

## NATURAL FLOOD STORAGE

River channels and the wider river floodplains are areas that can be used for storage of flood water.

During flood events watercourses will spill over their banks and spread into the wider floodplain or designated ponding zones. This allows storage of some of the flood water and can alleviate the potential for flooding or scheme failure in other areas of the catchment.

Interfering with this spilling can adversely impact on the integrity of the scheme, and cause catastrophic flooding elsewhere.

As flood levels decrease in the main channel, flood water that has spilled will slowly return, either through pumping or natural gravity flow.

Development in the wider floodplain and ponding areas has the potential to impact on the ability of these areas to store floodwater and alleviate the effects of flooding.



Waikato Regional Council ponding areas in the Piako River system

## PONDING AREAS

Some ponding areas may very rarely flood. But ponding areas remain part of a scheme and are its pressure valve.

The Piako River is stopbanked along both sides to convey upper catchment floodwater to the sea and to contain floodwaters. At the upper reaches of the stopbank system, adjacent to the Kopuatai peat dome, there are historic ponding zones. The ponding zones store floodwater and smooth peak flood levels through the lower reaches of the river.

There are four stages of ponding.

- **Uncontrolled ponding** – river flows freely pond on this area when channel flows cause a rise in water levels.
- **Initial ponding zone** – as river continues to rise these areas will pond next.
- **First emergency ponding zone** – when the Piako River is in flood and approaching the 10% (10 year) flow the first emergency ponding zone stopbanks overtop and floodwater accumulates within this zone.
- **Second emergency ponding zone** – when the Piako River is in flood and approaching the 5% (20 year) flow, the second emergency ponding zone stopbanks overtop and water accumulates within this zone.



# WAIKATO'S FLOOD SCHEMES AND HOW THEY WORK

## RAUEMI AUKATI WAIPUKE O WAIKATO



## PROTECTING PEOPLE, LAND

Our flood control schemes have an important job. They protect people, productive farmland, telecommunications links and roads by helping to minimise the risk of flooding.

Protection is achieved through a network of stopbanks, pump stations, floodgates and detention dams. The level of protection is decided by the community, who pays for it via a targeted rate. We are responsible for managing this flood protection infrastructure to the level of service agreed with the at risk communities.

It's important to note that we are in the business of river management – not river control. Our river systems are a force of nature, and as a result managing them can be challenging at times. However, our schemes play a key role in making our region productive and prosperous.

## FLOOD PROTECTION & CONTROL WORKS

# \$19.037 mil

in 2017/18



Funded through targeted rates

## WHAT WE DO DURING A FLOOD

### BEFORE

- Receive a forecast for heavy rain.
- The regional flood response team looks at this, and in combination with data collected via our rain and river gauges, assesses what state the rivers in the area are in and what impact the rain might have.
- River management staff check assets such as flood gates to ensure they are ready to respond, touch base with staff and contractors that may help with a response, and identify what points in the network may need extra attention.
- We work with power stations to ensure there is sufficient storage to accommodate the forecast rain in the hydro systems and storage areas.

### DURING

- River management staff are based in the Emergency Coordination Centre (ECC) and in the field. In the field staff monitor the flood and inspect assets to ensure they're performing as they should be, reacting to situations (such as if a stopbank was going to be over topped or a culvert was blocked), and deploying pumps. This is reported back to the ECC.
- Work with power companies to ensure correct use of the hydro systems and storage at all times to provide good outcomes. This is all part of high flow management. There are three phases of high flow management and these can be declared at any time. During high flow, flood management is the focus of hydro management rather than power generation business as usual.

### AFTER

- After a flood event the team will visit assets to assess any potential damage and prioritise any damage repairs. They will also evaluate what went well during the event and what they may need to keep in mind for next time.



## FLOOD WARNING SERVICE

Email [regional.hazards@waikatoregion.govt.nz](mailto:regional.hazards@waikatoregion.govt.nz) to sign up for the flood warning service or call 0800 800 401 and ask for the senior emergency management officer (EMO).

HE TAIAO MAUIORA HEALTHY ENVIRONMENT  
HE ŌHANGA PAKARI STRONG ECONOMY  
HE HAPORI HIHIRI VIBRANT COMMUNITIES

[waikatoregion.govt.nz](http://waikatoregion.govt.nz)  
0800 800 401



## LAND DRAINAGE

In the Waikato region there are rural areas that are very flat and have limited natural drainage outlets. Networks of drains have been developed over time within these areas to support pastoral farming and to alleviate flooding.

Some land drainage areas are managed by Waikato Regional Council, some by territorial authorities and some are self-managed.

Outside of these drainage areas or drainage districts, drainage systems are the responsibility of the private landowners.

Land drainage schemes generally provide a level of service that is designed to remove ponding from rural areas prior to pasture damage occurring, rather than preventing inundation.

There are some associated benefits during flood events as waters are moved through the drainage system, however this is not the primary purpose of a drainage scheme.

## RESIDUAL RISK

While flood protection provides protection to a community there is always a residual risk to any protected area compared with communities on high ground. Flood schemes are rated as to the level of protection afforded. If a weather system exceeds the scheme protection level it may fail to some extent. This is the residual risk.

## FLOODGATES

Floodgates in the Waikato region are designed to self-close when the water in the river is higher than the water in the drains. When the gates close, the pumps will activate to continue to drain the land.

The floodgates prevent backflow up the drains, providing they are not wedged open by objects such as branches or timber. Our river management teams carry out work during the year to remove debris from drains.

Waikato Regional Council uses a mixture of manually operated and self-closing floodgates. Manual gates provide more control over flows and can be shut at any time or water level.



## PUMP STATIONS

The size and number of pumps in a pump station is based on the catchment area and flow rates required to clear the design volume of water within three days. Most pump stations have two or more pumps so a staged pumping regime can operate as flow rates increase.

The pumps start to operate when the water reaches a set height – this normally occurs when water can no longer drain through floodgates under gravity. When a pump station has two or more pumps they are set up to turn on in a staged manner as the water level rises to provide increased pumping capacity and the removal of a greater volume of water from the drains as the drains become fuller. The pumps also stop automatically – in a staged manner – when the water level gets down to a set height.

The first pump to start is normally called the duty pump, with the others called the secondary pumps or flood pumps.

## SPILLWAYS

Spillways are installed in many flood protection schemes to:

- relieve pressure on the scheme and mitigate the risk of it failing
- stabilise the river/scheme flood flows.

They allow excess water to spill across a roadway and into a storage area or another waterway.

Spillways are used throughout the Waikato region as a mechanism for managing flood flows in areas where lack of space or existing land development prevent the full use of the flood plain for flood protection purposes. By creating spillways, we can also reduce stopbank height and channel width, saving costs.

Controlled release through a spillway is preferred rather than risking catastrophic stopbank structural failure at an unknown weak point or when the stopbank height has been breached.

Spillways are also used to help move water from river floodplains into ponding areas when a threshold height is reached.



## STOPBANKS

Stopbanks are compacted earth banks designed to contain rivers and streams in flood, preventing inundation of land and/or property by floodwater.

Some stopbanks are designed to be overtopped to relieve pressure on the scheme.

Stopbanks can be damaged during a flood, and apart from the risk of overtopping they may fail in other ways such as a breach in the stopbank wall.

Several factors can lead to a stopbank breach, including water infiltration, soil conditions and hydrostatic pressure. Damage caused by stock and landowners can also have an impact on the integrity of the stopbank.

