

Coastal Erosion Risk Mitigation Strategy For The Waikato Region



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Executive Summary

Introduction

This report outlines the risk mitigation strategy for coastal erosion in the Waikato Region. A draft version was reported to Council in July 1997 and has been further discussed with coastal district councils and others prior to finalising.

Purpose of the Strategy

The primary purpose of the strategy is to help promote a consistent, well integrated and sustainable approach to the management of coastal erosion in the Waikato Region in accordance with the purpose and principles of the Resource Management Act and the policies and objectives of the New Zealand Coastal Policy Statement (NZCPS), and the (proposed) Regional Policy Statement (RPS).

A draft, prioritised implementation plan is also proposed.

Relevant Responsibilities for the Management of Coastal Erosion

The strategy adopts the division of responsibilities proposed in the Regional Policy Statement (RPS) for the management of natural hazards. Namely, that territorial authorities have primary responsibility for the control of the use of land for the avoidance and mitigation of coastal erosion, except for the coastal marine area where Environment Waikato has primary responsibility. Environment Waikato has responsibility for ensuring Regional consistency in the management of coastal erosion.

However, in line with the proposed Regional Coastal Plan (RCP), the strategy also proposes a partnership approach for a number of activities. These include hazard assessment, dune management (through the Beachcare programme), site specific hazard management strategies, targeted education and information campaigns, and monitoring and review.

Outline of Proposed Strategy

The proposed strategy consists of 4 major elements:

Element 1 - Central Focus of Strategy

The central focus of the strategy is to develop a pattern of land use and development that enables coastal communities to live with coastal erosion and minimises the need to modify natural coastal processes. This entails a level of risk that can be appropriately lived with, not necessarily the absence of risk.

It is proposed that this be achieved by a Region-wide strategy that focuses on:

- avoiding and reducing risk - to be achieved by identifying and appropriately managing hazard areas and by protecting and enhancing natural coastal systems (such as dunes) that provide hazard protection;
- encouraging coastal communities to accept and live with coastal erosion - where this is practical and appropriate; *and*,
- emphasising public information and advice and working in partnership with coastal communities and affected stakeholders.

Element 2 - Site Specific Hazard Management Strategies

At some locations, the complexity of existing and potential hazard problems will require site specific management strategies.

It is proposed that these be developed using a multi-stakeholder partnership approach, involving Environment Waikato, the local district council and other relevant stakeholders (typically affected property owners, beach users, local communities and the Department of Conservation). This approach, consistent with the proposed RCP, has proved successful in pilot studies to date - most notably at Whiritoa Beach.

There are several difficult problem sites in the Region and prioritisation is required to adequately address these issues. Urgent action is required at Buffalo Beach, Raglan, Aotea and Mokau and it is proposed these be initial priorities.

Other high priority sites are Cook's Beach, Hahei, Koputauaki Bay, Thames Coast Highway, Kawhia and Marokopa.

Element 3 - Coastal Structures

Managing risk by shoreline modification will be minimised under the proposed strategy, particularly the use of shoreline armouring structures. Again, this is consistent with policy directions in the NZCPS and the proposed RCP.

This will require continued emphasis on advocacy and assistance with the development of alternative approaches. Useful progress has been made in the latter area in trials over the last two to three years.

However, it is recognised that there will also be some sites where there are no reasonable alternatives to shoreline armouring, particularly in the short to medium term. Therefore, it is proposed that guidelines be developed for the consenting and use of these structures. Initial guidelines are included in the risk mitigation strategy.

Element 4 - Monitoring and Investigations

A cost-effective, monitoring strategy is required to ensure that the effectiveness of the strategy is monitored and reviewed. Appropriate applied research should also be encouraged to help improve the assessment and management of coastal erosion.

Implementation

Implementation of the strategy is critical to effectiveness and has been emphasised by coastal district councils and communities.

An implementation strategy is planned which envisages the development and implementation of the strategy over three years - with all elements of the strategy operational by June 30, 2002.

Contents

Executive Summary	i
Introduction	i
Purpose of the Strategy	i
Relevant Responsibilities for the Management of Coastal Erosion	i
Outline of Proposed Strategy	i
Element 1 - Central Focus of Strategy	i
Element 2 - Site Specific Hazard Management Strategies	ii
Element 3 - Coastal Structures	ii
Element 4 - Monitoring and Investigations	ii
Implementation	ii
Contents	iii
1 Introduction	1
2 Structure of this Document	1
3 The Issue of Coastal Erosion Hazard	1
4 Statutory Considerations	2
4.1 Statutory Framework	2
4.2 Statutory Responsibilities for the Management of Coastal Erosion Hazard	4
5 Purpose of the Strategy	5
6 Management Options	5
6.1 Managing Land Use and Development	6
6.1.1 Undeveloped Areas	6
6.1.2 Existing Development in Areas of High Hazard	7
6.2 Protect and Enhance Natural Systems which Buffer Coastal Erosion	7
6.2.1 Dune Management	7
6.2.2 Beach and Dune Nourishment	8
6.3 Living with Coastal Erosion	10
6.4 Modify Natural Coastal Processes and Landforms	11
7 Proposed Risk Mitigation Strategy	12
7.1 Introduction	12
7.2 Outline of Proposed Management Strategy	13
7.2.1 Element 1 - Central Focus	13
7.2.2 Element 2 - Site Specific Hazard Management Strategies	13
7.2.3 Element 3- Coastal Structures	15
7.2.4 Element 4 - Monitoring and Further Investigations	16
8 Implementation Plan	16

1 Introduction

This document outlines the risk mitigation strategy for coastal erosion in the Waikato Region.

The strategy is based on the issue assessment report on coastal erosion hazard presented to the Environment Committee in October 1996. This latter report has also recently been expanded and will be issued as a technical report of Council in April/May 1999.

The strategy is based on Council experience at approximately 90 coastal erosion hazard problem sites over the last eight or nine years and extensive associated discussions with district council staff, community stake-holders and other parties. Best management practice from overseas has also been considered, including a recent study trip to the United States examining various aspects of coastal management including hazard management.

