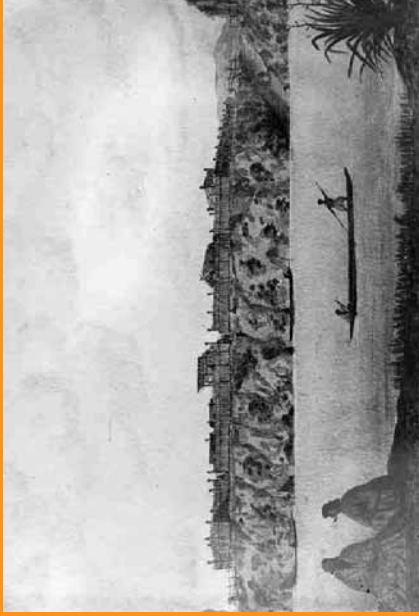
It is mainly from the study of middens that we know about the numerous bird species, including moa, swans and eagles, that once existed in New Zealand but are now extinct. Midden studies have also shown

that some animals were once common in areas where they are now rare. For example, elephant seals and fur seals had breeding colonies as far north as the Coromandel Peninsula 700 years ago, whereas now these are confined to the far south. Charcoal, seeds and land snails from middens can also enable the reconstruction of vegetation patterns from the past.

AN ORDINARY DAY

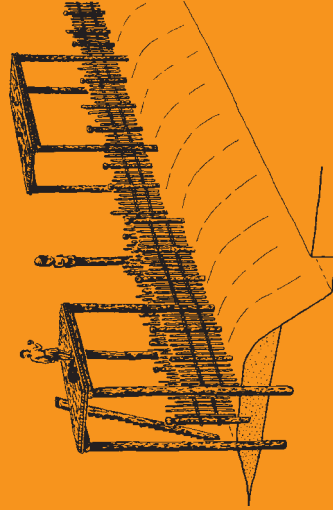
Oral history, traditional accounts and historical records tend to focus on important people and major events. They sometimes show how people wanted things to be, not how they really were. These accounts and records often contain very little information about the everyday lives of ordinary people.

Archaeological studies of rubbish dumps and middens can help redress the balance by enabling us to find out what people collected, consumed, made and eventually threw away during the normal course of their daily living. Archaeological studies can provide information about what things were actually like, by looking at this physical evidence.



HOW WERE PĀ DEFENDED?

Māori defended pā in three main ways. They could steepen natural slopes around the pā by scarping (removing earth). They could dig a deep ditch and use the earth to make an internal bank. Features constructed with soil are known as “earthworks”. They could build timber palisades (high fences). In the Bay of Islands and Taranaki stone was sometimes also used to strengthen banks and make walls, but this was uncommon elsewhere.



Fortifications were built to suit the needs of the defenders. If there was an easy approach along a ridge line, the way could be blocked with earthworks such as ditches and banks. Pā built for gun fighting had loop holes in the base of palisades to enable gun fire and angled earthworks for flanking fire. The entrance to a pā can be difficult to find. It is usually an easily defended narrow gap in the earthworks, sometimes between the end of defences and the edge of a steep escarpment.

PĀ TO VISIT

Bay of Islands	Kororipo, Kerikeri
Whangarei	Parahaki
Auckland	Maungakiekie, One Tree Hill Maungawhau, Mt Eden Te Pane A Mataaho, Mangere
Coromandel	Opito Point, Whitianga
Bay of Plenty	Kapu te Rangī, Whakatane
Hawkes Bay	Otatara, Taradale
Taranaki	Te Koru, Oakura Okoki (Sir Peter Buck Memorial)
Marlborough	Karaka Point, Picton
Canterbury	Kaiapoi Pā, Woodend
Otago	Huriawa, Karitane Katiki, south of Moeraki Mapoutahi, Purakaunui

These places are in public ownership and can be freely visited. They are important Māori heritage places and should be treated with care and respect. Pā on private land require the owners' consent to visit.

