ATTACHMENT 6 TO REPORT 03.480

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Wairarapa Peer Review

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FOR FURTHER INFORMATION

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1. Introduction

Annual peer reviews are undertaken of river asset maintenance programmes in the Wairarapa and Wellington areas. The peer reviews provide an audit of maintenance standards and procedures. The reviews are undertaken by inspections of representative sites selected by the peer reviewers. This year's inspection visited several sites on the Lower Wairarapa Valley Development Scheme and the Waiohine Scheme.

Inspected by: Jeff Evans (Area Engineer, Wellington), Garry Baker (Area Engineer, Kapiti), and Jacky Cox (Assistant Engineer) of Flood Protection, Landcare Division

Guides: Ranjan Cyril (Engineer), Dave Sim (Field Supervisor), Graham Reidy (Engineering Officer), and Michael Hewison (Investigations and Design Engineer) of the Operations Department, Wairarapa Division.

Inspection date: 29 July 2003

2. Lower Wairarapa valley development scheme (LWVDS)

The Lower Wairarapa Valley Development Scheme covers the section of the Ruamahanga River from the Waiohine confluence downstream to the Lake Onoke outlet into Palliser Bay, the Tauherinikau River from the Rail Bridge downstream to Lake Wairarapa, and all the eastern and western tributary streams.

Scheme construction commenced in 1964 and was completed in 1988. An asset management plan for the LWVDS was completed in March 1998 and received by the Wairarapa and Rural Services Committee on 2 June 1998. Key infrastructural assets include:

- 190km of stopbanks
- The Blundell Barrage gates
- Four overland floodways (Tawaha, Hikihinui, Awaroa and Oporua) and associated control structures
- 112 culverts and floodgates
- 45km of fencing.

The current value of the scheme is $68 million and has an annual maintenance budget of approximately $650,000.

2.1 Mongonui Weirs

Approximately 35 years ago the Mongonui stream was diverted. This effectively shortened the stream length by approximately 4.5 kilometres and streambed degradation resulted. To rectify this a system of five evenly spaced bed control weirs were constructed. Originally the weirs were constructed using driven rail irons and timber walings but these were difficult to maintain and in 2000, four B grade rock weirs were constructed to replace them. The construction involved the placement of limestone rock, which were then topped with heavier greywacke rock. Maintenance of these structures is done on a one per year basis. Vegetation on the banks is predominantly willow, however many of these are dying back due to old age. Native undergrowth is emerging and providing adequate bank protection.

Figure 1: One of the Mongonui weirs, showing steps built to assist fish passage

Overall the system seemed to be working well, with adequate steps built into all the weirs to allow and assist in fish passage. The reviewers note that regular ongoing maintenance of the weirs is required, and essential for these works to continue to be successful.

2.2 Onoke stopbanks

The Onoke stopbanks border the lower reaches of the Ruamahanga River and Lake Onoke. They were constructed in 1964 from dredged riverbed material that was stockpiled, dried and shaped with approximately a 6 metre berm. Due to the locality of the stopbanks they are subject to wind generated wave action and as a result substantial damage along the outer face of the stopbank is occurring. The berm no longer exists in many places and the stopbank is being steadily eroded. In areas, large holes are evident that are undermining the access road that runs along the crest of the stopbank.

Figure 2: A large hole in the outer face of the Onoke Stopbank

For the reconstruction of the some of the stopbank, gravel screenings have been used to rebuild the partially eroded sections. These are placed in the eroded area and then partially shaped to achieve a natural batter slope.

Figure 3: Reconstructed Stopbank

It was apparent to the reviewers that this is a valuable asset that is threatened with wave-lap erosion. The reviewers noted that all erosions areas have already being mapped and prioritised. At present a steering committee has been formed to review the LWVDS with an aim to complete the review process in June 2005. The reviewers also agree with the Scheme managers approach to urgently address this situation through the LWVDS review with a capital works programme put in place.

2.3 Oporua Floodway – 'Duckbill' structure

This drop structure in the Oporua floodway collects overland flows from the Ruamahanga River in a two-year event, which are then directed, to Lake Wairarapa. The area has required substantial repairs in past years due to flood damage. Works have been done to correct this and the structure passed the 1998 floods with only minor damage occurring.

Rather than being grazed, the area is fenced off from the surrounding area and tractor mown. This ensures a healthy grass cover adjacent to the spillover where velocities are high. The channel, drop structure, and surrounds appeared well maintained, with plantings in good health.

Figure 4: Oporua Floodway

The reviewers were impressed with the standard of maintenance in this area and agree with and reinforce the tractor mowing of the grass sward rather then grazing; this will ensure that grass growth is healthy and adequate.

2.4 Butcher's stopbank

Bordering the right bank of the Ruamahanga River is Butcher's stopbank. In this reach of the River, the stopbank river face was prone to slumping as silt accumulated in wilding willows. Over a three-year period the site has been rebuilt. This involved willow removal and reconstruction of the stopbank face and berm. The artificial berm was constructed from imported rock fill faced with river boulders. Site restrictions and budget considerations meant this berm was narrow and low. No willow planting was planned in order to avoid a repeat of the previous issue. The berm and stopbank were sown in grass.

Figure 5: Butcher's stopbank showing silt on the berm and stock damage

During the inspection it was noted that silt build up was evident on the berm; this is periodically scraped off by digger and disposed of. Currently the stopbank is grazed to control growth and it appears that stock are causing considerable damage to the stopbank with grass cover in places being patchy and rutted; this needs to be addressed. The river is also constricted at this point but due to problems with land issues the bend cannot be removed to ease flow.

