

Report No.	16-121
Information Only - No Decision Required	

RIVER AND DRAINAGE ENGINEERING REPORT (PRD 01 02)

PURPOSE

- 1.1. The purpose of this item is to report on progress with river and drainage activities for the period 1 April 2016 to 31 May 2016.

2. RECOMMENDATION

That the Committee recommends that Council:

- a. receives the information contained in Report No. 16-121 and annexure.

3. FINANCIAL IMPACT

- 3.1. Funding provision for all activities reported on in this item is either included in the River and Drainage General or River and Drainage Schemes Activity sections of the 2015-25 **Long-Term Plan (LTP)**; is covered by an approved carry-forward of unexpended budget in 2014-15; or additional approval will be specifically sought by way of recommendation in the item.

4. COMMUNITY ENGAGEMENT

- 4.1. Various matters contained in this item either have been, or will be, communicated with scheme ratepayers through their respective Scheme Liaison Committee and / or Annual Catchment Community Meetings. As necessary, other issues will be the subject of media releases.

5. SIGNIFICANT BUSINESS RISK IMPACT

- 5.1. There are no significant risks inherent in the adoption of recommendations contained in this report. There is however a significant risk of the drawdown of an excessive proportion of individual scheme emergency reserve funds for the purpose of flood damage reinstatement, in the event that a positive response to Council's application for assistance under the National Civil Defence Emergency Management Plan (the Plan) is not received.

6. DISCUSSION

- 6.1. Further progress has been made with the initial claim for Central Government assistance with the reinstatement of flood damage arising from the June 2015 Region-wide floods. The detailed audit of approximately 80% of individual claim items by **Ministry of Civil Defence and Emergency Management (MCDEM)** staff has now been completed. Arising from that audit, a small number of items were deemed to lie outside the criteria for assistance under the Plan. In a few cases the work undertaken was considered to be maintenance rather than asset reinstatement. In others the completed repair work was considered to have a higher level of service than the asset that existed prior to the June 2015 event and both necessitated some adjustment to the claim. A 'final' claim in the sum of \$1,680,185 has been agreed, which is \$102,000 or 5.7% lower than the initial claim.

- After allowing for the one-off deductible of \$870,872, the 60% Government contribution amounts to approximately \$486,000.
- 6.2. A briefing paper recommending payment in accordance with the Plan is currently being prepared by Ministry staff and is expected to go to the Minister and Cabinet for their approval by mid June. In the meantime, work has commenced on a second claim which will include all costs incurred up to 30 June. The quantum of that claim is expected to be in the order of \$1.65 million, and since the deductible will have already been applied, the Government share (60%) should be in the order of \$1 million. It is intended that a third and final claim will be submitted in December this year.
 - 6.3. The final seven Annual Catchment Community meetings took place over the first two weeks of the reporting period. Similar to what was reported to Committee in April attendance levels varied, with the Lower Whanganui, Matarawa, Rangitikei and Taringamotu Schemes having good levels of attendance and the Ohau-Manakau meeting having just one attendee. Clearly events associated with the June 2015 flood event formed a substantial part of the discussion at most of the meetings. A separate report captures the issues raised at these meetings, staff comments around the engagement initiatives trialled and what other initiatives might enhance understanding in the community of the various schemes.
 - 6.4. As previously advised, the cumulative effect of the **Lower Manawatu Scheme (LMS)** upgrade work and the widespread flood damage from the June 2015 event has generated a high workload for the Group. Issues such as the Awarua Stream report (a deliverable that forms part of the Whanganui Flood Management Review Group task list) have consumed more resource than originally anticipated, and that together with staff changes have further compounded matters.
 - 6.5. As a consequence, the Ohau-Manakau Scheme audit is not able to be delivered in the current financial year. The Tutaenui Scheme audit has been given priority for completion and is likely to be completed by the end of the financial year. The third audit identified for the current financial year is the Lower Kiwitea Scheme audit; staff are working toward delivery of this audit but there is some risk that this will also not be delivered by the end of the financial year.
 - 6.6. Those audits not completed can be added back into a revised scheme audit / review programme when it is next updated as part of the update of the LTP later next calendar year. Consideration does need to be given to whether the audit process is the best mechanism for ensuring better linkage between Scheme Reviews and the scope / direction of operational activity. Specifically whether a clearer framework for each scheme is needed.
 - 6.7. As instructed (motion from the February meeting of the Catchment Operations Committee), consideration has been given to the Rangitikei Scheme. The specific issue highlighted at the February Committee meeting was the reserves position of the Rangitikei Scheme; using reserve position as a measure it is (by some margin), in the poorest financial state of all of Council's River Management Schemes.
 - 6.8. The size of the scheme and its risk exposure make this scheme potentially a significant liability for Council. That risk exposure is derived from the substantial portion of river control activity that the scheme undertakes and (particularly upstream of Kakariki) the limited benefit area.
 - 6.9. While the outcome of the MCDEM claim seems likely to provide some short-term relief (the Rangitikei Scheme makes up just over a quarter of the estimated total value of the MCDEM claim for the June 2015 event) the challenges that the scheme faces around affordability have been well documented through a number of reviews. The changes Central Government are signalling with the establishment of the Local Government Risk Agency could place added pressure on the future viability of this scheme i.e. the ability to make claims from MCDEM for flood damage could become limited at best in the future.

- 6.10. Because levels of service are so difficult to define river control schemes are notoriously prone to 'scope creep', where objectives become progressively more localised and short-term. That is, the wider overall objective becomes somewhat secondary to pressure from individual landowners around loss of land.
- 6.11. Past gravel management practices also appear to have exacerbated matters, with royalties from extraction being counted as scheme income, essentially providing an undesirable incentive for extraction to occur.
- 6.12. As noted there is already a volume of review documentation that covers much of the challenges faced by the scheme. As such, there is probably limited value in adding to the amount of documentation already produced in this space. Relaxation of the alignment corridor has been introduced to provide some relief but the June 2015 event suggests this intervention by itself will not be sufficient to address the underlying issues.
- 6.13. There are a number of possible remedies, some more extreme than others. At the mild end of the spectrum (and something of a given) would be the development of a more structured strategic operational framework; essentially a criticality based approach designed to focus activity on the areas that provide the greatest benefit and pull the scheme away from 'bottom paddock' issues.
- 6.14. It could also be worthwhile, at some future stage, undertaking some economic analysis to determine an optimum scheme size / extent – determining what the optimum cost vs benefit point is for the scheme in regard to upstream extent.
- 6.15. Clearly the investment in flood protection infrastructure downstream of the State Highway Bridge means that this part of the scheme needs to remain. An option might be to 'decouple' the scheme at that point, with the upstream section potentially following the Pohangina-Oroua Scheme model or (at the extreme end of the spectrum) abandoning this part of the scheme altogether.
- 6.16. In any event substantive change to the scheme would best be made through the LTP process. It is intended to take the discussion items above to the next Scheme Liaison Committee meeting and gauge what appetite exists for change.
- 6.17. The long dry summer has seen substantial damage to protection plantings by the Giant Willow Aphid. Staff are collating the various observations for discussion with Plant and Food Research on what practical steps can be taken to minimise potential losses next season.
- 6.18. The Whanganui Flood Management Review Group produced its first, and most substantive deliverable, a report on the June 2015 flood event. That report addressed the particular aspects of the June 2015 flood, changes in river profile and the updated estimate of flood protections standards for Whanganui.
- 6.19. The Group Manager along with the Chief Executive of **Tararua District Council (TDC)** met with KiwiRail staff in Wellington on 3 June to jointly convey concerns regarding the integrity of the Ngawapurua Rail Bridge, its economic importance to the District and Region and ways in which Horizons might be able to assist with the management of that risk. KiwiRail staff advised that the Bridge has been elevated up the priority list and funding has been set aside in the 16-17 financial year to underpin approximately six of the Bridge's supporting piers.
- 6.20. The Foxton Loop Working Group met on 2 June. Consultants GHD engaged by **Horowhenua District Council (HDC)** verbally reported on their findings to date and indicated that they would be in a position to more formally report their findings later in June.
- 6.21. Lastly acknowledging the contributions of both Graham Doull and Derek McKee to river management at Horizons. Graham, as Senior Design Engineer, has made a significant contribution in providing Council with a precise understanding of flood risk for the Lower Manawatu Flood Plain, applying that understanding to provide a higher standard and much

greater level of uniformity of flood protection. Linked to that, Derek, has during his career with both the Catchment Board and Horizons lead operations and maintenance activity with the LMS and in upgrading the standard of flood protection afforded to Palmerston North. I wish both a happy retirement.