FURTHER READING

Davidson, J. 1987. *The Prehistory of New Zealand*. 2nd Edition. Longman Paul, Auckland.

Sutton, D, Furey, L and Marshall, Y. 2003. *The Archaeology of Pouerua*. Auckland University Press, Auckland.

FOR INFORMATION ABOUT ARCHAEOLOGICAL SITES

For information about archaeological sites, applying for an archaeological authority or the *Historic Places Act* 1993 contact:

New Zealand Historic Places Trust
Toll free 0800 HERITAGE (0800 437482)

Email archaeology@historic.org.nz

NZ Historic Places Trust, PO Box 2629, Wellington

New Zealand Archaeological Association's website
www.nzarchaeology.org

www.historic.org.nz





IMAGES

Inside spread, clockwise from top left: Motupoi Pah with Tongariro, 1844, George F. Angas (Alexander Turnbull Library, Wellington, New Zealand, A-196-022); Pa at Otaitu, South Taranaki, Kevin Jones (00C); From the Pah Pipitea, Port Nicholson, 1840, William Mein Smith (Alexander Turnbull Library, C-011-005); Present day Rangitiri Pa, Waikato (NZHPT); Earthworks at Rangitiri Pa, 1863, Charles Heaphy



(Alexander Turnbull Library A-145-005) / Front cover: Pa at One Tree Hill/Maungakiekie, Kevin Jones (00C) / Inside cover: Tane-nui-a-Rangi Pa, Hawkes Bay, 1859, Henry S. Bates (Alexander Turnbull Library, NON-ATL-0008); Fighting stages and palisade, Orakantini Pa, South Kaipara, 1971, P. Bellwood

WHAT IS A PĀ?

A pā is a fortified place built by Māori. Pā are associated with a group of related people and vary in size from those built for whanau (a large family) to hapu or iwi (tribe) of several hundred people. In the past, they were built as refuge from attack during times of war, but also had many other uses. They were secure places to live and store food, they were residences for important people and centres for learning, crafts and horticulture. Pā were not lived in all the time; according to the season, people may have been away fishing or collecting birds, or looking after gardens. People may have lived in open settlements most of the time, only going to the pā in times of trouble.

WHERE ARE PĀ FOUND?

The archaeological remains of pā can be very obvious in the landscape. They are often located on naturally defensible high points, such as the end of a steep-sided ridge, a coastal headland or an isolated hill. Pā were also built at the edge of swamps and sometimes on flat land. In many cases pā can be recognised from a distance by their profile on the skyline, such as a flat platform, the 'v' shaped notch of a defensive ditch or a series of steps (terraces) cut into the hillside to make level areas.

WHAT IS INSIDE A PĀ?

There is no set plan for the inside of pā, the layout depends on the nature of each site and its purpose. Archaeological remains of places that were commonly found inside may still be seen. The *tīhi* (platform) is a large flat area at the top, often associated with important people. Terraces are artificially levelled areas that provided flat areas for activities and buildings. Rectangular or circular depressions are often the remains of pits for storing kumara. Archaeological excavation has shown that these pits were originally up to a metre deep and were covered by a pitched roof.

WHEN WERE PĀ BUILT?

The earliest date for defended sites, obtained by archaeologists using radiocarbon dating techniques, is the 16th century. Many pā continued to be built and lived in until the early 19th century. Pā were seen and described by Captain James Cook in 1770 and by European missionaries and travellers in the early 1800s. After the arrival of the musket, traditional styles of pā construction were modified to suit fighting with guns and artillery. In some places, pā remain in use today.

PROTECTING ARCHAEOLOGICAL SITES

Pā are an irreplaceable part of our heritage. They are archaeological sites and are protected by the *Historic Places Act 1993*. If you wish to do any work that may affect an archaeological site you must obtain an authority from the New Zealand Historic Places Trust before you begin. It is an offence to modify, damage or destroy an archaeological site without the written authority of the Trust.

