# STORMWATER PLAN 2012 - 2017

capacity infrastructure services

HUTT CITY TE AWA KAIRANGI

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# SECTION 1: INTRODUCTION

Hutt City sits on a natural flood plain, and because of its natural topography is considered a high flood risk area. Major flooding events (such as the floods of 1976 and 2004) are infrequent, but can cost millions of dollars in damage and disrupt the city's residents and businesses. As a result, stormwater management is a core part of city management.

Hutt City Council (or simply 'Council') operates an extensive network of stormwater sumps, drains, pumps, stopbanks, catchpits, and open waterways to help mitigate the risk of flooding. Without these assets and other controls, flooding would be much more frequent. The contribution effective flooding and stormwater management makes to our city's economy, wellbeing and environment cannot be overstated. The network helps protect over 100,000 people and some $6 billion in assets.

While an extensive stormwater network is crucial, adequate protection by the network is not practical and economically achievable in all cases. In these cases, land use planning and controls on development can be used to lessen the impact of stormwater by reducing the amount of stormwater produced, or by lowering the risk to developments in susceptible areas.

Both development and our stormwater system can also have an impact on the natural environment – particularly the quality and life-giving capability of natural waterways. As the community's environmental awareness grows, such concerns are becoming an increasingly important aspect of stormwater management.

## The purpose of this plan

The purpose of this plan is to set out the principal stormwater issues facing Hutt City, and to outline the actions Council and Capacity undertake or intend to undertake for managing these now and in the future. These actions are focused on policies, practices and investigations needed at a city wide level as well as some specific works required.

Most of these actions are wholly or partially in place at present, reflecting the longstanding investment and expertise that Council and Capacity have put into stormwater management over the years. This plan reaffirms the role and importance of these actions. There are some areas where further work can be undertaken to improve stormwater management. These are identified and prioritised for development.

### *Who is Capacity?*

*Capacity Infrastructure Services Ltd. (Capacity) is a council controlled trading organisation owned by Wellington City Council and Hutt City Council. Capacity manages Hutt City's water, wastewater and stormwater network on Hutt City Council's behalf, although ownership of the assets remains with Council.*

The plan should be viewed as a document intended to help guide decision making. It does not:

- Replace or supersede any statutory management or reporting document such as Council's Long Term Plan, Hutt River Flood Management Plan, Stormwater Asset Management Plan, or the District Plan.
- Pre-emptively commit Council to any agency, organisation or person, or to expenditure beyond that already committed, without the need for formal consultation and adoption.

The plan also outlines the Council commitment to improving stormwater management from its own assets and developments, helping model best practice in the city.

## What is stormwater?

Stormwater is water that originates from rain or storms. Stormwater that does not soak into the ground becomes surface water, which either flows directly into waterways (such as streams and rivers) or is channelled into the stormwater network, which eventually flows into waterways. In extreme weather, rivers and streams and the stormwater network can carry very high volumes of water, and in some cases, the amount of water exceeds the capacity of the network or receiving waters, causing flooding.

## The challenge

From the perspective of stormwater management, Hutt City comprises three geographically separate areas; the Hutt Valley (including Stokes Valley); the Eastern Bays; and Wainuiomata. The Hutt Valley is surrounded by steep hillsides which have been developed in some areas, and is drained by the Hutt River which passes through the centre of the city. Throughout its recorded history the Hutt River has been the source of many large floods. The Eastern Bays area backs onto steep hillsides and fronts onto Wellington Harbour. Wainuiomata comprises several valleys surrounded by steep hillsides. It has a network of streams and drains which flow into the Wainuiomata River.

Urban areas of Hutt City are serviced by a reticulated stormwater system comprising a network of pipes, pumping stations and channels which discharge into open drains and watercourses at many locations across the city.

*The Hutt Valley is the most densely populated floodplain in New Zealand*

The Hutt City stormwater system has a finite capacity and will become overloaded when this capacity is exceeded. The capacity of the Hutt City stormwater system met accepted standards for urban stormwater systems when it was constructed. Standards for stormwater protection have since increased. In addition, the level of protection provided by the original stormwater systems has been eroded by changes in global weather patterns due to climate change and development in the city, which has increased the amount of impervious surface area, thereby creating more stormwater runoff.

During severe rainfall, runoff from steep hillsides can contain large amounts of debris which can choke stormwater intakes and stormwater drains. The capacity of watercourses may be exceeded leading to stream banks being overtopped and necessitating pumping stations in some low lying areas. Accumulations of sand on beaches can restrict the ability of stormwater drains to discharge.

Stormwater runoff from urban areas typically contains a range of contaminants washed from roofs, roads and other surfaces which can adversely affect the quality of water in receiving watercourses.

Although most of Hutt City is urban in nature there are several rural areas at the outskirts of Wainuiomata, the Western Hills of the Hutt Valley and Eastbourne. In undeveloped areas of Hutt City stormwater is generally disposed of to land or to watercourses.

