

**CLARKS BEACH
COASTAL EROSION MANAGEMENT GUIDELINES**

A joint initiative between:

**Auckland Regional Council
Franklin District Council
Clarks Beach & Waiau Pa Residents & Ratepayers Association**

**Final report
May 2004**



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EXECUTIVE SUMMARY

These erosion management guidelines have been produced as a joint initiative between the Auckland Regional Council (ARC), Franklin District Council (FDC) and local residents & ratepayers (R & R) to provide guidance on the management of the Clarks Beach and Waiau Beach coastline.

Coastal hazards at Clarks Beach and Waiau Beach include coastal erosion, inundation (flooding) and land instability. These guidelines are a tool for property owners who seek some assistance to manage coastal erosion. It provides direction on appropriate methods for managing coastal erosion, and the resource consent and building permit processes.

The report discusses shoreline change at Clarks Beach and Waiau Beach. The coastline at the western end of Clarks beach is largely stable due to the fact that it has been modified by seawalls and in some areas the shoreline has actually prograded (moved seaward) due to human activity. From analysis undertaken it appears that the eastern end of Clarks Beach (Knights Beach cliffs and Bradleys Beach) is eroding in the order of 0.1m to 0.2m per year.

In the context of the site (residential development, high recreational amenity, natural character and public access) several coastal erosion management methods have been identified as being suitable to fit with the vision for Clarks Beach and the relevant statutory documents. A map has been produced that identifies the potential erosion management options for specific locations along the coast. Structural support is likely to be required at coastal cliffs and clay banks. At sandy beaches backstop protection and planning methods have been identified as potential options to protect and preserve public access, visual and recreational amenity of the beach. Resource consent is required prior to undertaking construction of some of the options identified in the plan. The information contained in this plan will assist in the resource consent process.

There are many initiatives that the community could be involved with to enhance and restore the values of the coastal environment at Clarks Beach and Waiau Beach. The ARC and FDC work in partnership with many communities to help them achieve their vision for the coastal environment, and are supportive of any proactive coastal management practices that the local community would like to be involved with e.g. weed control, planting, beach clean ups, removal of ineffective structures.

PART ONE

1.0 INTRODUCTION

1.1 Purpose

Many coastal property owners at Clarks Beach and Waiau Beach are concerned about coastal erosion and consider it to be a significant hazard that requires structural coastal management methods to protect the remaining esplanade reserve and their properties. Many unlawful coastal protection structures have been built along the coastline in an ad hoc manner with little regard to coastal processes and the causes of erosion, or the natural character and amenity values of the area. Structures have been built in a variety of designs and materials, and many have not been maintained.

The ARC, FDC and local community have expressed concern that this approach is not a sustainable solution to long term management of erosion at Clarks Beach, and they have identified the need for a consistent approach.

VISION: To enhance and preserve the coastline of Clarks Beach through a balance of natural and engineered erosion management solutions to create a safe, sandy, aesthetically pleasing beach while still protecting public and private property.

The aim of this plan is to document coastal processes and shoreline changes at Clarks Beach, to understand the cause of coastal erosion and to identify 2-3 potential options for erosion management, and assess the environmental effects of each. The plan provides guidance on the resource consent process, and provides relevant information to support any coastal permit application for coastal erosion management works identified in these guidelines. Individual property owners will need to add site specific information confirming the location of their property and the selected design and construction methodology to complete their coastal permit application. This plan will assist to reduce the time and costs associated with gaining a coastal permit for erosion protection works as it will contain clear direction for landowners and the majority of the information required to support an application.

1.2 Objectives

- To gain a common understanding of the coastal management issues occurring at Clarks Beach.
- To provide a long term vision for Clarks Beach and to provide a consistent approach to coastal erosion management between agencies and the community.
- The ARC, FDC and the local community to work in partnership to enhance natural character and beach amenity values of Clarks Beach while addressing the impact of coastal erosion on human development.
- To provide guidance on where and what coastal erosion management activities are considered appropriate at sites along the beach.
- To provide guidance on the resource consent process, including providing supporting information for coastal permit applications.

1.3 Structure of report

Part One sets out the vision for Clarks Beach and objectives of the guidelines. It describes rates of shoreline change, possible causes of erosion and other hazards, and potential options to manage erosion, along with information to assist landowners with resource consent applications. It also sets out the methods that will be used to address unlawful structures.

Part Two contains more detailed background information including description of the physical site characteristics, methods used to assess shoreline change and the statutory setting under which our coastline is managed.

Part Three provides standard design plans, application forms for coastal permits and building permits, supplementary information to support these applications, plant species list, and some local native plant nurseries.

1.4 Definitions

<i>ARC</i>	Auckland Regional Council, responsible for environmental management of the coastal marine area (below MHWS).
<i>FDC</i>	Franklin District Council, landowner and service provider with environmental management responsibilities for landuse above MHWS
<i>Coastal Marine Area (CMA)</i>	The area seaward of the line of mean high water springs (MHWS).
<i>Mean High Water Springs (MHWS)</i>	The average height of spring tides. Approximately 4.25m above chart datum on the Manukau Harbour. Most practically determined by observing the highest debris line on the beach.
<i>Resource consent/coastal permit</i>	Permit from ARC under Section 12 of the Resource Management Act 1991 to undertake work in the CMA.
<i>Building permit</i>	Permit from FDC under the Building Act 1991 to ensure building standards and engineering specifications are met.
<i>Coastal management works</i>	Any structure or works erected, placed or carried out on or adjacent to the foreshore to alter natural coastal processes in order to protect land above mean high water springs against erosion or encroachment of the sea.
<i>Hazard</i>	The interaction of coastal processes with human use, property or infrastructure, the action of which adversely affects or may adversely affect human life, property or assets.
<i>Backshore</i>	The part of the beach landward of mean high water mark. Generally only subject to wave activity during significant storm events, especially when they coincide with periods of high water.
<i>Foreshore</i>	The part of the beach and intertidal area covered and uncovered by the tide at mean spring tides.

2.0 SITE DESCRIPTION AND BACKGROUND

2.1 Location

Clarks Beach is located on the south-western shore of Manukau Harbour between the Waiuku River and Clarks Creek, approximately 35 km south west of Auckland. The coastline from Karaka Point to Seagrove is approximately 9.5km long and is oriented in a WSW-ENE direction.

The coastal environment is largely modified by the small settlement of Clarks Beach. Approximately 100 coastal properties extend along the seaward side of Torkar Rd & Crispe Rd, over a distance of 2.5km. The Franklin District Council owns and manages reserve land along approximately 4.5 km of the coastline. The Seagrove area is largely rural land, with some smaller lifestyle blocks and there is no housing or development along the immediate backshore.

Clarks Beach is a reasonably typical estuarine beach interspersed with cliffs. In cross-section, the beach system consists of a wide inter-tidal flat, narrow sandy perched high-tide beach, backed by a low, steep bank ranging in height from 0.1-2.0m. Along some parts of the coastline there is little or no high tide beach and the intertidal bank (sand/mud flat) extends directly to the coastal cliffs up to 8-10m high. The majority of the coastline has been modified by various forms of erosion 'protection' and in some areas the shoreline has been pushed seaward by

reclamation and filled areas. There are several stormwater discharges across the beach, and little remaining native vegetation along the coastal fringe.

Waiau Beach is located 1 km south of Clarks Beach. There are approximately 10 coastal properties in this small settlement. The coastline is characterised by wide intertidal flats which extend up to the cliffs and existing seawalls where there is little to no high tide beach. There appears to have been some reclamation of the foreshore, and there are several stormwater outfalls discharging onto the beach in addition to two ramp/accessways.

For management purposes the coastline has been divided into compartments based on the coastline type and level of development. These are illustrated in Figure 1, and are listed below in geographical order from east to west. The main characteristics of each section of coastline area noted.

