

Hazardous Times

Hazard News and Views from the Auckland Regional Council



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The twelfth issue of Hazardous Times presents research on coastal cliff erosion rates on the North Shore and discusses the finalised Muriwai Beach Coastal Management Strategy.

Muriwai Coastal Hazard Management Strategy

A coastal hazards management strategy has recently been completed for Muriwai Beach, one of Auckland's most popular high-energy West Coast beaches. The coastline at the southern end of the beach, near the Muriwai Beach settlement, golf club, and Regional Park, is heavily used and has experienced longstanding problems with wind and coastal erosion. This has had significant impacts on assets, uses and values of the coastal zone for the last 40 years.

In the past a number of modifications and erosion management solutions have been implemented with varying degrees of success. Solutions offered have ranged from hard options, like shoreline armouring works, to softer approaches such as dune reshaping and planting. It was agreed by the project partners, Auckland Regional Council and Rodney District Council, that a better understanding of coastal processes affecting this coastline was required before any further modifications are undertaken. Tangata Whenua, the Muriwai residents and BeachCare group have all had significant input into this project.

Key issues identified at Muriwai

The Strategy addresses a number of key issues affecting the Muriwai Beach coastline, specifically:

- The integrity and appropriateness of erosion control measures that have been implemented to manage the coastal erosion hazard to near shore assets (southern car park, stormwater outlet, surf club tower, parking areas and northern end of the golf course).
- The impact of stormwater discharge structures and disposal on beach erosion.
- A number of beach access issues including the potential for serious wind erosion problems to occur as a consequence of heavy pedestrian and vehicle pressures, particularly in the area north of Okiritoto Stream.

Rates of Coastal Erosion

Historical shoreline changes were assessed by analysing information from historical photographs, surveys, ARC beach profile monitoring results, community and Tangata Whenua consultation and knowledge, council files, existing reports including thesis work, field surveys and site visits. It was clear from this information that Muriwai Beach has been subject to serious coastal erosion since the 1960's. This information provided the basis for the key management recommendations as summarised in the table below.

Where To From Here? There are two fundamental options for the management of coastal erosion – attempting to hold the present shoreline, or managing the use of the coastal margin to accommodate the erosion. It was agreed by the ARC Environmental Management Committee in early September that accommodating erosion should be the preferred approach, as it is both the most cost-effective and most sustainable option.

For more information on the Muriwai Coastal Hazards Strategy contact Andrew Benson, ph: (09) 366 2000, extn 7029, or email: Andrew.benson@arc.govt.nz. Copies of this Strategy can be ordered by completing the form on the back of this newsletter.

Southern Car Park

Dynamic equilibrium prior to the 1960s.

Serious shoreline recession since the 1960s.
Rates averaging 1-1.5m per year.

Key Recommendations

- Present erosion rates are adopted for management purposes (recognising that current trend unlikely to continue indefinitely).
- Landward excavation of the most seaward area of the car park, partially restoring former gully.
- Landward relocation of the stormwater outfall.
- Improve beach access from Flat Rock for boat launching and emergency vehicles.
- Progressively redirect users to car parks further north as facilities become available.

Domain and Golf Course to Okiritoto Stream

1960-1970 little net shoreline change.

1960/70-2001 significant erosion.
Rates averaging 1-1.5m per year.

Key Recommendations

- Manage wind and coastal erosion using the following zones:
 - Eroding dune face,
 - Wind erosion buffer,
 - Recreation and amenity zone.
- Only restore sand binding grasses on the eroding dune face when erosion has stopped.
- In the long-term, work with the golf club to relocate the northern end of the course landward.