## Activity Risk Management Plan

This plan does not address risks to the stormwater system from earthquakes and other natural disasters.  These risks are dealt with in Capacity's Activity Risk Management Plan. For example, a large seismic event would have a major effect on the stormwater system due to pipe rupture, grading problems with pipelines, and clogging of pipelines due to liquefaction.

*Construction of the Opahu Stormwater Pump Station (2006)*

# SECTION 2: STORMWATER MANAGEMENT IN HUTT CITY

## Responsibility for managing stormwater

Hutt City Council, Greater Wellington Regional Council, property owners and the general community all have responsibilities relating to the management of stormwater in Hutt City.

<table>
<tr><th>HUTT CITY COUNCIL</th><th>GREATER WELLINGTON</th><th>PROPERTY OWNERS</th><th>GENERAL COMMUNITY</th></tr>
<tr><td>Overall responsibility for managing the effects of stormwater runoff in Hutt City. This includes setting stormwater policy, service standards and ensuring required outcomes are achieved as efficiently as possible.</td><td>Responsible for managing major watercourses throughout the Wellington region including the Hutt River, the Wainuiomata River, the Waiwhetu Stream (from below Naenae) and the lower section of the Stokes Valley Stream.</td><td>Responsible for the private stormwater drainage systems servicing their property. This includes repairs, maintenance and improvements necessary to maintain the effective disposal of stormwater from their property. For example, ensuring that gutter pipes do not flow into wastewater gully traps.</td><td rowspan="4">Responsible for ensuring that they do not discharge contaminants to watercourses or stormwater drains or allow contaminants for which they are responsible to enter watercourses or stormwater drains. If it goes down a stormwater drain, it will end up in our rivers or harbour.</td></tr>
<tr><td>Responsibility for managing the public stormwater system. This comprises the piped stormwater network, open public drains and some watercourses.</td><td rowspan="3">Regulatory and environmental monitoring role under the Resource Management Act 1991 which includes considering the effects of discharges of stormwater to the environment and works that may affect watercourses. Also have role in influencing regional stormwater management through their Regional Policy Statement (RPS).</td><td>Responsible for maintaining private watercourses where they pass through their property.</td></tr>
<tr><td>Regulatory role under the Building Act 2004 and Resource Management Act 1991 which includes ensuring buildings meet flood protection standards and that private drainage systems comply with requirements specified in the New Zealand Building Code. Also responsible for managing consents for private drainage works.</td><td>Responsible for ensuring contaminants from their property do not enter the stormwater system.</td></tr>
<tr><td>Under the District Plan, Council can also control land use which can help minimise the impact of stormwater on the city, and the amount of stormwater generated.</td><td></td><td></td></tr>
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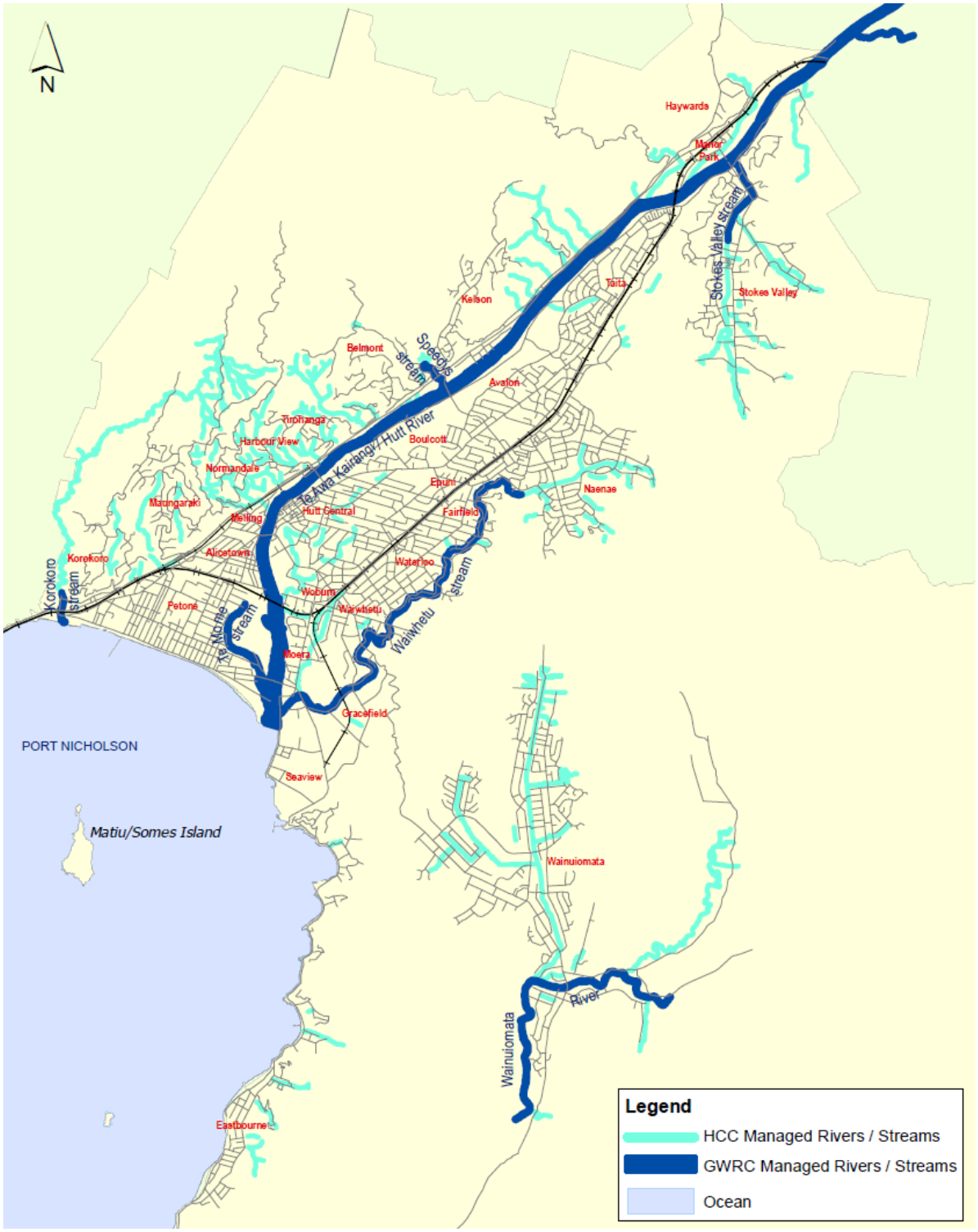
## Hutt City Council and Greater Wellington together

