greater WELLINGTON
REGIONAL COUNCIL

Wairarapa Peer Review 2006/07

FOR FURTHER INFORMATION

Greater Wellington
Regional Council
Wellington
PO Box 11646

T 04 384 5708
F 04 385 6960
W www.gw.govt.nz

Greater Wellington
Regional Council
Otaki
PO Box 15-155
Otaki

T 06 364 7130
F 06 364 7128
W www.gw.govt.nz

N/50/01/30

August 2007

Contents

1. Introduction

Annual peer reviews are undertaken of assets on rivers in both the Western and Wairarapa Regions. The peer reviews provide an audit of maintenance standards and procedures, and are an essential component of each region's asset management systems.

This year's inspection visited sites on two schemes; the Lower Wairarapa Valley Development Scheme and the Waiohine River Scheme.

Inspected by: Jacky Cox, Jeff Evans, Kees Nauta, and Graham Winterburn of the Flood Protection (Western), Catchment Management Division.

Guides: Graeme Burnett, Ranjan Cyril, Maia Kawana, Mike Longworth, and Graham Reidy of the Flood Protection (Wairarapa), Catchment Management Division.

Inspection date: 9 August 2007.

2. Lower Wairarapa Valley development scheme (LWVDS)

The LWVDS covers the section of the Ruamahanga River from the Waiohine confluence downstream to the Lake Onoke outlet into Palliser Bay; the Tauherenikau River from the Rail Bridge downstream to Lake Wairarapa, all the eastern and western tributary streams, overland floodways and two lakes.

Construction of the LWVDS commenced in 1964 and concluded in 1988. Following the revaluation of Flood Protection assets, the LWVDS has an Optimised Depreciated Replacement cost of $84.4 million (excluding land). The goal of the LWVDS is *"to continue to provide the highest standards of flood protection to the Lower Wairarapa Valley consistent with financial, environmental and social restraints"*.[1]

2.1 Onoke stopbanks

The Onoke stopbanks border the lower reaches of the Ruamahanga River and Lake Onoke. The stopbanks were constructed in 1964 from dredged riverbed material, their location means they are subject to both tidal action and wind generated wave lap that has resulted in substantial damage to the riverside stopbank face. In areas, large holes are affecting the integrity of the stopbank, which is further exacerbated by river borne debris.

This area was visited during the 2003/04 peer review; at that time the reviewers' noted that this was a valuable asset that was under threat and that this was to be addressed through the LWVDS review. The reviewers' are pleased to note that as a result of the review a $1.7 million development works programme, commencing in the 2007/08 financial year, is being implemented over the next 7 years. Prior to the review, stopbank repair was done on a limited scale and was funded from the annual maintenance budget.

Prior to the implementation of the development works a survey of all stopbanks was undertaken. Stopbanks were rated from 1 to 4 depending on condition, a condition

[1] LWVDS Asset Management Plan Pg 2

rating of 1 being awarded to those sections of stopbank that require immediate repair (the completed survey plan is available in **appendix 1)**.

The development works include:

- Filling and shaping of the effected locations to achieve a natural batter slope.
- Reinforcement of the stopbank face with d_{50}100 mm gravel material; applicable to those stopbanks with a condition rating of 1 or 2.
- Planting of the riverside berm with native shrubs; applicable to those stopbanks with a condition rating of 3 or 4.

Picture 1: erosion 'hole' (left); repaired stopbank (right)

2.2 'Duckbill' drop structure, Oporua floodway

The duckbill drop structure in the Oporua floodway collects overland flows from the Ruamahanga River in a greater than 2 year flood event; these flows are then directed to Lake Wairarapa. The area has had substantial repairs in the past due to flood damage and was severely hit again in the July 2006 flood event.

During this event, the Ruamahanga River, and the river's eastern and western tributaries (especially the Huangarua River) had flood peaks that occurred about 24 hours apart, resulting in a very long duration flow peak. The flow remained above 900 m^3/s, the estimated threshold for the main floodway system to come into operation, for in excess of 64 hours. This is the longest duration for the floodway operation since the early 1980s, when the floodway and stopbanking were completed as part of the Lower Wairarapa Valley Development scheme. Although the flow during the February 2004 event was higher (1,900 m^3/s) the floodways were only operational in that event for about 38 hours. Therefore the July 2006 flood event resulted in the largest total volume of water flowing through the floodways on record.[2]

The duckbill drop structure essentially consists of three main components, a large grassed area that surrounds the actual drop structure, the Reno mattress drop structure, and shrub willows immediately adjacent to the channel. Due to the sandy nature of the soil, the 'duckbill' is prone to erosion. During the July 2006 flood event, a large erosion embayment (shown in **appendix 2**) developed at the downstream end of the left bank

[2] Gordon M., & Watts, L., 2006: The 4 – 7 July 2006 storms in the Wellington region, hydrology and meteorology.