Location	Local name	Coastline description	Development
A	Seagrove Peninsula	Sandy beach	Rural land, no coastal development, some structures & stopbanks, important bird habitat
B	Bradleys Beach	Sandy beach	Sandy beach backed by low clay bank and peat, variety of coastal structures: timber seawalls, rock rip rap, buried gabion revetment, low retaining walls, planting, and areas of natural shoreline
C	Cliffs between Hoskins accessway and Knights Beach	Cliffs	Coastal cliff with no high tide beach, slips, drainage issues from adjacent properties, unlawful seawalls in various states of repair adjacent to most properties
D	Knights Beach	Sandy beach	Low grassed reserve, low backstop timber seawall
E	Halls Beach east of Red Rock	Modified coastline	Unlawful timber seawalls along most of this length of coastline
F	Halls Beach west of Red Rock	Sandy beach	Wide beach backed by 1-2m bank, few structures (rock seawall with planting and wire fence adjacent to reserve), some iceplant and good vegetation along beach
G	Irwins Beach	Sandy beach	Some vegetation, few structures, rocks, garden rubbish
H	Wilsons Beach	Modified coastline	Unlawful timber seawall adjacent to reserve, sandy beach
I	Western Clarks Beach	Modified coastline	Housing and sewer line at CMA boundary, seawalls
J	Karaka Point / Torkar Bay	Cliffs/sandy beach	Coastal cliffs, boat ramp and unlawful groyne.
K	Waiau Beach	Modified coastline and cliffs.	Northern section concrete seawall, rubble, stormwater discharges Southern section cliffs, small slips and some undermining

2.2 Values of coastal environment

The beach and adjacent council reserves are valued recreational assets to the community. They are also valued by adjacent property owners as they provide a buffer from continued long term coastal erosion. Many people enjoy walking along the beach and sitting in shaded areas on the reserves or on the beach. It is important that any erosion management option in the coastal marine area does not compromise these values, and that appropriate options are used where it is identified that it is important to retain reserves such as the grassed area beneath the pohutukawa trees at Knights Beach.

It is also important to protect the sandy beaches, which may continue to erode in front of seawalls if there is a trend of long term coastal erosion. Beach lowering in front of seawalls will result in the high tide beach being reduced in

width and potentially lost in the long term if the beach profile is unable to adjust by moving landward to reach an equilibrium.

Public access to and along the CMA is identified as a matter of national importance in policy documents that relate to the coastal environment. Public access to the beach and wider coastal marine area is largely unobstructed along the length of Clarks Beach except during high tide when there is little to no dry beach along some parts of the coast due to the construction of seawalls and fences across the beach. Natural features along the beach such as cliff/headland outcrops also impede public access at high tide.

The preservation of natural character and protection from inappropriate use and development of the coastline is a matter of national importance. The natural character of an area is determined by several factors including the level of human development, natural functioning of ecosystems and coastal processes, landscape values and visual amenity. It is important to consider natural character of an area in the local and regional context.

The CMA from Clarks Point to Seagrove has been identified as a Coastal Protection Area 2 in the Proposed Regional Plan: Coastal because of the ecological value of the intertidal sand flats, and the intertidal area adjacent to Seagrove has been identified as being of international significance as an important bird habitat. The coastline of the Waiuku River south of Torkar Point and including Waiuku Beach have been classified as a Regionally Significant Landscape in the Proposed Regional Plan: Coastal.

Coastal sites were popular areas of Maori settlement, and many midden are exposed at coastal sites. There are several sites recorded in the ARC Cultural Heritage Inventory east of Clarks Beach along the Seagrove Peninsula, and some midden at Waiuku Beach.

3.0 COASTAL HAZARDS

The ARC has produced a Coastal Hazards Strategy (CHS) and Coastal Erosion Management Manual (CEMM) which are non-statutory documents that act as a guideline for property owners to understand the nature of coastal erosion hazard and to help with the selection of the appropriate management option for any particular site. This plan is an example of the practical implementation of the CEMM.

The CHS identifies Clarks Beach as an eroded tidal lowland with a low level of development, low wave energy, and medium-low potential for coastal hazard issues. The Franklin District Council Shoreline Erosion Management Guidelines (1999) provides an assessment of the impacts of coastal erosion processes occurring along the FDC shoreline and outlines a priority for action. In that report, Clarks Beach is said to have a low potential erosion hazard at present, and a moderate threat in the future (due to sea level rise).

The primary coastal hazards affecting Clarks Beach and Waiuku Beach are erosion, inundation of low lying areas and land instability.

3.1 Coastal erosion

3.1.1 Rates of shoreline change

Erosion is defined as long term landward retreat of the coastline. Rates of shoreline change (erosion/accretion) were determined using aerial photographs, survey information, field observations and community information. Additional detail on the methodology for assessing shoreline change is included in Part Two of this report and ARC (2003).

The three coloured lines in Figure 1 represent the Clarks Beach shoreline in 1942, 1977 and 2002. This shows that the coastline at the western end of Clarks Beach is largely stable due to the fact that it has been substantially modified by seawalls, and in some areas the shoreline has actually prograded (moved seaward) due to human activity. Figure 1 indicates that the coastline at the eastern end of Clarks beach is eroding in the order of 0.1m per year of cliff retreat, and 0.2m per year at Bradleys Beach. The following table summarises the average rate of shoreline change from 1942 until 2002 in each compartment assessed from aerial photographs and field observations.

	Location	Average rate of change 1942 to 2002	Conclusion
A	Seagrove	Undetermined	Eroding – anecdotal evidence
B	Bradley's Beach	-0.2m/yr	Eroding
C	Cliffs between Hoskins & Knights	-0.1m/yr	Eroding
D	Knights Beach	-0.1m/yr	Eroding
E	Halls Beach east of Red Rock	0.0m/yr	Modified coastline
F	Halls Beach west of Red Rock	-0.1-0.0m/yr	Stable, shoreline pushed seaward
G	Irwins Beach	0.0m/yr	Stable
H	Wilsons Beach	+0.0-0.2m/yr	Stable, shoreline pushed seaward
I	Western Clarks Beach	0.0m/yr	Modified shoreline
J	Karaka Point / Torkar Bay	undetermined	
K	Waiiau Beach	undetermined	

A Seagrove

Quantitative measurements of shoreline change east of the Clarks Beach settlement were not attempted from aerial photos due to the lack of stable reference points from which measurements could be made. However site observations of the location of old farm fences on the beach and intertidal area indicate that the coastline has moved landward.

B Bradley's beach

Aerial photo analysis indicates a rate of erosion of between 0.1 and 0.2 m /yr for the period 1942 to 2002. Field measurements were also made of the 2003 line of MHWS (edge of vegetation) in relation to an old fence line at the eastern end of the beach which is believed to mark (approximately) the property boundaries surveyed in 1930. The survey peg between 8 and 10 Crispe Rd was located approximately 1m seaward of this fence line. When the property boundaries were established in 1930, according to survey plan DP 24925, MHWS was 60 links from the boundary line. This distance converts to a metric distance of 12m. The present position of MHWS is now some 4 to 7m landward of the fenceline. This equates to an erosion rate of between 0.22 and 0.26 m/year over the 73 year period 1930 to 2003 which is slightly greater than the rate of shoreline change determined from analysis of aerial photos for the similar period.

C Cliffs between Hoskins accessway and Knights accessway

Field observations indicate that the shoreline is eroding by the presence of slips. Figure 1 gives a false impression of shoreline movement in this area because vegetation obscured the shoreline in aerial photos. Some field measurements were obtained from three survey pegs located in the intertidal area between 25 & 27 Torkar Road, 29 & 31 Torkar Road and 31 & 33 Torkar Road. These survey pegs are shown on cadastral plan DP43200, surveyed in 1955, as being 85 links (17m) from MHWS. The distance from the survey pegs to the existing shoreline was measured. Where the coastline is held by timber seawalls the shoreline (toe of cliff) has eroded by 4m over 48yrs (0.08m/yr). Where there is no seawall and the bank has been undercut beneath an existing pohutukawa, the shoreline has moved 9.6m landward (0.2m/yr). These measurements are reasonably consistent with anecdotal evidence by residents who recount how the cliffs "are now the very least twenty feet back from where we knew them over the last sixty-odd years" (Fausett, 1992). Retreat of 6m (20 feet) over 60 years equates to an average erosion rate of 0.1m/yr.

D Knights Beach

There is no reliable quantitative information on the rate of erosion because the vegetation obscures the shoreline in historical aerial photos. However anecdotal evidence indicates a slow rate of erosion. Some local residents can recall that a bach built on high ground near Knights accessway had to be removed because of high tides.

E Halls Beach east of Red Rock

The shoreline in front of the old baches between 57 and 73 Torkar Rd has been held by seawalls. From comparison of photographs taken by members of the local community, the seawalls appear to be a similar position as the natural coastal edge in 1948. However the width of the dry high tide beach appears to have reduced since 1948. In 2003 the width of the dry high tide beach in front of the timber seawall was 4m. The level of sand in front of the seawall is much lower indicating some erosion and loss of beach sand.

F Halls Beach west of Red Rock

This section of coastline is mostly unmodified and appears to be stable. The width of the dry high tide beach is approximately approx 8m, which is twice as wide as the beach east of Red Rock. A local that has owned a beach front property since the early 1950's recounted that the shoreline in this area had not moved substantially over the last 50 years. Phyl Fausetts account of Clarks Beach from Dec 1925 to June 1992 notes that "the beach banks in this area have not been eroded as badly as those along some other areas, but never-the-less it still goes on, as noted by the falling of the fence posts and railing on the reserves".