2 Structure of this Document

This document has the following structure:

- **Section 3** reviews coastal erosion hazard as a management issue in the Waikato Region;
- **Section 4** summarises relevant statutory responsibilities for the management of coastal erosion hazard, as defined by the proposed RPS;
- **Section 5** outlines the purpose and associated objectives of this strategy;
- **Section 6** reviews the various options for the management of coastal erosion;
- **Section 7** outlines the proposed risk mitigation strategy; and
- **Section 8** outlines a suggested implementation plan and identifies relevant responsibilities of the various agencies.

3 The Issue of Coastal Erosion Hazard

The 1996 and 1999 reports note that coastal erosion hazard raises widespread and significant management issues around the coast of the Waikato Region.

These management issues essentially relate both to:

- risk to development (including houses and roads), important cultural sites and residential property; *and*,
- environmental and other problems associated with inappropriate management of this hazard.

Actual or potential risk to residential property and development occurs at the vast majority (>80 percent) of coastal settlements in the Region, with serious existing problems at 21 settlements. Several roads are also subject to serious coastal erosion issues, particularly along the eastern and western margins of the Firth of Thames. Significant threat to important cultural sites also exists, including urupa at Koputauaki Bay and Mokau.

Most of the existing and potential coastal erosion hazard problems arise because of coastal subdivision and/or development having been undertaken too close to the sea. At most sites, there is no present trend for long term recession and erosion is primarily associated with dynamic natural shoreline fluctuations and changes. Subdivision and development has simply been undertaken without adequate set-back to accommodate these natural shoreline movements.

The report also noted that there was considerable potential for aggravation of existing problems by ongoing concentration of value in hazard areas and the potential impacts of changes likely to accompany predicted global warming.

For instance, calculations of aggravated erosion were made for the eastern Coromandel based on present "best estimates" of sea-level rise over the next century. These suggest that along the eastern Coromandel coast, sea-level rise alone could result in serious risk to existing property and development with a combined present value in excess of \$525 million. This compares to the present moderate to serious risk to residential property and development worth approximately \$150 million. Moreover, for the same area, there would be serious risk to nearly 570 existing dwellings compared to about 60 dwellings presently at risk along that coastline.

The management of coastal erosion hazard is also very complex with conflicts of interest related to the high public and private values which intersect along the coastal margin.

To date, the risk (or perceived risk) to development or private property has typically been managed by attempting to modify natural coastal processes and shoreline behaviour - particularly with the use of shoreline armouring devices. However, the assessment reports note that the structures frequently raise significant environmental concerns and other issues and they are unlikely to provide sustainable and appropriate medium to long-term solutions at many sites. An increased emphasis will be required on managing human aspirations and behaviour if coastal erosion is to be managed effectively while sustaining the natural and amenity values of coastlines.

4 Statutory Considerations

4.1 Statutory Framework

The management of natural hazards, including coastal erosion, is primarily conducted within the framework of the Resource Management Act 1991 (Figure 1). As such, the avoidance or mitigation of coastal erosion hazard must be undertaken in a manner that is consistent with the purpose and principles of the Act and with the policies and objectives of subsidiary documents, including the New Zealand Coastal Policy Statement (NZCPS) and the proposed Regional Policy Statement (RPS) and Regional Coastal Plan (RCP).