Okiritoto Stream and five-mile strip

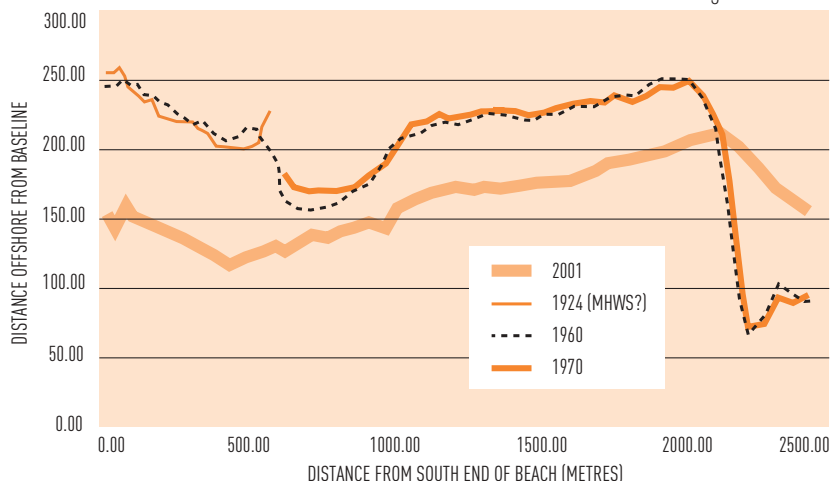
Stream mouth: advanced 50-100m from 1960/70.

North of stream: high foredune actively eroding.

Key Recommendations

- Minimise the potential for serious wind erosion to occur as a result of human activity. Focus on education, public awareness, and working with stakeholders to bring about changes in user behaviour.

Muriwai Beach: Okiritoto Stream - Southern Car Park Shoreline Change 1924-2001



NEWS IN BRIEF

Managing Volcanic Hazards in Auckland

On 18th June, scientific and planning experts on the Auckland Volcanic Field and volcanic crisis planning gave a series of presentations to emergency and utility managers on "Managing Volcanic Hazards in Auckland". The topics covered included:

- The Auckland Volcanic Field – what can we expect?
- The Auckland Volcano-Seismic Monitoring Network – a tool for warning of impending volcanic eruptions.
- The principles of Volcanic Contingency Planning.
- The physical and social impacts of volcanic eruptions and how can we mitigate against them?
- A utility perspective on preparing for volcanic eruptions.

A copy of seminar notes can be obtained by phoning Louise Chick, (09) 366 2000, extn 8903, or emailing: louise.chick@arc.govt.nz

Exercise Phoenix

On July 23-27 a practical exercise tested how Auckland and Wellington would manage if an earthquake, measuring 7.5 on the Richter scale, were to hit Wellington, resulting in 100's of deaths, 1000's injuries from collapsed buildings, and extensive infrastructural damage.

Auckland disaster planners considered: how will hospitals cope with the influx of patients and how do we deal with the welfare of evacuees; how will Auckland deliver medical supplies and other equipment to Wellington, and how quickly can overseas Urban Search And Rescue support be processed through Auckland airport.

Along with over 50 regional and national agencies, the exercise involved 40 disaster management experts from countries like United States, Singapore, and Australia, thanks to the facilitation of the United Nations.

The exercise identified a number of improvements that can be made to Auckland's disaster planning. Over the next 6 months, the Auckland CDEMG will conduct a series of workshops to identify solutions.

CDEMG Update

The Auckland Civil Defence Emergency Management Group has recently launched a new web site to provide information and open dialogue on its CDEMG Plan.

To find out more about this site and what the Auckland CDEMG are up to, visit www.auckland.cdemg.org.nz or see the enclosed leaflet.



Hazards Guidelines Project

The Hazard Guidelines Project is a key initiative of the Local Authority Hazards Liaison Group. This group is made up of representatives from the ARC and the territorial authorities. It was formed in 1997 to help co-ordinate the management of hazards between the district, city and regional councils within the Region.

Three guidelines will help give effect to the Civil Defence Emergency Management Group's 'reduction' responsibilities as well as enable local authorities to better manage hazards within the Region.

The overarching goal in developing these guidelines is to:

Minimise the risks to communities and the environment from the effects of a range of hazards, including natural and technological hazards.