G Irwins Beach

From the analysis of aerial photos this section of coast appears to be relatively stable. Field observations do not indicate active long term erosion.

H Wilsons Beach

The eastern end of Wilsons Beach has changed significantly since the late 1930s. The shoreline in the vicinity of 131 Torkar Rd appears to have moved seaward. Discussions with local residents suggest that this is a human induced change rather than natural accretion of the coast. Photographs from 1939 show the shoreline of the beach near the base of the clay bank. Mrs Manning, who has a long association with Clarks Beach, has identified that the boatshed that was originally located on the upper beach adjacent to her family property, was turned to be parallel with the shoreline in 1955 after flooding during high tides. The beach area in front of the boatshed has been capped with soil and is grass reserve. The shoreline in this area has been pushed seaward, and is now approximately 9m seaward of the shoreline position in 1939.

A timber seawall was constructed to protect the carpark and reserve in 1999. The seawall was constructed seaward of MHWS moving the shoreline out and contributing to the human induced progradation of the coastline.

I Western Clarks Beach

The coastline has been armoured by seawalls and from analysis of aerial photos the coastline appears to have been stable over the last 50 years with shoreline movements assessed from aerial photography being within the margin of error associated with the method.

J Karaka Point / Torkar Bay

No quantitative assessment of shoreline change undertaken due to lack of reference points for aerial photos.

K Waiau Beach

No quantitative assessment of shoreline change undertaken due to lack of reference points for aerial photos. The northern part of the beach has been armoured by seawalls. During site visits some scouring at the base of the cliffs at the southern end of the beach indicated a slow rate of erosion.

3.1.2 Causes of erosion

Coastline change (erosion/accretion) can be caused by natural coastal processes and by human activity. Sand level on the beach changes in response to different wind and wave conditions. Sand levels may build up or drop off over different time scales. This fluctuation in sand level is a natural beach process. The geological properties of the site effects its ability to withstand erosive forces. Human activity such as removal of coastal vegetation, and shoreline modification by structures and stormwater discharges can also contribute to coastline change.

Tonkin & Taylor Ltd (1997) identified that long-term coastline retreat is occurring along the majority of the cliff coasts along the Manukau Harbour due to a combination of weak soil properties and hydraulic forces. The main cause of erosion along Clarks Beach and Waiau Beach appears to be the repetitive wetting and drying (weathering) of soils on cliffs and banks. Structural weaknesses between strata exist along some cliffs and can result in mass movement and slips. Groundwater seepages can make these weaknesses 'greasy' and cause the slips between strata. Stormwater discharges at the top or down the face of cliffs via 'elephant trunks' can also contribute to increased weathering of sediment through continual wetting and drying. The development of Clarks Beach has resulted in an increase in impervious surfaces for roading, driveways and roof tops and an associated increase in stormwater discharges which can also erode sediment as they discharge across the beach.

There appears to be only limited sediment supply to the beach. Sand sources include onshore movement from sandbanks, biogenic production (shell material) and erosion of cliffs (seawalls have contained many sources however the cliffs would only produce a small volume of suitable beach sized sediment). Sand has been lost from the beach system at Clarks Beach by sand extraction which was undertaken in 1930s. The intertidal area acts to dissipate some wave energy, however there is only a very narrow beach (and in some cases no high tide beach) to act as a buffer for coastal cliffs and clay banks. Increased wave heights over intertidal and beach area during storms activates sand which is moved by longshore currents, and wave reflection from vertical impervious structures can create turbulence and scour the beach in front of these structures. Subsequent beach recovery is difficult as there are only very small areas of the exotic South African iceplant to trap sand on the beach, and there are no native sand binders such as pingao & spinifex. Stormwater discharges across beaches and intertidal flats scour sand, and this is accelerated where stormwater has been concentrated and receives large volume of runoff from adjacent developed areas.

Large trees and cliff top development can place additional stress and loading on coastal cliffs and banks. The loss of vegetation cover which would have provided some soil stability and protection against weathering can be another contributing factor to erosion. Small rock and concrete rubble placed along the coastline can exacerbate erosion as the material can be moved by wave action to abrade the adjacent cliffs and banks.

3.2 Flooding and inundation

Coastal flooding and inundation of low lying land, is a hazard to some properties at Halls Beach and Bradleys Beach, and the FDC reserves at Halls Beach and Wilsons Beach. Storm surge due to wind stress and low atmospheric pressure can cause elevated water levels which increase flood damage, and when combined with high tides can cause extreme water levels. These low lying properties have been effected by storm surge on occasion in the past. A significant amount of flooding occurred in 1975, 1998/99 and in 2003.

3.3 Land instability

Tonkin & Taylor (1992) identified that structural weaknesses between strata at several locations along the cliffs as a potential hazard. Specific investigation was undertaken in relation to properties between 1 and 39 Torkar Road, and 47 and 55 Torkar Road and are detailed in Tonkin & Taylor (1992).

4.0 OPTIONS FOR EROSION MANAGEMENT

It is necessary to establish whether there is an erosion problem in the first instance. If the shoreline is eroding then the cause of the erosion should be identified to ensure that any proposed management option will address the cause to be effective. Erosion may be caused by natural processes (long term continual retreat, or short term cyclic erosion from storm events and extreme weather patterns), or human intervention (e.g stormwater drainage), or both. The selected option must be a balance between what is socially and economically acceptable to reduce the risk of erosion to existing properties, and the effect that the option will have on the values and amenity of the site. The CEMM discusses all erosion management options. Here we discuss the most likely options for managing coastal erosion along the Clarks Beach coastline that have been identified through consultation to fit with the long term vision.

It is necessary to consider the alternatives to built erosion management options and the associated and ongoing costs of any proposed works. It is important to recognise that doing nothing by not interfering with natural coastal processes can be the appropriate response to managing the coastline if it is not actually eroding in the long term, or if the active erosion does not threaten any development and can be accommodated by the existing land use.

'Soft options' may be appropriate and should be considered in the first instance, this could include planting and beach nourishment to mitigate erosion without the need for expensive protection works. Alternatively some 'soft options' could be used in conjunction with a other options such as a revetment constructed as a back stop landward of the beach.

When considering any 'hard options', consider the costs of building the erosion protection work including the design, consents, installation and ongoing maintenance costs over time including replacement of the structure if it is damaged or at the end of its life span. Different structural options will have varying design life spans. Ongoing maintenance is a requirement and responsibility of the consent holder.

4.1 Potential erosion management options

Clarks Beach and Waiau Beach are highly developed and the natural character of the beach has been largely modified, while Seagrove is less intensively developed and retains a higher level of natural character largely due to lack of buildings. Structural options are less appropriate in areas of low development and high natural character, but may be more appropriate in developed areas where the environment is already modified extensively. The visual impact of structures along the coast can be mitigated by the design if the choice of construction materials and alignment of the works blend in with naturally occurring materials and shape of the coastline.

Figures 2 and 3 illustrates areas where erosion management options have been identified as potentially suitable for specific areas of Clarks Beach or Waiau Beach. The colour coding relates to the options discussed in the following sections, and the reasons why different options are considered appropriate or are not recommended area.



CLARKS BEACH COASTAL EROSION MANAGEMENT ZONES

CLARKS BEACH FLOWN AND RURAL PHOTOS FLOWN FEB 02

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CLARKS BEACH COASTAL EROSION MANAGEMENT ZONES

CLARKS BEACH FLOWN AND RURAL PHOTOS FLOWN FEB 02

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4.1.1 (A) Seagrove Peninsula (pink on Figure 2)

<i>Options</i>	<i>Reasons</i>
APPROPRIATE	
Land management and development setback to avoid development in hazard zone.	<ul style="list-style-type: none"> FDC use planning methods and district plan. The Seagrove peninsula is less developed than Clarks Beach which has been modified for residential purposes.
Planting	<ul style="list-style-type: none"> Planting of native coastal species to help improve bank stability, restore biodiversity and improve visual amenity.
NOT RECOMMENDED	
Seawalls and groynes	<ul style="list-style-type: none"> Seagrove peninsula is largely undeveloped and retains its rural character. Hard structures (e.g. seawalls , rock rip rap, groynes) should be avoided along this stretch of coastline in favour of softer management options including planting and revetments.
Planting spartina	<ul style="list-style-type: none"> Spartina is a weed, listed as a Total Control Plant and is banned from propagation and distribution. Eradication of Spartina is scheduled to be undertaken by ARC, and it is anticipated this will commence in September 2004.