The Planning Framework

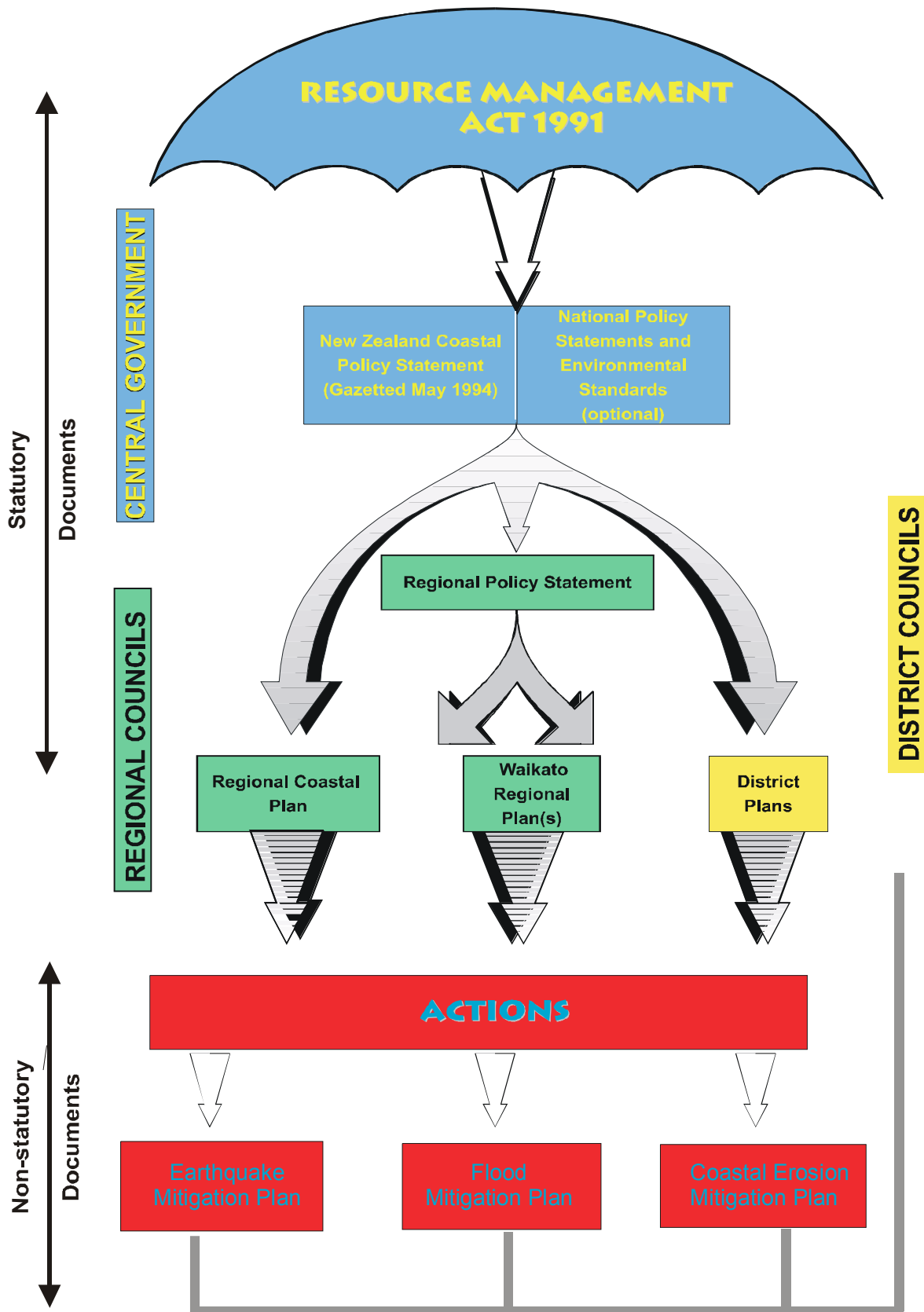


Figure 1: The Planning Framework of the Resource Management Act 1991.

Therefore, environmental matters are now integral to the management of coastal erosion hazard. These environmental management objectives include the preservation of the natural character of the coast and the maintenance and enhancement of public access to and along the coast and amenity values (RMA, Part II, Sections 6a, 6d, and 7c). The assessment reports identified these matters as environmental values that have frequently been significantly impacted by historic management of coastal erosion hazard.

Other relevant statutes include the Building Act 1991, the Civil Defence Act 1983, the Local Government Act 1974 and the Soil Conservation and Rivers Control Act 1941.

4.2 Statutory Responsibilities for the Management of Coastal Erosion Hazard

Under the Resource Management Act, the primary responsibility for the control of the use of land for the avoidance or mitigation of natural hazards rests with regional councils and territorial authorities.

However, the exact division of responsibility is not specified in the Act. Rather, section 62 (1) of the Resource Management Act (RMA) requires regional policy statements to clarify the relevant responsibilities of regional and territorial authorities in relation to the control of the use of land for the avoidance or mitigation of natural hazards.

Section 3.8.3 of the proposed RPS (as per Variation 1, August 1998) proposes that territorial authorities have the primary responsibility for the control of the use of land for the avoidance or mitigation of natural hazards - including the development of objectives, policies and rules relating to this function. In regard to the coast, this responsibility applies to all land except the coastal marine area (CMA) - where Environment Waikato has primary responsibility (in conjunction with the Minister of Conservation). The management regime for the CMA is set out in the proposed RCP.

Although the RPS is not yet operational, the above divisions of responsibility have met with broad agreement and are unlikely to change. The respective responsibilities, landward and seaward of mean high water springs, emphasise the need for integration and consistency. Under the proposed RPS, Environment Waikato has primary responsibility for ensuring that objectives, policies and rules relating to the control of the use of land for the avoidance or mitigation of natural hazards are consistent between Councils. As part of ensuring an integrated and consistent framework for hazard management, Environment Waikato has a lead role in the development of hazard specific mitigation plans and in collection, analysis, storage and communication of natural hazard information to territorial authorities.

Coastal territorial authorities also have responsibilities under the Building Act 1991, which contains specific provisions governing the issue of consents for the erection of buildings on "land .. subject to, or .. likely to be subject to, erosion ..". Under section 36(1) of the Act, a territorial authority is required to refuse to grant a building consent for a new building or major alteration on such land - unless they are satisfied that adequate provision has or will be made to protect the land or building. Environment Waikato has similar responsibility for all structures in the CMA.

The Department of Conservation also has responsibilities relevant to the management of coastal erosion, including its roles in monitoring the implementation of the New Zealand Coastal Policy Statement (NZCPS) and in the consenting of Restricted Coastal Activities. Various public utility operators who provide essential services (e.g. communications, electricity, gas, transport) also have a key role to play in planning to minimise damage and disruption to these services due to natural hazards.

5 Purpose of the Strategy

The primary purpose of the strategy, a non-statutory document, is to promote integrated and sustainable management of coastal erosion hazard within the Waikato Region - in accordance with the purpose and principles of the Resource Management Act (RMA) and the policies and objectives of the NZCPS and the proposed RPSⁱ and RCP.

In particular the strategy aims to help promote an approach to the management of coastal erosion hazard which will:

- ensure that adverse effects (including environmental effects) associated with coastal erosion hazard are minimised, in accordance with Objective 3.8.4 of the proposed RPS;
- promote a consistent approach to the management of coastal erosion hazard across the Region, in accordance with Policy 1, Section 3.8.3 of the proposed RPS;
- clarify the responsibilities of all relevant agencies for the management of coastal erosion hazard to minimise inefficiencies and/or duplication of functions, in accordance with Objective 3.8.3 of the proposed RPS;
- promote integrated management of coastal erosion hazard, in accordance with Objectives 2.2.2 and 3.5.6 of the proposed RPS;
- ensure that coastal communities and other stake-holders (e.g. the operators of public utilities) are adequately informed of management directions and responsibilities, in accordance with Objective 3.8.3 of the RPS;
- provide opportunities for effective and meaningful participation by coastal communities and other stake-holders in the management of coastal erosion; and,
- be practical and cost-effective.

6 Management Options

There are four basic options to avoid or mitigate coastal erosion hazard:

- manage land use and development in hazard risk areas;
- protect and enhance natural systems which buffer coastal erosion (e.g. beach and dune areas between subdivision and the sea);
- accept and live with coastal erosion; and/or,
- modify natural coastal processes and/or landforms.

The first three of these options involve a focus on human use and behaviour, while the fourth focuses on managing the nature and/or behaviour of the natural coastline.

These options are not mutually exclusive and a hazard management strategy for any particular locality may involve any one or a combination of these options.

