

Your Ref:
Our Ref:



20 December 2012

Attention: Mr A Richards

Department of Internal Affairs
Policy Group
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Wellington 6140

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Dear Anthony

Edgecumbe-Rangitaiki Plains Flood Mitigation Works: 30 June 2012 Progress Report

Following the marked-up draft version sent for your review on 12 October 2012, please find attached the finalised version of the Edgecumbe-Rangitāiki Plains Flood Mitigation Works 30 June 2012 Progress Report to the Department of Internal Affairs (DIA).

Bay of Plenty Regional Council (BOPRC) and the river scheme are very appreciative of the ongoing financial support from DIA. Please note that BOPRC staff wish to meet with DIA to discuss the challenges that the project has encountered with the Floodway widening works and the impact those challenges will have on the programming and cost of the overall project.

Please call if you have any questions.

Yours faithfully

A handwritten signature in blue ink, appearing to read "BK Crabbe".

Bruce Crabbe
Rivers and Drainage Manager

for General Manager Natural Hazards



Edgecumbe – Rangitaiki Plains Flood Mitigation Works

30 June 2012 Progress Report to Department of Internal Affairs



Bay of Plenty Regional Council

Edgecumbe and Rangitāiki River Flood Mitigation Project

June 2012 Progress Report to the Department of Internal Affairs

1 Executive Summary

Physical progress with the geotechnical strengthening works and stage 1 of the floodway widening works through the 2011-2012 construction season has been very good. The full programme of planned geotechnical works and 1,300 lineal metres of the floodway widening works were completed.

However preparation for getting construction works underway on the next stages of the floodway widening for this coming construction season has encountered some major challenges that Bay of Plenty Regional Council (BOPRC) has to resolve and it is doubtful that physical works on the Floodway widening will occur this 2012-2013 season. These challenges include, geotechnical issues, scope of works increases and compensation expectations of some landowners being significantly higher than expected.

At this stage BOPRC is still working through options for progressing the next phase of works, however this is expected to take some time as one option may involve compulsory purchase of some farm land. Further details of these options are described in the body of this report. Unfortunately this delay and expected additional costs will extend the duration and cost of this project and BOPRC seeks to meet with Department of Internal Affairs staff to discuss this issue in more depth in due course.

BOPRC's works on the Edgecumbe and Rangitāiki River Flood Mitigation Project comprises of three separate aspects; geotechnical strengthening; Rangitāiki Floodway widening and construction of the Rangitāiki Spillway structure. Progress on the works and revised cost estimates as a result of more detailed design and undertaking the works themselves are reported.

Geotechnical strengthening works for the 2011-2012 financial year have progressed well with \$562,991 of works being completed compared with budget of \$500,000.

Cost estimates for geotechnical works are typically very uncertain until the final detailed investigation and analysis is undertaken. Revised cost estimates are that the geotechnical works will now cost \$2.7M more than the original estimate.

The Floodway widening works progressed well with 1,300 lineal metres of widening works being completed. Significant geotechnical issues and issues relating to land entry permission shortened the length of work that could be carried out for the first stage. Expenditure closed at \$1.75M at year end compared with budget of \$2.926M (inflation adjusted). This under-expenditure will be carried forward into the 2013-2014 financial year subject to Council approval. Refer to section 8 below regarding inflation adjusted budgets.

Spillway control structure works are programmed for 2013-2014 in BOPRC's Ten Year Plan, however the anticipated delays will push this date out at least one financial year unless the works are carried out concurrently. Revised cost estimates based on the inflatable dam option have these works now estimated to cost \$1.2M less than originally anticipated (ignoring inflation adjustments) although detailed design and estimates have not yet been carried out.

Significant works have been completed by BOPRC on the Edgecumbe urban stopbanking part of the project. This work is being carried out and funded by Whakatāne District Council and is included in this progress report for information purposes only.

Key issues and risks affecting the works are discussed and ongoing communication of these works to the public is reported.

2 Background

Over the period 15 – 18 July 2004 the eastern Bay of Plenty was subjected to both extreme rainfall and a swarm of localised earthquakes, causing flooding damage and community disruption in the Whakatāne District. In May 2005, localised extreme rainfall caused additional flooding damage and community disruption.

Subsequently, Bay of Plenty Regional Council (BOPRC), in conjunction with the Whakatāne District Council (WDC), presented a request for special policy financial assistance to the Government for new hazard mitigation works related to the recovery from the 2004 and 2005 events.

On 17 June 2009, Cabinet agreed to the provision of \$3.367 million (GST exclusive) to BOPRC toward new hazard mitigation work to be conducted on the Rangitāiki River Flood Protection scheme, as detailed in Section 2.1.4 of Improved Hazard Mitigation in Whakatāne District business case claim.

