Report No.	13-152
Decision Required	

UPPER WHANGANUI SCHEME - WHANGANUI RIVER AT MATAPUNA - CHANNEL MANAGEMENT (PRD 05 32)

1. PURPOSE

1.1. The purpose of this item is to report to the Committee on an investigation of erosion that has occurred on the Upper Whanganui River at Matapuna, including the identification of mitigation options.

2. RECOMMENDATION

That the Committee recommends that Council:

a. receives the information contained in Report No. 13-152 and annexures; and

b. instructs the Group Manager Operations (GMO) to communicate investigation findings to the Scheme Liaison Committee and the affected landowner, with a view to including light erosion protection measures at Matapuna, within the Scheme Management Programme for 2013-14.

3. FINANCIAL IMPACT

3.1. Any costs arising from this item will be met from either the current or future years' Upper Whanganui Scheme maintenance budgets.

4. COMMUNITY ENGAGEMENT

4.1. This matter has regularly been discussed at both Scheme Liaison Committee and Annual Ratepayer meetings for the Upper Whanganui Scheme and has been discussed with the landowner on a number of occasions. Further discussion will follow the adoption of this report.

5. BACKGROUND

5.1. The Upper Whanganui Scheme came into operation in 2003 following extensive investigations and community consultation under a project sponsored by the Ruapehu District Council (RuDC), Horizons Regional Council (HRC) and Transit New Zealand (now New Zealand Transport Agency (NZTA)). Each of these authorities has an interest in river management issues along the reach of the Upper Whanganui River adjacent to Taumarunui.

5.2. The investigation covered the nature and stability of the river, the type of assets at risk, the effectiveness of existing works to protect those assets, suitable additional protection measures, and the maintenance of those measures.

5.3. The results of the investigation are set out in a comprehensive report entitled "Upper Whanganui River Manunui to Taumarunui Reach, Investigations of Bank Erosion and Channel Stability", 2002, Williams, Philpott and Gellatly. Detailed river scheme works are presented in a further report entitled "Upper Whanganui River Management Scheme", July 2003, W.J.L.Philpott.

5.4. The works area of the Upper Whanganui River Management Scheme covers the Whanganui River from the SH 41 Bridge at Manunui to 2 km below the confluence with the Ongarue River, adjacent to SH 43 and Mania Road, which is a total river length of approximately 10 km. The 2003 report proposed a design channel some 60 m in width through the reach.

5.5. An area of erosion on the true left bank is quietly active, commencing around 350 m downstream of the Matapuna railway bridge and extending for 150 m. However, contrary to some perceptions, there has been minimal loss of land since the scheme's inception. An examination of aerial photographs confirms, that over the 37 year period, up until the latest aerial photography in 2011, no more than 0.26 ha of land was lost in this area (refer aerial photo at Annex A). Furthermore, an analysis of cross sections confirms that was essentially all lost prior to the establishment of the scheme in 2003. From 2011 to the present time, there has been no more than 2-3 m lost to erosion at the worst point around the bend.

5.6. There has been ongoing discussion concerning this erosion and the mitigation measures taken, for the past 6 years or thereabouts. There have been consistent calls from the affected landowner to extract gravel from the subject river reach or to cross-blade gravel within the active channel, in the belief that this will mitigate the erosion problem. Most recently, Councillor Plowman expressed concern at the June meeting of the Catchment Operations Committee, as regards the reluctance of the Scheme Manager to utilise gravel extraction as a means of managing channel alignment and thereby mitigating the erosion problem. The Committee requested that a report addressing the issues raised by Councillor Plowman be presented to its scheduled August meeting.

6. DISCUSSION

6.1. There were no rock linings proposed in the 2003 river management report for this river reach. What was proposed was the establishment of a 30 m wide buffer zone of willow planting and layering. However, following a period of increased erosion and the river's encroachment towards a high terrace, at which point mitigation options would have been seriously limited, a rock lining was constructed in two phases over a length of 180 m downstream of the rail bridge and immediately upstream of the current erosion site. That lining has been 'topped up' on a least one occasion and the upstream 'cut-off' was strengthened last year. The lining will continue to be maintained as necessary and a stockpile of rock is maintained on site for that purpose. However, there is no intention of extending the lining further downstream and indeed there is no expectation of that from either the Scheme Liaison Committee or the landowner concerned.

6.2. The erosion extends from approximately 50 m downstream of cross-section 7716140 to 100 m upstream, as shown on the photomap below.

6.3. The expectation of channel management by way of gravel extraction or re-distribution, no doubt, arises from the historic use of that practice by the Ministry of Works in the Whanganui River through Taumarunui over many years. However this past practice, of continued extraction and entrenchment of the channel has resulted in a serious degrading of the channel. This is shown in the figures of the river cross-sections taken in April 1979 and February 2011 at the following three cross-sections as attached at Annex B.

