

# Our changing environment

– the risks and challenges of living with natural hazards

## Natural Hazards Overview

As Christchurch residents, we're all too familiar with what Mother Nature can throw at us. Since September 2010 we've all learnt about the impact of natural hazards on our district, and the 5 March 2014 flooding event further reinforces the need to anticipate and plan for a wide range of natural hazards.

*Christchurch – a long history of living with natural hazards*



Flooding Barrington Street, opposite Spreydon Park  
10 August 1925



Flooding August 1941 Judge Street, Woolston



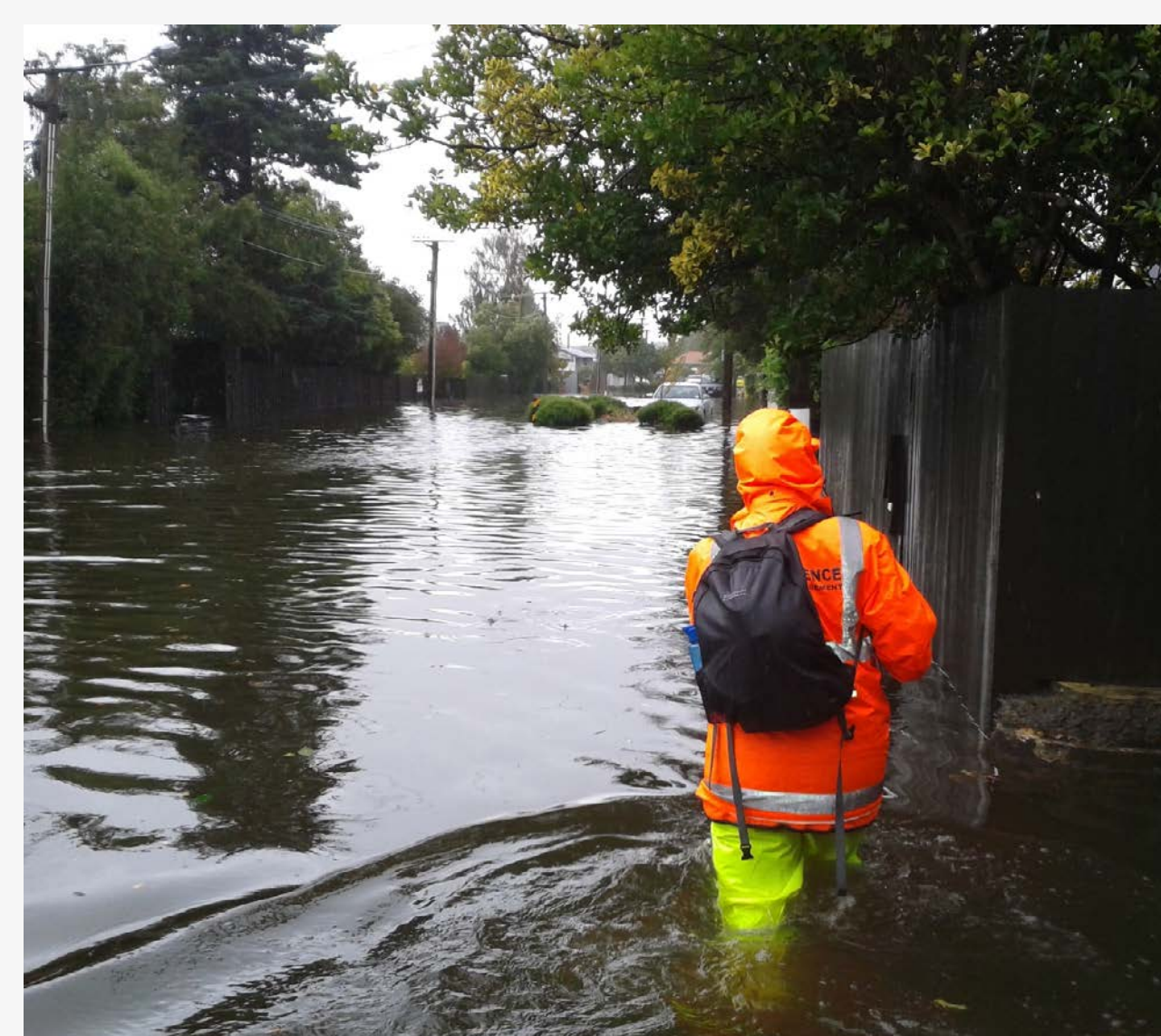
Storm surge Sumner 1954



Snow storm Worcester Boulevard 1992



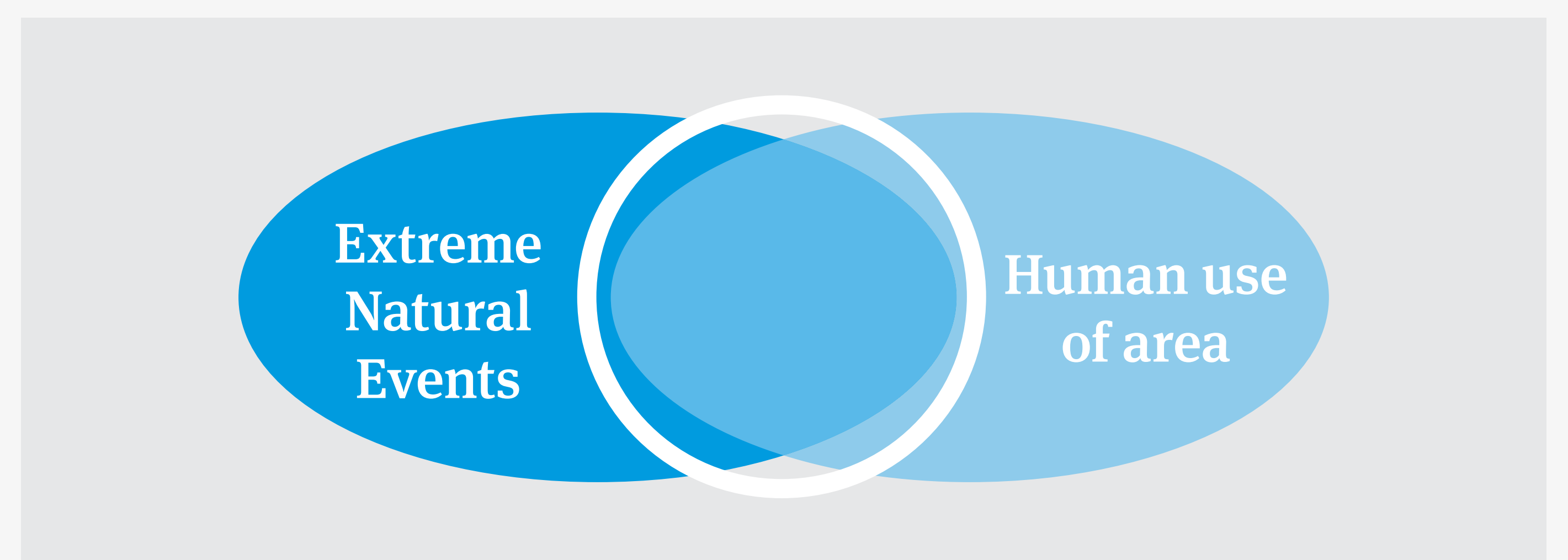
Snow storm Hereford Street 2011



Flooding event 5 March 2014

## What is a natural hazard?

A natural hazard is the interaction between an extreme natural event and human activity – our use of an area. For example, **an avalanche is not a natural hazard unless it happens at a skifield.**



The hazards we face in Christchurch are:

- Land instability
- Flooding
- Earthquakes
- Liquefaction
- Tsunami
- Coastal processes – exacerbation by sea level rise

## There are three ways we can manage hazards:

- Modify the natural event – for example, stop banks to prevent flooding and sand fences to reduce flood risk to beach settlements
- Reduce our vulnerability – for example, land use planning and information or awareness initiatives
- Minimise the consequences of disaster – for example, communities can prepare evacuation plans

**A combination of these three approaches is generally the best solution.**

# Our changing environment

– the risks and challenges of living with natural hazards

## Land instability – the science and the response

The earthquakes caused slope instability hazards – cliff collapse, rockfall and mass movement.

These geotechnical hazards pose a threat to people's lives. The extent of threat is established using a life risk model developed by GNS Science.

Once the risk is calculated above one in 10,000 in any one year, other actions may follow. For rockfall and cliff collapse, for example, there have been red zones and the government offers and, in some cases section 124 prohibited access notices.