4.1.2 Coastal cliff areas (blue on Figure 2) C) between Hoskins access and Knights Beach; J) Karaka Point; and K) Waiiau Beach

<i>Options</i>	<i>Reasons</i>
APPROPRIATE	
Timber seawall	<ul style="list-style-type: none"> The coastline has been highly modified by residential development and the construction of coastal erosion management. Appropriate if it is consistent with timber seawalls on adjacent coastline. Structural works will likely be required to stabilise slopes and to prevent any undercutting of coastal cliffs. It may also be necessary to unload slopes by trimming large trees or battering back the top of the slope so that it is not oversteep.
Grouted rock seawall	<ul style="list-style-type: none"> The coastline has been highly modified by residential development and the construction of coastal erosion management. Appropriate if it is consistent with rock/concrete seawalls on adjacent coastline. Structural works will likely be required to stabilise slopes and to prevent any undercutting of coastal cliffs. It may also be necessary to unload slopes by trimming large trees or battering back the top of the slope so that it is not oversteep.
Drainage systems	<ul style="list-style-type: none"> Drainage systems should be installed to reduce stormwater cascading over the face of the cliff.
Coastal planting	<ul style="list-style-type: none"> Additional planting can be undertaken to improve soil stability by increasing root mass. Permission is required from the NZ Historic Places Trust before disturbing any archaeological sites, this includes planting into midden.
NOT RECOMMENDED	
Planting only	<ul style="list-style-type: none"> Coastal planting on its own will not provide structural stability.
Rip rap	<ul style="list-style-type: none"> Rock rip rap seawalls dissipate some wave energy however they are not considered appropriate at Clarks Beach because they require a large footprint and occupy a greater beach area than vertical seawalls. This can affect public access to and along the beach, and recreational amenity of the area. Adverse effect on visual amenity of the beach.

	<ul style="list-style-type: none"> • The rock material does not blend with the natural coastline.
Groynes	<ul style="list-style-type: none"> • Not effective where longshore drift/transport of sand is small, and potential for lee side erosion. • Visual/aesthetic effects. • Obstructions across beach effect on public access along CMA.

4.1.3 Clay bank areas (Green on Figure 2): E) Halls Beach east; I) western Clarks Beach; and K) Waiau Beach

<i>Options</i>	<i>Reasons</i>
APPROPRIATE	
Timber seawall	<ul style="list-style-type: none"> • The coastline has been highly modified by residential development and the construction of various forms of coastal erosion management. • Structural works may be required to stabilise slopes and provide toe support to prevent slips. • Seawalls do not protect the beach or neighbouring land from long term erosion. Some wave energy will be reflected and may scour sand in front of the seawall to lower beach levels. • It may be necessary to unload slopes by trimming large trees or battering back the top of the slope so that it is not oversteep.
Grouted rock seawall	<ul style="list-style-type: none"> • The coastline has been highly modified by residential development and the construction of coastal erosion management. • Structural works may be required to stabilise slopes and provide toe support to prevent slips.
Drainage	<ul style="list-style-type: none"> • Drainage systems should be installed to reduce stormwater runoff exacerbating natural weathering and frittering of the bank.
Buried backstop sloping revetment and planting	<ul style="list-style-type: none"> • Backstop protection in conjunction with planting of native coastal species to help improve bank stability • Additional planting can be undertaken to improve soil stability by increasing root mass..
NOT RECOMMENDED	
Planting only	<ul style="list-style-type: none"> • Coastal planting will not provide structural stability on its own.
Rip rap	<ul style="list-style-type: none"> • Rock rip rap seawalls dissipate some wave energy however they are not considered appropriate at Clarks Beach because they require a large footprint and occupy a greater beach area than vertical seawalls. This can affect public access to and along the beach, and recreational amenity of the area. • Adverse effect on visual amenity of the beach. • The rock material does not blend with the natural coastline.
Groynes	<ul style="list-style-type: none"> • Not effective where longshore drift/transport of sand is small, and potential for lee side erosion. • Visual/aesthetic effects. • Obstructions across beach effect on public access along CMA.

4.1.4 Sandy beaches (orange on Figure 2): D) Knights beach; F) Halls Beach west; G) Irwins Beach; and H) Wilsons Beach

<i>Options</i>	<i>Reasons</i>
APPROPRIATE	
Buildings setback	<ul style="list-style-type: none"> Adherence to FDC building setbacks to avoid construction of dwellings in the hazard zone.
Planting	<ul style="list-style-type: none"> Planting of native coastal species to help improve backshore stability. This will retain maximum beach width as a natural buffer, and help to preserve public access and enhance visual and recreational amenity of the beach.
Drainage	<ul style="list-style-type: none"> Drainage systems should be installed to reduce stormwater eroding beach sand.
Buried backstop sloping revetment	<ul style="list-style-type: none"> Backshore protection in conjunction with planting of native coastal species to help improve backshore stability and to provide backstop protection during periods when sand levels are low. Retains maximum beach width as natural buffer, helps to preserve public access along the beach at high tide and recreational and visual amenity. Will not prevent inundation of low lying properties.
Low backstop protection above MHWS	<ul style="list-style-type: none"> Structural protection for property on land located as far landward as possible above MHWS and following the natural coastline shape. This will retain maximum beach width as a natural buffer, and help to preserve public access and recreational amenity. Will not prevent inundation of low lying properties.
Beach nourishment	<ul style="list-style-type: none"> Increase beach width to provide a natural buffer for erosion, and to enhance the visual and recreational amenity of the beach. Will not prevent inundation of low lying properties.
NOT RECOMMENDED	
Seawalls	<ul style="list-style-type: none"> Shoreline is generally stable and in some locations has moved seaward. A long term trend of erosion was not identified through shoreline change analysis. Seawalls reduce width of dry high tide beach affecting public access, and recreational and visual amenity. Seawalls interfere with natural coastal processes and scour from wave reflection can lower beach levels. Seawalls will not prevent inundation of low lying properties.
Rip rap	<ul style="list-style-type: none"> Rock rip rap seawalls dissipate some wave energy however they are not considered appropriate at Clarks Beach because they require a large footprint and occupy a greater beach area than vertical seawalls. This can affect public access to and along the beach, and recreational amenity of the area. Adverse effect on visual amenity of the beach. The rock material does not blend with the natural coastline. Will not prevent inundation of low lying properties.
Groynes	<ul style="list-style-type: none"> Not effective where longshore drift/transport of sand is small, and potential for lee side erosion. Visual/aesthetic effects. Obstructions across beach effect on public access along CMA.

4.1.5 Eroding sandy beach (aqua on Figure 2): B) Bradleys Beach

<i>Options</i>	<i>Reasons</i>
APPROPRIATE	
Buildings setback	<ul style="list-style-type: none"> Adherence to FDC building setbacks to avoid construction of dwellings in the hazard zone.
Planting	<ul style="list-style-type: none"> Planting of native coastal species to help improve backshore stability. This will retain maximum beach width as a natural buffer, and help to preserve public access and enhance visual and recreational amenity of the beach.
Drainage	<ul style="list-style-type: none"> Drainage systems should be installed to reduce stormwater eroding beach sand.
Buried backstop sloping revetment	<ul style="list-style-type: none"> Backshore protection in conjunction with planting of native coastal species to help improve backshore stability and to provide backstop protection during periods when sand levels are low Will not prevent inundation of low lying properties.
Low backstop protection above MHWS	<ul style="list-style-type: none"> Structural protection for property on land located as far landward as possible above MHWS and following the natural coastline shape. This will retain maximum beach width as a natural buffer, and help to preserve public access and recreational amenity. Will not prevent inundation of low lying properties.
Seawalls	<ul style="list-style-type: none"> Trend of slow long term erosion of residential developed property identified through shoreline change analysis. Seawalls reduce width of dry high tide beach effecting public access, and recreational and visual amenity. Seawalls interfere with natural coastal processes and scour from wave reflection can lower beach levels. Seawalls will not prevent inundation of low lying properties.
Beach nourishment	<ul style="list-style-type: none"> Increase beach width to provide a natural buffer for erosion, and to enhance the visual and recreational amenity of the beach. Will not prevent inundation of low lying properties.
NOT RECOMMENDED	
Rip rap	<ul style="list-style-type: none"> Rock rip rap seawalls dissipate some wave energy however they are not considered appropriate at Clarks Beach because they require a large footprint and occupy a greater beach area than vertical seawalls. This can affect public access to and along the beach, and recreational amenity of the area. Adverse effect on visual amenity of the beach. The rock material does not blend with the natural coastline. Will not prevent inundation of low lying properties.
Groynes	<ul style="list-style-type: none"> Not effective where longshore drift/transport of sand is small, and potential for lee side erosion. Visual/aesthetic effects. Obstructions across beach effect on public access along CMA.

