

THE DIVERSION SCHEME

Gates, stopbanks, channels and floodways

The Lower Wairarapa Valley Development Scheme is one of the largest and most complex flood management systems in New Zealand. Nearly 30 years after its completion there are still challenges in the management of the scheme.

Future increased sea level and floods, owing to the impacts of climate change, need to be fully understood. Enhancing the environmental impact of the scheme, while maximising the reduced flooding effects, will require considerable investment in research and works. The scheme has had a major impact on the environment. The area of wetlands has been considerably reduced and the hydrological regime of Lake Wairarapa has been altered significantly. The impacts of these changes are only now becoming apparent. The challenge for the future is to maintain this development but at the same time establish and maintain complementary environmental systems.

The Scheme is a complex of man-made constructions. Keeping the Ruamahunga River mouth opened is the most important element of the scheme.

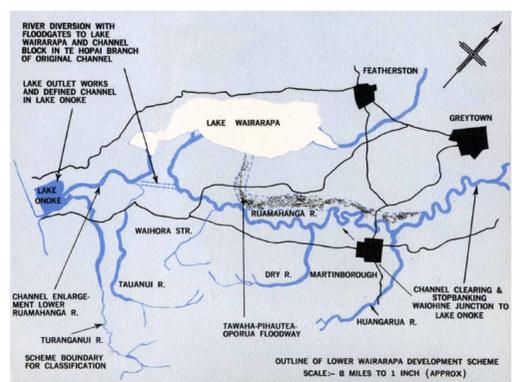
The Ruamahunga River flows into the sea at Palliser Bay through the Lake Onoke Spit. The mouth of the Ruamahunga River is called the lake opening. The natural opening generally migrates towards the eastern end of the sand bar and when this happens the flow out to sea is reduced considerably. Under the scheme the opening is sited in line with Lake Ferry road to enable quicker drainage of the river.

Typically, between January and May the mouth gets blocked when there is low river flow, combined with large southerly swells in Palliser Bay. However, it can get blocked at other times, too. In an extreme year, the mouth could be blocked as many as 18 times but on average there are between six and eight blockages a year.

For the first time the mouth of the Ruamahunga River is opened mechanically circa 1940s. Keith McMaster is at the helm. Today, the opening is made using the combination of a digger and bulldozer. Photograph private collection



Opening the Ruamahunga River mouth opposite the Lake Ferry Inn (now Lake Ferry Hotel), 1991. Photograph GWRC



A man-made channel diverts the Ruamahunga River from Lake Wairarapa directly to the sea.

It is the very straight section of the Ruamahunga river that cuts across the Rongotea and Pouawha lagoons, connecting Te Hopai with the mouth of the Tauanui River. The Diversion Channel has become a very popular area for jet boating and water skiing.



The Ruamahunga River diversion can be seen on the left. The natural pre-diversion Ruamahunga River channel to Lake Wairarapa is on the right. The Ruamahunga diversion channels approximately 95% of the Ruamahunga River flow directly to Lake Onoke and the sea. Photograph GWRC

Prior to the construction of the diversion scheme, the Ruamahunga river flowed into and through Lake Wairarapa before entering Lake Onoke. Today, approximately 95 percent of the Ruamahunga River flows go directly to Lake Onoke, bypassing Lake Wairarapa. This is a significant change and, together with the Lake Onoke opening, results in flood flows receding very quickly following a flood event. Pre-scheme, flood waters were present for some weeks. Also it has helped to keep the mouth opened for a longer period.



Dredge working on the diversion, 1967. Photograph GWRC

Local residents R. Donald and Mr. & Mrs. Holmes survey progress of the diversion, 1967. Photograph private collection

Barrage radial gates stabilise the water level in Lake Wairarapa to allow sufficient freeboard to accept floodwaters from the Lower Wairarapa Valley Development Scheme's floodways and tributaries.

The operational regime of the gates is based on a complex interaction of Lake Wairarapa levels, Lake Onoke levels, flow in the Ruamahunga River and current and predicted weather patterns.

The objective is to stabilise the water level in Lake Wairarapa to a defined operating range and to allow sufficient freeboard to accept floodwaters from the Lower Wairarapa Valley Development Scheme floodways and tributaries. The Barrage Gates may be used to either lower or raise the water level in Lake Onoke, or in Lake Wairarapa, depending on the conditions. The seasonal levels at Lake Wairarapa has been determined after years of consultation with the interested parties such as the lake shore landowners, DoC, Fish and Game, the Iwi, LWVDS Advisory Committee, Ducks Unlimited, SWDC and the Regional Council. These levels are stated as "Target Levels" in the Resource Consent issued for the operation of the Barrage Gates, as they are not absolute levels that can be controlled. By and large the weather conditions determine the lake levels.