The Government contribution is set out in the Agreement for Financial Assistance for Hazard Mitigation Work for the Rangitāiki River Flood Protection Scheme dated December 2009.

This progress report is required by the above agreement and covers only the BOPRC flood mitigation works. BOPRC and WDC are working closely together to implement the flood mitigation measures; however WDC will furnish progress reporting for their part of the project separately.

The previous progress report for this project was provided by BOPRC dated June 2011.

3 2010, 2011 & 2012 weather events impacting Bay of Plenty

Several flood events have significantly impacted all of the region's rivers schemes over the past couple of years with the last event occurring in January 2012. These events have resulted in severe flood damage requiring very significant additional expenditure on flood damage repairs. The Rangitāiki-Tarawera River Scheme ratepayers are facing a flood repair estimate of at least \$8.8M in addition to the cost of this project and the routine operating costs. This has impacted seriously on the scheme's targeted rates with an increase for Year 1 (2012-2013) of the Ten Year Plan of 55%, to be followed by 18% and 18% respectively for the following two financial years.

4 **Introduction**

The BOPRC works comprise three separate aspects; geotechnical strengthening of the stopbanking system, Rangitāiki Floodway widening works and construction of the Rangitaiki Spillway structure. Progress with these areas is explained as follows:

5 **Geotechnical strengthening works**

Investigations into previous failures of the flood protection system revealed that the stability of the foundation materials beneath the stopbanks is substandard in many areas due to the pervious and light-weight nature of the highly variable subsoil layers. Significant geotechnical strengthening works have been recommended over much of the of stopbanked section of the lower Rangitāiki River. This work has been ongoing since 2006 as this weakness was recognised as being the highest priority essential remedial works regardless of whether or not the Government would contribute toward the works.

Progress with the geotechnical strengthening works has been very good during 2011-2012 with expenditure of \$562,991 compared with budget of \$500,000 (refer to expenditure details in Appendix 2). Overall expenditure to date and the estimates to complete the whole project, including the geotechnical strengthening works, are shown in Appendix 1.

The overall cost of the geotechnical strengthening project is now expected to cost approximately \$2.7M more than the estimate provided with the business case claim.

The status of the geotechnical remedial works project (refer Appendix 3) is summarised as follows:

Status of works	Number of works	Percentage of total
To be investigated	1	2%
Under investigation	5	11%
Investigation complete	6	13%
Works in progress	0	0%
Works complete	34	74%
Total number of works	46	100%

The works programme and estimates for the 2012-2013 financial year is included in Appendix 4. Locations for all of the geotechnical strengthening works are shown on Map 1 and Map 2 attached.

Significant additional geotechnical strengthening work is also being required in the Floodway widening works as it progresses. This additional work is described below.

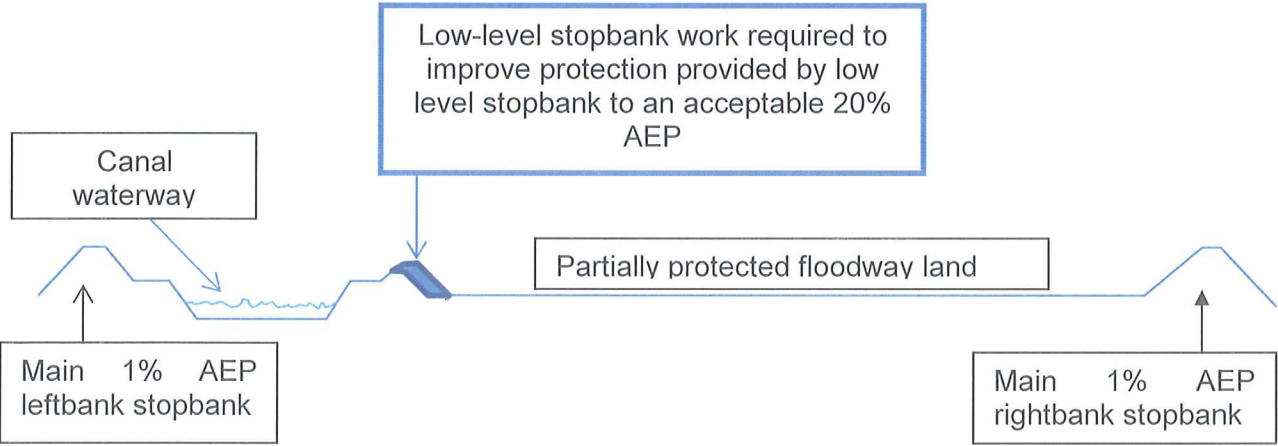
6 Rangitāiki Floodway widening works

The major works involved in widening the lower reach of the Rangitāiki Floodway commenced during 2011-2012 and progressed well with approximately 1,300 lineal metres of the Floodway widening being completed.