4.2 Design details

Any structure in the CMA must be well designed and constructed taking into account the processes that have caused the erosion. All structures have a design life and the need for ongoing maintenance and monitoring of the structure must be recognised by property owners. Typical detail plans for different coastal erosion management options are attached in Part Three. The following descriptions provide additional information regarding design. **All resource consents must be obtained before construction starts.**

4.2.1 Timber seawalls (T&T Plan No. 21381-03)

- Suitable where adjacent properties are protected by seawalls constructed from timber materials.
- Follow the natural curvature of the existing bank and position the seawall as far landward as practical at the toe of the bank,

- Returns at either end of the seawall should extend at least 2.0m back from the main seawall or if it is adjacent to an existing seawall it should be of the same design and adequately joined. If the seawall is located adjacent to a headland it should be keyed into the cliff.
- Founded on hard rock or have adequate foundations to ensure wave scour at base of wall does not undermine the structure.
- Timber to be treated for marine exposure (H6 grade) and all bolts and fastenings to be hot dip galvanized.
- Drainage holes must be spaced at even centers along the wall to reduce the build up of water pressure behind the wall (from ground water and tide).
- Geotextile fabric must be used as a filter layer to prevent the loss of fine material from behind the wall. Care should be taken to ensure backfill material does not puncture the fabric.
- If beach sediment is excavated for the foundations it should be retained and reused at the completion of the works to regrade the beach. Unsuitable excavations i.e. mud/fill should be removed from the coastal marine area.
- All work should be undertaken at low tide, and any concrete should include fast curing agents.
- Use of vehicles on the foreshore should be avoided as much as possible. If vehicles use the foreshore they should minimise the work corridor (say 15m from shoreline) and should avoid soft muddy sediment and areas of vegetation. Disturbance can be minimized by use of swamp mats or similar methods.



Photo 1 & 2: Examples of well constructed seawalls. Planting of native coastal species to be completed on bank landward of seawall.

4.2.2 Grouted rock seawall (T&T Plan No. 21381-02)

- Suitable where adjacent properties are protected by seawalls constructed from concrete or grouted rock.
- Seawall to follow the natural curvature of the existing bank and position the seawall as far landward as practical at the toe of the bank,
- Returns at either end of the seawall should extend at least 2.0m back from the main seawall or if it is adjacent to an existing seawall it should be of the same design and adequately joined. If the seawall is located adjacent to a headland it should be keyed into the cliff.
- Founded on hard rock or have adequate foundations to ensure wave scour at base of wall does not undermine the structure.
- Drainage holes must be spaced at even centers along the wall to reduce the build up of water pressure behind the wall (from ground water and tide).
- Geotextile fabric must be used as a filter layer to prevent the loss of fine material from behind the wall. Care should be taken to ensure backfill material does not puncture the fabric.
- If beach sediment is excavated for the foundations it should be retained and reused at the completion of the works to regrade the beach. Unsuitable excavations i.e. mud/fill should be removed from the coastal marine area.
- All work should be undertaken at low tide, and any concrete should include fast curing agents.
- Use of vehicles on the foreshore should be avoided as much as possible. If vehicles use the foreshore they should minimise the work corridor (say 15m from shoreline) and should avoid soft muddy sediment and areas of vegetation. Disturbance can be minimized by use of swamp mats or similar methods.

4.2.3 Backstop protection revetment (T & T Plan No. 21381-01)

- An option of erosion management is a sloping revetment constructed along the backshore as a back stop to protect the property from erosion.
- The structure should be constructed as far landward as practical and follow the natural curvature of the beach to allow the natural beach to develop with minimal interaction of wave reflection from a vertical hard seawall structure.
- Revetment structures will require ongoing maintenance as sand levels fluctuate.
- Backstop retaining wall protection above MHWS minimises interaction with coastal processes and retains maximum beach width.
- Planting should be undertaken in conjunction with the revetment using low lying saline tolerant native coastal species as the root mass will help improve soil stability, and the vegetation will help to mitigate visual effects.



Photo 3 & 4: Examples of a backstop protection landward of the beach (above MHWS).

4.2.4 Planting

- Planting will not provide structural stability however it will help to increase the root mass which will contribute to improved soil stability and protection of the ground surface from weathering.
- Planting will also enhance the landscape amenity of the coastal environment. Saline tolerant species should be used and some replacement planting will likely be required in the harsh coastal zone. A list of appropriate native coastal plants is provided in Appendix Five of these guidelines.
- To assist plant survival adequate site preparation should be undertaken to add compost/peat to build up soil and avoid over compacting the area.
- Planting should be undertaken in the 'planting season' from April to August, and planting should be undertaken at close centres in conjunction with weed control and the provision of accessways.
- The maintenance of coastal views is an important issue for many coastal property owners. Franklin District Council can provide guidance on suitable methods for trimming large trees such as pohutukawa to ensure the health of the trees are not compromised, and FDC will trim trees on esplanade reserve.



Bradley's walkway, Crispe Road

Photo 5: Example of native coastal planting and geotextile revetment with some temporary rock toe support. Geotextile revetments will not provide structural stability but can help to manage erosion by improving slope stability.

4.2.5 Beach nourishment

Sediment used for nourishment must have a similar or coarser texture. Beach nourishment is an option that will increase the beach width to provide a buffer to erosion. After placement sediment will initially be redistributed by natural processes until beach slope reaches dynamic equilibrium. Like other erosion management options nourishment will have limited life and the beach will likely need renourishment to maintain the beach width. The advantage of beach nourishment is that the beach is retained.

The sand banks in the Manukau Harbour may be a potential source of sand for beach nourishment. FDC and ARC plan to investigate beach nourishment of a number of beaches on the Manukau Harbour.

5.0 APPLYING FOR A COASTAL PERMIT

All resource consents are required to be obtained before any construction work starts. A coastal permit application form is attached in the appendices along with standard information which may be submitted in support of your application. Additional detail should be filled in the spaces indicated in the standard report to confirm the selected erosion management option, site details, construction method and mitigation methods.

Applicant's are required to cover the actual costs incurred by the ARC during the processing of any resource consent application. The deposit fee for a non-notified coastal permit application has been set at \$1,000 in the 2003/03 ARC Schedule of Fees. The ARC has determined that the actual processing costs will be lower for a coastal permit application for erosion management works at Clarks Beach that is consistent with the options identified in Section 4.1 of the Clarks Beach Erosion Management Guidelines. The deposit fee has been reduced to \$500 from which the actual processing costs will be charged.

It is also important to be aware that the ARC charges consent holders an annual fee under Section 36 of the RMA. The annual fee charge is set each year by the ARC in the Schedule of Administrative Charges and is used to cover the costs incurred by the ARC for administering and monitoring the consent, and contributes to a proportion of the costs of some of the projects that the ARC undertakes that are of benefit to, or occasioned by, the activities of consent holders. More detailed information regarding Annual Fees is included in Appendix 6.

6.0 ADDRESSING UNLAWFUL STRUCTURES

All structures which are located in the CMA require a coastal permit from the ARC. Structures located on FDC reserve require approval from FDC as the landowner.

This plan provides a tool for property owners to identify whether, if there are erosion management structures constructed adjacent to their properties, those methods are considered appropriate by the relevant agencies. The guidelines help to ensure that erosion management options are properly designed and effective, consistent and that they minimise impacts on public access and visual amenity.

Consent must be obtained for structures that are located in the CMA if property owners wish to retain them. Alternatively the structures must be removed. Unlawful structures (including rubble, power poles, garden rubbish etc.) which do not fit the potential methods for managing coastal erosion identified in these guidelines are required to be removed from the CMA.

It is anticipated that the guidelines will assist the Councils and community to plan and implement the gradual removal, repair or replacement of the less appropriate unlawful structures. This will contribute to the long term vision for Clarks Beach and Waiau Beach by ensuring the coastline is consistently managed, and it will enhance the visual and recreational amenity of the beach.

PART TWO

7.0 SITE DESCRIPTION AND PHYSICAL CONSTRAINTS

7.1 Geology

The predominant material forming the cliffs at Clarks Beach are andesitic breccias of the Waitakere Group. These materials are weakly cemented and are prone to slow erosion, giving rise to near vertical cliffs with small basal niches. Overlying the andesitic breccias are siltstones, mudstones and consolidated peats of Pleistocene Kaihu Group. This strata is faulted and dips, and is folded in limited lengths. These materials tend to soften on wetting and weather to soft clayey soils which are easily eroded (Tonkin & Taylor Ltd, 1992).