The Barrage gates are the largest mechanical asset of the Lower Wairarapa Valley Development Scheme. Owing to salty water, the gates need to be regularly repainted and the lifting ropes changed. They are operated mechanically and can be controlled electronically by the Council's telemetry system.

Located on the Papatahi Road (East-West Access) the Geoffrey Blundell Barrage is a structure of six radial-type gates. Each gate is 12.19 metres long, with a maximum clear opening of 4.5 metres. (Right) The opening of the Geoffrey Blundell Barrage Gates, March 1994. Photographs GWRC



Some 200 kilometres of stopbanks have been constructed to contain high river levels.

On the Ruamahunga River stopbanks have been built from just upstream of Martinborough down to Lake Onoke. Tauherenikau River is stopbanked from SH53 downstream to Lake Wairarapa. The lower reaches of eastern and western tributaries to the Ruamahunga River and Lake Wairarapa are also stopbanked.

Stopbanks on the Ruamahunga River. Photograph GWRC



The stopbanks have been built to different standards primarily because of funding shortages.

Stopbanks between Martinborough and Tuhitarata were designed for 20-year flood standard. This means, there is a 5 percent chance of floods occurring to this level in any one year. The occurrence of floods since the scheme's construction has reduced this to a 10-year flood standard due to the increased frequency of flood events and deposition of gravel and silt. In 2004 a one in 40-year flood occurred and some of the stopbanks were overtopped. Just one pre-scheme stopbank breached during that event.

Short-term overtopping of the stopbanks is not a major problem where they are well maintained, have a good batter slope, a good grass cover and have no stock tracks.

Vegetation, such as willows, but some flaxes and native grasses, are planted on the outside of the stopbanks, on the river berm. The roots of these plantings act as reinforcing to hold up the river edge and their leaves tend to slow down the current. Following extended floods, the berm area can be vulnerable to slumping, which can threaten the edge of the adjacent stopbank. Slumping is where the bank drops away, generally when the floods recede, due to its weight under very wet conditions. Removal of the build up of silt, and good management of the trees reduce the chance of slumping.



Flooding over State Highway 51, Martinborough, 2004. Photograph GWRC



Sandbags add extra protection on Ruamahunga River stopbanks, 2004. Photograph GWRC



Paul's Bank between Lake Onoke and Poumuri Lagoon. Photograph GWRC

Floodways are secondary paths for river flows that exceed the channel capacity of the Ruamahunga River.

The operation of the floodways is governed by weather and river flow patterns. River level data is used to predict when the floodways will operate. This is essential as the majority of the floodways are farmed.

The Tawaha floodway is a natural feature. The waters leave the usual channel of the Ruamahunga River and pass overland through Jenkins Dip on the main road into Martinborough. They re-enter the Ruamahunga River at a lower point in its course.

The Hikunui and Awaroa sills are man-made low structures that allow the flood flows to leave the Ruamahunga River channel and enter a contained floodway leading to Lake Wairarapa through Oporua.

At Oporua, extensive works have been constructed to reduce scouring of Kahutara Road and the channel through the floodway. Great care is needed to maintain this area to prevent the scouring of the floodway upstream. The Kahutara Road is closed when the Oporua floodway is working.

The February 2004 flood demonstrated the value of the Lower Wairarapa Valley Development Scheme.

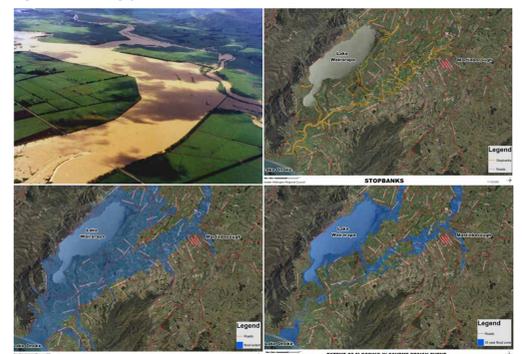
Though there was one stopbank failure, and extensive overtopping of sections of stopbanks, the scheme area came through the floods in February 2004 relatively unscathed. The failed stopbank was constructed pre-scheme to a lower flood standard.

Prior to the scheme, a major flood could affect 20,000 hectares of land, with some areas being flooded up to eight times a year. Roads were often blocked for days at a time, communication lines were damaged, fences destroyed and stock losses were severe.

The scheme has considerably reduced the frequency and duration of floods on 40,000 hectares of land. The community has also benefited owing to improved roading networks, for example the East-West Access Road, protection of infrastructural assets and the ability of children to get to school. The value of the Scheme assets is now around \$90 million.

The added flood protection has seen a considerable change in land use, with dairying now widespread. As well, significant investment has been made in the area. This is a highly productive agricultural area.

The Oporua floodway working in 2000. The Ruamahunga River (top right) is feeding the floodway. The Kahutara to Pirinoa road is diagonal bottom left. Photograph GWRC



The Lower Wairarapa Valley Development Scheme stopbanks and floodways.