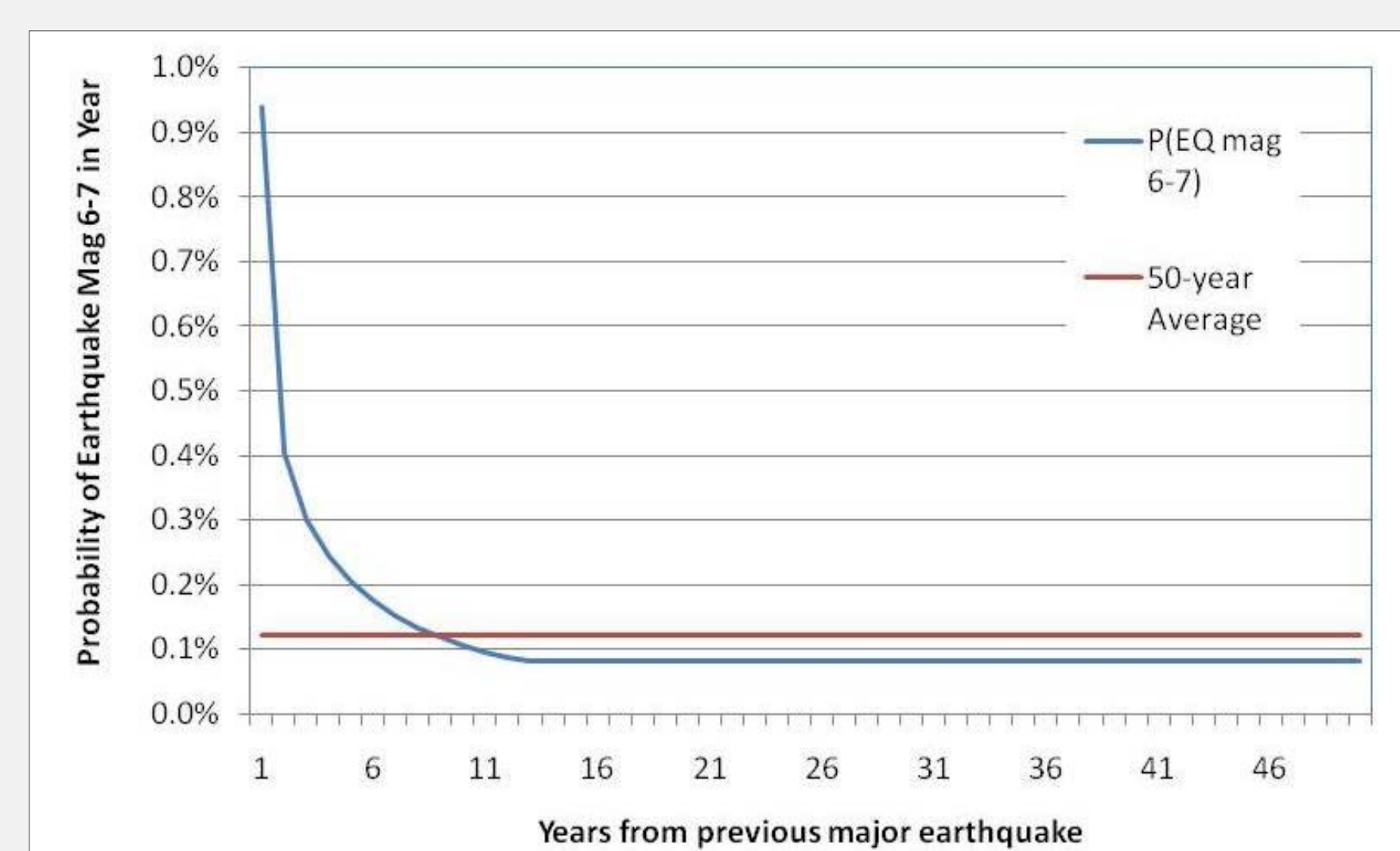
### Hazard mitigation options

Since December 2012, owners of Port Hills properties who have received a red zone offer from the Crown may apply to the Council to erect a private rockfall protection structure and may be eligible for funding. Council staff are also looking into the viability of community-based rockfall protection structures.

For information on rockfall protection structures visit [www.ccc.govt.nz/porthillsgeotech](http://www.ccc.govt.nz/porthillsgeotech)

### What next?

The probability of a large earthquake happening drops sharply in the five years following a major quake. It then falls slowly over many decades. However, another major earthquake would change the modelled probability and increase the risk associated with slope instability hazards.



A graph showing the projected decline in seismicity following a major earthquake.

## Land instability and the District Plan Review

The current Christchurch City Plan and Banks Peninsula District Plans were prepared in the 1990s, with some changes made over the years. We have new knowledge about slope hazards and their associated risk gained over the last three years that is being included in the current District Plan Review.