7. INVESTIGATIONS AND DESIGN

INVESTIGATIONS

- 7.1. Following the 19-21 June 2015 floods, demand on Investigations and Design resources on both scheme and public matters continues at high levels and over this bi-monthly period a large number of assessments and requests for design advice were received. There is still a continuing volume of advice required for roading waterway crossing reinstatements and undermined sections of road and other related activities. However, with the completion of some major reports and the expectation that most post-flood issues have now surfaced, this demand should start to decrease.

LOWER MANAWATU SCHEME

- 7.2. The current 2015-16 summer construction season is Year 10 in the 12-Year **Rural Upgrade Project (RUP)** programme and all construction activity has now ceased. Design work is currently primarily focussed on planned upgrades in Year 11 (16-17 financial year) of the upgrade to achieve the 1% **Annual Exceedance Probability (AEP)** (100 year) standard with 450 mm freeboard. During the reporting period designs on these works have included:

- Further Whirikino isolated day works jobs.
- Completion of Linton Main Drain stopbank Upgrade.
- All 37 upgrades to the Tokomaru stopbanks.
- Design notes pertinent to upgrade of the Mangaore Stream stopbanks.
- Upgrades to the Mangapuketea and Kara stopbanks (please refer to detailed report following).
- Design levels for the Whakarongo stopbanks. This involved careful assessment of the optimum bed levels expected in the next few decades –this reach is in a recovery phase from degradation. The assessment considered the data and findings of the report entitled “Lower Manawatu Scheme Gravel Resource Study”, Horizons Regional Council Report, 12-27, Jon Bell, February 2012. This report was largely funded by Council’s Fluvial Monitoring and Research Programme and was presented to the Catchment Operations Committee on 14 March 2012. This report noted that over the reach from immediately downstream of Fitzherbert Bridge (48 mile benchmark) to Ashhurst Bridge (63 mile benchmark) “the (Manawatu) river has degraded significantly” over the period from 1993 to 2011. Furthermore, the majority of this has occurred post 2003. Degradation has caused erosion problems since 2004 and consequently the design of the stopbanks has based recovery of bed levels to this period.

- 7.3. Further design at Benmore Avenue proceeded on options for mitigating flooding that occurred in the 20-21 June 2015 floods on isolated properties located in the Mangaone floodway in the vicinity of Karere Road and Gillespies Line. This included comparison of flooding in the 16-17 February 2004 floods and examination of remedial options. Of considerable importance was the contribution from catchments contributing downstream of the Flyers Line spillway. These flows were well above the normal expected in a flood of the 2015 magnitude.

- 7.4. Further design information has been supplied to the Working Party on the Foxton Loop. In particular, this included information on “cleaning out” the upstream end of the Loop as part of the development of the resource consent application.
- 7.5. Further assessments and discussions were required to ensure the Higgins Awapuni gravel consent remediated problems with obstruction to Manawatu River berm flows and did not adversely impact the level of service provided by the Manawatu River stopbanks.
- 7.6. The impacts of plantings at Waitoetoe Park were assessed to also ensure the plantings did not adversely impact the level of service provided by the Manawatu River stopbanks.
- 7.7. Duty Officer Training was provided for the Moutoa Sluice Gates and Makino Gates operation.

LMS RURAL UPGRADE PROJECT - MANGAPUKETEA AND KARA STOPBANKS

- 7.8. The LMS, RUP (revised 2008) included provision of \$526,163 to reinstate the 100 year (1% AEP) flood protection for the stopbanks above State Highway 57 on Kara Creek, including the tributary Mangapuketea Stream. At that time, an additional \$409,479 had already been spent on the Kara upgrade downstream of the highway to the confluence with the Tokomaru River. The remaining work was estimated to cost a further \$252,120 on the Kara Creek and \$274,043 for the Mangapuketea. This work is programmed for completion in Year 12 (2017-18). Detailed investigation and preliminary design work to confirm the scope of the works required has now been completed.
- 7.9. The current LMS stopbanks (as surveyed in 1999 and 2005) along the Kara Creek extend for some 750 m from the Highway up to high ground and would need to be topped up 100-600 mm on the left bank and 200-400 mm on the right bank. Channel degradation of over 1.0 m has occurred in the upper half since the channel was straightened many years ago. The resulting steep batters are prone to slumping and ideally the upgrade work would involve channel reshaping and stopbank set back, with excavated material used for the required topping up.
- 7.10. Additional private banking (possibly constructed as board works) extends upstream along the right bank of Kara Creek for another 1100 m. Large flood flows can outflank this banking at the top end but generally it performs well to contain flows in the channel. Overflows in the June 2015 flood contributed to the ponding that built up to record levels, nearly reaching the top of the Mangapuketea banking.
- 7.11. This area is prone to ponding of local runoff, flood overflow from the Mangapuketea across Kingston Road and overflow from Kara Creek. The land is relatively high so ponded water drains well when river levels drop and inundated pasture is not significantly affected. Some additional floodgate capacity would provide an improvement and consistency with the size of existing culverts on the main side drain that feeds water from under Kingston Road. It is therefore proposed to replace an existing old 600 mm concrete floodgated culvert with a 900 mm floodgate.
- 7.12. Further work will continue on detailed estimates for the selected proposals once options are confirmed.

LOWER WHANGANUI RIVER

- 7.13. A major report was prepared on the June 2015 flood. Particular topics covered were:
 1. Review of the June 2015 flood size;
 2. Review of design flood levels; and
 3. Based on changes in the cross sections surveyed in 1995 and December 2015, an assessment of whether silt removal should be programmed.

- 7.14. The review of the discharges in the June 2015 required a detailed assessment of the actual flood discharges for the nine principal tributaries downstream of the Te Rewa flow recorder site. In past floods, excluding the 1990 flood, the tributary flows have been essentially cancelled by attenuation in the Whanganui River; however the rainfall in the lower catchment was abnormally high in this flood. The tributary discharges are all above the 1% AEP flood flow, some substantially. Appropriate phasing of these tributaries and modelling of them by the Whanganui River MIKE11 model resulted in an increase in flow from 4755 cumecs at the Te Rewa gauge to 5150 cumecs at the Town Bridge location. This is equivalent to a 0.77% AEP (1 in 130 year) flood.
- 7.15. The exceptional flows in the tributaries are part of the reason for the very high flood levels that occurred in the Aramoho area in the June 2015 flood. Conversely, lower than normal levels occurred adjacent to the Balgownie stopbank, due to a favourable set of conditions for extensive scouring of the riverbed near the river mouth.
- 7.16. The design flood levels firstly required a review of the design flows for the 2% AEP (1 in 50 year), 1% AEP (1 in 100 year) and 0.5% AEP (1 in 200 year) flood events. The design flows were reviewed based on the updated annual maxima flow series at Te Rewa and appropriate combination of concurrent tributary flows. The model was recalibrated to allow for the current bed levels, actual flows including tributary flows and mouth scour. Very little adjustment was required to the parameters assessed in the original 2007 model, except of course for the increased flows and updated cross-section profiles. The outcome was that design flood levels increased by 0.10 m to 0.15 m for the various flood sizes in the reach adjacent to the Balgownie stopbank and 0.32 m to 0.42 m in the reach from Cobham Bridge to Dublin Street Bridge. Around 0.2 m of the increase in this latter reach was due to increases in flows and the remainder due to modelling refinements – this second factor is within the 0.3 m imprecision component provided in the design level freeboard.
- 7.17. The findings are that whilst there is significant silt deposition at the river margins, the impacts on flood levels are almost entirely mitigated by compensating scour in the main river channel. Furthermore, that there does not appear to be a significant sedimentation problem in the Lower Whanganui River.
- 7.18. The report has been adopted by the Whanganui Flood Management Review Group and referred to both Councils.