Hutt City Council and Greater Wellington are responsible for much of the stormwater and flood management within Hutt City. Their respective roles are quite different however. Greater Wellington's role is to manage the major water courses, as highlighted below, including managing the risk of flooding from these. Council is responsible for managing surface water everywhere else in the city. This includes the land area of the city and the city's many small water courses.



## How stormwater is managed in Hutt City

Hutt City's stormwater management programmes contain a balance of measures to achieve our stormwater management objectives. These include both structural and non-structural measures:

| | |
|---|---|
| **Non Structural measures** | Planning and building controls such as restrictions on building in high flood risk areas and minimum floor heights for buildings. |
| | Public education programmes intended to minimise the entry of pollutants to the stormwater system and a variety of traps in the stormwater system designed to reduce the quantities of debris that can be conveyed in the stormwater drains and discharged into watercourses. |
| **Structural measures** | A network of pipes, pumping stations, catchpits, and channels which discharge into open drains and watercourses at many locations across the city. This is known as the **primary stormwater system**. |
| | Stormwater flow paths which have been provided in some areas to safely accommodate floodwaters when the primary stormwater system is overloaded. This is known as the **secondary stormwater system**. |

### Non-structural measures

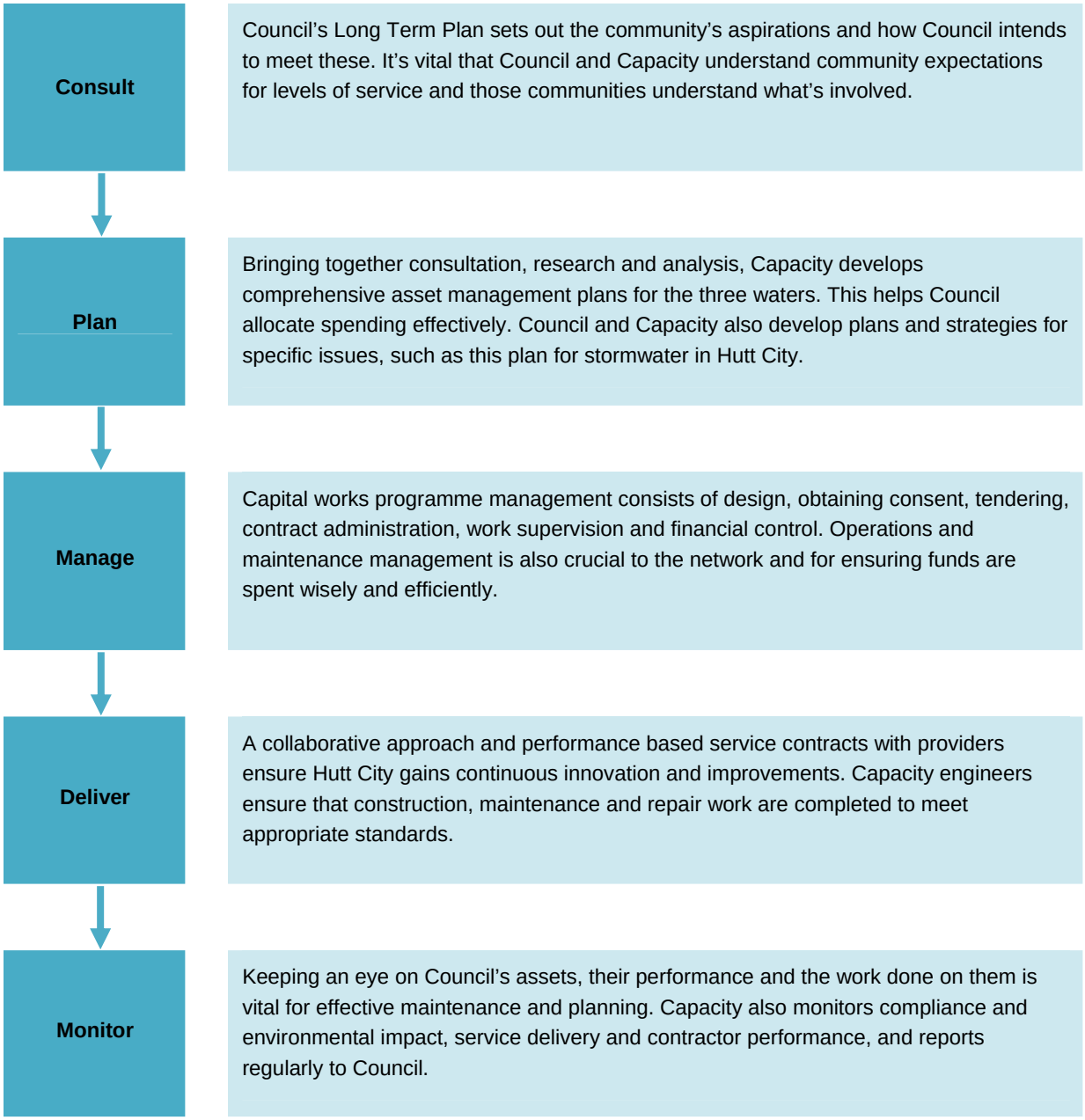
Stormwater runoff is most effectively managed through a combination of structural measures (such as stormwater drains) and non-structural measures (such as planning controls, building controls, and support and information for the community).