### What is the approach being proposed for Port Hills areas as part of the District Plan Review?

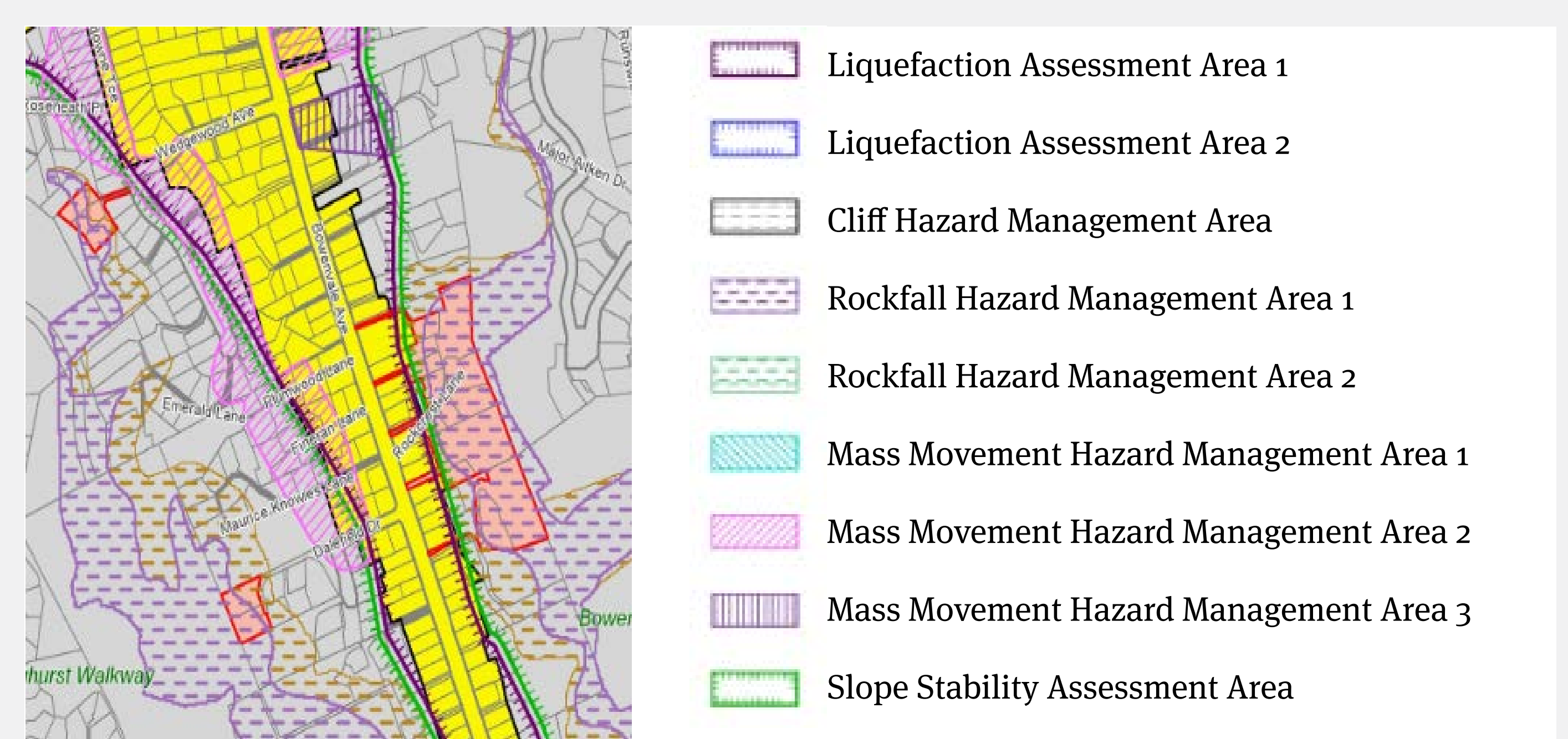
Subdivision and development will be avoided in those areas of the Port Hills where the risk to life-safety from slope instability hazards is assessed as intolerable and controlled where this risk is assessed as tolerable.

In these areas, most development will need resource consent approval, but in areas vulnerable to cliff collapse or catastrophic mass movement some activities will be prohibited.

If a subdivision is being proposed in other hillside areas, the Council will consider if slope instability hazards are present at the time.