The options are outlined further below.

6.1 Managing Land Use and Development

Most existing coastal erosion hazard problems in the Waikato Region result from locating subdivision and/or development too close to the sea to accommodate natural shoreline changes. Therefore, management of land use and development is generally required at most sites to effectively avoid or mitigate risk - either in isolation or in association with other management options.

Fundamental to this approach is the identification of areas of existing and potential hazard. Appropriate assessment of hazard requires good information, particularly on coastal processes, sediment sources and budgets, and the nature and pattern of historical shoreline changes. Also in regard to future changes which may affect coastal erosion hazard, such as predicted global warming. However, collectively, these are factors on which there is generally only limited information. As such, hazard assessment also inevitably draws heavily on experience and judgement. There is often considerable difference in the judgement of even experienced practitioners. Therefore, considerable care is required to ensure that precautionary but reasonable assessments are made and that Regional consistency is obtained as far as is practical and appropriate. These matters will require careful attention in the implementation of the risk mitigation strategy.

Most typically, management of land use and development is undertaken using various subdivision and development controls, particularly development setbacks and relocatability requirements. However, there are also a wide range of other measures which can be used to manage human use and development - including reserve takes, voluntary covenants, purchase of hazard risk areas, physical relocation of existing development and "planned retreat".

These measures have considerable flexibility and can be used variously to:

- avoid the creation of hazard problems in undeveloped areas;
- avoid or minimise the aggravation of existing hazard problems;
- reduce existing risk; and/or
- mitigate risk associated with conditional use of hazard areas.

As such, they offer considerable versatility in the management of hazard. For instance, they can be used in a variety of situations where different emphases are required - such as both developed and undeveloped areas, or areas of both high and low risk.

These measures can also facilitate the integration of coastal hazard management with other management objectives. e.g. Multiple objective development set-backs, providing not only for hazard protection but also for other objectives such as preservation of natural character, enhancement of public access and amenity values, and protection of cultural and archaeological sites.

Examples of potential application are briefly discussed in following paragraphs.

6.1.1 Undeveloped Areas

In undeveloped areas, risk avoidance can usually be readily achieved by the use of subdivision and development setbacks. The taking or acquisition of reserves is also important to ensure effective management of natural buffer zones and provide for a range of other coastal management objectives (e.g. public access and amenity).

6.1.2 Existing Development in Areas of High Hazard

Areas in which there is existing property and development at risk generally present the most complex hazard management problems. In these situations, there are typically no easy or cheap options for the relevant agencies and property owners. Site specific and staged strategies, involving the use of a number of management options, are generally required for practical and environmentally sustainable solutions.

Subdivision and development controls are inevitably an important element of such strategies. These measures are required to effectively prevent aggravation of the existing problems. The measures also reduce risk over time, by providing for re-development to be setback out of the hazard area (provided that there is an adequate buildable area further landward on the same section).

Effective management of existing natural buffers is also required at such sites

Other measures are also required where development such as roads or dwellings are at immediate risk. Typically used are measures that modify natural coastal behaviour, such as beach or dune nourishment, groynes or shoreline armouring. These can be useful and appropriate measures where their role is to “hold” the situation while the planning controls take effect.

There are also less frequently used and alternative approaches that can potentially be used in such situations, particularly relocation of threatened development and/or property purchase.

However, neither these or “holding measures” are without major difficulties. Considerable time and skill is required to design and implement practical and appropriate strategies involving planning and other measures. These strategies generally have to be staged over time. It is particularly important to involve all relevant parties in the design of such strategies to ensure an appropriate balance of interests and minimise conflict, while also promoting sustainable management. As a general rule, such strategies cannot be effectively designed by “experts” working in isolation from the communities of interest.

6.2 Protect and Enhance Natural Systems which Buffer Coastal Erosion

This management option incorporates a wide variety of approaches that are designed to:

- manage and protect existing natural coastal systems (e.g. dunes) which provide protection from coastal erosion; and/or
- enhance the natural buffering ability of these coastal systems (e.g. beach and dune nourishment)

Natural features such as beaches, dunes, mangroves, and salt-marsh wetlands provide the cheapest and most environmentally appropriate means of protecting subdivision and development against natural hazards. As such, the protection of these systems and their natural buffering ability is a fundamental and essential element in any effective strategy for the management of coastal erosion. High priority is given to this in national, regional and district planning documents (e.g. policies 3.4.2 and 3.4.3 in the NZCPS).

6.2.1 Dune Management

Many ocean beaches along the east and west coast of the Region are backed by sand dunes which provide effective natural protection from coastal hazards such as erosion. These dunes are also critically important to the natural and amenity values of the

beaches and frequently contain important cultural and archaeological sites. As such, protecting the sand reserves and the natural integrity and function of these coastal dunes is fundamental to sustainable coastal management - including hazard management.

This is especially so at developed beach sites, particularly along the east coast of the Region. At many of these sites, most of the dune sand reserves which have accumulated over the last 6000 years have been buried by coastal subdivision, leaving only narrow buffer zones between coastal settlements and the sea. Some of these buffer zones have already proved inadequate (e.g. parts of Buffalo and Cooks beaches) and many of the rest are potentially inadequate given the effects likely to accompany predicted global warming (Dahm, 1999). Once the protective dunes are lost or become inadequate, serious conflicts and complex problems develop - with simple or inexpensive solutions rarely available.

Available information also suggests that there is no longer any significant *net* sand supply to beaches along the eastern Coromandel - so that present dune and beach sand reserves can essentially be regarded as fixed and finite. This places extra emphasis on the need to protect existing dune sand reserves as effectively as possible.

As such, it is ultimately desirable to have effective dune management action at most east coast settlements in the Waikato Region - though initial work should focus on priority developed sites and/or badly degraded dune systems.

Effective dune management is essentially based on maintaining an adequate vegetation cover - particularly the native sand grasses on the dune face, which are critical to natural dune building and repair. This generally requires management of human use (particularly vehicle and pedestrian access over the dunes) as well as action to re-establish sand grass cover in areas where it has been damaged. If severe wind erosion damage has occurred, dune repair can also be a prerequisite to re-establishment of an appropriate vegetation cover. Community support is also essential to effective dune management.