7.2 Ecology

The Proposed Regional Plan Coastal, identifies the coast between Clarks Beach and Karaka Point as a Coastal Protection Area 2 because the intertidal banks and shell banks are an excellent feeding ground for many thousands of international migratory and New Zealand endemic wading birds including a number of threatened species. The Department of Conservation has identified the Manukau Harbour and the roosting sites in the vicinity of Clarks Beach as an Area of Significant Conservation value (ASCV). The intertidal flats support the greatest diversity and abundance of intertidal sand flat organisms in the Manukau Harbour, and there are important areas of saltmarsh along the northern shore of Seagrove Peninsula (ARC, 1999).

Spartina (a weed) has colonised and changed areas of Clarks Beach/Seagrove foreshore. Spartina is listed as a Total Control Plant in the Auckland Regional Pest Management Strategy and is banned from propagation and distribution. The ARC is responsible for controlling Spartina in the Manukau Harbour, and eradication will be undertaken in the near future.

7.3 Coastal processes

7.3.1 Tides

Manukau Harbour is a shallow enclosed estuary on the west coast of the North Island. Tides in the harbour are semi-diurnal, with a mean spring tidal range of 3.4m at Onehunga Wharf and a neap tide range of about 2m. The large tidal range exposes extensive areas of intertidal flats at low tide (Hume, 1980; Bell, 1998).

7.3.2 Currents

Currents are generated by both tides and waves. Currents over the intertidal flats are driven by wind generated waves and are much slower than tidal currents caused by the ebb (outgoing) and flood (incoming) tide. The tidal current is strong in the Waiuku Channel where the tidal prism is restricted between Te Toro and Clarks Beach (Bell, 1998). Benson (1993) recorded a weak longshore current to the west at high water.

7.3.3 Wind

Prevailing surface wind directions are from the south-west (average 26% of a year), north to north-east (24%) and west (10%), whereas it is calm for 13% of the time. Sustained winds $>15 \text{ m s}^{-1}$ are seldom experienced (0.2%), usually associated with cold, unstable south-west airstreams (Bell, 1998).

7.3.4 Waves

Waves in the Manukau Harbour are wind generated (except at the harbour entrance) and their nature depends on wind speed and duration, and the fetch (the distance over which the wind blows). Wave climate in Manukau Harbour is characterized by short period steep waves that are strongly fetch limited, and are modified by refraction and shoaling in shallow waters (Hume, 1980). At Clarks Beach locally generated wave action is from the N and NE, with a maximum fetch of approximately 23km to the north and 17km to the northeast. The beach is sheltered from wave action from other directions, including the predominant SW winds, and is only exposed to wave action at high tide. Waiuku Beach is exposed to the prevailing south-westerly conditions however fetch for wave generation is restricted across the Waiuku River.

Few wave measurement projects have been carried out in the area. Hume (1980) undertook some investigation for the then proposed Waiau Pa thermal power station. Instruments were set out on Poutawa Bank, a large sandy intertidal bank 1.5m above chart datum approximately 2 km NE of Clarks Beach. The highest waves were recorded after high tide when water depth is greatest and when the wind had been blowing for long duration. The largest waves were from the northern to eastern quadrant, and to a lesser extent from the northern to western quadrant. In a 30 knot ENE wind, extreme waves of Hs 0.71m and Tz 2.8s were recorded.

Benson (1993) deployed instruments on the intertidal flats at Clarks Beach as part of a study on the effects of seawalls on beaches. Wave heights recorded during 5-7m/s winds from NE to N were 0.3-0.55m Hs with wave period of 2-3s.

7.4 Sediment movement and the beach system

Beach sediment at Clarks Beach is comprised of poorly to very poorly sorted medium to coarse sand, which is negatively skewed by the abundance of coarse material (predominantly shell material). The sediment becomes finer with increasing water depth and distance offshore (Benson, 1993). There is a narrow high tide beach and a thin veneer of beach sized sediment over the intertidal flats. The beach system appears to have relatively few sediment sources, predominantly from the erosion of cliffs, biogenic (shell) material and onshore movement of sand from the large sandbank offshore.

Sediment is picked up by waves travelling over the intertidal flats and beaches, and is moved by wind wave generated currents. Sand level on the beach changes in response to different wind and wave conditions. Sand levels may build up or drop off over different time scales. This fluctuation in sand level is a natural beach process. At Clarks Beach the upper beach is sheltered from prevailing south-westerly winds, however the intertidal flats are less sheltered and are exposed to waves from the southwest to north east. Prevailing wind and wave conditions determine circulation patterns which move sand banks on the intertidal flats. Local people have observed the sand banks on the outer intertidal flats to move towards the east under persistent south-westerly winds.

Beach sand appears to have accumulated on the eastern side of obstacles such as rocky outcrops, headlands and structures (such as groynes and ramps) that have been placed on the foreshore. The accumulation of sand on the eastern side of headlands is more obvious at Bradleys Beach and Halls Beach where the beach is much wider. This is an indication that the long term net movement of sand along the upper beach is transported in a westerly direction by wind waves from the north east which has the greatest fetch. There is no information on the volume of sediment that is transported along the coastline, however it is not likely to be large volumes.

7.5 Human changes

7.5.1 Historical development

The settlement at Clarks Beach has grown considerably with development over the last 50 years. Rural properties and baches are now mainly occupied by permanent residents. Owners of properties on the coastal margin have erected various coastal structures to protect land from coastal erosion.

The main subdivision of Clarks Beach took place in a number of stages during the 1970s. Most building consents were granted with a 60m setback from MHWS. However the Franklin County Scheme of the time did make allowance for offering some dispensations to allow building 30m from MHWS.

Photographs from the late 1930s show baches at Halls Beach were constructed on the upper beach backshore area. Early holiday makers built their baches amongst manuka scrub, and a low vegetated dune extended along the back of the beach. Sand being blown or trampled into baches was a 'problem' and low walls were erected as a barrier to keep the sand on the lower beach.

Long time residents have recalled that sand was extracted from Clarks Beach around the 1920s. Sand was taken from the area behind red rock. Barges were landed at the beach and loaded by hand from wheelbarrows, and then transported to Onehunga and also used for construction of Kingseat Hospital. People with a long association with Clarks Beach can recall dunes behind the beach, and the intertidal area had a greater veneer of sandy sediment and was the venue for many beach cricket matches.

7.5.2 Existing structures

Seawalls have been constructed at Clarks Beach and Waiau Beach from a variety of materials including timber, rock rip rap, concrete pipes and pylons, concrete blocks, wooden posts, tyres and other debris. The majority of the coastal structures have been constructed without the required permits and due to design and construction faults many have failed to manage the erosion and/or have lost their structural integrity.

The majority of unlawful seawalls have been poorly designed and constructed, and have not been maintained. Many seawalls have been back-filled with a range of materials including rubble and garden refuse, that has consequently been distributed across the beach by wave action. The beach in front of many seawalls has lowered and long term erosion has continued at the end of existing seawalls. Many structures impact on the visual and recreational amenity of the beach because of the construction materials used, the alignment of the structures, and the piecemeal appearance of the coastline where different styles of seawall have been used at adjacent properties.

FDC Stormwater Engineers have recently carried out works to upgrade the stormwater system at Clarks Beach. The level of subdivision that has occurred has resulted in a considerable increase in the area of impervious surfaces. This increase, particularly in roof and paved areas has resulted in a larger amount of collected stormwater. Works have been carried out along Torkar Road to channel the water from properties onto the road and into the adjoining pipe network. The water is discharged at a number of points along the beach. Some works have been undertaken to dissipate the energy of the stormwater when it reaches the beach system to prevent it from adding to the erosion problem.

Many private properties have installed 'elephant trunks' or nova coil drainage pipes down the face of cliffs and banks. Stormwater discharges at these locations can exacerbate coastal erosion by increasing weathering and wetting and drying of the weak cliff materials and channeling of stormwater discharges. Further consideration needs to be given to stormwater to determine the best management options.

8.0 SHORELINE CHANGE

8.1 Methods to assess shoreline change

Measurements of natural shoreline movement is hampered by the fact that much of the Clarks Beach shoreline has been amoured with seawalls, which mask any natural movements in the shoreline position that may have taken place.

Community information - Property owners including many people who have had a long association with the beach, and the community have been actively concerned with coastal erosion for many years. Very useful information and observations has been obtained from members of the local community including old photographs, and anecdotal information on past erosion and shoreline change. This information was collected via questionnaire forms sent to all residents, and several meetings in October 2002 and February 2003 with local residents who brought along historical photos to help document changes at the beach. In some instances, members of the community were able to describe the location of the shoreline from its proximity to old fences/buildings or trees located on properties or in historical photos, enabling an assessment of shoreline change to the present day in those areas. Some residents with long association with Clarks Beach were able to recall that barges were landed at Clarks Beach for sand extraction.