### Mapping the hazards

Planning maps have been prepared of the natural hazards on the Port Hills. In some areas, multiple hazards will be managed. Here is an example:



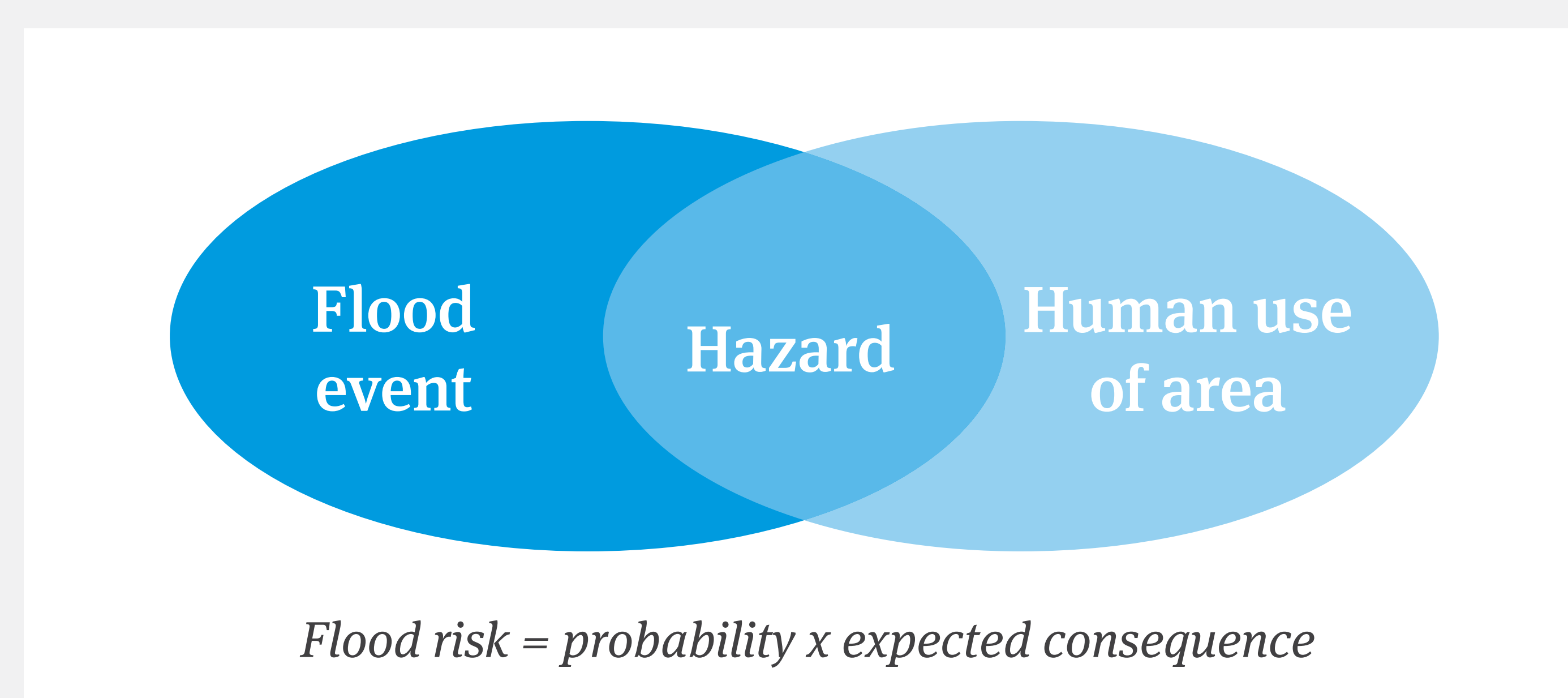
District Plan Review: for the latest information on this programme please go to [www.ccc.govt.nz/districtplanreview](http://www.ccc.govt.nz/districtplanreview) and to [www.futurechristchurch.co.nz](http://www.futurechristchurch.co.nz) for online dialogue.