AWARUA STREAM

- 7.19. A detailed report was completed reviewing the flood risks and flood mitigation options at the Awarua Stream. Several houses flooded in this vicinity in the June 2015 flood. This flood was near the highest magnitude rainfall and the estimated flow at Wikitoria Road of 24.5 cumecs is 12% above the 0.5% AEP flood. The report concluded that had the flood flow been the 2% AEP flow assessed of 11.1 cumecs, at the time of house floor level setting, then all the houses would have had at least 600 mm freeboard.
- 7.20. Options assessed were:
- Stopbanking of the flooded housing area;
 - Ring banking of individual houses;
 - Upstream flood detention dams;
 - A new bridge at Wikitoria Road;
 - A new box culvert at Wikitoria Road;
 - House raising; and
 - Lowering Wikitoria Road.

MAKIRIKIRI

- 7.21. The final structural design was completed of the new floodgate structure to reduce construction costs, yet retain the level of service. This structure will very significantly reduce the time that floodwaters are ponding on farmland following major floods in the Turakina River. Further hydraulic assessments were required to address the impacts of the structure.

LAKE HOROWHENUA EVIDENCE

- 7.22. Evidence has been completed for the Lake Horowhenua water quality upgrade works Environment Court Hearing. This also involved presenting evidence at the Hearing. This has been a very substantial project, with significant design input.

TUTAENUI STREAM HYDRAULIC MODELLING AND AUDIT

- 7.23. With the provision of the LiDAR information, very good progress has been made on the model build for the Tutaenui Stream. The majority of tributaries are also configured into the model. The next stage will be to produce design runs and sensitivity analyses to confirm the current standard of flood protection; and importantly, to assess options for lowering the flood risk to Marton, Bulls and Brandon Hall Road.

MAKOTUKU STREAM HYDRAULIC MODELLING

- 7.24. A detailed report was completed reviewing the flood risks and flood mitigation options at Awarua.

ASSET MANAGEMENT SYSTEM SOFTWARE UPDATE

- 7.25. Issues identified during final testing of updates to the **Asset Management System (AMS)** software have been addressed by Datacom. Validation checks are due to be completed by the end of May and the upgrade will then go live. The largely incremental improvements affect defect length data, design and structural data, financial reporting, condition rate reporting and various other issues, some of which have been longstanding problems in the system. While further improvements would be desirable they are not essential at this stage, especially as the existing AMS is based on the outdated Powerbuilder software platform and is due to be replaced within the next three years or so.

DESIGN ADVICE

- 7.26. During this period ongoing design advice has continued to be given to the River Management team project and scheme management staff and other department's and **Territorial Local Authority (TLA)** staff in relation to several matters. They continue to be mainly focussed on the flood-related matters as outlined above. Designs completed included:
- Design of a floodwall on the Manawatu River left bank stopbank at river distance 57 km near Rangiotu. This design had to be adjusted to permit economic access and maintenance and a new design solution was adopted, based on advice in the publication "International Levee Handbook, 2013, Jointly Published by CIRIA and US Army Corps of Engineers.
 - Design of a rock riprap lining upstream of the Longfields site on the Lower Mangahao Stream. This site cannot be held any more by vegetative means and a small stopbank requires relocation.

- Confirmation of a design of rock riprap over a 15 m length of the Makino Stream at Hobson Street, Feilding.

REGULATORY ADVICE

- 7.27. A very substantial amount of regulatory work completed with recorded advice provided on 68 substantive matters during this reporting period. This unfortunately set a new record for enquiries addressed in the bi-monthly period. Additionally there were numerous other matters quickly assessed and not recorded due to other pressing priorities.
- 7.28. There were numerous enquires about vulnerabilities from current landowners or prospective purchasers plus several relating to District Plan Changes by MDC.
- 7.29. This regulatory work involves specialist advice on flood risks and technical reports for consent applications, rezonings and subdivisions including:
- Advice on 44 flood risk and related enquiries.
 - A detailed site assessment was completed on a proposed house at Mangatainoka and numerous other flood risks were evaluated.
 - Multiple advice provided to landowners in the Mahi Grove and Roots Street vicinity near Pharazyn Street, Feilding. This area is floodable from local stormwater paths. MDC are currently constructing a lowered length of Pharazyn Street to reduce flood risks to existing and future houses.
 - An assessment was completed of flood risks to a development adjoining the Oroua River. Whilst the proposed house site was above the 0.5% AEP flood level, the safe egress required further work by the landholder.
 - Flood risks were advised on the proposed New World Supermarket at the corner of Aorangi Street & Gladstone Street, Feilding.
 - Two enquiries were received about coastal hazard risks to Manga-Pirau Street, Waikawa Beach. One of these properties is significantly vulnerable and has an encumbrance on the title. The landowner has several times over the past decade requested reassessments.
 - Flood risks were advised for two proposed developments in Durie Vale Road, Whanganui.
 - Flood risk advice was provided for a very large proposed subdivision bounded by Hansens Line, Rangitikei Line and Te Arakura Road. This area extensively flooded in the June 2015 flood event, but proposed stopbank upgrade works will reduce the flooded area. There will still be vulnerabilities from the Curtis and Montgomery's Drains and from floods greater than the 1% AEP standard of the Oroua River upgrade. There certainly is higher land outside of relic or overland flowpaths and decisions on safe locations can be considered by MDC at the building consent stage.
 - Further advice was sought on flood levels for the large subdivision at 17, 19 and 25 Makino Road. This was to take account of the modified topography and roading layout and how it affected stormwater flows as modelled from the western hills. Good agreement was reached.
 - The Commissioner's Decision on the Waitarere Surf Club **Notice of Requirement (NOR)** was released. The decision was for a 35 m setback based on the "current" western vegetation line at the toe of the foredune. This enabled the progradational trend to be accommodated and a relatively safe position of the building determined (after allowing for short term storm cut variations, dune stability and a modest safety factor).

- Information was provided on flood risks in the Rangitikei District. This was to assess their review of the District Plan. A meeting was held between **Rangitikei District Council (RDC)** staff, submitters on their District Plan Review and Horizons staff. Key issues discussed were flood risks to Hunterville, Marton and Bulls.
- Information was provided for the **Horizons Regional Council (HRC)** submissions on MDC Plan Changes 52, 53 and 60 and **Palmerston North City Council (PNCC)** Plan Change 21.
- Advice was provided on 6 bridges and 5 proposed culverts. This included a proposed culvert of the Waitewhena Stream upstream of Ohura. This stream has high flood flows (the 2% **Annual Exceedance Probability (AEP)**) flow is estimated at 60 cumecs) and a culvert is unsuitable, unless it is intensively engineered, including major bed armouring.
- Advice continues to be provided on the PNCC Kahuterawa Bridge at Bells Road. This is part of the proposed walkway to Linton. Advice was also provided on the walkway bridges on the HRC Totara Reserve and an urban walkway in Feilding. Design flows were provided for a crossing of the Porewa Stream.
- Advice was provided on several flood damage sites adjacent to the Whangaehu River and on a difficult repair at Okirae.
- Advice was provided on applications for renewed gravel extraction consents at two locations on the Retaruke Stream.
- Advice was also provided on an application to renew a gravel extraction and rock lining (that was not built under the previous consent) on the Oroua River at Marton Block Road. The three cross section surveys required under the previous consent had not been completed and the renewed consent requires these to be completed before and after exercising the consent.
- Some further advice was provided on the several sites of damaged riverbanks on the Whanganui River that are being repaired. These included the walkway near Cobham Bridge, beside the Waimarie and erosion near the City Bridge.
- Advice was provided on a proposal to armour the Rangitawa Stream at Kakariki with demolition concrete. Previous works here failed in the 20-21 June 2015 floods and an access road to an industrial plant was severely undermined. These works will only receive technical recommendation for consent if they are shown to be sound. The previous demolition concrete is all now sitting in the streambed.
- Several other compliance matters and diverse unrecorded enquiries.