The three guidelines, which mirror the main elements of the risk management process are:

ONE Hazard Information Management (completed)

TWO Hazard Identification and Risk Assessment (completed)

THREE Risk Treatment and Monitoring of Hazards (under development)

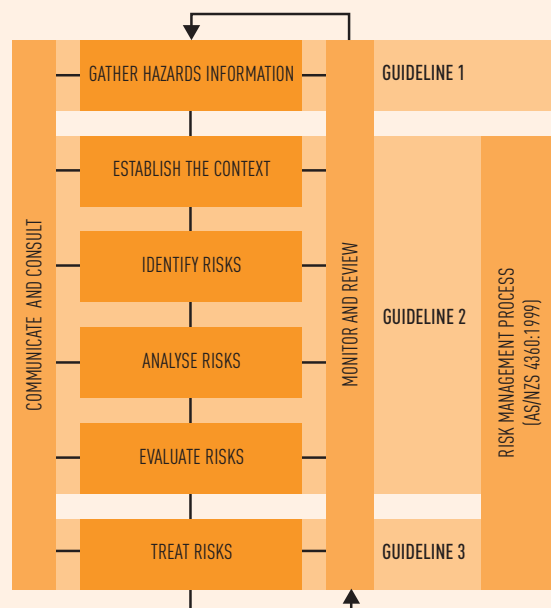
The first guideline, Hazard Information Management, identifies sources of hazards information and looks at how this information is collected, sorted, recorded and stored in the Auckland region. It is especially relevant to the development and maintenance of hazard registers.

The second guideline, Hazard Identification and Risk Assessment provides guidance on establishing the context for risk analysis, identifying hazards and risks, and carrying out risk analysis and risk evaluation.

Risk Treatment and Monitoring of Hazards is the third guideline. It is considered critical to the series and will be presented as a "handbook" setting out the hazards that affect the region (at both the local and regional level) and specify the range of risk treatment options that can be used to minimise community risk from hazards.

The aim of Guideline 3 is to provide a selection of tools and methods that local authorities can use to manage hazard risk in their city, district or region. While each local authority will manage hazards risks differently, according to the risks they face as well as community expectation, this guideline should help ensure that there is a consistent understanding, approach and options for the management of risk. Guideline 3 is due for completion at the end of 2002.

For more information on Guidelines 1, 2, or 3, please contact Rob Kelly, ph: (09) 366 2000 extn 8122, or email: rob.kelly@arc.govt.nz. Copies of Guidelines 1 and 2 can be ordered by completing the form on the back of this newsletter





Wedge failure below Takapuna Grammar School that has occurred at the intersection of a fault plane (on right) and a joint (on left).

Living on the Edge

Cliff Erosion on the North Shore

Ross Paterson, an Auckland University Masters student supported by the Auckland Regional Council, has recently completed his thesis which investigates the rates of and reasons for coastal cliff erosion at Takapuna, on Auckland's north shore. The cliffs are the location of some of the most expensive properties in New Zealand as well as several sights of geological significance.

These Waitemata Group cliffs of Miocene age (~20 million years) are predominantly comprised of alternating very weak and weak sandstones and mudstones, and are actively eroding. The headlands and reefs are composed of the more resistant Parnell Grit and limonitic (iron oxidated) sandstones.

The results indicate that erosion rates can be as little as 2.6m per 100 years at a more stable section of cliff and over 13m per 100 years, where large-scale mass movement is a factor (~5% of the cliff section).

It is well known that cliff stability and erosion is affected by rock strength, water presence, extent of vegetation (especially the pohutukawa), and human impacts (drainage disposal, earth moving etc). However, along the cliffs the susceptibility of a rock or soil to erode is influenced as much by the way it responds to water (slakes) as it is by strength.