The reviewers agree with the approach taken to solve a difficult problem with a limited budget and issues associated with the release and removal of land and willows from the left bank. On the right bank, the reviewers considered the stopbank to be overgrazed. Attention needs to be given to both the management of this grazing to prevent further damage occurring to the stopbank. The development of a grazing plan for particular problem areas may be appropriate.

3. Waiohine – Managatarere River Scheme

The Waiohine River has a relatively long and narrow catchment area of 378 km^2 on the eastern side of the Tararua Ranges. From its headwaters at an elevation of 1500 m, the river flows out onto the alluvial gravel deposits of the Wairarapa plains over a distance of 20 km to its confluence with the Ruamahanga River. On the Wairarapa plains the Waiohine River is joined by one major tributary, the Mangatarere, which has a catchment of 90 km^2 in the Tararua foothills.

3.1 Wong bank protection works

In 2000, the Waiohine River eroded the outside right bank edge in this section of its banks back to the stopbank. To rectify this problem a boulder rip-rap bank was put in place. The construction of the rip-rap involved gravel from the gravel beach opposite being moved across the channel. This was then shaped to provide a 15 metre berm area and a natural batter slope. The berm was planted with rows of rooted willows and the batter slope armoured with 2,500 tonnes of boulders sourced from the upper Waiohine. On the inside of the bend is a large gravel beach and during the summer months a mobile crusher was brought in, the gravel was crushed and then removed off site.

It was noted that there was minimal damage to the backside of the armouring however there were some depressions in the toe of the rip-rap bank; this may mean some form of toe protection will be required in the future.

Figure 7: Boulder rip-rap bank protection

The reviewers consider the significant works constructed to deal with a difficult problem in an aggressive river appropriate and successful.

3.2 Tui Glen

At Tui Glen recent works included stopbank construction, as well as berm reconstruction. Here the old stopbank had been constructed to follow boundary lines. It was in poor condition, did not provide the desired level of protection, and in parts was slumping. The upgrading work to a 20-year return period in this area raised the stopbank level, adopted a more logical alignment away from the river, and provided a manageable width of berm. The new stopbank is grazed to control growth and appeared in good condition, with no over grazing evident. Upgrading work to the Waiohine scheme will continue as part of the review being undertaken by the steering committee so that stopbanks are either constructed or upgraded to a 20-year return period in rural areas and a 100-year return period in urban areas.

Figure 8: Gravel bank and linear iron training fence

The initial works for the berm reconstruction consisted of the construction of a gravel bank by pushing up the existing gravel beach, shaping of the batter, then armouring this with small 'paperweight' concrete blocks. The upstream works consisted of an existing linear iron training fence.

The new stopbank appeared well constructed, and was generally in good condition. The overall improvement works were well established and seemed to be working well. As the preferred alignment of the Waiohine River has been established, the reviewers' recommend that all future works should relate to this.

3.3 Bicknell improvement works

The Bicknell farm is situated in a flood prone area and is subject to frequent flooding in a less than annual event. Areas upstream of this property have suffered from severe erosion and as a result the river had noticeably widened and any existing protection works removed. To correct this a series of works were constructed to re-establish the protection that existed prior to the works being removed, including:

- Construction of a series of rock groynes with planting in between to provide suitable bank protection.
- Construction of a sill bank to re-establish the existing bank edge levels; this bank provides protection up to 500 m^3/s discharge.
- Installation of a floodgate from the Muhunoa Stream with construction of a rock apron at the outfall and placement of boulders at the toe of the bank for protection.

Figure 9: Floodgate from the Muhunoa Stream

The reviewers were impressed with the works constructed in this area to re-establish protection for the landowner.

3.4 Pearce property, Mangatarere River

The Mangatarere River flows through the Pearce property. On the reach of the river inspected by the reviewers was an 'S' bend that during high flows was prone to severe erosion. On the inside of this 'S' bend a series of works were attempted to prevent flooding and erosion. The works included a low level stopbank on the bank edge, however shortly after its construction a flood event occurred and the stopbank failed. Next a low level rail iron deflector fence was installed to protect and deflect the water away from the channel edge. However, this too proved to be inadequate on its own in

providing the desired protection. Now the deflector fence has been strengthened with boulder rip-rap to protect the bank edge.

Figure 6: Rail iron deflector fence and newly constructed boulder rip-rap bank protection

The construction of the rip-rap involved gravel from the gravel beach opposite being moved across the channel; boulders sourced from the upper Waiohine were then placed on top to form the rip-rap. At this site there is the potential for the rip-rap bank to be undermined due to the high velocities experienced on the inside of this 'S' bend, however due to the nature of the rip-rap, the boulders will slump accordingly to accommodate any drop in bed levels. This will require an ongoing maintenance program to be developed to 'top up' the boulders as slumping occurs. On the outside downstream bend a series of rock snub groynes have been constructed to provide bank protection.

The reviewers were impressed with the works constructed to deal with a difficult problem. An ongoing maintenance programme will need to be developed to ensure that the rip-rap bank is kept in good condition until both sufficient grass cover and willows have been established.

4. Summary

Due to the short time available the reviewers were only able to visit a few sites in each scheme; this provided an overview only.

Impressions of the Lower Wairarapa Valley Development Scheme were that in general existing assets were being adequately maintained to ensure their continued effectiveness, with the exception being the Onoke Stopbanks. This concern was noted and should be addressed and rectified through the steering committee review process to be completed in June 2005.

The Waiohine scheme, is a scheme that has had a history of being under funded. This has been rectified, to a significant degree, with an increase in the annual maintenance budget for the river. Increased funding is allowing for improvement works to be constructed to correct problem areas by either increasing or re-establishing protection levels. Now that a preferred river alignment has been determined maintenance and capital works can be proactive rather then reactive, as was the case.

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