# Our changing environment

– the risks and challenges of living with natural hazards

## Flood risk in Christchurch

*What is flood hazard and flood risk?*



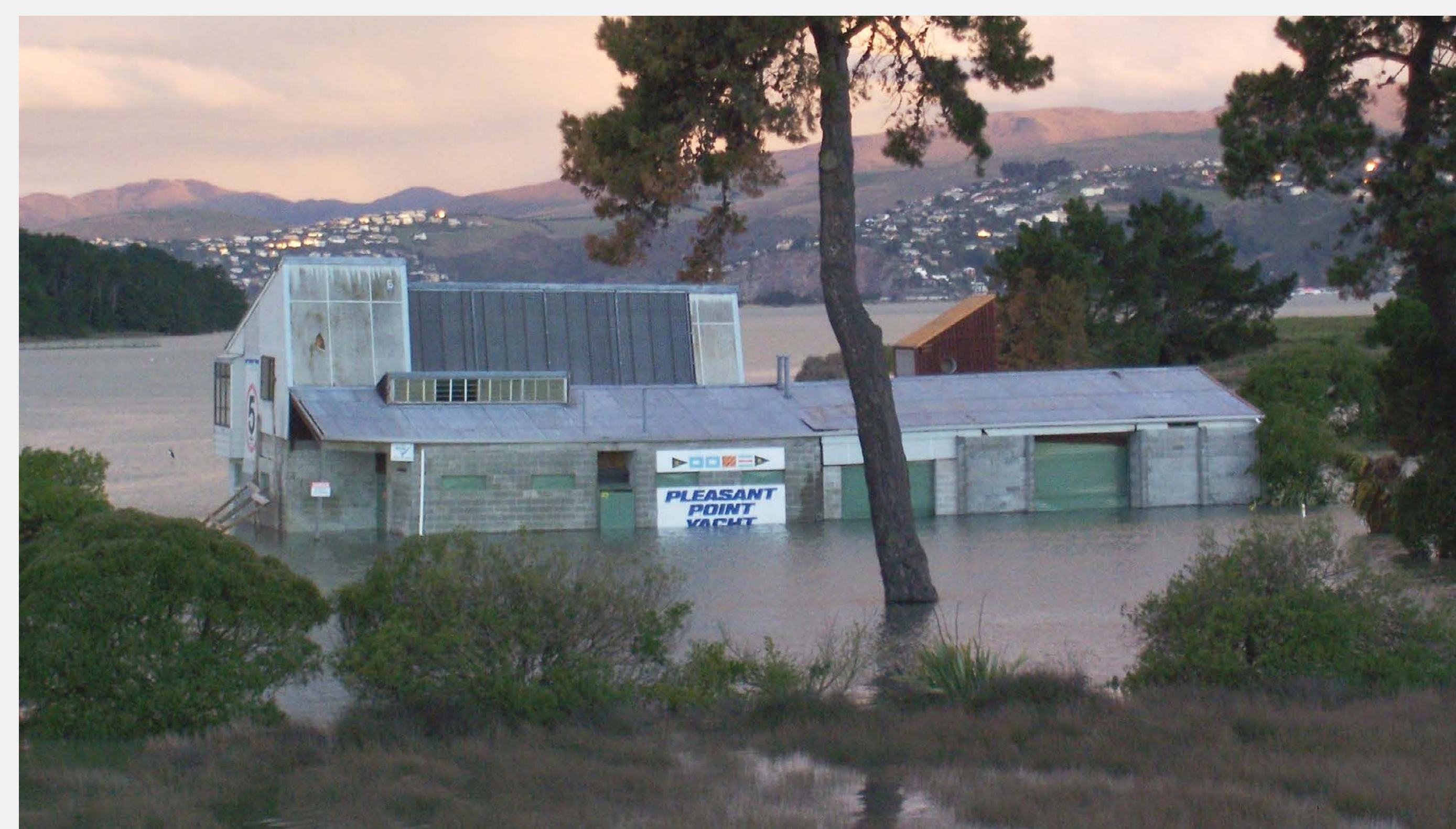
### Flood sources

Flooding has been a problem in Christchurch from the very beginning of the city's development. This is from three main sources:

- Ponding in low-lying areas
- Rivers
- High tides

### Environmental changes

Environmental changes such as those that happen as a result of urban development, sea level rise and earthquakes, have had an effect on the frequency and severity of flooding. This has affected some areas of the city more than others.



High tide at Pleasant Point Yacht Club New Brighton following the 22 February 2011 earthquake.