8. CENTRAL AREA

GENERAL

- 8.1. This reporting period had unseasonal low rainfall throughout April followed by heavy sporadic rain in May. As a result, river levels remained consistently low during April before peaking discontinuously several times throughout May to be near their highest flow levels at the end of the period.
- 8.2. The total rainfall for this period (1 April 2016 to 25 May 2016) has been recorded as: 180.0 mm at Milson Line (Mangaone); 159.0 mm at Cheltenham (Makino); 266.0 mm at Scott's Road (Kahuterawa); 226.0 mm at Delaware Ridge (Pohangina); 391.0 mm at Makawakawa Divide (Pohangina); and 198.0 mm at Rangiwahia (Oroua).
- 8.3. The Manawatu River experienced two flow peaks recorded at Manawatu Teachers' College during this reporting period. The first being $180 \text{ m}^3\text{s}^{-1}$ (1.619 m) on 6 May while

the second followed at $312 \text{ m}^3\text{s}^{-1}$ on 24 May (2.187 m stage). Both peaks occurred in May following April's low seasonally rainfall.

- 8.4. The Oroua River similarly had low rainfall recordings in April before having more intense rainfall events in May. The Oroua had four significant rainfall peaks in May beginning on 14 May with a flow of $8.827 \text{ m}^3\text{s}^{-1}$ (1.182 m stage) before peaking three more times on 17 May at $18.843 \text{ m}^3\text{s}^{-1}$ (1.388 m stage), 19 May at $18.052 \text{ m}^3\text{s}^{-1}$ (1.376 m stage) and 21 May at $37.831 \text{ m}^3\text{s}^{-1}$ (1.688 m stage).
- 8.5. The Mangaone Stream had two significant peaks, both in May, the first on 5 May experiencing a flow of $0.764 \text{ m}^3\text{s}^{-1}$ (stage height of 0.56 m) while the second peak of $1.004 \text{ m}^3\text{s}^{-1}$ (stage height of 0.618 m) occurred on 23 May.
- 8.6. The Makino Stream had low flow throughout April before beginning to consistently rise from 18 May to peak at a high flow of $0.768 \text{ m}^3\text{s}^{-1}$ (stage height of 0.645 m) on 24 May.
- 8.7. The Tokomaru Stream had two peak flows, the first being on 5 May which recorded a peak flow of $39.082 \text{ m}^3\text{s}^{-1}$ (stage height of 2.434 m), and the second being on 25 May with a peak flow of $21.073 \text{ m}^3\text{s}^{-1}$ (stage height of 2.022 m). Before 3 May the flow in the stream was consistently beneath Low Flow Gauging under the One Plan Water Allocation of $0.24 \text{ m}^3\text{s}^{-1}$.
- 8.8. The Kiwitea Stream's flow fluctuated around Low Flow Gauging for much of April. It fell beneath the One Plan Water Allocation on three separate days during this time, before consistently rising throughout May to have three flow peaks near the end of the month. On 18 May it recorded a flow of $5.763 \text{ m}^3\text{s}^{-1}$ (1.172 m stage height), 20 May recorded a flow of $5.687 \text{ m}^3\text{s}^{-1}$ (stage height 1.169 m), and 25 March had a peak flow of $5.563 \text{ m}^3\text{s}^{-1}$ (stage height 1.164 m).
- 8.9. Scheme engineers have continued to assist in the delivery of the RUP and City Reach Upgrade programmes with much of this years' program being completed. **Closed Television Circuit (CCTV)** inspections will be continuing for all culverts located within the RUP work programme area, to identify any repairs or renewals that can be done by the scheme during the upgrade works.
- 8.10. As a continuation to the initial workshops focusing on the revised Health and Safety at Work Act 2015 undertaken last period, Kairanga staff have also participated in an additional workshop concentrating on contractor management within the updated system. Future workshops will also be undertaken to build knowledge and competence over the remainder of 2016.
- 8.11. Scheme engineers have been assisting PNCC with He Ara Kotahi, the shared path that will run along the Manawatu River, and the Kahuterawa and Turitea Streams. The working party, chaired by PNCC, to undertake this project involves NZ Army, Massey Farms, Rangitaane, **New Zealand Transport Authority (NZTA)** and Horizons.
- 8.12. Annual Inspections are well underway by scheme staff and will continue throughout June. The results of these inspections will be incorporated into the **Asset Management System (AMS)** and the **Geographic Information System (GIS)** asset maps will also be updated. The results of these annual inspections help in forming the maintenance programs for the coming year.

LOWER MANAWATU SCHEME

- 8.13. Works undertaken on the various rivers within the scheme during this period include the following:

MANAWATU RIVER

- 8.14. Maintenance throughout the City reach is continuing including mowing, spraying and freeing of natives along the Ashhurst walkway and at Massey, spraying rock assets, graffiti removal, general inspections and drain debris clearing. Due to previous success, compost has once again been spread around the native plantings at the Esplanade steps and platform to help prevent losses in the area due to poor ground conditions.
- 8.15. In addition to the usual natives maintenance work undertaken along the Ashhurst walkway, our contractor undertook a small amount of spraying where there was possibly **Old Man's Beard (OMB)**. This weed seems to be increasing in the area and scheme engineers have reinitiated the proposal to have this area incorporated into the weed busters program, much like the inner City reaches.
- 8.16. Annual asset inspections have commenced throughout the scheme and will continue throughout June.
- 8.17. Scheme staff have continued maintenance tasks along the river, floodway and around the Moutoa Sluice Gates and Tower. These included inspecting and clearing floodgates and apron area, spraying the lime caps of the gate piers, mowing floodway stopbanks, spraying and mowing the Foxton Loop, spraying weeds on and near stopbanks, small stopbank repairs and maintenance, cleaning drains and grass seeding.
- 8.18. The six monthly electrical inspection of the Moutoa Gates was completed this reporting period with no issues arising.
- 8.19. Significant erosion damage remains in the Ashhurst Domain area between the Road and Rail Bridges. The Ashhurst Road Bridge to the Manawatu Gorge marks the upstream boundary of the LMS, and therefore this area is not maintained by the scheme. Bank protection adjacent to the Rail Bridge has been reinstated by the tenant at their own cost. The erosion upstream of the Road Bridge, if left unchecked, will cause the river to adopt an undesirable meander pattern that will course erosion downstream of the bridge and in the scheme. Therefore, a section of tied tree works is planned to be completed as soon as possible as a temporary fix to prevent this, and will be undertaken as an environmental grant with the landowner, PNCC.
- 8.20. The June 2015 event caused significant damage along the banks at Hoult's yard in Aokautere, where recently constructed bank protection works were destroyed as a result of weakening of the upstream berm caused by a slip. The repair works have been designed and the tender process completed. Due to the amount of rock required and problems with rock supply at the time, the supply of rock was tendered as a separate contract. Mills Albert was eventually successful in their bid and all rock has been expediently delivered to site. The anthracite rock supplied by Mills Albert originates from the central plateau and processed by different methods compared to locally sourced greywacke. The supplied rock has been 'paddock picked' and broken or chipped to roughen the surface, and even though it does meet specification, it is 'rounder' than the quarried greywacke and requires a shallower gradient for its rock face than greywacke. This has increased the quantity of rock over preliminary estimates. The placement contract for Hoult's is awaiting suitable weather conditions to commence, and given the present weather conditions, is highly unlikely to proceed before spring.
- 8.21. Concrete riprap is currently being stockpiled at a site opposite the Hoult's gravel yard where old protection works has opened up. This is planned to be placed in the coming weeks.
- 8.22. Bank protection works have been completed at Sproull's property in Aokautere. The existing groyne and downstream bank were damaged during the June flood with repair works including the reinstatement of the rope and rail groyne and tree layering, adding 55 m of riprap together with extending the asset downstream to protect the extended erosion site.