Some significant unforeseen issues have arisen during this first stage that will cause delays and additional expenditure during subsequent stages as follows:

Geotechnical issues: Foundation investigations through the footprint of the new Floodway stopbanks have revealed that ground conditions are very poor and that significant additional seepage pressure relief systems will be required through most of the widened reach. Extraordinary works include seepage relief trenches, seepage relief wells, vertical wick drains and significant toe-loading works. Additionally, the foundations of some of the existing stopbanks have been found to be substandard in geotechnical factor of safety and strengthening works have been required in some areas.

Low-level stopbanks: The low-level stopbanks are an integral part of the Floodway design and provide protection for affected landowners against a combination of very high sea storm conditions and heavy rainfall. These two conditions arose during a flood event in January 2011 with the consequence that many of the affected landowners suffered overtopping of the low-level stopbanks and consequent ponding of floodwaters and extensive flood damaged pastures. Not surprisingly these landowners have required that upgrading of these stopbanks occurs in conjunction with the adjoining Floodway widening works. This is an expenditure that was not anticipated in the original business case proposal. Refer sketch below.



Typical cross section through Rangitāiki Floodway

Landowner expectations for compensation: Negotiations with landowners in the Stage 2 section of the Floodway widening project have encountered resistance to the usual Council policy for compensating for losses involved with capital construction works. Council is considering its options with this issue.

The overall estimate for the floodway widening remains as \$5.5M (prior to inflation adjustments) however there is expected to be a shortfall in the funding required to complete the works. It is however, premature to provide an estimate of what the shortfall would be until options have been investigated and landowner agreement has been reached.

7 Rangitāiki Spillway Works

The original business case application to Government included the Rangitāiki Spillway control structure design as a concrete and steel radial gate configuration. Further research following lodging of the business case has found that the profile of the spillway (i.e. being long and shallow rather than narrow and deep as radial gates usually are) better suits an inflatable dam device. The inflatable dam option cost is estimated at \$1.9M (now adjusted for inflation to \$2.239M, refer Appendix 5) compared with the radial gate structure option at \$3.1M (in original Business Case \$). The inflatable dam option has now been included as the preferred option in the project estimate.

The spillway control structure works are programmed in Council's Ten Year Plan for FY2013-2014. However the inevitable delays referred to above with finishing the Floodway widening works is expected to delay commencement of this part of the project.

8 Impact of inflation

Reporting of actual expenditure against the Business Case project budget has now become difficult as BOPRC's Ten Year Plan budgets are adjusted to include inflation. The latest 2012-2022 Ten Year Plan capital works budget for the Rangitāiki-Tarawera Rivers Scheme is attached as Appendix 5. The original Business Case budget based in 2007 dollars is shown for comparison purposes in Appendix 1 with no inflation adjustment applied.

9 State Highway Two bridge reinstatement

NZ Transport Agency has now completed the bridge construction that is required for the Floodway to operate at full capacity. The risk of this work delaying the Spillway control structure works is therefore abated.

10 Resource consent

Resource consent for the works herein was granted in September 2009.

11 Key issues

11.1 Scope of remaining geotechnical strengthening works

The scope of the geotechnical challenges has now expanded to be significantly impacting the Floodway widening works as well as the originally planned main river channel geotechnical strengthening works. Geotechnical investigations of the foundations for the new widened section of the Floodway have encountered some undesirable soil layers that will require extra remedial work to achieve an acceptable factor of safety. Recommended remedial works for this are still being finalised but it is expected that they will increase the cost of the widening works.

Geotechnical remedies for the Thornton Hall Road downstream of the highway bridge area are still to being investigated and considered.

12 Landowner acceptance of proposed remedial methods (e.g. inundation)

The recently completed investigation for Site 3c “Thornton School – Shaw’s/Tops lowland area” involves an area of approximately 80 hectares of low lying land that is significantly lower than the adjacent stopbanks. In an extreme flood event the geotechnical analysis indicates a high risk of a seepage induced foundation failure (i.e. similar to Sullivan’s breach during the 2004 flood event). Initially the recommended remedial works proposed intentionally flooding the low lying basin prior to a flood event to minimise the head difference between the flood level in the river and the low lying ground.