The balance between structural and non-structural measures will significantly affect the extent of stormwater infrastructure required and costs to the community to achieve an acceptable level of stormwater protection. A substantially more extensive stormwater infrastructure is required in the absence of effective non-structural measures. For example, an extraordinary level of infrastructure is likely to be required to protect houses built at low levels in high flood risk areas from being flooded. Consequently, in some situations protection via structural solutions is unlikely to be practically and economically achievable. For these reasons, a greater emphasis on non-structural stormwater measures is needed in the future.

### Structural measures

Hutt City's stormwater infrastructure is largely managed by Capacity on Council's behalf. Capacity takes an integrated infrastructure management approach to all three waters (potable water, wastewater, and stormwater). Integrated infrastructure management delivers efficient and effective planning, management and maintenance – reducing overall costs.

**Key aspects of integrated infrastructure management**



## Hutt City Council Developments

While Council (and Capacity) is responsible for managing the existing stormwater systems and risks across the city, Council also has an important role in leading best practice for stormwater management.

Council's roading, berms, reserves, parks and gardens, and property assets make up a significant part of the city. Development and more often, redevelopment, of these assets over time presents Council with an opportunity to consider stormwater management more holistically. By managing stormwater at or close to its source, Council can help moderate stormwater flows and improve stormwater quality.

There is a range of soft infrastructure and low impact design measures that can be undertaken to help achieve this including rain gardens, swales, and pervious paving surfaces that increase rainfall infiltration and groundwater recharge and rain water capture and use. Such approaches have potentially large environmental benefits and in many cases, may have negative net costs.

Council's commitment to low impact design will form part its approach to development and redevelopments across its various asset classes - property, parks, reserves, roads and urban public space. Low impact measures will be explored as part of investigation and design, and will be pursued where viable. Incorporating this commitment into existing capital projects, rather than undertaking a separate stream of works, increases the scope for such measures to be realised on a wide scale across the city in the long term.

*Stormwater outlet in native bush*

# SECTION 3: STORMWATER MANAGEMENT OBJECTIVES

| SERVICE CATEGORY | SERVICE ASPECT | STORMWATER MANAGEMENT OBJECTIVE |
|---|---|---|
| **Service quality** | Effectiveness | To minimise the effects of flooding |
| | Reliability | To provide for the reliable disposal of stormwater |
| **Customer focus** | Customer satisfaction | To achieve a relatively high overall level of customer approval of the stormwater service |
| | Responsiveness | To respond promptly to requests for service for the stormwater network |
| **Cost effectiveness** | Operating efficiency | To provide a cost effective stormwater service |
| | Management efficiency | |
| **Environmental performance** | To manage stormwater in an environmentally sensitive manner | To maintain and promote appropriate standards of water quality and waterway health in the city's coastal and river environments |
| | Resource consent compliance | To minimise adverse effects on the environment |
| **Legal compliance** | Legislative compliance | To comply with relevant legislation |
| | | Full compliance with the Health and Safety in Employment Act 1992 |
| **Integrated planning** | Susceptibility of development to stormwater risks, and impact of new development on stormwater flows | To reduce stormwater and flooding risk to new development |
| | | To reduce amount of stormwater produced by development |

# SECTION 4: ISSUES AND ACTIONS

This section lays out the key stormwater issues facing Hutt City and what Council and Capacity are doing or intend to do about them. Most of these issues are concerned with risks associated with either:

- Stormwater and associated flooding
- Development in the city
- Managing stormwater (such as cost or environmental impacts).