- 8.23. Practical Completion has now been awarded for the rock lining contract at the Esplanade in the City. Additional berm shaping was included in the works to enhance the area and improve drainage.
- 8.24. Practical Completion has also been awarded for the stopbank upgrade works on either side of Burkes Gates in Rangiotu on Robert Ervine and Roy Funnell's properties. One of the two required floodwalls in this area has been completed with only a small amount of fencing still required. The second wall is scheduled for early in the coming construction season. The rock apron at Blackmore's Drain culvert has been installed as part of the contract works. A short section of race leading up to the main stopbank ramp on Roy Funnell's property in the same area, has been hard faced by the scheme to ensure it remains in useable condition throughout the winter season.

OROUA RIVER

- 8.25. Four erosion sites from the June 2015 floods were repaired; one using concrete riprap material and the other three using graded rockwork.
- 8.26. The supply and placement of 1,100 t of 300 kg rock has been undertaken along the outskirts of Feilding. The engineered design placement of this rock enabled the repair of two sites damaged following the June flood event. The repairs reinstated bank protection for the AFFCO New Zealand Manawatu Plant and the Feilding Golf Club. While plant was on site, two smaller erosion sites were also repaired as routine maintenance, one of which allowed for the relocation of concrete rubble which was excess to river repairs at the AFFCO New Zealand Manawatu Plant site. The other required 300 kg grade rock to reinstate the toe of existing rock work adjacent to Johnston Park.
- 8.27. Vegetation clearance has continued on the Oroua. The spraying programme for 2015-2016 is now complete with required bends from Awahuri Bridge through to Hoihere Road Bridge sprayed using a truck and trailer and long reach hose. Further to this, Rangitikei Helicopters were used to provide aerial spraying to points inaccessible on foot. Aerial spraying was undertaken from the Manawatu confluence to Kopane Bridge. The spraying of vegetation ensures that river flows have minimum resistance on the inside of bends which in turn alleviates pressure from the outside of bends.
- 8.28. Willow mulching has occurred on the Oroua on the true right bank from Kaimatarau Road to Puawai Road and is currently underway on the true left bank over a similar distance. It was noted after the June floods last year, that the height and alignment of the willows promoted the damming of wooden debris flowing down the river, which split the flow and placed added pressure on the stopbanks. By selectively mulching larger willows with poor alignment the likelihood of similar dams is minimised. While a long reach excavator has been on site mulching, the wooden debris piles which were removed from the river channel following last June's flood have been burnt, with the digger requirement to ensure fire risks were minimised.
- 8.29. The raising of the stopbank at Glen Oroua on Saunders' and Morrison's properties is underway. Fine weather conditions through April and the start of May allowed 1,000 m of the proposed 1,200 m to be raised effectively. Since mid May however, the seasonal autumn weather has begun and as a result works have halted due to wet soil conditions. Wet conditions were anticipated in construction with works occurring on the land side of the stopbank to ensure the river side remained adequately covered with vegetation. The Land Entry Agreement in place between landowners and Horizons allows works to continue until 30 June, if an opportunity presents itself where the remaining 200 m of stopbank can be lowered and re-raised the contractors will proceed, however it is expected the remaining 200 m will be finished after the winter season.
- 8.30. The earthworks, blockwall and fencing components have been completed on the Hoihere Bridge stopbank upgrade. The permanent stop log components are being fitted and a full

practice run will be undertaken by the end of May. The stop log will be housed on site and installed when required at one end of the bridge.

- 8.31. Annual asset inspections are currently underway along the Oroua River. This will enable a draft work programme to be formulated for the next financial year, with clear prioritisations of required asset works.

MANGAONE STREAM

- 8.32. General maintenance has continued along the stream reserve including edge trimming, weed spraying and the trimming of over-hanging trees and hedges. Mowing of the Mangaone Stream City reaches has been completed this reporting period with the next being scheduled when required. Favourable growing conditions have continued into the autumn season, however with one more mow allowed for within this financial year, no additional mowing requirements will be required to keep the area looking tidy.
- 8.33. Minor repairs were completed early this reporting period by Horizons staff to fill holes dug into the stream bank by members of the community below Benmore Avenue. This type of activity has occurred previously, and not only puts the diggers at risk that the bank may collapse on them, but puts the wider community at risk as it creates a weakness in the stopbank that is quickly exploited by the stream in times of flood. Further downstream a buried tree stump had also formed a hole in the toe of the stopbank. This was removed with a small digger and the stopbank repaired.
- 8.34. Further mechanical clearing of large pampas grasses and treetop weed growth has been undertaken at the old dog pound site on Botanical Road. The area of untidy vegetation and steel structure remnants had been cleared as it did not enhance the stream environment in a positive way. The area has been nicely opened up and the smaller weeds have been sprayed again. Once grass cover has been reinstated, the site would be ideal for a picnic table or other focal point piece.
- 8.35. Scheme staff are continuing to liaise with PNCC regarding repair requirements around City assets on the Mangaone Stream. Where the walkway is planned for construction under bridges and repairs are less urgent, protection works will be combined with the walkway construction, such as the proposed underpass for Botanical Road.
- 8.36. Most vegetated beaches within the channel were removed during the June flood events, and those that have reformed are continuing to regenerate with vegetation. A small amount of spraying of these beaches was completed early in this reporting period. Excessive vegetation growth within the channel needs to be controlled to maintain channel capacity, and is usually controlled with spraying or mechanical beach removal.
- 8.37. The Mangaone Stream City reach is being frequently inspected by scheme engineers and overall, is in a good condition with regards to flood protection. Any areas where risk to stopbanks becomes imminent, emergency works will be completed. Non-urgent works to be completed next year include the replacement of the timber floodwall with rock riprap below Rangitikei Line and assisting PNCC with the replacement of the gabion baskets at the Tremaine Bridge.
- 8.38. The stopbank upgrade works along the Mangaone spillway for this year have now been completed. The borrow area for these works was located within the City reach, downstream of Flyers Line. Using berm areas for borrow material will help reduce berm height, reinstate channel capacity and the location will reduce the cost of the stopbank work in the future.
- 8.39. A short section of the Flyers Line floodway stopbank was raised as part of the City Reach Project. Several areas of erosion along this same stopbank were also repaired.

- 8.40. The borrow area downstream of Flyers Line for the two upgrade project works i.e. Richardson Line stopbank and Flyers Line stopbank (recently completed), was reinstated and re-grassed. Fence lines removed to undertake the upgrade works were erected.
- 8.41. The contractor was advised from the outset of these works to undertake watering across the borrow site as necessary to keep the dust to a minimum. The extremely dry and often windy conditions at the time did make this very difficult as there were still complaints from local residents regarding dust from the site. The borrow area has been reinstated very successfully with a good grass strike for the time of year. The heavy rain soon after completion did cause rilling across the area. Once adequate grass coverage is achieved any defects will be filled.