This option had been proposed to the affected landowners and they are very concerned about the impact on their farming operations. The alternative remedy, to import overlay fill material to provide resistance against the seepage uplift pressures has been provisionally estimated at approximately \$9M which is extremely expensive and unaffordable for the scheme. It is also not favoured by the landowners as they believe the disruption to their pastures would take years to recover from.

Further investigations of possible remedial options for this area have settled on a combination of reduced overlay areas combined with an innovative vertical seepage ‘wicking’ system. Vertical wicks are a controlled de-watering and pressure release system consisting of a designed polymer core wrapped in a nonwoven geotextile filter jacket. The wicks are inserted into the soil to a predetermined depth at and spacing that shortens the drainage path for exiting of seepage water. Compared to other methods the wicking system is going to be the most economical option. For example a proposed bentonite (clay) barrier would cost of the vicinity of \$650,000 per lineal kilometre compared to the wicking system that is estimated to cost approximately \$100,000 per lineal kilometre.

Ideally a land purchase with the low lying area being transformed into a wetland would be the ideal solution; however the scheme is not in a position where this option is affordable.

13 Compensation for perceived loss of farm land value

Remaining landowners most affected by the proposed floodway widening works have expressed some concern that passing additional flow down the Rangitāiki Floodway (i.e. 200m³/sec compared with the current 100m³/sec) will reduce the value of their properties due to a perceived increase in flood risk. It has been explained to the landowners that the purpose of the floodway widening works and the geotechnical strengthening works is to make the flood protection system more robust and therefore safer; however their perception is different.

BOPRC has now progressed the design of the next stage of the widening, and the associated geotechnical remedial works, and obtained landowner agreement in principle for those works. However there is still a wide divergence of expectation relating to compensation values. There are other mechanisms for gaining authority to proceed (i.e. Public Works Act); however that is always the last resort as it is very costly and creates significant ill-feeling with the landowners and community.

While the estimated cost for the Floodway works includes land compensation based on usual compensation values the compensation sums being requested are significantly higher than estimated.

14 **Grant payment schedule**

In June 2009 Government approved a contribution of \$3,367,000 toward BOPRC’s share of the Edgecumbe-Rangitāiki River Flood Mitigation Project. The December 2009 agreement with The Department of Internal Affairs sets out the following schedule of Government contributions:

Amount (excluding GST)	Due Date	Status
\$462,500	January 2010	Received
\$462,500	July 2010	Received
\$907,500	July 2011	Received
\$907,500	July 2012	Pending this progress report
\$627,000	July 2013	
\$3,367,000	Overall total	

15 **Routine maintenance costs and 2004 flood response costs**

The Rangitāiki-Tarawera River Scheme received Government funding assistance for the 2004 flood response and recovery works carried out on the scheme. The works involved in this flood mitigation project are separate from the 2004 response and recovery works and no aspects of the expenditure detailed here overlap with that project. Similarly, routine river maintenance works and any ‘business as usual’ costs are excluded from this claim. The stopbank strengthening works at site 43a have a component of stopbank raising work (identified as being lower than design height) and this will be surveyed before and following the work to measure and deduct the additional cost involved.

The Rangitāiki-Tarawera Rivers Scheme suffered huge flood damages resulting from the 2010 and 2011 flood events. These events have caused approximately \$8.8M of erosion damages which are progressively being repaired concurrently with the Flood Mitigation project. None of the flood repair costs are included in this project.

A declaration from the Chief Executive of BOPRC regarding routine maintenance costs and business as usual costs being excluded from this project is attached (refer Appendix 6).

16 **Council Collaboration**

BOPRC and WDC have been working closely together to get the Edgecumbe urban area works completed. BOPRC staff have managed construction of the east side (north-east and south-east quadrants) and the south-west quadrant stopbank works for WDC. BOPRC has separately been recompensed by WDC for these works which have been included in the financial information enclosed, but are not part of BOPRC’s claim to the Department of Internal Affairs.

17 Public information

BOPRC has kept, and will continue to keep, the public aware of the significant financial contribution from the Government. BOPRC will continue to make media releases to celebrate milestones as the project progresses and the Governments contribution will be mentioned whenever appropriate. Whenever relevant the close cooperation between WDC and BOPRC is also emphasised.

Report prepared by Bruce Crabbe, Rivers & Drainage Manager.