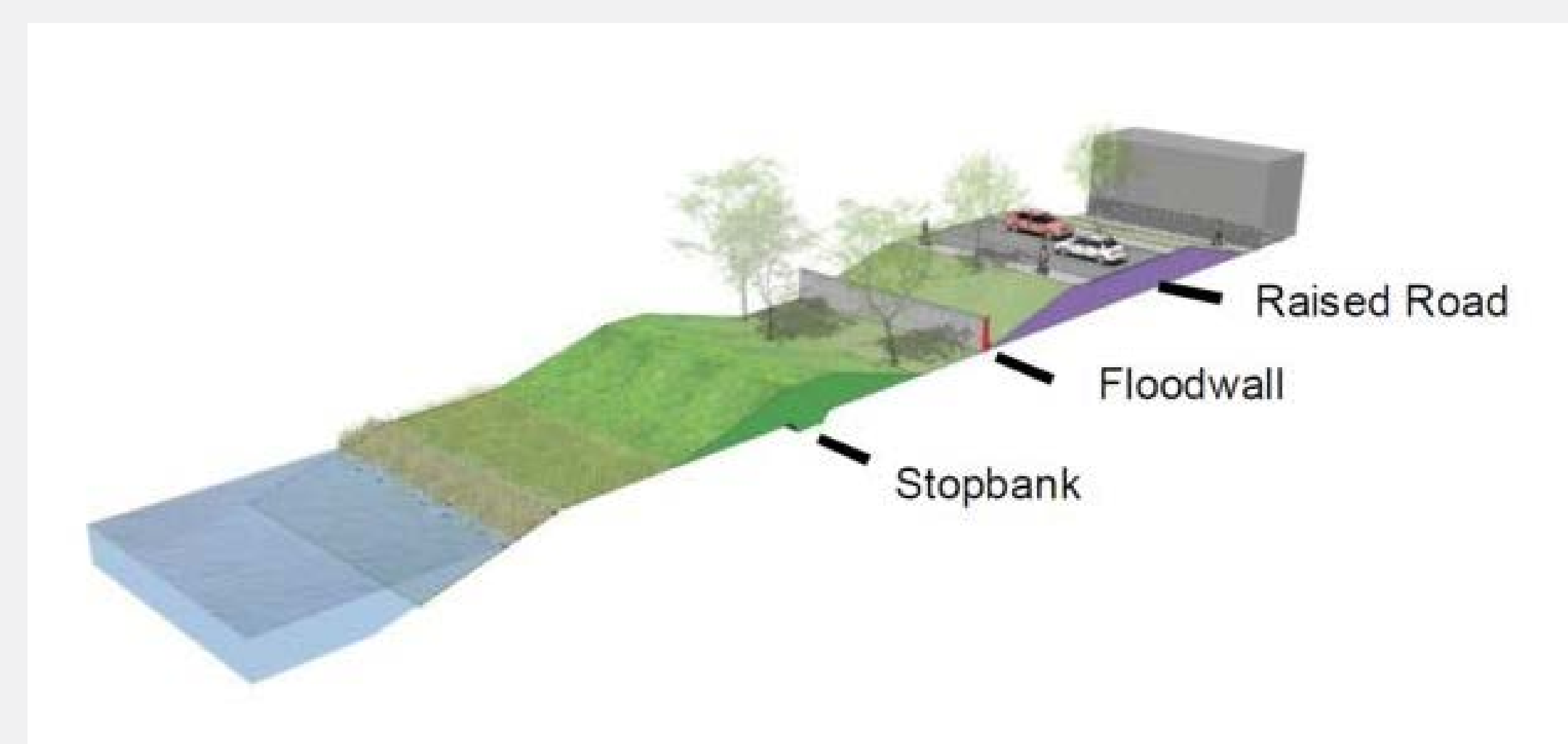
## Land Drainage Recovery Programme

In 2011, the Christchurch City Council developed the Land Drainage Recovery Programme with the goal of evaluating and understanding the consequences of the earthquake series on Christchurch's land drainage network.

The programme involves six values – drainage, ecology, recreation, cultural, landscape, and heritage. It also includes assessments, hydraulic modelling and engineering.



An artist's illustration of a recovered network. The desired outcome of the Land Drainage Recovery Programme is to return the network to a pre-earthquake level of service.



An example of optional flood mitigation measures.

## Planning: Why have land use rules?

Flood hazard planning rules are designed to prevent loss of life, damage to property and a reduction in value of private land.

# Our changing environment

– the risks and challenges of living with natural hazards

## Flood Management Areas

The Regional Policy Statement (RPS) – sets the framework for resource management in Canterbury. Its policy and methods aim to protect properties against natural hazards such as flooding events. The District Plan gives effect to the RPS and is focused on the city and Banks Peninsula (the district). It provides guidance and rules to manage activities and development in the district.

Flood Management Areas were identified in Christchurch before the earthquakes as areas that are particularly prone to flooding from major tidal or rainfall events. Many of these areas are also vulnerable to the effects of the predicted rise in sea level. Across the city, the Building Act requires the floor levels of new builds to be above a one-in-50-year flooding event.

The current District Plan, and its rules around flood management, only look at certain areas of the city, such as those near rivers. The District Plan Review is underway now and proposes to extend the Flood Management Areas for the one-in-200-year flooding event for all likely flood affected areas across the city.



Spreydon Cinema 1968.