MAKINO STREAM

- 8.42. Several areas of the Makino Stream had maintenance works undertaken, consisting of channel clearing of flood debris and fallen trees; the relocation of gravel build ups, which were causing further erosion problems; and also the mulching of large outcrops of bamboo growing along the stream edge.
- 8.43. The gravel beach build up at the Duke Street Bridge, within the Feilding Township, was removed to maintain the flood carrying capacity of the stream channel.
- 8.44. Repairs to eight flood-damaged sites that occurred during the June 2015 floods were completed over this reporting period. One site required the reconstruction of an existing stopbank; while another site was repaired using rock riprap. A further site had the existing timber flood wall repaired; and an erosion site in Kowhai Park had channel realignment works completed, ready for rock placement. Another four erosion sites were repaired using concrete block walls.
- 8.45. Following electrical inspections on the electronics at the Makino diversion structure, investigations are being undertaken into an upgrade of the building that houses the electronic control panel. The current building does not provide sufficient atmospheric insulation which, if unaddressed, could lead to rust and unexpected failure of the equipment. A building is currently being priced to provide electrician approved storage. It has been proposed that during this upgrade the electrical equipment at the site also be upgraded.

DERBY CREEK

- 8.46. No works have been undertaken on Derby Creek this reporting period.

STONEY CREEK

- 8.47. The second stage of significant channel maintenance works were completed this reporting period. Works involved the removal of gravel and silts from the stream bed to regain the design channel flood-carrying capacity.

MANGAORE STREAM

- 8.48. All floodgates have been inspected.

MOUTOA FLOODWAY

- 8.49. The stopbank has been mown (6 km) to remove fescue and all floodgates have been checked. Several smaller repairs have been undertaken in berm areas and fence lines across two properties due to flood damage.

TOKOMARU RIVER

- 8.50. Maintenance along the Tokomaru River has included 5 km of mowing; spraying 9 km of gorse, willows and blackberry within the channel; 6 km of mechanical channel cleaning with a long reach excavator, and inspections of all floodgates.

LOWER KIWITEA STREAM SCHEME

- 8.51. The entire reach of the KIWITEA Stream, within the scheme boundary, was sprayed to remove any unwanted vegetation growth on the gravel beaches.
- 8.52. Three erosion sites, resulting from last June’s flood, were repaired. Two were repaired using concrete riprap material, and one using tied tree bank protection.

KAHUTERAWA STREAM SCHEME

The last week of May saw two large pine trees fall across the stream, forming a dam. With the prediction of heavy rainfall over the following two days, the decision was made to put an excavator into the stream to clear the trees. The resource consent for the Kahuterawa, while restricting scheduled maintenance to be only undertaken in March and April, does allow for unplanned and unforeseen works to be undertaken outside of this time.

ASHHURST STREAM SCHEME

As agreed at the last Annual Catchment Community Meeting for the scheme, works were programmed to replace the stock gates on the stream where recent flood protection works were completed. Six have been built and installed, with a further three being built at present, to be installed in June 2016.

LOWER MANAWATU SCHEME – CITY REACH PROJECT

ANZAC CLIFF REALIGNMENT

- 8.53. The Practical Completion Certificate that forms ‘Separable Portion A’ of this major contract was issued on 29 February 2016. This commenced the Defects Liability Period of 12 weeks. This period expired on 23 May and the Final Completion Certificate has been issued for the completion of ‘Separable Portion A’. All retentions held by Horizons have been paid to the contractor.
- 8.54. The earthworks component of the contract, ‘Separable Portion B’ are well advanced but with the onset of a very wet period of weather (late May), it is possible the earthworks will be suspended for the winter.

LOWER MANAWATU SCHEME RURAL UPGRADE PROJECT

- 8.55. The following table schedules all current RUP works and provides commentary on present project status.

Project Title	Description	Status
Oroua River Left Bank Stopbank Upgrade, Hoihere Road to Rangiotu	Upgrade 5,200 m of stopbank on the left bank of the Oroua River downstream from the Hoihere Road Bridge to Highway 56 at Rangiotu.	Construction works on this stopbank upgrade achieved Practical Completion on 11 April 2016.

15 June 2016

Oroua River Right Bank Stopbank Upgrade, Hoihere Road To Rangiotu	Upgrading 5,300 m of stopbank on the Oroua River right bank downstream from the Hoihere Road Bridge to Highway 56 at Rangiotu.	Construction works on this stopbank upgrade achieved Practical Completion on 8 May 2016.
Oroua River Right Bank, Firth Block Wall and Concrete Floodwall at Reilly Property, 379 Hoihere Road	Construct a Firth block retaining wall and concrete floodwall to upgrade the stopbank adjoining this house as a result of a very narrow berm width. Works include installing a removable stoplog across Hoihere Road.	Construction works on this block wall achieved Practical Completion on 1 May 2016.
Oroua River Right Bank Stopbank Transition at Hoihere Road Bridge	Upgrade a section of right bank stopbank immediately upstream of the Hoihere Road Bridge.	Construction works on this stopbank upgrade achieved Practical Completion on 22 December 2015.
Oroua River Left Bank Road Raising at Hoihere Road Bridge	Raise Hoihere Road to the adjoining upgraded left bank stopbank height.	Road raising at this location achieved Practical Completion on 10 January 2016.
Protect Individual Property: Hopkins Farming Group, 1591 & 1601 State Highway 56	Construct bunds around two houses owned by the Hopkins Farming Group on State Highway 56, Tiakitahuna.	Construction works on these two bunds achieved Practical Completion on 6 May 2016.
Protect Individual Property: S. Bond house, 767 Lockwood Road	Protect the Bond house at 767 Lockwood Road by waterproofing (tanking) the ground floor area of this house.	Waterproofing works on this property achieved Practical Completion on 22 December 2015.
Protect Individual Property: R. Astwood House, 802 Lockwood Road	Raise the Astwood house at 802 Lockwood Road.	House raising work on this property achieved Practical Completion on 9 March 2016.
Protect Individual Property: V. Muncey House, 821 Lockwood Road	Provide flood protection to the Muncey house at 821 Lockwood Road	Due to the landowner being unwilling to sign a Land Entry Agreement authorising works to proceed, this work has now been postponed.
Protect Individual Property: G. Lynch House, 892 Lockwood Road	Raise the Lynch's Farm Manager's house at 892 Lockwood Road.	House raising work on this property achieved Practical Completion on 4 March 2016.
Protect Individual Property: Vertogen House, 691 Lockwood Road	Protect the Vertogen house at 691 Lockwood Road by waterproofing (tanking) the ground floor area of this house.	Waterproofing works on this property achieved Practical Completion on 11 May 2016.
Protect Individual Property: Strahan Dairy Farm, Rangiotu Road	Construct 65 m of concrete floodwall on the Strahan farm to complete protection of dairy buildings and other infrastructure.	Tenders for this project closed on 8 Apr 2016. The landowner has requested that works be undertaken over the period 23 May to 25 June 2016 to align with his farming operation.
Manawatu River Right Bank Stopbank Upgrade, Karere Road, Longburn	Upgrade 4,250 m of the Manawatu River right bank stopbank in the vicinity of Karere Road, Longburn. This project has increased in scope to include an extended length upstream of the railway line behind Longburn.	Construction works on this stopbank upgrade have had an approved Extension of Time and are scheduled to be complete by 17 May 2016.
Manawatu River Right Bank Stopbank Upgrade, Ervine Property & Funnell Lease, Rangiotu	Upgrade 3,600 m of the Manawatu River right bank stopbank immediately downstream of the Opiki Bridge and through the Ervine property into Taonui Basin 'D'.	Construction works on this stopbank upgrade achieved Practical Completion on 9 May 2016.
Manawatu River Left Bank Stopbank Upgrade, BM 486, Funnell Lease, Poplar Road	Upgrade 1,600 m of the Manawatu River left bank stopbank on Council-owned land currently leased by Mr Funnell adjoining Poplar Road, Opiki.	Construction works on this stopbank upgrade achieved Practical Completion on 19 February 2016.
Manawatu River Right Bank Stopbank Upgrade, Bielski & Parlato properties.	Upgrade 360 m of the Manawatu River right bank stopbank on the Bielski & Parlato properties downstream from the Moutoa floodgates.	Construction works on this stopbank upgrade achieved Practical Completion on 21 February 2016.
Manawatu River Right Bank Stopbank Upgrade, Whirokino Road and Springs Road	Upgrade 2,500 m of the Manawatu River right bank stopbank on Department of Conservation reserve land at two locations in the vicinity of Whirokino Road and Springs Road.	A contract has been awarded to Paranui Contractors Ltd on 12 February 2016 in the sum of \$374,495. The balance of the work is on hold over winter.