The issues are ordered according to whether the issue presents a high, moderate, or low risk to Hutt City. The status of an action indicates how well progressed the action are. The status descriptions used and what they mean are listed below.

| STATUS | MEANING |
|---|---|
| **In place** | Practice or policy is documented and forms part of the business as usual approach to management or initiative has been fully implemented. |
| **In progress** | Practice or policy is in place and is in the process of becoming the business as usual approach to management or the initiative is partway through implementation. |
| **Proposed** | New practice, policy, or initiative is proposed. |

Many of the actions captured in this plan are already in place. However, there are 14 actions that are only “in progress” and a further seven actions that are “proposed”, and therefore not in place at all. These actions will be progressed according to a risk assessment, and as Council funding permits. Actions that address high-risk issues will be progressed before those that relate to medium-risk issues.

## High Risk Issues

### 1. Flooding from rivers and streams combined with stormwater flooding

The single biggest flood risk facing Hutt City is that posed by the city’s rivers – The Hutt and the Waiwhetu in particular, but also the Awamutu, Black Creek in Wainuiomata, and the Opahu stream. When combined with an over-loaded stormwater system, the severity of this river flooding is intensified. Greater Wellington has estimated that a large flood in the Hutt River that breached the stopbank system could have a financial cost in excess of one billion dollars. This risk is being addressed through a programme of works implemented as part of the Hutt River Floodplain Management Plan.

| ACTIONS | STATUS |
|---|---|
| Support ongoing implementation of the Hutt River Floodplain Management Plan by Greater Wellington. | **In place** |
| Upgrade Council stormwater drains in the vicinity of Greater Wellington's upgrading works, in conjunction with Greater Wellington. | **In place** |
| Support the development of the Waiwhetu Floodplain Management Plan by Greater Wellington. | **In place** |
| Identify and undertake flood improvements in the Awamutu stream, Black Creek, and Opahu stream. | **In progress** |
| Where adequate information has been provided by third parties, ensure that Council is consistent with the various planning controls and policies which are intended to control development in flood-prone areas; especially those provided for in the District Plan, Regional Policy Statement, and Regional Freshwater Plan for the Wellington Region. | **In place** |

### 2. Lack of secondary stormwater flow paths

**Secondary stormwater flow paths** (the secondary stormwater system) are planned flow paths which are intended to safely convey floodwaters when the primary stormwater system is overloaded. The provision of secondary stormwater systems was not common practice in New Zealand at the time most urban development in Hutt City occurred.

| ACTIONS | STATUS |
|---|---|
| Require secondary stormwater flow paths to be provided in new greenfield developments. | **In place** |
| Reflect risks associated with adequacy of secondary stormwater flow paths in the capacity provided in primary stormwater drains when they are replaced / upgraded. | **In place** |
| Investigate a programme for transferring recorded information into a mapped and easy-to-view form, regarding properties susceptible to secondary stormwater flows. | **In progress** |

### 3. Flood risks not adequately taken into account in building design and construction

There are buildings in Hutt City which have been designed and constructed with little regard to flood risks (for example buildings built at low levels in the floodplains of watercourses or in the line of floodwater flows). An essential part of cost effective flood protection is to consider the flood risk to new developments and buildings at the design stage, as it is costly and impractical to later increase the capability of the stormwater system in order to protect buildings.

| ACTIONS | STATUS |
|---|---|
| Require new residential subdivisions to comply with the District Plan requirement that the level of stormwater protection meet a 100 year Annual Return Interval (ARI) minimum standard. | **In place** |
| Encourage existing developments to meet the recommended standard of a 100 year ARI, rather than the minimum standard of a 50 year ARI. | **In progress** |
| Require all consent applications for buildings in flood hazard areas (as denoted by the District Plan) to specify a proposed level of protection against flooding. This may include sites having floor levels constructed above the 1 in 100-year flood event level, and maximum limits on the scale of additions to existing buildings within the 100-year flood extent area. | **Proposed** |

### 4. Blockage of stormwater intakes in gullies

Stormwater intakes are often situated at the base of gullies. Much of Hutt City is surrounded by steep undeveloped hillsides which can convey large quantities of debris into stormwater intakes during severe storms, leading to blockages and overland flows of floodwaters.

| ACTIONS | STATUS |
|---|---|
| Require a risk assessment to be carried out as part of the design of all new stormwater intakes with the design of the intake to reflect the assessed risk. | **In place** |
| Require secondary stormwater flowpaths that take account of intake blockages to be provided in new greenfield developments. | **In place** |
| Carry out a risk assessment of all stormwater intakes as a basis for determining the need for upgrading. | **In progress** |
| Inspection and maintenance programmes for Council stormwater intakes to reflect the likelihood and consequence of blockage. | **In progress** |

### 5. High costs of flood protection

There are high costs associated with flood protection which increase steeply as additional capacity is provided in the stormwater infrastructure. The issue is balancing the level of protection provided with the risk and estimated cost of flood damage, with costs of providing higher levels of protection, with other demands for Council expenditure, with community expectations, and with what the community is prepared to pay.