Council initiated Beachcare, a pilot community-based dune management programme in January 1993 to address dune management issues - in partnership with local district councils. This programme, which now involves eight or nine coastal communities and has operated for six years, has proved to be an effective means of designing and implementing appropriate dune management action and increasing community support and awareness. The involvement of coastal communities has been capped at this level during the trial and development period.

6.2.2 Beach and Dune Nourishment

In some situations, it can be practical and appropriate to enhance the buffering ability of beach and/or dune systems by nourishment (i.e. adding sand to these systems). Beach and dune nourishment are now widely practised overseas (e.g. beach nourishment is the foremost tool used along the coast of the eastern United States in the management of coastal hazards). However, although there has also been an increasing number of examples in New Zealand in recent years, the practice is still relatively rare here.

A significant advantage of beach and dune nourishment is that this work generally has minimal adverse environmental effects - provided that appropriate sand (particularly, similar in size to existing beach sands) is available and can be obtained without undue consequences.

However, beach nourishment can be limited by the availability of suitable sand, the costs of obtaining and placing the sand, the dynamic nature of the beach environment (which can result in placed sand being quickly moved offshore or alongshore - necessitating frequent maintenance) and the volumes of sand that are often required to

usefully mitigate erosion hazard (particularly for ocean beach systems which generally extend some distance offshore and alongshore).

A further limitation of beach nourishment is that it is generally not a long-term solution - since the sand is gradually lost offshore and/or alongshore. (In very dynamic environments this loss can occur at such a rate that nourishment is not effective and/or economic as a means of managing coastal erosion). Therefore, where this measure is used to manage coastal erosion it will generally need to be coupled with other measures to ensure long-term sustainable solutions are ultimately developed. i.e. the primary use of beach nourishment is as a short term "holding" measure - while more appropriate longer term measures are implemented and take effect.

Lack of familiarity of New Zealand coastal communities with beach and dune nourishment can also be a limiting factor. Council experience in recent years is that considerable effort can be required to get community support for such work. (However, recent sites have exhibited less resistance, suggesting that pilot trials over the last four or five years have increased community appreciation of the potential of this option). With options such as dune nourishment, views and disturbance of existing vegetation are extra complications that can also make such work difficult to promote (though effective restoration of dune vegetation is relatively easily undertaken with a well-planned project).

Despite these limitations and difficulties, there is considerable scope for increased use of beach and dune nourishment around the coast of the Waikato Region. Work conducted in the Region to date indicates that beach nourishment can be particularly appropriate (i.e. practical and cost-effective) as hazard mitigation in sheltered environments - such as some sites in east coast estuaries. It has also proved to be useful for enhancing recreational values at such sites.

Beach and dune nourishment can also be conducted for little to no public cost when tied in with local dredging programmes being undertaken for other purposes. Such use also helps conserve limited sand reserves. Council has introduced measures in the proposed Regional Coastal Plan (RCP) to promote the use of dredged sands for beach and dune nourishment where appropriate.

Pilot study trials have already been conducted (and others are presently being planned) to help develop appropriate guidelines for such work. To date Council has been involved in seven separate beach nourishment efforts in Otahu, Whangamata and Tairua estuaries. These have generally proved relatively successful in managing erosion issues in these estuarine environments - though low cost, wooden groynes have also been required to help hold the sand in place at two of these sites. These trials have all used sands dredged for other purposes, which were required to be returned to the coastal environment in line with the above-noted measures in the RCP.

There is less immediate potential for beach nourishment on open coast beaches, because of the large volumes of sand required for such work. Moreover, most dredged sand sourced from development projects is from estuarine environments and often finer than beach sands. However, in some cases these sands are suitable (e.g. sufficiently coarse) for dune nourishment along ocean beaches.

Major dune nourishment was successfully undertaken along the Whitianga foreshore in connection with the development of the Whitianga Marina in 1994 and 1995. This work was largely designed through a community participation programme co-ordinated by Whitianga Beachcare and resulted in the placement of approximately 60,000 cubic metres of sands. Further dune nourishment is presently being planned for the northern end of the beach; also utilising a community based approach (largely focused on local property owners).

6.3 Living with Coastal Erosion

As coastal erosion is a natural process on all shorelines in the Region, it is important that communities increasingly come to recognise and live with this process. As noted earlier, most of the present erosion hazard problems arise through inadequate recognition of and allowance for natural coastal processes. Many of these issues are aggravated by a widespread community perception that shorelines are static or advancing and that erosion is somehow unnatural or exceptional, a problem rather than a natural process.

An improved understanding of the dynamics of local shorelines will help enable coastal communities and property owners to better adapt to living with these shorelines.

To date, the option of tolerating or living with coastal erosion has been given little consideration by management agencies and beachfront property owners. However, there does appear to be considerable scope for increased use of this option - particularly where shorelines are simply undergoing dynamic fluctuations as opposed to long-term recession.

The option is particularly appropriate where coastal erosion poses no immediate threat to development or to private property. However, it is also likely to be appropriate in many situations where erosion poses a risk to private property alone - provided that it is clear that the erosion does not also pose a threat to development (e.g. dwellings). In many of these cases, adjustment to coastal erosion simply requires managing this section of property as a natural buffer rather than "static" property. For instance, reinstating frontal dunes and native sand-binding vegetation where these features have been levelled and/or grassed.

However, living with coastal erosion is not a practical or appropriate option at sites where development is likely to be threatened. At these sites, options are required which address the threat to the development.

Despite the latter limitation, there is considerable scope for increased use of this option. However, advisory and education work will be required to raise public awareness and acceptance.

In particular, it is important that considerable effort is placed on informing coastal communities about the dynamic nature of the Region's coast. This requires an increased attention on community information and education, as well as opportunities for community participation (e.g. in coastal management and monitoring) that will enable communities to better understand the Region's shorelines.