Mary-Anne McLeod
Chief Executive

Edgecumbe - Rangitaiki River Flood Mitigation Project

Project Expenditure Summary

	Actual Expenditures to Date							Estimates to Completion			Actuals + Estimates to Completion	Business Case Budget ⁵	Variance
	05/06	06/07	07/08	08/09	09/10	10/11	11/12 (see note 2 below)	12/13	13/14	14/15			
Options investigation, design, Business Case claim, & resource consent application		22,087	109,788	42,827	0	0	0	0	0	0	174,702	excluded	174,702
Geotech works management and supervision	excluded	excluded	15,891	9,198	33,758	31,149	13,375	20,000			123,370	incl below	123,370
Geotechnical Investigations (external engineering consultants)	24,043	74,002	65,646	36,792	30,756	35,670	3,490	5,000			275,399	incl below	275,399
Geotechnical stopbank strengthening works	30,763	489,789	668,378	423,891	804,573	382,928	546,127	475,000			3,821,449	1,500,000	2,321,449
Edgecumbe stopbank construction works ⁴					136,050	305,967	3,045				445,061	0	445,061
Floodway widening works					59,902	158,179	1,754,805	3,023,000	1,200,000		6,195,886	5,500,000	695,886
Spillway control structure						0	0			2,239,000	2,239,000	3,100,000	-861,000
Totals =>	54,806	585,878	859,703	512,708	1,065,039	913,893	2,320,841	3,523,000	1,200,000	2,239,000	13,274,868	10,100,000	3,174,868

Notes:

- 1. All actual expenditure details exclude GST, and estimate figures (excluding the "Business Case Budget" column) are inflation adjusted to reconcile with BOPRC's TYP.
- 2. Refer to Appendix 2, sheet "Summary Revenue and Expenditure for 2011-2012 to 30 June 2012" for 2011-2012 expenditure & revenue details.
- 3. Geotechnical works for 2012/2013 and beyond are still being progressively investigated and firm cost estimates for remaining sites have not been established yet.
- 4. The Edgecumbe stopbank construction works expenditure is funded by Whakatāne District Council as their part of the flood mitigation project.
- 5. The Business Case Budget figures are based on the 2007 estimate and are not adjusted for inflation.

Rangitāiki-Tarawera Rivers Scheme: Edgecumbe - Rangitāiki River Flood Mitigation Project

Summary Revenue and Expenditure Report for FY2011-2012 to 30 June 2012								
	Revenue Actual	Revenue Budget	Revenue Variance	Capex Actual	Capex Budget	Capex Variance		
Geotechnical Strengthening Works:								
RT01GA1CX01 - Geotech Works - Sullivans seepage relief wells	0.00	0.00	0.00	129,684.21	0.00	(129,684.21)		
RT01GB1CX01 - Geotech Works - Thornton School berm/rockworks	0.00	0.00	0.00	76,335.18	0.00	(76,335.18)		
RT01GJ0CX01 - Geotech Works -Thornton School rockworks 2.3km	0.00	0.00	0.00	110,203.44	0.00	(110,203.44)		
RT01GC0CX01 - Geotech works - Langdon Site No 11	0.00	0.00	0.00	112.50	0.00	(112.50)		
RT01GD1CX01 - Geotech Works - Langdons Cow shed Overlay	0.00	0.00	0.00	229,754.53	0.00	(229,754.53)		
RT01GE1CX01 - Geotech Works - Vierbooms Reids Central	0.00	0.00	0.00	36.85	0.00	(36.85)		
RT01GO1MA01 - Rangitaiki-Tarawera geotech works management	(907,500.00)	(907,500.00)	0.00	16,864.10	500,000.00	483,135.90		
Subtotals	(907,500.00)	(907,500.00)	0.00	562,990.81	500,000.00	(62,990.81)		
Floodway Widening Works:								
RT01SB0MA01 - Edgecumbe Flood Mitigation -management	0.00	0.00	0.00	2,226.50	0.00	(2,226.50)		
RT10SB1CX01 - Rangitaiki Floodway survey,investigation,proj mgmt	0.00	0.00	0.00	63,216.57	2,926,000.00	2,862,783.43		
RT10SB3CX01 - Floodway stopbank raising contract works	0.00	0.00	0.00	1,460,432.25	0.00	(1,460,432.25)		
RT10SC1CX01 - Rangitaiki Floodway widening-Investigation/modelling	0.00	0.00	0.00	228,929.80	0.00	(228,929.80)		
Subtotals	\$0.00	\$0.00	\$0.00	\$1,754,805.12	\$2,926,000.00	\$1,171,194.88		
Edgecumbe Stopbank Works:								
RT01SB1CX01 - EFM - Mobile pump pads	0.00	0.00	0.00	2,519.72	0.00	(2,519.72)		
RT01SB2CX01 - EFM - Edgecumbe South-Western S-bank	0.00	0.00	0.00	525.01	0.00	(525.01)		
Subtotals	\$0.00	\$0.00	\$0.00	\$3,044.73	\$0.00	(3,044.73)		
Total	(907,500.00)	(907,500.00)	\$0.00	\$2,320,840.66	\$3,426,000.00	\$1,105,159.34		