Wetting and drying results in slaking in the susceptible mudstones, which form loose curved chips that are easily removed from the cliff face. This undercuts the sandstones, which have two perpendicular joint sets, resulting in block fall and slides in the residual soil. Where prominent defects intersect, wedge failure occurs. These wedge failures are the greatest hazard to cliff top properties in the study area as they can remove large volumes of soil and rock (often up to 10 m horizontal retreat).

These type of failures are not uncommon. For example, along one 2 km section of cliff there are four wedge failures.

In addition, slope stability is influenced by dip direction, which in these cliffs varies as a result of local folding. Failures are common in extremely weathered rock and residual soils with dips between 30° and 60°.

The geomorphology of the cliffs is defect controlled. Joint sets show a strong trend into the cliff face while several continuous faults can be seen parallel to the cliffs in the shore platform. Faults running perpendicular to the cliff face erode ahead of the cliffs, not at a faster rate.

The continuing erosion along these cliffs represents a significant risk to residences and infrastructure along this coast, some of which are located as close as a few metres from the cliff face. It is recommended that options for managing this risk should consider the presence of defects, which pose the highest hazard in regard to cliff stability. A hazard zone scheme has been developed for consideration and discussion by interested parties, and is incorporated in this thesis.

This thesis can be viewed at the University of Auckland Library.

Planning for Volcanic Eruptions in Auckland

Auckland city is built upon a potentially active volcanic field. The next eruption will be from a new, completely unknown location. It can't be predicted when the next eruption will occur. So, how do you plan to cope with such an event?

While an eruption from the Auckland Volcanic Field may devastate a relatively small proportion of the Region, ash fall and indirect effects are likely to have significant implications for a broad range of industries and services.

The Volcanic Contingency Plan (VCP) prepared for the Auckland Regional Council demonstrates that an eruption from the Auckland Volcanic Field can be planned for. This plan, adopted by the Auckland Civil Defence Emergency Management Group and the ARC in May earlier this year, provides a coordinated emergency management framework to aid preparedness for, response to, and recovery from a local eruption event.

More specifically the plan outlines information vital for effecting managing volcanic crisis:

How will we know when an eruption is likely and how much warning will we get? The Auckland Volcano-Seismic Monitoring Network monitors volcanic activity in the region and could warn us of volcanic reawakening days to weeks before an eruption.

How widespread will the volcanic hazards be? Expect total devastation within a 3-5km radius from hazards such as lava, and base surges. Ash dispersion up to 100km from vent.

What are the potential impacts of volcanic hazards? Likely disruption to most lifeline utilities but will depend on exact eruption location. Direct effects of volcanic hazards could require evacuation of up to 200 000 people. More people may be required to evacuate if lifeline services are disrupted for any length of time.

How long will an eruption last for? Eruptions from the Auckland Volcanic Field could last for months.

Who will do what? The VCP outlines the roles and responsibilities of local authorities, The Institute of Geological and Nuclear Sciences, the Ministry of Civil Defence Emergency Management, and other key organisations, SOE's and Utility providers. It outlines how 'command and control' will work in eruption response; resource requirements; the process for issuing warnings and declaring a civil defence emergency; evacuation processes, and welfare considerations.

In order to ensure this plan is sufficiently robust, future work will focus on filling information gaps identified through the planning process, and testing this plan through a regional exercise that will involve all key agencies.

For further information on the ARC Volcanic Contingency Plan, please contact Graham McKean on (09) 366 2000, extn 7138; email: graham.mckean@arc.govt.nz

AELG Update



The AELG held its annual meeting on the 20th August. This forum is a key opportunity for lifelines organisations to network and share information on risk/emergency management initiatives being undertaken in each sector. The guest speaker was Dan Cuocco from Thornton-Tomasetti who were the principal structural engineers advising on the removal of debris following the World Trade Centre terrorist attack. AELG Patron Gwen Bull praised the AELG members as a "group of volunteers who just got on with the job". The annual meeting was an opportunity for a wider audience to have input into AELG future direction and projects. Some of the presentations and a brief report from the meeting can be downloaded from the AELG website www.aelg.org.nz.