Some work has already commenced with the Beachcare programme and the Coasts and Us unit presently being developed by Environmental Education Programme.

Council has also recently installed a computer-controlled video monitoring unit at Tairua Ocean beach and is presently planning a similar installation on the west coast (at Mokau). While these units have primarily been installed for improved coastal monitoring, they also have considerable potential for use in community information and education. Video images are placed directly on the internet and have already proved popular with the community for beach condition information. However, it is also planned to develop time-lapse videos of beach and bar changes which will considerably assist communities understand dynamic changes in these environments.

However, despite these useful initial efforts, a well co-ordinated and strategic information and participation programme is desirable - since major changes in present understandings and perceptions are required.

6.4 Modify Natural Coastal Processes and Landforms

There are a wide variety of measures which have been used to manage coastal erosion by modifying natural coastal processes or landforms. Such measures include various shoreline armouring devices, groynes and (more rarely) offshore reefs and/or breakwaters.

These measures are designed to protect property and development behind the coast by limiting or preventing coastal erosion. i.e. They are essentially property protection devices. If properly designed and constructed, the measures can (and frequently do) provide effective protection for both property and development.

In the Waikato Region, a fundamental issue with the use of these measures is that they focus on modifying coastal behaviour, while most problems in the Region relate to human behaviour - particularly the placement of subdivision and development too close to the sea. By providing a measure of security, or apparent security, these measures can potentially lead to pressure for more development in areas of hazard risk.

Nonetheless, the management of erosion hazard in the Waikato Region has historically emphasized the use of such measures.

In particular, the use of shoreline armouring devices (e.g. dumped rocks, sea walls, rip-rap revetments) placed along the foreshore to armour the coast and prevent landward movements. A recent survey indicated that there are now over 400 of these structures around the coast of the Region.

While well designed shoreline armouring works can effectively protect property and development, the measures can also have significant impacts on coastal processes and result in a number of adverse environmental impacts. The assessment reports note that particularly significant adverse effects often occur in relation to natural character, amenity values and public access along the coast. These effects largely relate to loss of beach width, due primarily to direct burial or "passive erosion" effects. Aggravation of erosion may also play a part, though present information suggests this effect is probably limited. The nature of these impacts and the reasons for them are discussed more fully in the erosion hazard assessment report. As the protection of such values are matters central to the purpose and principles of the Resource Management Act and to the policies of the NZCPS, such adverse effects are not consistent with sustainable coastal management.

There are also a variety of other concerns in regard to shoreline armouring structures, broadly outlined in the hazard assessment report.

It is sometimes possible to minimise adverse effects associated with shoreline armouring. For instance, some adverse environmental effects can be significantly reduced by locating and burying the armouring works sufficiently landward that they are only exposed for short durations (e.g. during and after extreme erosion events). However, this is not common practice and most structures are placed on the foreshore where adverse effects are maximised.

Overall, the significant adverse effects and other concerns with shoreline armouring are such that these measures are generally incompatible with sustainable coastal management. As such, the structures are generally undesirable as a means of managing coastal erosion - particularly as long-term solutions to erosion hazard.

Nonetheless, structures can and do prove important short to medium term measures at sites where there is serious hazard to dwellings or roads. Whenever practical, use of structures in such situations should use measures designed and located to minimise adverse environmental effects. This can include the use of relatively soft measures. For instance, Environment Waikato has worked with district councils and communities

to develop simple but effective beach nourishment and groyne proposals which have avoided the need for shoreline armouring works at three sites in recent years.

However, use of harder measures like shoreline armouring cannot be entirely avoided at many sites in the short term. Examples in the Waikato Region include parts of State Highway 25 along the Thames Coast and at the southern end of Buffalo Beach. The road in these areas would be severely damaged without the use of shoreline armouring. However, use of structures in such situations should emphasise measures designed and located to minimise adverse environmental effects.

Ideally, long term strategies are also required at difficult problem sites to ensure that actions over time eventually reduce and, where practical, eliminate the need for structures. The need for such long-term strategies can also be identified as a consent requirement for new shoreline armouring works in such locations. A recent example is the shoreline armouring placed along the sea frontage of Te Puru School.

7 Proposed Risk Mitigation Strategy

7.1 Introduction

The review of management options presented in section 6 suggests that any strategy for sustainable management of coastal erosion should focus on:

- management of land use and development;
- protection and, where appropriate, enhancement of natural buffer zones; and/or,
- living with coastal erosion.

While measures that involve modification of natural shorelines will sometimes be necessary and/or appropriate, these measures are generally incompatible with the objectives of sustainable coastal management. As such, their use should be limited.

Overall, this suggests that the central focus of sustainable management of coastal erosion should be to develop a pattern of land use and development that minimises the need to modify natural shoreline behaviour. i.e. A pattern of human use and development that will enable coastal communities to live with coastal erosion.

Essentially speaking, this requires a natural buffer of adequate width so that natural shoreline movements do not threaten people or things they value to the extent that they are unable to live with such movements.

This does not necessarily entail the absence of risk, but rather a level of risk that can be appropriately lived with. As such, it can be achieved both by:

- avoiding and reducing risk; and,
- learning to live with appropriate risk.

As it is not possible to completely eliminate risk, given the existing pattern of use and development around the Waikato Region, sustainable management of coastal erosion will require a strategy that focuses on both these aspects.

Moreover, as both of these aspects have a considerable focus on changing human activity and attitudes, emphasis should also be placed on measures that are likely to promote such changes in understanding and behaviour. In particular, good information

accessible to communities, advice, advocacy and community participation programmes.

7.2 Outline of Proposed Management Strategy

The proposed strategy consists of four major elements:

- a central focus - relevant to the management of coastal erosion hazard at all sites in the Region;
- site specific hazard management strategies - relevant to difficult problem sites;
- guidelines for the use of coastal structures - in recognition that these devices will continue to be relevant in the management of coastal erosion hazard at some sites in the immediate future; and,
- ongoing monitoring and investigations - required to develop, monitor and refine strategy over time.