For more information visit [www.ccc.govt.nz/floorlevels](http://www.ccc.govt.nz/floorlevels)

## Other useful websites

### Resilient communities

A new community-driven questions-and-answers based service  
[www.intheknow.org.nz](http://www.intheknow.org.nz)

[www.futurechristchurch.co.nz/smart-building/100-resilient-cities-network](http://www.futurechristchurch.co.nz/smart-building/100-resilient-cities-network)

<http://100resilientcities.rockefellerfoundation.org/>

### EQC

[www.eqc.govt.nz/canterbury-earthquakes/land-claims/flat-land/increased-risk-of-flooding](http://www.eqc.govt.nz/canterbury-earthquakes/land-claims/flat-land/increased-risk-of-flooding)

[www.eqc.govt.nz/canterbury-earthquakes/progress-updates/canterbury-faqs](http://www.eqc.govt.nz/canterbury-earthquakes/progress-updates/canterbury-faqs)

## Evaluating flood risk

The Council maps the Flood Management Areas following detailed modelling and evaluation of the risks.



Heathcote flooding map: showing areas of possible flooding.

## Risks and challenges of living with natural hazards

### Risk is addressed through:

- Network upgrades
- Engineered structures
- Operations and maintenance
- Adaptation through planning rules

### For instance:

- Specifying higher floor levels prevents buildings from being inundated by flood events
- Prevention of development in natural ponding areas is necessary to provide storage of stormwater and stop flooding downstream
- Prevention of land raising or filling in the floodplain is important for similar reasons, as it pushes floodwaters onto other residents
- Requiring setbacks from waterways

## ‘High hazard’ areas

Some areas in Christchurch are ‘high hazard’, as defined by Environment Canterbury. These are where water will be extra deep or swift in a one-in-500-year event, or where there will be coastal erosion or sea level rise in the next 100 years. These areas require additional consideration under the District Plan.



Corner of Colombo and Tennyson streets 19 May 1945.

# Our changing environment

– the risks and challenges of living with natural hazards

## We all have a part to play

As we've seen over the past three years in Christchurch, natural hazards impact on all of us. And individuals and communities have important roles in planning how we respond to these events. Working together to create resilient communities is going to be critical in meeting the challenges we face from our changing environment.

## So what can you do?

### Grow your understanding, have your say

Take the opportunity to build your knowledge on natural hazards, and what's being proposed to help manage them.

Information seminars and forums on these topics are held regularly by the Council, CERA, the University of Canterbury, and various other groups. So keep any eye out for these.

As the Council drafts the new district plan, we need to understand what's important to Christchurch people. Be part of the conversation by heading to one of the community drop in sessions or presentations around the city, or online at [www.ccc.govt.nz/districtplanreview](http://www.ccc.govt.nz/districtplanreview)



## Prepare yourself and your family

Make sure you have a household emergency plan, and an emergency supply kit. Having these things in place will help you respond safely, and quickly, should disaster happen.

Check out [www.getthru.govt.nz](http://www.getthru.govt.nz) for comprehensive information and checklists to help you be well prepared.



# Our changing environment

– the risks and challenges of living with natural hazards

## The District Plan and natural hazards

### The District Plan:

- Affects what you can do with your property and land.
- Provides objectives, policies and rules to achieve sustainable land use of the district.
- Includes zoning of land throughout the district, including use of overlays.
- Generally allows for activities compatible with the zone to occur without need to obtain resource consents (permitted activities).

### What we have now:

- Neither the City Plan nor Banks Peninsula District Plan have a clear focus on natural hazards.
- Flood Management Areas – primarily alongside main river systems.
- Very little reference to liquefaction.

### What we are considering:

#### Objectives:

- Reduced risk from the effects of natural hazards.
- Increased public awareness of range and scale of natural hazards.
- Facilitate repair of earthquake damaged land.

### Policies:

- General policies, specific flooding and liquefaction policies.
- Draft proposed flooding policies include:
  - Avoid development in high hazard areas.
  - Mitigate flood damage in areas affected by major flood events by raising floor levels.
  - Continue to protect capacity of flood ponding areas and our stopbank system.

### Get involved

District plan changes touch on the lives and futures of everyone across the city and Banks Peninsula. We'd like to understand what's important to Christchurch people about the district plan.

District Plan Review: for the latest information on this programme please go to [www.ccc.govt.nz/districtplanreview](http://www.ccc.govt.nz/districtplanreview) and to [www.futurechristchurch.co.nz](http://www.futurechristchurch.co.nz) for online dialogue.