Rangitaiki River Geotechnical Works Schedule as at 30 June 2012						
Note: 2004 flood repair works sites excluded from schedule						
Site No. (file #)	Geotechnical Report	Section/Description	Location	Job Code	Status	Remedial Measures
2a		Van den Top-Phillips	LB 1700 - 2150	PHILLIPV	Works Complete	Filled drain at stopbank toe
2b	July 2007 Report	Moore Road seepage	LB 1620-1900		Investigation complete	Salt water intrusion to low basin. Also concern that there could be further areas downstream and opp. Side of river . Works programmed for 2012/2013
3a		Thornton School - Seepage at Braemar water line	RB 2500-2600		Investigation complete	Possible seepage along water main under river. Works programmed for 2012/2013
3b		Thornton School - Berm & rock works	RB 2300 - 2950		Works Complete	Approx 90% complete
3c		Thornton School - Shaws/Topps lowland area	RB 2100 - 3100		Investigation complete	Consultation with affected landowners underway but huge issues involved. This work also addresses Site 5 seepage concerns
5	Section 11	East Bank Road Floodwall	RB 2900 - 3200	RT1WALLS	Works Complete	Stability and seepage. Wall joints, and foundations grouted to reduce seepage
8		Greig Road Floodwall	LB 3800	RT1WALLS	Works Complete	Stability and seepage. Wall joints, and foundations grouted to reduce seepage
10		Reynolds Bend: Berm seepage/rockworks	RB 4200 - 4600		Works Complete	Possible seepage area Reynolds Bend. Works programmed 2012/2013
11	Section 4	Langdons: Pressure relief wells	RB 4899 - 6300		Works Complete	Seepage relief wells and overlay works complete
11a	Part section 4 above	Langdons berm and Martins	RB 5650 - 5870		Investigation Complete	Berm material to be used for overlay work - works not completed.
15		U/s of Langdons: Seepage concern	RB 6400 - 7350		Works Complete	Overlay works underway
22	Section 12	Opp. Soldiers Road	RB 8950 - 9100		To be investigated	Seepage analysis still to be done
23	Section 2	Upstream Edgecumbe Domain	LB 9100 - 9300		Works Complete	Pressure relief trench
24		Opp. Tanekaha St	RB 9280 - 9370		No works required	No geotech works required. Required rockworks will be completed as maintenance works.
25	Section 15	Hendl's to Tanekaha St	LB 9300 - 10150	COLTANE	Works Complete	Tree clearing, berm seepage cut-off and rockworks
25a	Section 15 continued	Concrete floodwall	LB9360-9720	COLTANE	Works Complete	Floodwall seepage cutoff nib-wall completed
28	63A College Road	Hendl's Subdivision section	LB 9820 - 9970		Works Complete	Overlay on town side of stopbank
29	Section 14	35 College Rd to Hendl's	LB 10150 - 10300	COLHENDL	Works Complete	Pressure relief trench and tree clearing completed
30	Section 1	35 College Road	LB 10300 - 10400	MILNEHRW	Works Complete	Sheet piling for seepage cutoff
30a		35 College Road berm works	LB 10350 -10600	COLLEGER	Works Complete	Rock protection/berm seepage cut-off
32		College Road	LB 10450 - 10600	COLLEGER	Works Complete	Rock protection/berm seepage cut-off
33	Section 13	SH2 to Riverslea Floodwall	LB 10600 - 11200	COSSIECL EDGETCRT	Works Complete	Pressure relief trenches, overlays & subsoil drains complete. Tennis court retaining wall completed.
33a		Upstream of Riverslea Wall	LB 10400 - 10600	COLLWALL	Works Complete	Seepage stripdrain completed
37	Section 5	Kowhai Av. to SH2 (part of Ngaio Place works)	LB 11200 - 11500	NGAIOPLG	Works Complete	Pressure relief trench and 1m overlay.
37a		Upstream Rail bridge - Main Street	LB 11300 - 11450		Works Complete	Berm reinstatement & rock works completed
38	New section	Miro Place	RB 11200 - 11850	MIROPLOL	Works Complete	Coal concern re seepage. Toe loading
38a		Miro Place - Berm Works	RB 11200 - 11550	MIROBERM	Works Complete	Debris pile on berm removed. Mound beneath bridges removed
38b		SH2 & Rail Bridge stopbank	RB11150-11180	MIROBERM	Works Complete	Raise stopbank between bridges. Geotech concern re sand layers
38c		Hydro Road seepage wells	RB11700-11900	HYDROWEL	Works Complete	Seepage relief wells on Hydro Road complete
39	Section 3	Ngaio Place Section (Fert works to Kowhai Av.)	LB 11500 - 12200	NGAIOPLG	Works Complete	Pressure relief trench, wells (Ngaio Place) and overlay completed.
40a	Part Section 6	Hydro Road (Wayne Howe)	RB11870-11920		Works Complete	Seepage relief trench
41	Section 6	Downstream of Transpower	RB 11600 - 11950	TRANSRBR	Works Complete	Rock protection/berm seepage cut-off
41a		Downstream of Transpower	RB 11600 - 12260	TRANSPOL	Works Complete	Toe-loading overlay works - multiple sites. Drainage and topsoiling to complete.
41b		Transpower to Miro Pl.	RB 11600 - 11950	MIROTRAS	Works Complete	Stopbank seepage control works
41c		Downstream of Transpower	RB 11950 - 12200		No works required	No geotech works required. Required rockworks will be completed as maintenance works.
43	Section 10	Otakiri Road area - Vibickas section	LB 12200 - 12700		Works Complete	Berm seepage, rockworks and stopbank seepage cutoff completed
43a		Virbickas to Campbells - stopbank seepage	LB 12400 - 14400		Works Complete	Seepage cutoff layer along stopbank completed
46a		Black's Farm	RB 12850		No works required	Wet area investigated - no works required (Marianne email of 10-9-07)
78	Additional works	Sullivans Bend: seepage relief wells	RB 12900 - 13100		Works Complete	Seepage relief wells and ground water monitoring piezometers
49	Section 8	Black's Farm Area	LB 13000 - 13500		Works Complete	Berm seepage, rockworks and stopbank seepage cutoff completed
49a		Campbell's Corner	LB 14100 - 14350		Works Complete	Stopbank seepage control works completed
50	Section 9	U/s of Sullivan's	RB 13600 - 13800		Under Investigation	Seepage concern (old meander course?)
53a		Kokohinau Bend (seepage trench/overlay)	LB 15870 - 16000		Investigation complete	Seepage concern at original repair site
58	Section 7	Pryor	LB 17600 - 18000		Under Investigation	Seepage and stability (tomo hole etc)
73		Omeheu Canal (Richardson's)	RB 3600-3700	JROMEHUS	Works Complete	Toe loading of seepage area completed - Omeheu Canal not on map
74		Reids Central Canal (Vierbooms)	RB 1500- 1700		Investigation complete	Seepage concern - Cut off drain & overlay programmed 2011/2012
75		Reids Central Canal (Shaws)	LB 2320-2740		Under Investigation	Seepage concern
76		Rangitaiki R Thornton Hall Rd	RB 800-1000		Under Investigation	Seepage concern.
77		Rangitaiki R Thornton Hall Rd	RB1500-1900		Under Investigation	Seepage concern.