- Section 7715943 adjacent to Taupo Road;
- Section 7716140 around 500 m downstream of the Matapuna Bridges (downstream end Poole's farm); and
- Section 7716162 around 150 m downstream of the Matapuna Bridges (upstream end Poole's farm).

6.4. In the first two cross-sections the thalweg bed levels have dropped by around 1.5 m during this period. At Section 7716162, not only has the thalweg dropped by just over 1.5 m, but the mean bed level of the active channel has also dropped by that amount.

6.5. Recent partial surveys show a minor recovery of 30 to 40 % of the degradation at the most serious site, Section 7716162. There is little change at the subject site and a slight further drop in bed levels at Section 7715943.

6.6. The response of the riverbanks to the degradation is significant undermining of the riverbanks and exacerbation of erosion. It will take several years, if not decades, for bed levels to recover.

6.7. The degradation has resulted in increased channel capacity and now the stopbanks are well above the original design flood capacity. However unfortunately, the present erosion threats very much outweigh improvements in channel capacity.

6.8. The management practice involving major gravel extraction of decades past was endemic in New Zealand and overseas, and was based on a belief that entrenchment of river channels was the way to control both erosion and flooding. It resulted in very serious

lateral erosion and undermining of banks and adjoining community assets in many schemes. Currently, there are embargos on extraction over several major rivers in New Zealand, as recovery of bed levels is sought.

6.9. A frequent catch-cry was that gravel needed to be extracted from the inside of bends to reduce the pressure on the opposite riverbank. Unfortunately, the removal of gravel from the river system caused a spiral of degradation over that particular reach of river. There are indeed cases when judicious extraction is warranted at river bends, particularly those rivers with healthy riverbed levels. However, quite clearly, the riverbed levels need to recover in this reach of the Upper Whanganui River.

6.10. The degradation in this case is the single main cause of the scheme needing to finance rock riprap protection works – to prevent undermining of the toe of riverbanks.

6.11. It is accepted that some minor extraction/relocation may be undertaken from time to time, as a means of managing the shape of the subject right bank gravel beach and preventing the establishment of vegetation. Indeed, there has been such extraction from time to time as a scheme works. However, the scale of this extraction should not be expected to achieve either permanent or temporary re-alignment of the low flow channel, as is the expectation of some.

6.12. Gravel redistribution is an option in that it does not impact on the overall gravel budget. It is a technique whereby gravel is shifted from a relatively high location to a deep channel – such as the outside of a bend. The practice can afford some temporal benefit in mitigating erosion. However, it is generally not cost-effective in the long-run and provides a false sense of security in terms of erosion protection. When the major floods arise any benefit will be small or maybe non-existent. Again, re-distribution of gravel has been undertaken at the subject site, in this case shortly before the scheme's establishment. However, the benefits were short-lived, with the next flood depositing a large quantity of gravel back on the right bank beach. Re-distribution could be attempted again under the existing 'global' consent held by the scheme, however the cost would account for a substantial proportion of the scheme's annual budget, with the prospect of any longer term benefit being slim.

6.13. A recent inspection of the site has revealed that the present low flow channel alignment is fine. The rock lining is performing as intended and is slightly deflecting flow away from the left bank at its downstream extremity. The gravel beach on the opposite (right) bank is relatively low and uniformly shaped and is not having any significant effect on flow direction as the river rises.

6.14. The recommended option for addressing the gradual erosion immediately downstream of the rock lining is to revert to a variation of the original proposal for this particular reach. That would involve battering back the steeper sections of river bank within a total length of approximately 150 m and establishing a willow mattress on that batter. The location and extent of that recommended work is shown on the photomap above. These works would require the permanent retirement and fencing off of a buffer width of approximately 4 m, which would still fit within the original buffer zone footprint. The estimated cost is $25,000. A lower-cost option of unsecured pole planting would have little prospect of success at this site, given the dry and loose gravel material on the 4 m high river bank and the immediate exposure to river flow.

7. NEXT STEPS/CONSULTATION

7.1. Despite being unsuccessful with past attempts to convince the landowner concerned of the unsuitability of gravel extraction/relocation as a means of mitigating erosion at this site, it is proposed that staff persevere in this regard. The recommended establishment of a river edge erosion buffer, using a willow mattress technique, will be discussed with both the landowner and the Scheme Liaison Committee, with a view to including such works in the works programme at the first opportunity.

8. SIGNIFICANCE

8.1. This is not a significant decision according to the Council's Policy on Significance.

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INVESTIGATIONS & DESIGN MANAGER

Allan Cook
GROUP MANAGER OPERATIONS

ANNEXES

A Aerial Photograph of Plan and Profile

B Upper Whanganui River Cross Sections and Location Maps