| ACTIONS | STATUS |
|---|---|
| Carry out assessment of options for capital works to ensure the best option is selected. | **In place** |
| Subject operations and maintenance works to competitive tender. | **In place** |
| Subject capital works to competitive tender. | **In place** |
| Implement non-structural flood protection options where practical. | **In place** |

### 6. Early obsolescence of infrastructure

The capacity of the stormwater infrastructure is “locked in” at the time it is constructed. Providing additional capacity (such as installing larger pipes) replaces existing infrastructure which would otherwise have many years of life remaining.

| ACTIONS | STATUS |
|---|---|
| Use both condition and flood risk in assessing priorities for pipeline replacement recognising this will result in the replacement of some pipelines that are still in good condition. | **In place** |

### 7. Capacity of major drains in some areas

There are some areas of Hutt City where the major stormwater drains become overloaded during severe rainfall. Localised upgrading of the stormwater drains will not produce significant improvements unless greater capacity is also provided in the major drains which convey stormwater from these areas to receiving watercourses.

| ACTIONS | STATUS |
|---|---|
| Include preferred upgrading options in draft capital works programme for consideration relative to other capital works priorities. | **In place** |
| Carry out a flood risk assessment of areas where there is insufficient capacity in major drains. | **In progress** |

### 8. Environmental effects from stormwater contamination

Stormwater runoff (in particular the “first flush” of stormwater runoff following a dry period) may contain contaminants. These can include sediments, oils, greases, metals and organic material washed from roads and other impervious areas, together with rubbish and contaminants illegally discharged into the stormwater system. Contamination of stormwater can also arise from overflows from the wastewater system (generally due to wet weather overloading of the wastewater system). Contaminants entering the stormwater system subsequently discharge into receiving watercourses.

Council acknowledges that Greater Wellington is currently undertaking a **Regional Plan Review** which may impact on stormwater monitoring requirements, and consequently Council’s monitoring practice in the future.

| ACTIONS | STATUS |
|---|---|
| Incorporate debris traps in street sumps. | **In place** |
| Programmes for cleaning of street channels and street sumps. | **In place** |
| Programme to reduce wet weather overflows from the wastewater system. | **In place** |
| Ongoing investigation on a regional basis into practical measures to further reduce stormwater contamination. | **In place** |
| Council Trade Waste officers carry out audits at business sites (as part of discharge consent monitoring) to identify and remedy risks to sewer and stormwater. | **In place** |
| Provide information to the community on reducing stormwater contamination. | **In progress** |

### 9. Capacity of watercourses constrained by private developments

The capacity of some watercourses has been restricted by developments such as landscaping, filling of floodplains and fencing in private property. This has created constrictions to the stream flow and reduced the area available for accommodating floodwaters.

| ACTIONS | STATUS |
|---|---|
| Owners with watercourses passing through their property will be issued information setting out obligations and restrictions relating to the watercourses. | **In progress** |
| Set appropriate easements or Consent Notices with regard to over-land flow paths, building set-backs or minimum building floor levels for new subdivisions where necessary. | **Proposed** |

### 10. Inability to discharge excess water when river levels are high

The Hutt Valley is protected against flooding from the Hutt River by a system of stopbanks which enable the river to reach high levels without overflowing into adjacent areas. There are many stormwater drains laid under the stopbanks which normally discharge stormwater into the Hutt River. Floodwater from the Hutt River is prevented from back-flowing up these stormwater drains by "flap gates" which are intended to allow water to flow only in an outwards direction. When these "flap gates" are closed by the pressure of water from the river, stormwater cannot discharge and backs up until levels in the Hutt River subside.

This issue also affects the Awamutu Stream, although to a much lesser extent than the Hutt River.

| ACTIONS | STATUS |
|---|---|
| Carry out a risk assessment of all areas potentially vulnerable to flooding when the discharge of stormwater is prevented by high water levels in receiving watercourses as a basis for prioritising the need for additional pumping. | **In place** |
| Prioritise the need for additional pumping relative to other stormwater capital works requirements. | **In place** |

## Moderate risk issues

### 11. Impact of stormwater system on life-giving capacity of natural waterways

Many natural waterways have been highly modified through such measures as straightening, piping and the construction of dams. This has adversely affected the life-giving capacity of these waterways – for example, fish passage has been obstructed and daylight prevented from reaching streams. As the community's environmental awareness grows, such concerns are becoming an increasingly important aspect of stormwater management.

| ACTIONS | STATUS |
|---|---|
| Identify and distinguish between living, historical waterways that may have been modified and public drainage structures that have been built specifically to convey stormwater. This is proposed to be undertaken in conjunction with Greater Wellington and Mana Whenua (Port Nicholson Block Settlement Trust). | **Proposed** |
| Investigate measures for improving the life-giving capacity of identified living, historical waterways as part of all works on those waterways. These measures may include day-lighting (restoring a previously modified stream so that it flows above-ground in its natural form), and devices to aid fish passage. | **Proposed** |