Note: Refer to the aerial photo-plan maps attached for locations of works.

Appendix 4

Edgecumbe-Rangitaiki River Geotechnical Remedial Works Project

Geotechnical Works Programme and Estimates

Description	2011-2012 Works (Actuals)	2012-2013 Works (Estimates)
Site 2b: Moore property - Thornton. LB 1620-1900 Drainage stabilisation works to control seepage pressures		\$160,000
Site 3: Thornton School Section: RB 2100-3100 3a) Overlay and filter to control seepage around Braemar water pipe 3b) Berm reinstatement and rockworks (completed) 3c) Shaw/Top seepage remedial works: wicks & toe-loading	\$186,539	\$10,000 \$189,000
Site 5: East Bank Road: Floodwall remedial works. The seepage issue at this site addressed by the 3c) works above	included above	
Site 11a: Langdon's berm RB 5650-5870: material removal to overlay house block	\$113	\$10,000
Site 15: Upstream of Langdon's (cow shed to old house overlay) RB 6400-7350 (completed)	\$229,755	
Site 50: Upstream Sullivan's breach RB 13600-13800. Seepage wells, overlay and piezometer wells (completed)	\$129,684	
Site 74: Reid's Floodway (Vierboom's) - RB 1500-1700. Toe-load/overlay	\$36	\$106,000
Site 75: Reid's Floodway (Shaw's) - LB 2320-2740. Include with Floodway widening project		-
Site 76: Thornton Hall Road RB 800-1000. Solution still being investigated		-
Site 77: Thornton Hall Road RB 1500-1900. Solution still being investigated		-
Works Only Subtotal	\$546,127	\$475,000
Supervision/Management	\$13,375	\$20,000
Geotechnical Engineering investigations	\$3,490	\$5,000
Estimate Total	\$562,991	\$500,000