Aerial photographs - Aerial photographs taken in 1942, 1977 and 2002 were compared to assess shoreline change according to the methodology described in ARC (2003). The photos selected represent the range and a mid-point of the available aerial photos.

Survey information - Some survey information from property titles was used to determine the historic position of MHWS in relation to cadastral boundaries. These surveys were compared with the present position of MHWS determined by field measurements. Five beach profile lines have been established by ARC and surveyed on 26 September 2003. Future profiles can be taken from the newly established reference datum for comparison.

Field observations - indicators of erosion include slips and debris at the base of cliffs, steep faced cliffs, leaning trees, undercutting of banks, erosion scarps along backshore, exposure of foundations of existing structures.

Other information - Other work included compilation of information from council files and previous reports such as Tonkin & Taylor Limited (1992) Geotechnical Study of sea frontage at Clarks Beach.

9.0 STATUTORY REQUIREMENTS

9.1 Agencies involved

The ARC has a regulatory and advisory role in coastal erosion management, and is responsible for the environmental management of works in the CMA. It does this under Section 12 of the RMA and through the rules and policies contained in the Proposed Regional Plan:Coastal.

Most of the reserve land on the Clarks Beach coastline administered by FDC is classified as Esplanade Reserve. The Reserves Act 1977 sets out the purpose and objectives for the management of esplanade reserves as being:

- Maintain or enhance the natural functioning of the adjacent sea, river or lake
- Maintain or enhance aquatic habitats
- Protect associated natural habitats
- Mitigate natural hazards
- Enable the public access to or along any sea, river or lake

FDC have responsibilities both as a landowner of coastal reserves, and for environmental management of any development undertaken above MHWS through the District Plan. The ARC has transferred responsibility for administering the Building Act in the CMA to FDC.

9.2 Landowner responsibility

Landowners have responsibility for ensuring that their activities are consistent with RMA and other statutory documents such as the Coastal Plan and District Plan. In some cases, property titles may extend below MHWS and the property boundary may be located in the CMA. In this case the provisions of the Coastal plan apply to any works in the CMA which are still subject to requirements of s12 of RMA.

Coastal erosion management is the responsibility of individual property owners. There is no over-riding right to construct coastline armouring devices, nor any presumption in favour of such management options over any others. Any proposed coastal erosion management works must obtain all the necessary resource consents and building consents as applicable.

Common law property rights pertaining to use of land, including the right to protect property from the sea, are subject to the purposes and principles of the RMA and where such rights are inconsistent with the Act they are no longer applicable.

9.3 Statutory documents

9.3.1 Introduction

The Resource Management Act 1991 (RMA), New Zealand Coastal Policy Statement (NZCPS), Auckland Regional Policy Statement (ARPS) and the Proposed Regional Plan: Coastal (PRP:C) contain the statutory, regulatory, and planning framework for the management of the coastal environment. Planning documents promote the sustainable management of the coastal environment. The policy direction is generally toward protecting natural character and coastal processes and beach amenity values from inappropriate development, and away from the use of engineering works for coastal protection. When there is a coastal hazard some erosion management works may be required and it is necessary to determine what type of management option is appropriate and to balance this with the protection and preservation of certain values of the coastal environment (such as natural character, natural heritage and public access, maintaining natural coastal processes) while allowing for people to provide for their social, cultural and economic well being.

9.3.2 Auckland Regional Council

The Auckland Regional Council is responsible for the environmental management of activities undertaken in the coastal marine area (CMA), which is the area below MHWS. Any work in the CMA requires consent under to

Section 12 of RMA from ARC unless authorised by a rule in a coastal plan. Consent is required under Section 12(1) to disturb the seabed, and under Sections 12(2) & 12(3) to occupy and use the CMA. The ARC has prepared the Proposed Regional Plan: Coastal which contains objectives, policies and rules in relation to use of the CMA. Policies of the coastal plan state that proposals for coastal protection structures must demonstrate that the adjoining landward area or development is at risk from a coastal hazard, that doing nothing or relocating landwards are not practicable options, that the proposed structure is the most appropriate method having regard to non-structural options (policy 12.4.10). Structures should also be designed taking into relevant dynamic coastal processes and possible sea level rise (policy 12.4.12).

Policies 21.4.3 and 21.4.4 direct that non-structural methods of erosion management should be used and that natural features such as beaches which buffer coastal hazards should be protected. Further development should be avoided in coastal hazard areas so that future coastal protection measures are not required (Policies 21.4.1 and 21.4.2).

Proposals for coastal erosion management structures at Clarks Beach and Waiau Beach will fall as a discretionary activity under Rule 12.5.16 of the coastal plan. The disturbance to the seabed during construction and any discharges to water during construction will fall as a permitted activities under Rules 16.5.7 and 20.5.4 as vehicle movement over the beach will be remedied by natural processes within 7 days, and no contaminants will be discharged.

9.3.3 Franklin District Plan

Franklin District Council is responsible for managing the effects on the environment of land use above MHWS. The Franklin District Plan addresses a number of issues such as earthworks and building setbacks near the coast, and sets out a number of mechanisms to ensure that the effects of coastal erosion are mitigated. Such mechanisms include the establishment of coastal protection yards in rural areas and development set backs in urban areas. Any development within the coastal protection yard or the development setback area may require resource consent from the District Council, in addition to any building consent required. It is recommended that prior to undertaking such development(s) discussions should be held with Franklin District Council planning staff.

The Building Act 1991 places certain requirements on the erection of new structures where there may be effects from natural hazards such as coastal erosion. Case law has established that the District Plan can impose tougher requirements than those spelt out in the New Zealand Building Code. Any building structure, disturbance or excavation located above MHWS may be required to obtain a resource and/or building consent from Franklin District Council. A building consent will be required from Franklin District Council for any seawall construction and for retaining walls higher than one metre. In addition to this rule, any structure that carries a load needs to be engineered and also requires a building consent. Note if any building structure, disturbance or excavation works are undertaken within the esplanade reserve, Franklin District Council permission and/or consent is required. Building consent application forms can be found in Appendix Two of these guidelines.

10.0 COMMUNITY ACTION

The community can be actively involved in proactive coastal management practices such as the following:

- Monitoring: This could comprise 'Walkovers' noting the general condition of the coastline, beaches and structures, any changes in profile or major changes to structures with photos from comparative points. This will help to evaluate existing structures, record performance in storm events and assess any damage, plan maintenance schedule future works and improve design for future work.
- Planting on council reserves and private land. A community nursery could be established, perhaps with the local school and the Residents and Ratepayers Association. Plant lists are attached in Part Three.
- Beach clean ups – e.g. litter, garden waste, debris and unlawful structures
- Other local issues – e.g. accessways, shellfish resources
- The ARC has an Environmental Initiatives Fund (EIF) that community groups or individuals can apply to for funding for projects such as planting to restore natural habitats and esplanade reserves. Additional information on the EIF is available on the ARC website www.arc.govt.nz.
- Weed management – e.g. ARC Community Initiatives Programme

11.0 CONSULTATION

FDC parks officer has spoken to Dennis Ngataki (Ngati Tamaho) and Karl Flavell (Ngati Te Ata) and advised them of the guidelines that FDC, ARC and the local R&R are working on. A site visit will be arranged after they have been provided with a draft of the plan.

The Department of Conservation have also been consulted in relation to these coastal erosion guidelines and are supportive of the joint initiative of the Councils and community to address coastal erosion management in a consistent and sustainable manner.

12.0 SUMMARY

This report has discussed shoreline changes at Clarks Beach and Waiiau Beach, and in the context of the site (residential development, high recreational amenity, natural character and public access) several coastal erosion management methods have been identified that fit with the long term vision for the coastline and are suitable in terms of the relevant statutory documents. The coastal environment at Seagrove has been identified as having a lower hazard risk from coastal erosion and the area is less intensively developed. Structural methods of coastal erosion management along this stretch of coastline are not considered appropriate and are contrary to many of the policies and objectives of the relevant statutory documents.

Resource consent is required prior to undertaking construction of any of the potential erosion management options identified in the plan. The information contained in this plan will assist in the resource consent process. All resource consents are required to be obtained before any construction work starts.

There are many initiatives that the community could be involved with to enhance and restore the values of the coastal environment at Clarks Beach and Waiiau Beach. The ARC and FDC work in partnership with many communities to help them achieve their vision for the coastal environment, and are supportive of any proactive coastal management practices that the local community would like to be involved with e.g. weed control, planting, beach clean ups, removal of ineffective structures.