Reno mattress protection. As the damage occurred during a period of wet weather a temporary repair of filter cloth and rock was constructed. Permanent works, which continued the existing Reno mattress protection (shown in **appendix 2**) and included the construction of a low level stopbank, were completed in March 2007 and the end result is shown below in picture 2.

Picture 2: damaged 'Duckbill' drop structure (left) and the repaired structure (right).

The reviewers consider that the approach taken, in terms of temporary and permanent works, was appropriate. It was noted that the structure performed extremely well given the duration that the floodways system was in operation. The reviewers' endorse the development of the wetland area immediately behind the low level stopbank.

2.3 Hikunui sill

The Hikunui sill forms part of the extensive floodway system within the LVWDS. The sill is situated at the upstream end of the Pahautea floodway, and activates when flows reach 900 m^3/s.

Significant scour damage to the downstream face of the sill occurred during the July 2006 flood event (shown in **appendix 3**); exacerbating the initial damage that occurred in February 2004. As for the 'duckbill' drop structure, the damage to the sill occurred during a period of wet weather necessitating the scour holes to be filled with large boulders until a permanent works could be constructed.

The flood damage repair work included:

- Extending the existing stopbank.
- Rebuilding the sill on a new alignment, inland and towards the south.
- Reinforcing the upstream half of the sill structure with enkamat (an erosion protection mat) to allow for overflow velocities.
- Lowering the riverside berm to reduce slumping of the bank.
- Constructing 4 debris fences on the lowered berm (to be constructed this construction season); the fences will be designed to pass small debris, and to deflect rather than capture large debris.
- Strengthening the bank edge with the rock used in the temporary repair works and the buffer zone by willow planting.

Design details are available in **appendix 3**.

Picture 3: riverside berm to be lowered (left); extended stopbank and realigned sill (right)

The reviewers were impressed with the scheme manager taking the opportunity to construct sustainable permanent works rather than to continually patch the sill. It is imperative that the second stage of the works (the construction of the debris fences) occurs as soon as is practicable as the sill in its present condition is still very vulnerable.

Grass growth on the newly extended stopbank and the new sill is good. The reviewers' note that if the sill is to be grazed, that this will need to be closely managed so that unnecessary damage from stock does not occur.

3. Waiohine River scheme

The Waiohine River scheme covers:

- 16 km of the Waiohine River from the 'lower gooseneck' to the Ruamahanga River confluence.
- 5 km of the Mangatarere River from Brooklyn Road to the Waiohine River confluence.

The Scheme was established in 1957. Following the revaluation of Flood Protection assets, the Scheme has an Optimised Depreciated Replacement cost of $4.4 million (excluding land). The goal of the scheme is "*to manage the Waiohine River and flood mitigation system, providing an agreed scheme standard of protection to riverside property, whilst maintaining and enhancing environmental and recreational values*".[3]

3.1 Channel realignment between Fairbrothers and Kuratawhiti Street

This section of the Waiohine River is situated in the upper reaches of the river, immediately downstream of the railway bridge. The reviewers were shown how this reach of this river is managed almost entirely by working towards the design channel alignment through construction of small snub groynes, willow plantings, and in channel gravel management.

[3] Waiohine River management scheme Asset Management Plan Pg 2

By providing the Waiohine River with a consistent width, removing constrictions, building berm areas up through planting, and taking the pressure off vulnerable bank edges, the river is staying within the confines of its design alignment.

*The reviewers noted that this approach has been successful to date (refer to the aerial photography available in **appendix 4**), however, the success may be improved through:*

- *Increasing the numbers of willow planted per annum. Plantings should ideally be over the entire berm area; however the reviewers note that the groyne pattern planting currently occurring is working well in this river system.*
- *Working towards designing and constructing more substantial rock groynes to provide increased bank edge protection. The reviewers note that the 50 tonne groynes currently being constructed are performing adequately.*

4. Summary

As with past peer reviews the sites chosen are only snapshots of the schemes managed by the Flood Protection Department (Wairarapa) but are selected on the basis that they are reasonably representative of each of the schemes as a whole.

As has been noted by reviewers in the past, the approach taken in many situations by Engineers of the Wairarapa Region is innovative and done with foresight, often as a direct result of budget constraints.

The reviewers are confident that the schemes within the Wairarapa Region are being managed and maintained appropriately given the resources available and achieving the scheme goals as outlined in the relevant asset management plans.

Report prepared by:	Report prepared by:	Report prepared by:
Graham Winterburn Field Supervisor (Kapiti)	Jacky Cox Assistant Engineer	Kees Nauta Area Engineer (Kapiti)

Report prepared by:	Report approved by:
Jeff Evans Team Leader, Western Operations	Graeme Campbell Manager, Flood Protection