Refer to aerial photo-map for works locations

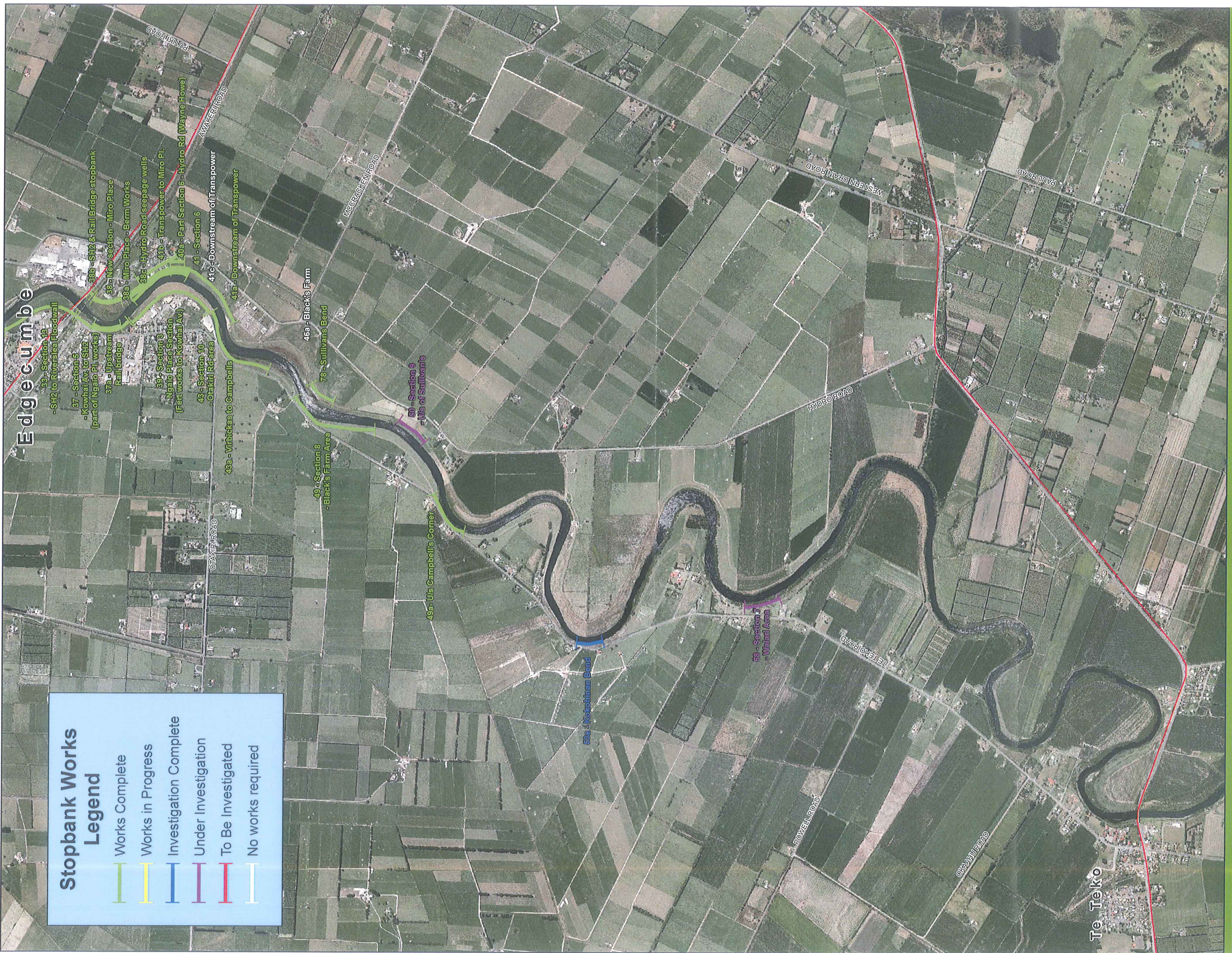
Appendix 6: Declaration

I hereby certify with reference to this progress report to the Department of Internal Affairs relating to BOPRC's part of the Edgecumbe-Rangitāiki River Flood Mitigation Project:

- That each River Scheme asset under consideration is maintained consistent with reasonable practice in the sector and that no grounds exist for believing that a lack of maintenance or protection has increased the cost of this remedial work in any way.
- That the geotechnical strengthening, floodway widening or spillway construction works detailed in this progress report do not overlap with any 'business as usual' routine maintenance costs associated with the scheme's management.



Mary-Anne McLeod
Chief Executive



Stopbank Works

Legend

Works Complete

Works in Progress

Investigation Complete

Under Investigation

To Be Investigated

No works required