The AELG has now started work on three new projects. All are planned for completion by the middle of next year:

- Framework for Developing Lifelines Strategies (designed to help utility organisations get maximum benefit from the projects the lifelines group undertakes and how to build key information into their asset management and emergency management planning).
- Lifelines Communication Systems – reviewing the physical communication systems used to coordinate between lifelines utilities and with the Emergency Management Office during emergencies.
- Priority Utility Sites for Recovery – identifying priority sites for each utility to recover first after a major event/disaster, taking into account the community needs and the dependencies of lifelines on each other during response and recovery.

You can find out more about the AELG activities from their website www.aelg.org.nz, or if you'd like to receive their six monthly newsletter contact the project manager Lisa Roberts (email: lisa.roberts@meritec.org or ph: (09) 379 1261).

Hazardous Times Resource List Reports

Coastal Hazards

Auckland Regional Council. Coastal Hazard Strategy and Coastal Erosion Management Manual, Auckland Regional Council Technical Publication No. 130, July 2000. (\$129.00 Hard copy) (\$49.00 CD Rom)

Earthquake

Alloway B., Lyall J., and Kozuch M. Mapping and Characterisation of the Drury Fault, Auckland Regional Council Technical Publication No.96, September 1998. (includes A1 map of fault geology) (\$25.00)

Stephenson, W., Baguley, D., Kozuch, M. Assessment for Amplification of Earthquake Shaking by Soft Soils in Central Auckland, Auckland Regional Council Technical Publication No. 94, July 1998. (includes A1 map of site locations) (\$25.00)

Stephenson, W., Townsend, T. & Hull, A. Assessment for Amplification of Earthquake Shaking by Soft Soils in South Auckland, Auckland Regional Council, Technical Publication No. 87, August 1997. (Free)

Fellows, D.L. Preliminary Paleoseismic Assessment of the Wairoa North Fault. Auckland Regional Council, Technical Publication No. 75, September 1996. (includes A1 map of fault [1:25,000]) (\$40.00)

Hull, A.G., Mansergh, G.D., Townsend, T.D. & Stagpoole, V. Earthquake Hazards in the Auckland Region. Auckland Regional Council, Technical Publication No. 57, April 1995. (includes two A3 maps: fault hazard and preliminary ground shaking hazard) (\$25.00)

Education

Ronan, K.R., Johnston, D.M. Children's Risk Perceptions and Preparedness: A Hazards Education Survey. Auckland City Council and Auckland Regional Council, Auckland, March 1997 (Available on loan from ACC Library)

Flooding

Auckland Regional Council. Dam Safety and Surveillance Guidelines for Safe Practice Auckland Regional Council Technical Publication No. 109, June 2000. (\$30.00)

Auckland Regional Council. Low Impact Design Manual for the Auckland Region Auckland Regional Council Technical Publication No. 124, April 2000. (\$20.00)

Auckland Regional Council. Guidelines for Stormwater Modelling in the Auckland Region, Auckland Regional Council Technical Publication No. 108, April 1999. (\$25.00)

Land Instability

Williams, A. Slope Instability Hazards in the Auckland Region: A Preliminary Assessment. Auckland Regional Council, Technical Publication No. 71, June 1996. (includes four A3 maps [1:500,000]: soil/rock mass distribution, slope grade distribution, areas of slope instability, instability hazard) (\$35.00)

Meteorological Extremes

Salinger, M.J., Porteous, A.S., Reid, S., Thompson, C. & Snelder, T. Meteorological Hazards in the Auckland Region: A Preliminary Assessment. Auckland Regional Council, Technical Publication, No. 76, November 1996. (Free)

Hessell, J.W.D. Hazards in the Auckland Region due to Meteorological Extremes: An Initial Assessment. Auckland Regional Council, Working Report No. 68, January 1996. (Free)