### 12. Capacity of the primary stormwater system

It would be impractical to provide a primary stormwater system with the capacity to accommodate stormwater runoff from all possible storms. The majority of the Hutt City stormwater system was designed with the capacity to accommodate stormwater from a 1 in 5 year storm (a storm with a 20% chance of occurring or being exceeded in any year). However, over time this level of protection has been eroded as a result of climate change, and development creating more impervious area in the city.

| ACTIONS | STATUS |
|---|---|
| Reflect climate change predictions in rainfall intensities in the design of new and replacement stormwater drains. | **In place** |
| Adopt a risk based approach to reflect the flood risk in each individual situation when determining the network capacity to be provided in new or replacement stormwater drains, to accommodate stormwater collection from storms with an average recurrence interval (ARI) of between 10 years and 50 years. | **In progress** |

### 13. Safety of Stormwater intakes

To be effective stormwater intakes must have the ability to accommodate stormwater inflows. However this capability can also represent a hazard. There have been instances where people have fallen or been swept in stormwater intakes.

| ACTIONS | STATUS |
|---|---|
| Require safety to be taken into account in the design of new stormwater intakes. | **In place** |
| Carry out ongoing safety assessments that determine, on a case by case basis, the need for grilles and safety fences (at initial design and from ongoing safety assessments). | **In place** |

### 14. Watercourses overtopping their banks

There are areas in the city which are low lying relative to flood levels in adjacent watercourses, which have a finite capacity within their normal flow channel. During severe rainfall the capacity of some channels can be exceeded resulting in the banks being overtopped and floodwater flowing into surrounding areas.

| ACTIONS | STATUS |
|---|---|
| Carry out a risk assessment of watercourses that may be subject to overtopping and apply remedial measures (if necessary). | **In progress** |

### 15. Levels of stormwater protection to be provided

Council endeavours to provide stormwater protection that is cost effective and which meets community expectations. Costs increase steeply as additional capacity is provided in the stormwater infrastructure, and that additional capacity may be used infrequently. For example, a stormwater pipe with the capacity to accommodate a 50 year return period storm would be expected to be fully utilised on average only twice over its total lifespan. It is necessary to balance the level of stormwater protection provided with the risk and estimated cost of flood damage.

| ACTIONS | STATUS |
|---|---|
| When determining levels of stormwater protection, differentiate between **nuisance flooding** and flooding entering habitable buildings. | **In place** |
| Provide at least a 10 year ARI level of protection against “nuisance” flooding in all new and replacement stormwater infrastructure. | **In place** |
| Consider both structural and non-structural options for closing stormwater protection service gaps with preferred options providing the best balance between benefits and medium term costs. | **In place** |

### 16. Risk of stormwater backflows from watercourses

Floodwater levels in some watercourses (principally the Hutt River and the Waiwhetu Stream) can be higher than the ground level in adjacent areas. At these times there is a risk of floodwater back-flowing up and out of the stormwater drains that normally discharge to these watercourses even if the watercourses do not overtop their banks.

| ACTIONS | STATUS |
|---|---|
| Minimise backflow risks by lowering stream flood levels where practical in preference to generating high watercourse levels through stop banking. | **In place** |
| Install **flap gates** on all stormwater drains where a risk of backflows from watercourses has been identified (Note: flap gate installation should be managed so that fish passage is not compromised). | **In progress** |
| Carry out a preventive maintenance programme for all flap gates. | **In place** |
| Provide secondary floodgates on selected stormwater outlets where the consequences of flap gate failure have been assessed as severe. | **In progress** |

### 17. Impact of climate change on stormwater protection

In recent years there has been an increase in the incidence of extreme weather events around the world. Evidence indicates that this is more than a random variation and is likely to reflect a long term or permanent change in weather patterns. A report by the Intergovernmental Panel on Climate Change concluded that the climate in the future "will be one in which the hydrological cycle will in general be more intense, leading to more heavy rain events". Actual rainfall data for Hutt City supports these predictions that severe rainfall events are likely to occur more frequently. Peak rainfall intensities in the Wellington region are predicted to increase by about 13% over the next 25 years and total rainfall is expected to increase by 5%. It is also predicted that sea levels will rise, which may result in salinisation of stormwater infrastructure. Increased rainfall and sea level rise may together also contribute to raised groundwater levels, in turn reducing soakage and intensifying pressure on the stormwater network. These climate change trends pose definite risks to the effectiveness of the stormwater system.

| ACTIONS | STATUS |
|---|---|
| Take account of predicted changes in rainfall patterns in the design of new stormwater infrastructure. | **In place** |
| Adopt a pro-active approach to managing the potential risks of sea-level rise, accounting for the long lead times involved with this issue. On top of this, incorporate findings from Council's sea-level rise research to inform future updates to the Stormwater Plan. | **Proposed** |

### 18. Impact of development on stormwater

Development impacts upon stormwater flows, usually by increasing the volume of water which enters the stormwater system. This in turn can lead to more frequent stormwater flooding elsewhere. Opportunities to mitigate against this include measures to increase permeable surfaces (such as by sewing grass), and install water retention devices (for example, rainwater tanks).