15 June 2016

Manawatu River Right Bank Stopbank Upgrade, Various Small Locations, Whirokino	Upgrade 17 individual sections of stopbank on the Manawatu River right bank in proximity to Whirokino Road upstream of State Highway 1.	Eight sections of stopbank upgrade have been completed with another three to be undertaken as part of the above-listed contract works at Whirokino Road and Springs Road. The balance of the work is on hold over winter.
Manawatu River Left Bank Stopbank Upgrade, Akers Property, Linton	Upgrade 800 m of the Manawatu River left bank stopbank at the Akers property immediately upstream of Akers Road, Linton.	Construction works on this stopbank upgrade achieved Practical Completion on 5 May 2016.
Manawatu River Right Bank Stopbank Upgrade, Higgins & Tait-Jamison, Whakarongo	Upgrade 4,880 m of the Manawatu River right bank stopbank at Whakarongo.	Landowners have been contacted to discuss the proposed works however this project has now been postponed until the 2016-17 financial year.

9. NORTHERN AREA

GENERAL

9.1. The long dry stable weather conditions experienced throughout April and May have continued to provide a great working environment for staff to advance planned maintenance works and also the much needed repairs to river protection assets. An impressive volume of work has been achieved using multiple contractors. Showing no signs of abating are the demands on staff responding to engineering advice requests from non-scheme areas and also from landowners wishing to take advantage of Councils environmental grant opportunities. As the days become shorter there is less likelihood of additional work commencing as a result of a favourable outcome to the MCDEM claim. It is more likely that this claim will be finalised during the winter months and impact on next year's work programme.

TRAINING AND FORUMS

9.2. Staff have been involved in several training opportunities this period including:

- Duty Officer Training – updating roles and responsibilities, Flood Plans and operation of the Moutoa and Makino floodgates.
- Health & Safety Training – being updated on the implications of the new Safety Act.
- A Refresher Training Course on the Lower Whanganui Scheme three different types of flood barrier erections.

ENGINEERING ADVICE

9.3. During the last two months there have been continued requests for advice on a variety of issues including rural flooding in non-scheme areas, involving clearing blocked culverts, clearing stream channels of vegetation and fallen trees, and flood damage work.

COMMUNITY INVOLVEMENT

9.4. The area engineer attended a meeting of the Whanganui Navigational and Water Safety Group in Whanganui on 19 April.

RANGITIKEI RIVER CONTROL SCHEME

9.5. The scheme Annual Catchment Community Meeting was held on Thursday 7 April 2016.

RANGITIKEI MAINTENANCE WORKS

- 9.6. Work priority over the last two months has concentrated mainly on rope and rail groyne installations. These new works are replacements for flood damaged structures or additions to increase the level of protection. One area of completed work is the installation of new groynes at Mary Wilson's property around the base of a large erosion bay to provide protection until MCDEM funding is approved for larger works.
- 9.7. Rock delivery is now starting to improve as supplies from Mills Albert filter down from quarries around Taihape and Higgins begin ramping up production from their Linton quarry. With winter fast approaching we will now stockpile material at work sites for placement next summer.
- 9.8. Opus has commenced a large project for the NZTA upgrading a rock lining on the right bank upstream of the Bulls Bridge. Work is programmed over three periods with a completion date in July. River Management staff are assisting the contractor with river issues and by providing a communication link to the Bulls River Group.
- 9.9. The presence of the Giant Willow Aphid has increased once again as the summer draws to a close. It is now apparent the aphid is attracted to all ages of willow with no particular preference of species. The damage in some areas inspected is so advance there are serious concerns that the willows will not survive the winter.
- 9.10. The round of annual asset inspections is just commencing and early indications are that our stopbanks and floodgates are in good condition as we move into winter.

RANGITIKEI CAPEX WORKS

- 9.11. *Parewanui Stopbank Flood Damage Repairs at Walmac Farm* – The contract let to Paranoi Contractors Ltd was completed in mid January and on 11 April 2016 the Defects Liability Certificate was issued. All fencing was re-erected in conjunction with the Farm Manager by the end of January. With very warm autumn temperatures and occasional showers of rain there has been very good growth of the grass sowed.
- 9.12. *Parewanui Stopbank Upgrade for 2016-17* - Survey work is already underway in preparation for upgrading a further 1 km of the Parewanui stopbank from river distance 5 km to 6 km. Design and drawings are programmed to be completed by 30 June 2016 with contract documentation being completed early in the new financial year.

RANGITIKEI RIVER ENHANCEMENT

- 9.13. No enhancement work undertaken this period.

GRAVEL EXTRACTION

- 9.14. Stringfellows have commenced taking gravel from the McKelvie consent lower down in the Rangitikei catchment. Gravel volumes are not yet known.

POHANGINA-OROUA RIVER CONTROL SCHEME

POHANGINA RIVER

- 9.15. For several years now concern has been expressed about the deterioration of the channel alignment in the Pohangina River immediately upstream of the Raumai Bridge. Prior to the June 2015 flood event, it was the engineers' view that the dramatic and undesirable channel alignment at the site, resulting in a serious bank erosion on the right bank of the Pohangina River, could encroach and potentially sever the road access to the Raumai Bridge in one major flood event.

- 9.16. Designs were prepared and discussions were held with the MDC as to the impact of a flood event that could detrimentally affect their assets. Consequently, financial approval has now been given by MDC for Council staff to prepare contract documentation, to tender, and to manage the contract for constructing a major rock groyne and associated rope and rail groynes to mitigate future flood erosion to the right bank of the Pohangina River. It is programmed that this work will be completed by mid December 2016. The contract is being put out to tender early as currently there are difficulties with the supply of rock.
- 9.17. An ongoing erosion problem at the Ward property was addressed over the last two months with extensive channel maintenance and vegetation clearance work undertaken to help reduce pressure on the highly erodible left bank. Work is focused on easing the sharp 90 degree bend in the river by encouraging flows further towards the right bank using groyne installations and vegetation clearance techniques.
- 9.18. This work would be further enhanced with the removal of a large gravel bank that has built up along the right bank; staff continue to work to identify a contractor interested in extracting this material at no cost to the scheme.
- 9.19. Aerial spraying of the scheme from Totara Reserve to the end of the scheme was completed in late March with approximately 26 ha covered. The effectiveness of this activity is now being seen with good kill rates along the beaches and riparian strips.

PROPOSED WILLOW NURSERY

- 9.20. As part of the drive to plant more willows on the Pohangina, staff are currently investigating the development of a small area under the Saddle Road Bridge as a willow propagation nursery. This is on the Bolton property and both the landowner and Horizons are keen to see the area used to the scheme's advantage. At present the site is uncared for and a popular fly tipping zone.

GRAVEL EXTRACTION

- 9.21. Approximately 1765 m³ has been extracted from the Leamy property on Pohangina Valley Road.

TOTARA RESERVE

- 9.22. No work undertaken in this period.

OROUA RIVER

- 9.23. Channel maintenance has been carried out on the Oroua River at Ebbit's property as well as a tree bank protection job at Griffith's property on Almadale Road. This property has recently changed hands and the new owners are being very pro-active in wanting erosion damage repaired quickly. A mechanical clean of the Almadale Drain at this location has also been completed with approximately 400 m being cleared. The remainder is to be completed next financial year.
- 9.24. As with the Pohangina River, the 12 ha of aerial spraying that took place in late March from Coulter Line to the top end of the scheme and is showing signs of being very effective.

GRAVEL EXTRACTION

- 9.25. On the Spur Road site, 1850 m³ has been extracted and at the Barrows Road site 2584 m³.