Tsunami

de Lange, W.P. & Hull, A. G. Tsunami Hazard for the Auckland Region. Auckland Regional Council, Technical Publication No. 50, November 1994. (Free)

Volcanic

Auckland Regional Council. Contingency Plan for the Auckland Volcanic Field, Auckland Regional Council Technical Publication No. 165, January 2002. (\$45.00)

Paton, D. et al.. Auckland Volcanic Risk Project - Stage 2, Auckland Regional Council Technical Publication No.126, November 1999. (\$25.00)

Johnston, D.M., Nairn, I.A., Thordarson, T. & Daly M. Volcanic Impact Assessment for the Auckland Volcanic Field. Auckland Regional Council, Technical Publication No.79, April 1997 (\$35.00)

Infrastructure Failure/Auckland Engineering Lifelines Group Publications

Auckland Regional Council. Auckland Engineering Lifelines Group Priority Emergency Routes Auckland Region, Auckland Regional Council Technical Publication No. 145, November 2001. (\$25.00)

Auckland Regional Council. Auckland Engineering Lifelines Group Volcanic Ash Review, Part 1: Impact on lifeline services and collection and disposal issues. Auckland Regional Council Technical Publication No. 144, May 2001. (\$25.00)

Auckland Regional Council. Auckland Engineering Lifelines Project, Final Report - Stage 1, Auckland Regional Council Technical Publication No. 112, November 1999. (Includes CD-ROM) (\$100.00)

Auckland Regional Council. Part 3: Risk Management: Looking Forward from the Auckland Power Crisis, Auckland Regional Council Technical Publication No. 100, January 1999. (\$25.00)

Auckland Regional Council. Auckland Engineering Lifelines Project, Stage 1 Report. Auckland Regional Council, Technical Publication No. 116, July 1997. (\$90.00 Hazard and Network information (project participants only)) (\$80.00 Hazard information only (non-project participants))

Auckland CDEM Group Publications

Auckland Region Civil Defence Emergency Management Group. Extent of Civil Defence Emergency Management Planning in the Auckland Region, Auckland Regional Council Technical Publication No. 180, July 2002. (\$25.00)

Auckland Region Civil Defence Emergency Management Group. Management Mechanisms used by Emergency Management Agencies for Natural and Technological Hazards in the Auckland Region, Auckland Regional Council Technical Publication No. 181, May 2002. (Free)

Risk Management

Local Authority Hazard Liaison Group. Hazard Guidelines, Part 2. Hazard Identification and Risk Assessment, Auckland Regional Council Technical Publication No. 106, September 2002. (\$25.00)

Local Authority Hazard Liaison Group. Hazard Guidelines, Part 1. Hazard Information Management, Auckland Regional Council Technical Publication No. 106, June 1999. (\$25.00)

Auckland Regional Council. Civil Defence Disabilities Planning Guide, Auckland Regional Council Technical Publication No. 98, September 1998. (Free)

Daly, M. & Hull, A. Natural Hazards Management Workshop 95: Workshop Summaries. Auckland Regional Council, Technical Publication No. 70, May 1996. (the Workshop Proceedings are available from the Institute of Geological & Nuclear Sciences, PO Box 30 368, Lower Hutt) (Free)

Hazard Facts

Auckland Regional Council's Hazard Facts are a series of free factsheets written to provide the public with hazard information.

- H01 Auckland's Volcanic Field
- H02 How do Auckland's Volcanoes Form?
- H03 Rangitoto: Auckland's Youngest Volcano
- H04 Auckland's Volcanic Hazards
- H05 Auckland Volcano Seismic Monitoring Network
- H06 Measuring Earthquakes
- H07 Earthquakes in Auckland
- H08 Earthquake Hazards
- H09 What is a Tsunami?
- H10 Volcanic Eruptions in Auckland – How to Survive
- H11 Hazards in Auckland

Hazard Facts are available from ENVIROLINE: 0800 80 60 40 or online: www.arc.govt.nz.

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