Each of these four elements is outlined below.

7.2.1 Element 1 - Central Focus

It is proposed that sustainable management of coastal erosion should be promoted by a Region-wide strategy that focuses on:

- ***avoiding and reducing risk by:***
 - identifying hazard risk areas and managing subdivision and development within these areas to avoid and (with existing development) reduce hazard risk; *and,*
 - protecting and, where practical and appropriate, enhancing the buffering ability of natural coastal systems;
- ***encouraging coastal communities to accept and live with coastal erosion, where this is practical and appropriate; and,***
- ***facilitating the above directions by placing emphasis on public information, advice, and advocacy together with opportunities for meaningful community participation in decision-making likely to affect their interests.***

These elements are central to effective and sustainable management of coastal erosion hazard at all sites.

7.2.2 Element 2 - Site Specific Hazard Management Strategies

At some sites in the Region, the complexity of present hazard problems will require site specific management strategies in order to work towards long-term sustainable solutions.

Meaningful participation by stake-holders is critical to effective resolution of the complex conflicts of interest at these sites. Therefore, these site specific strategies should preferably be developed using a multi-stakeholder approach involving Environment Waikato, the local district council and other relevant stake-holders (e.g. affected property owners, Department of Conservation, beach users, local communities).

Most acute problems identified in the hazard assessment report are likely to require site specific hazard management strategies.

Discussions with district councils have been conducted and priorities have been agreed with most councils, as follows:

- **Thames Coromandel District Council:** Agreed priorities with district council and local community boards are **Buffalo Beach, Cooks Beach, Tararu and Koputauaki Bay.**

Urban development and residential property is threatened at the first three of these sites, with the State Highway also at risk at Buffalo. Coastal structures are also a significant issue at all 3 sites. At Koputauaki Bay, primary concern is a Maori urupa (burial ground) seriously threatened by erosion. The Coromandel Community Board have requested that site be given priority to assist local Maori landowners find and implement an appropriate solution.

Other sites in this district likely to require site specific strategies once priority sites have been addressed **include Whangapoua, Hahei, Te Puru and possibly Wharekaho.** The issues at these sites relate largely to threat to residential property and development. Coastal structures are also an issue at some sites.

State Highway 25 along the Thames Coast is also a high priority issue. As use of shoreline armouring is inevitable on parts of this road (**and some areas of district council roads to the north of Coromandel**), guidelines are required for erosion protection to facilitate any future action required while minimising adverse effects. Input is also required into longer term strategies for these roads to ensure erosion hazard is minimised as far as practicable.

- **Hauraki District Council: Whiritoa Beach** is the primary erosion hazard issue in this district. Risk to the surf club is the main remaining issue at this site.
- **Franklin District Council:** No priority sites yet agreed with FDC, though the **Seabird Coast Road** is probably the main outstanding issue. An eroding landfill south of Kaiaua was initially a priority but Environment Waikato and FDC have agreed on action at this site and this work has now been completed and is being monitored. Similarly, issues at Sunset Beach, Port Waikato have now largely been addressed through the Beachcare group initiated in 1993.
- **Waikato District Council:** Cliff erosion in **Raglan township** has been the major priority identified by the District Council. Coastal structures, particularly shoreline armouring, are also a major issue around parts of the township. There are also various other relatively minor erosion issues around the vicinity of Raglan, the harbour entrance area and Manu Bay.
- **Otorohanga District Council:** Priority issues relate to the **Kawhia and Aotea** foreshores. Issues include threat to residential property and development and to local roads. Coastal structures are also an issue at both sites, with the most immediate of these issues at Aotea where there is significant community concern and conflict with regard to the local foreshore.
- **Waitomo District Council:** The **Mokau sand spit** is the highest priority in this district, with serious threat to local residential properties and dwellings. **Other priority sites** for later attention include **Marokopa, Seaview and Te Waitere.** Threat to local residential property and development is the major issue at these sites, though coastal structures and dune management are also significant issues at Marokopa.

However, given the limited resources, available work in the immediate future must focus on the highest priority sites. In terms of hazard risk and urgency of management action, the highest priorities are **Buffalo Beach, Raglan, Aotea and Mokau**. Therefore, these will probably be the major priorities for the next financial year.

However, urgent issues could also develop at other sites (e.g. Cooks Beach and Hahei) if there are major cyclones and some flexibility in work-load will need to be maintained.

There is also very strong political and community pressure for support of the local Maori at Koputauaki Bay. The urupa at this site, which includes recently buried family, is now very seriously threatened.

Strategies for other priority sites can be initiated as the above sites are addressed.

7.2.3 Element 3- Coastal Structures

Managing risk by shoreline modification will be avoided as far as practical under the proposed strategy, particularly the use of shoreline armouring structures.

However, there will be some sites where there will be no reasonable alternatives to such measures, reflecting the level of investment and infrastructure already located in hazard risk areas and the impracticality of other management options in the short term.

Therefore, given the range of potential problems with the use of such structures, it is critically important to develop guidelines for the future consenting and use of these measures - particularly for shoreline armouring.

These guidelines will also considerably assist with the consenting of the large number (400+) of existing unauthorised structures. (As noted in the October 1996 report, it is a statutory requirement that a coastal consent be applied for all unauthorised structures within 6 months of the Regional Coastal Plan becoming operative. Guidelines will also need to address issues such as the removal of structures that have failed or that are no longer required.)

In order to develop such guidelines it will be necessary to investigate and evaluate existing structures and also to review experience elsewhere.

However, the following are recommended as interim guidelines:

- Structures should only be considered where coastal development (e.g. dwellings, infrastructure) is threatened and it is not reasonably practical to manage the risk using a more appropriate approach (e.g. to live with the risk or to relocate the development further landward).
- Preference should be given to moderately “soft” structures (e.g. groynes with beach nourishment) where these are practical. Council has made some progress in promoting and developing such applications over the last three years, and this work should be continued.
- Where a “hard” option (e.g. shoreline armouring) is required, the structure should be designed and located to avoid or minimise adverse environmental effects (e.g. avoid exposure on the foreshore; minimise seaward intrusion; locate as far landward as possible). Where adverse effects cannot be avoided, appropriate mitigation action should be required (e.g. provision for public access where this is adversely impacted).
- Where a structure is required, it should be consented as a short to medium term “holding measure” (as opposed to a long term solution), while more appropriate

long-term measures are developed or take effect. Preferably, it should be part of a defined strategy which will eventually eliminate the need for the structure.