| ACTIONS | STATUS |
|---|---|
| Encourage on-site water storage by not charging consent fees on non-plumbed rainwater tanks. | **In place** |
| Low Impact Urban Design and Development ("LIUDD") options are investigated as part of District Plan reviews, and, where appropriate, incorporated into relevant planning documents. | **In place** |
| Council to lead by example by investigating LIUDD measures as part of its approach to development and redevelopment across its various asset classes. | **In progress** |

### 19. Blockage of street sumps

Debris such as litter tends to accumulate in street channels. Street sumps have a grating to restrict the entry of debris to stormwater drains; however accumulations on sump tops can restrict or completely obstruct the drainage of stormwater, leading to localised flooding. Storms may generate substantial quantities of debris which can block sumps.

| ACTIONS | STATUS |
|---|---|
| Programmes for cleaning of street channels and street sumps. | **In place** |
| Inform property owners that in the event of a storm, sump tops may be blocked by debris, creating a flood risk. Owners can assist in reducing the flood risk by keeping sump tops in the vicinity of their property clear during severe rainfall. | **Proposed** |

### 20. Blockage of Stormwater outlets on beaches

Sand levels on some beach have risen over the last 15 years, impeding the discharge of stormwater outlets. It is not practically possible to keep these stormwater outlets clear at all times because excavated stormwater outlets may be buried again within a few days.

| ACTIONS | STATUS |
|---|---|
| Carry out a risk assessment of all stormwater outlets and reflect the assessed consequence of blockage in maintenance and upgrading programmes. | **In place** |
| Conduct further investigations on affected outlets identified with the highest risk and consult on potential solutions to mitigate the risk. | **In progress** |

### 21. Flooding from lack of maintenance of private watercourses

In most cases owners are responsible for the maintenance of watercourses where they pass through their property, though this may not be clearly understood. The maintenance of some private watercourses can involve considerable expense, particularly after severe rainfall when there may be substantial build-ups of debris in the stream channel. These build-ups generally extend over multiple properties so removing the build up from a single property may be ineffective.

An effective solution usually involves a coordinated approach to removing accumulated debris across all affected properties; however the cost of this work may be beyond the resources of some owners.

Furthermore, a failure to adequately maintain private watercourses may not have a significant effect on the property through which the watercourse passes, but it may affect other properties in the path of overflows from the stream.

| ACTIONS | STATUS |
|---|---|
| Council will provide engineering advice relating to the maintenance of private watercourses. | **In place** |
| Council will consider (on a no obligation basis) requests for assistance to clear blocked private water courses that are causing flooding to neighbouring properties following severe storms. | **In place** |
| Produce information material for owners with watercourses passing through their property setting out obligations and restrictions relating to the watercourses. | **Proposed** |

## Low risk issues

### 22. Dependence on main supply to power pumping stations

There are some areas of Hutt City which depend on pumping for stormwater protection. Electric pumps are generally used. Stormwater protection can be compromised if a power cut coincides with severe rainfall.

| ACTIONS | STATUS |
|---|---|
| Install backup power generation on stormwater pump stations where the consequences of a power failure during severe rainfall are assessed as severe. | **In place** |

*Stormwater outlet, Hutt River at Alicetown*

# GLOSSARY

**Secondary stormwater flow path** (see Issue #2): a route taken by stormwater when the primary stormwater system is blocked or its capacity overloaded.

**Nuisance flooding** (see Issue #15): flooding which causes public inconvenience, but little or no property damage.

**Regional Plan Review** (see Issue #8): Greater Wellington Regional Council are currently (at time of writing, August 2012) undertaking the first review of their existing five Regional Plans (Freshwater, Air, Coastal, Discharges to Land, and Soil Plans), which are likely to be amalgamated into one 'Regional Plan'.

**Flap gate** (see Issue #15): A device that allows water to flow in only one direction through a pipe. They are used on stormwater outlets to prevent backflows (that is, river or stream water entering pipes) during flooding situations.

*Hutt River looking south to rail bridge*

## Stormwater Tips

There are a few simple steps you can take to protect your stormwater system, help minimise future costs to ratepayers and look after the environment.

**It's extremely important that you don't use stormwater drains to dispose of any foreign matter – this will pollute our waterways.**

**If you're not sure how to get rid of certain materials (like paint or oil, for example), contact us for advice on the main Council line:** (04) 570 6666

You can help protect your stormwater system by:

- Taking all reasonable care to avoid damaging any public stormwater pipes which pass through your property, and ensuring that our ability to obtain prompt access to these pipes isn't restricted.
- Not planting trees or shrubs on your property within 1.5 metres of buried stormwater pipelines.
- Not discharging your stormwater (rainwater) into the wastewater system. Separate systems are provided for wastewater disposal. The entry of stormwater into the wastewater system can cause the wastewater system to quickly become overloaded, and can lead to overflows of sewerage.
- Keeping your stormwater drainage system in good condition and compliant with the requirements of the New Zealand Building Code. This will minimise the likelihood of health risks to occupants of your property.
- Not discharging motor oil, fuels, solvents or highly toxic substances into the stormwater system.

*"Owners can assist in reducing flood risk by keeping sump grates in the vicinity of their property clear during severe rainfall"*