

There are flooding issues in Makara resulting from unrestricted development and the amount of increased impermeable surface area, hence increasing stormwater runoff. This runoff may lead to increased low land flooding and the erosion of sediments.

## 6.6 Stormwater Risks

A comprehensive Risk Management Plan for the stormwater asset covering statutory compliance, property safety, capacity, future stormwater quality issues, service reliability and responsiveness to customer issues was implemented in July 2002. It also formulated controls and procedures to deal with these risks.

Council is aware that the buried infrastructure has inherent risks associated with it. However it is not just the buried infrastructure as there are risks associated with anything dependent on natural events, such as earthquakes and rainfall.

To mitigate the risk of a decreased level of service associated with a natural event an Emergency Management Plan including a response plan is in place for natural events whose timing is unknown such as storms and earthquakes. In most cases the normal procedure to service fault notifications will cope with rain, overflowing pipes and other events.

These above documents all interrelate to mitigate risk possibilities associated with unexpected situations which could affect the stormwater system

### 6.6.1 Water quality risks

Recreational Water Quality and Public Health Risks	Level of Risk
Enterococci levels can be elevated above contact recreation standards after significant rainfall events	Moderate
Illness due to contact with contaminated stormwater or receiving waters	Low
Loss of access to recreational bathing areas due to poor water quality	Moderate
Consumption of contaminated shellfish	Moderate

The risk to public health through contact with contaminated stormwater is being responded to by:

- Continuing studying the effects of contaminants, especially heavy metals, on the environment. The recently completed BAEE of stormwater discharges to the Harbour and South Coast indicates that more work is required.
- A close working relationship with GWRC staff to determine the actual effects and best solutions to comply with the RMA 1991. Being aware of current national and international information and trends regarding testing, effects and solutions to environmental matters.
- Regular water quality monitoring and compliance with relevant MfE and Public Health guidelines on notification and sampling requirements

Drinking Water Quality	Level of Risk
Treatment and disposal of stormwater poses a risk from contaminated run-off discharging into streams which may be a downstream water supply	Moderate

The presence of heavy metals and other contaminants is documented, but the dominant sources, effects of these and possible solutions are not known at this stage. Investigation is proceeding both by this Council and other agencies.

### 6.6.2 Flooding

Flooding	Level of Risk
Risk of house flooding and the consequential effects	High
Wastewater contamination from overflows	Moderate
Decrease in standard of living due to constant flooding	Moderate
Risk from raging and contaminated floodwaters	Moderate

The risks of flooding are being mitigated in the following ways;

Council adopted a Flood Protection Strategy in May 1993. This outlined a procedure for assessing the deficiencies of the drainage system and dealing with flooding.

The strategy has two levels of flood protection as intervention levels for works:

- A base level which defines an unacceptable level of flood protection and should be corrected in the short term.
- An intermediate level of flooding problems that can be tolerated in the short term but should be targeted for longer term upgrading.

Existing stormwater flooding and the effects of infill housing are dealt with in accordance with the Flood Protection Strategy and prioritised for funding. Localised stormwater capacity issues that are not covered by a Catchment Management Plan will need to be investigated as a basis for managing any future changes.

Upgrade works to decrease flooding risk or improve stormwater quality and include:

- the construction of a new pipe
- the increase in size of an existing pipe
- the construction of new devices such as rain gardens, sand filters, wetlands.
- the construction of attenuation facilities and other non-pipe solutions.

The Drainage Rehabilitation Strategy identifies drains that are defined as ‘critical’. Council has a Critical Drains Policy to deal with ongoing risks of failure to the stormwater asset and reduction in service levels. “Critical Drains” are those where the consequences of failure of the drains for public safety, cost and social disruption.

Council risks a civil claim for negligence or nuisance out of damage or loss caused by flooding. Although it is uncertain how the courts would view Council’s liability to such claims, Council could be found liable for damages where it had created or exacerbated flooding problems by continuing to approve land development, when it was aware a problem existed. A suitably funded and rationally prioritised works programme (encompassed in the stormwater AMP) would be a prerequisite to any successful defence against such charges.

Environmental Consequences	Level of Risk
Deterioration in biodiversity	Moderate
Loss of habitat	Moderate
Erosion from overland flow	Moderate

Work is being carried out across a number of Council units to determine how staff can best apply the principles in “Wet and Wild”.

The erosion risk is being mitigated by

- Building Standards and the Earthworks Bylaw
- Liquid Waste Management Plan which has an objective to decrease the quantity of sediment and silt reaching waterways to a level acceptable to GWRC
- GWRC research.

Risks attributable to the absence of stormwater services	Level of Risk
Flooding	Low
Sediment erosion	Low

## 6.7 The Future and Risk Mitigation

### 6.7.1 Water Quality

Wellington Harbour stormwater contamination project

The most significant medium to long-term impact of urban stormwater discharges on the Wellington Harbour environment is the accumulation of stormwater-related contaminants in the sediments. This is because the contaminants can, over time, build up to concentrations that are toxic to sediment-dwelling organisms.