- At those rare sites (e.g. parts of SH 25 along the Thames Coast) where “hard” structures may be required as medium to long-term solutions to erosion hazard, the avoidance of adverse effects should be given particularly strong emphasis - together with the mitigation of adverse effects that cannot be avoided.

Council has made useful progress in avoiding the use of shoreline armouring in recent years by following these guidelines in advisory and advocacy work with coastal communities. Similarly, the guidelines have proved useful for consenting. It is important to maintain and extend such work to help promote a more appropriate shoreline management culture in the Region.

7.2.4 Element 4 - Monitoring and Further Investigations

A simple, cost-effective, monitoring strategy is required to ensure that:

- coastal changes are adequately monitored;
- hazard assessment areas are regularly reviewed and updated (at least once every 10 years and/or as significant new information comes to hand - e.g. major revision of IPCC predictions);
- effectiveness of the strategy can be assessed; and,
- individual management measures (e.g. dune management; guidelines for coastal structures; planning instruments) can be reviewed and improved as appropriate.

Appropriate investigations by other agencies (e.g. Crown Research Institutes, Universities) should also be encouraged to improve prediction and management of coastal erosion hazard.

Similarly, liaison with other regions and appropriate agencies should be maintained and extended to improve prediction and management of coastal erosion hazard and to promote inter-regional integration and consistency.

8 Implementation Plan

A detailed implementation plan will continue to be negotiated and agreed with district councils and other relevant parties. However, Table 1 outlines a recommended implementation strategy and relevant management responsibilities.

- **Year 1 – 1999/00:** In this year the focus is on:
 - Developing and documenting hazard management zones for priority districts
 - Incorporation of hazard zones and appropriate management provisions into district plans
 - Initiation of management strategies at priority sites
 - Initiate development and implementation of the monitoring and review programme
 - Refine initial guidelines for the use and consenting of erosion protection structures

- Completion of a review of the Beachcare programme
- **Year 2 – 2000/01:** In this year the focus is on:
 - Develop and initiate a targeted environmental education programme aimed at nearshore property owners and coastal communities
 - Completion of hazard zone assessment work for Region
- **Year 3 – 2001/2002:** Completion of all matters relevant to operationalising the strategy, including:
 - Complete incorporation of hazard zones and appropriate management provisions into district plans
 - Completion of all planning matters relevant to implementation of the strategy
 - Completion of strategies for the six pilot study sites
 - Guidelines for coastal structures, dune management and dune/beach nourishment completed
 - Complete monitoring and review programme

Essentially, all aspects of the strategy should be operational by June 30, 2002.

Note:

The proposed implementation plan is subject each year to the normal Business Plan preparation, budgeting and approval processes associated with the Annual Plan.

Table 1: Proposed Implementation Plan

Action	Who	When
Strategy Development		
• Finalise strategy	Environment and coastal councils	Waikato district Completed
Hazard Definition		
• Define appropriate hazard management zones and document	Environment and coastal councils	Waikato - in consultation with coastal district councils Complete for entire Region by June 2000
• Recognise hazard management zones in appropriate district councils plans	District councils in consultation with Environment Waikato	Ongoing. Complete by December 2000
• Hazard Mapping	Environment and District Councils.	Waikato Programmed and completed by June 2000 for specific sites.
Planning Matters		
• Implement appropriate subdivision and development controls in district plans	District councils in consultation with Environment Waikato	Ongoing. Complete on priority basis by December 2000 including site specific Risk Management Strategies.
• Implement other required changes to Regional and district plans	Environment and district councils	Waikato Ongoing. Complete on priority basis by December 2001

Buffer Zone Protection and Enhancement

- Review Beachcare dune management programme and develop long-term strategy Environment Waikato, district councils and Beachcare groups Complete by June 2000
- Produce guidelines for community based dune management Environment Waikato, district councils and NZFRI Ongoing – production of manuals with external agencies. December 2000
- Pilot studies of beach/dune nourishment TCDC and Environment Waikato Ongoing - East coast estuaries and beaches 1997-2002
- Develop guidelines for beach and dune nourishment Environment Waikato and district councils Complete guidelines by June 2001

Site Specific Risk Management Strategies

- Buffalo Beach Environment Waikato, TCDC and other stakeholders Ongoing. Complete by June 2001
- Aotea Environment Waikato, ODC and other stakeholders As above
- Mokau Environment Waikato, Waitomo DC and other stakeholders As above
- Thames Coast Highway Environment Waikato, TCDC, Transit NZ, DoC and other stakeholders As above
- Raglan Environment Waikato, Waikato District Council and other stakeholders As above

Information, Advice and Advocacy

- General Environment Waikato and district councils Ongoing
- Targeted education and information campaigns As above Develop and initiate in 2000/2001

Coastal Structures

- Develop guidelines for the use, consenting and removal of erosion protection structures Environment Waikato - in consultation with district councils, utility operators and other stakeholders Complete by 2002

Monitoring and Review

- Develop appropriate shoreline monitoring programme Environment Waikato - in consultation with district councils and other regions Programme identified and initiated by June 2001
- Programme to monitor effectiveness of strategy Environment Waikato and district councils As above with reporting date June 2002.

Liaison

- Liaison with research agencies Environment Waikato Ongoing
- Liaison with management agencies in other regions and countries Environment Waikato and district councils Ongoing

This document was approved for issue by Environment Waikato on (February 16, 1999). It is intended to review the document in 2003/2004. Note that the Civil Defence Act 1983 has now been replaced by the Civil Defence and Emergency Management Act 2002.