REFERENCES

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PART THREE

APPENDICES

- I ARC Coastal permit application form
- II FDC Building consent application form
- III Additional information and standard assessment of environmental effects to assist in the preparation of individual coastal permit applications
- IV Design plans
 - timber seawall
 - Grouted rock seawall
 - Sloping backstop revetment
- V Native plant species list
- VI Annual fees charged under Section 36 RMA by ARC

APPENDIX ONE: ARC COASTAL PERMIT APPLICATION FORM

APPENDIX TWO: FDC BUILDING PERMIT APPLICATION FORM

3 Assessment of Effects on Environment

3.1 Natural character & landscape values

The rural coastal landscape of Clarks Beach has been modified by residential development and the natural character has largely been compromised. By comparison the coastal environment of Seagrove peninsula still retains a degree of natural character as the area has been less intensively developed and has retained its rural character.

Structures have the potential to adversely effect the natural character of the area if they are clearly visible from a distance, contrast with the existing landform and use materials unrelated to the site. The visual amenity of the area will be improved if the material used to construct the erosion protection matches natural materials of coast, and if the profile and alignment blend in with the natural contour of the coastline. Visual 'chaos' from a mixture of materials and designs along the beach will be avoided as erosion protection has been designed to be consistent with structures at adjacent properties.

Removing construction debris and any unnecessary structures including broken and poorly maintained structures and garden debris will also improve the visual amenity of the area and contribute to the restoration of some of the natural character values. Planting with native coastal species will also enhance and restore natural character and improve landscape amenity.

3.2 Natural features and ecosystems

The coastal marine area at Clarks Beach and Seagrove is an important habitat for birdlife, and there are also highly valued shellfish beds on the intertidal flats. Sand movement and weathering of coastal cliffs is a natural process and it is important to ensure that any erosion protection method does not modify coastal processes to result in shoreline changes at adjacent properties. Inadequately toed, tied back or keyed structures may be undermined or outflanked and long term erosion may continue along adjacent unprotected sections of coast which can result in piecemeal scalloped coastline. Sloping structures such as revetments reflect less wave energy than vertical seawalls, and generally beach levels are lowered more in front of vertical seawalls than in front of natural unprotected sections of coast

Access to the site will mainly be from the adjacent land, however where any machinery will be required to operate on the foreshore care will be taken to ensure that any effects due to vehicle movement which could include crushing of organisms and their habitat and disturbance of bird species will be minimised by controlling the extent of vehicle movement to a corridor no more than 15m wide. Work will be undertaken at low tide and no construction materials will be stored in the coastal marine area to avoid sediment discharge and discolouration of the water. Where concrete is required as part of the construction a fast curing agent will be added and any machinery will be operated to ensure that there is no refueling or oil leaks.

Planting will be undertaken to restore native coastal vegetation which has largely been removed from the coastline, and to avoid removing more vegetation and disrupting bird life. Planting will be undertaken considering the preservation of views and to provide areas where shade may be required in the future.

3.3 Cultural Heritage

Coastal sites were popular areas of Maori settlement, and many midden are exposed at coastal sites. Tangata whenua have been consulted, and permission is required from the NZ Historic Places Trust before disturbing any archaeological site, this includes planting into midden.

In general the area is considered to be a high priority for new archaeological survey and assessment based on the probability of cultural heritage sites being present and the low level of existing survey information on the area. There are several sites recorded in the ARC Cultural Heritage Inventory east of Clarks Beach along the Seagrove Peninsula. These sites are not considered to be threatened because the erosion management plan has identified that 'hard' structural erosion protection along this section of coast is inappropriate. In any event, if archaeological remains are discovered during any works in the coastal marine area works will cease and the ARC archaeologist will be contacted to ensure that this information is recorded.

3.4 Public access and amenity values

Public access for pedestrians to the beach is currently available via several established walkways over FDC reserve. In places public access along the beach is restricted at high tide because there is no exposed sandy beach, either naturally in front of steep cliffs or due to the construction of seawalls and in some cases fences.

In order to ensure that public access along the coastal marine area is not obstructed, the erosion protection will be designed to ensure that the minimum footprint of beach area is occupied, and where vertical walls are required these will be sited as far landward as possible to minimise loss of beach area. Where appropriate, pedestrian access steps (or similar) will be incorporated into the works.

The beach is highly valued to the local community for recreation. To ensure safety of beach users and minimise disruption to beach users the construction work will be undertaken to avoid periods when the beach is heavily used by recreational users. To improve access along the beach existing structures which obstruct public access which are not required will be removed from the coastal marine area.

3.5 Mitigation methods

Tick where appropriate	Proposed mitigation
	Erosion protection structure has been designed to have the minimum footprint, blend in with natural coastal materials and alignment of the coastline.
	Erosion protection designed to be consistent with neighbouring property.
	Vehicle movement will be restricted to an area no more than 15m wide from the shoreline to avoid damaging shellfish, disturbing wildlife and reducing visual damage.
	Work will be undertaken at low tide i.e. when the sea is clear of the area to be disturbed, and generally after an outgoing tide.
	Timing of work will be undertaken to avoid popular recreational use of the beach.
	Unconsented structures which are not recognised as appropriate in the erosion management plan (including rubble, tyres, poorly maintained structures etc.) will be removed from the coastal marine area to improve visual amenity and to remove obstructions to pedestrians.
	Any material or litter (including garden waste) on the foreshore that is not natural sediment shall be removed from the foreshore and disposed of in an inappropriate matter.
	In the event of inadvertent disturbance of taonga or other archaeological artifacts, work will stop and the appropriate interest groups will be contacted for direction.
	Coastal planting will be undertaken to enhance visual amenity and help to restore natural character.
	Steps will be provided to enhance public access to and along the CMA (if appropriate).

4 Consultation

The local community have been involved with developing the erosion management plan. Ngaati te Ata and Ngati Tamaoho Environment have been consulted in relation to the plan and have advised that they have no concerns regarding the proposed coastal protection methods. The Department of Conservation have advised the ARC that they have no concerns with erosion management options detailed in the erosion management plan. It is considered that there are no other parties who will be adversely affected by the proposal.

5 Summary

The proposed activity is to undertake coastal protection to manage erosion at the site. The activity will have no more than a minor adverse effect on the environment with the proposed mitigation methods. The proposal is consistent with the provisions of the NZCPS, RPS, TRCP and PRP:C.

APPENDIX FOUR: STANDARD DESIGN PLANS

APPENDIX FIVE: COASTAL PLANTING GUIDELINES

APPENDIX SIX: ANNUAL FEES CHARGED UNDER SECTION 36 RMA BY THE ARC

Under Section 36 of the Resource Management Act 1991 the ARC can fix charges payable by consent holders for some of the ARC's resource management functions and activities. Each year the ARC considers the distribution of these costs to a consent holder determined through an assessment to which the environmental programmes benefit or are occasioned by consent holders as opposed to the regional community as a whole. The Annual Fee to consent holders is comprised of:

- 1) Administration, Monitoring and Supervision charges; and
- 2) Functions, Powers and Duties charges.

The Schedule of Administrative Charges is prepared each year, and notified for public submission. Consent holders are invited to make a submission on the proposed charges, and the amount proposed to be paid by them as individual consent holders. The following information has been extracted from the 2004/05 Schedule of Administrative Charges. A full copy of the schedule can be obtained from Enviroline (90) 366 2000.

The Administrative charge covers the full and reasonable costs of maintaining the consents database and related records, responding to enquiries about consents, and other related costs. For 2004/05 this has been set at \$65 per consent.

The Monitoring and Supervision Charge covers the cost of monitoring inspections, reporting and administration associated with ensuring consented activities are carried out in compliance with the conditions of consent. All structures in the coastal marine area are visited and inspected for compliance with the conditions of the coastal permit once every five years. The average time taken for the site visit, reporting, correspondence, travel time, managing the consent database, disbursements and staff costs and follow up action including correspondence, has been calculated to be 2.5 hours per consent. For 2004/05 this equates to \$64 per consent, which is the actual estimated cost incurred to the ARC for monitoring of coastal permits for structures.

The Functions, Powers and Duties component of the annual fee covers the consent holders contribution to the ARC's state of the environment monitoring programmes, environmental research and investigations, and educational and advisory programmes which are either of direct benefit to consent holders, or are undertaken by the ARC because of the activities of consent holders, as opposed to regional ratepayers. For 2004/05 the FPD component of the annual charge for seawalls and associated steps at Clarks Beach will be waived.

The ARC has recognized that it is necessary to review the Functions, Powers and Duties component of the Annual Fee for the 2005/06 financial year.