UPPER WHANGANUI RIVER MANAGEMENT SCHEME

- 9.26. The Annual Catchment Community Meeting was held in Taumarunui on 14 April at which there were no particular issues to note.
- 9.27. The District Council has fielded numerous calls commending the removal of poplar trees through the urban reach of the Ongarue River. The overwhelmingly positive response though was more as a result of the better vision created by the canopy removal rather than the river management objective achieved.

TARINGAMOTU RIVER MANAGEMENT SCHEME

- 9.28. The Annual Catchment Community Meeting was held on 14 April where there was considerable discussion on the direction of the scheme following the end of the current agreed work programme in June 2017. Options were put to the community that would see the current channel debris clearing programme followed in 2017-18 by a more substantial channel management programme that would also address the considerable problems associated with the bank vegetation in the scheme. The scheme would become, in part, a river control scheme. This proposal was reasonably well received at the meeting and it was agreed that a final decision on the future of the scheme will be made at next years' Annual Catchment Community Meeting, pre-circulating a newsletter to raise interest and assist with the decision-making.
- 9.29. Good progress has been made this year with 10.14 km of channel clearing operations completed leaving only 5.82 km remaining before reaching the confluence with the Ongarue.
- 9.30. Planned work this year is now completed.

MATARAWA FLOOD CONTROL SCHEME

- 9.31. The Annual Catchment Community Meeting was held Monday 4 April 2016.
- 9.32. Repairs to the spillway at Dam 3.1 are now completed. Through close consultation with the landowner the new rock lining was incorporated into a farm track that provides access to the back of the farm. This has resulted in a very agreeable outcome for both parties.
- 9.33. Following consultation with the landowner at the diversion structure it was agreed to install a small section rock lining upstream of the city reach to prevent undermining of a section of stopbank that prevents overland flow from entering that part of Whanganui. The estimated \$10,000 cost required for this installation is not available within the current year's budget and will appear on the balance as an overspend. Also, as the scheme emergency reserves are fully committed to other flood repair work this additional expense will require loan funding.

TUTAENUI FLOOD CONTROL SCHEME

- 9.34. Two significant studies are currently in progress for the Tutaenui Scheme. The first being a scheme audit that will review performance objectives against those delivered and also investigate the potential to increase the flood protection standard to the community. The second is an exercise looking at flood plain modelling. Marton staff are busy assisting our Design team through both these activities.
- 9.35. Maintenance work for the year is now largely complete with only a few tidy up jobs remaining.

MAKIRIKIRI FLOOD CONTROL SCHEME

- 9.36. Tender prices received for the Makirikiri drop gate are significantly greater than can be accommodated within this year's budget. Talks between the project partners are currently underway to secure the new level of funding required to allow the project to proceed. If successful, this work will commence in January 2017 taking advantage of the drier summer ground conditions.
- 9.37. With the egress gate project now on hold, there remains the need to fully reinstate the stopbank at Tunnel Hill to a fully functional status before winter. This structure was breached following the June 2015 flood to allow ponded Turakina River water to drain into the Makirikiri Stream. Thus draining land and allowing the Koitiata Road to reopen. Access to the site is now possible following the harvesting of local maize crops and full repairs are programmed for early June.
- 9.38. Also to be completed in June, is the annual drain spraying programme and maintenance inspection of the scheme's floodgates.

POREWA FLOOD CONTROL SCHEME

- 9.39. The operational integrity risk at Dam 29 is now alleviated with conditions back to normal following the completion of work removing the slip material from the dam outlet. Also completed is the channel clearing work through the Crawford and Marshall properties which saw fallen trees removed prior to winter.
- 9.40. Staff have been working with the Natural Resources and Partnerships team around planned native plantings within the scheme area. Through close liaison at the start of this project we can ensure plantings are planned so not to impede on our ability to access the channel for maintenance reasons.
- 9.41. Work to replace the temporary Bailey Bridge at Te Hou Hou Road by the RDC has commenced. River management staff are maintaining a close dialogue with the contractor to ensure work does not conflict with scheme activities and that community correspondence is directed through the correct channels.
- 9.42. There has been a reduction in dam maintenance work this year as budgets have been reprioritised to manage flood repairs. To date, this has caused no problems but it does highlight the need to focus on this area in the next financial year.

WHANGAEHU MANGAWHERO RIVER MANAGEMENT SCHEME

- 9.43. Work approved at the Annual Catchment Community Meeting on 16 March to proactively remove slumped trees from the river bank at Kauangaroa is complete using the \$11,000 drawdown from emergency reserves.

TURAKINA RIVER MANAGEMENT SCHEME

- 9.44. No work undertaken this period.
- 9.45. There is still some flood debris to be removed from the Green and Glasgow properties following the June 2015 flood. This work has been delayed until the maize crop is harvested and access to the river is possible.
- 9.46. Scheme work over the last three years has been reacting to flood events and associated debris removal. There will be a change in focus next year with work returning to the much needed willow clearance in the upper catchment.

LOWER WHANGANUI VEGETATION MANAGEMENT AND FLOOD PROTECTION PROGRAMME

- 9.47. The Annual Catchment Community Meeting was held on Monday 4 April 2016.
- 9.48. Full repairs have now been completed to the damaged Kowhai Park stopbank and flood protection assets following the June 2015 flood. The reprioritisation of budget to flood repairs this year has seen a major reduction in vegetation management work which will require an intensive effort next year to catch up.
- 9.49. WDC have acknowledged their intentions to take on the maintenance responsibility for the Upokongaro Jetty site. This is a welcome decision for us as the site has been placing an increasing financial burden on the scheme with high desilting costs following each major fresh in the river.
- 9.50. Negotiations are progressing well with the new property owner of the flood damaged house on Anzac Parade upstream of the Matarawa Stream Bridge. A property professional has been engaged to determine any loss in value the property may incur should our planned flood protection upgrades proceed through his land.

PAKIHI SCHEME

- 9.51. No work undertaken this period.

FOREST ROAD DRAINAGE SCHEME

- 9.52. The scheme's annual drain spraying programme is complete for the year.

HAUNUI DRAINAGE SCHEME

- 9.53. No work undertaken this period.

OTHER WORKS**NORTHERN ANNUAL SCHEME REPORTS**

- 9.54. Each year an Annual Report is prepared outlining the activities, and financial standing of the 14 schemes in the Northern Area for the previous financial year. Currently the report is 70% completed.

THE BIG FIVE

- 9.55. Currently one staff member is representing the Marton Service Centre on the Big 5 Strategy Group. Strategies such as Celebrating Success, Understanding our Business, Process for Innovation etc. have been included into an Action Plan 2.0 with subgroups looking at guidelines and processes to see the realisation of the particular strategies in the Action Plan. This will become part of Horizons' culture in this coming year.

ENVIRONMENTAL GRANT WORK

- 9.56. As a result of the June and the September 2015 flood events there has been an increased level of requests for flood damage repair works. This year to date, there have been 21 environmental grant applications made. Repairs at 12 sites have now been completed, with a further five sites approved. One approval will be postponed to next year, and three others delayed by the property owners.

OTHER PROJECTS

MOAWHANGO RIVER

- 9.57. Willow on 3.5 km of channel has been sprayed and some of the heaps of slash formed in January as part of channel clearing operations have been burnt.
- 9.58. Planned vegetation management and clearance work for Genesis Energy is complete for the year.

GLASGOW BED CONTROL

- 9.59. Flood damage repairs to five bed control structures on Alex Glasgow's property following the June 2015 storm event are now completed. This should see the end of our responsibilities to this work that was undertaken at the request of our Strategy and Regulation Team.

10. EASTERN AREA

GENERAL

- 10.1. After an exceptionally long and dry autumn, where earthworks were able to proceed generally uninterrupted, the weather finally changed with considerable periods of high rainfall occurring from mid May.
- 10.2. The highest total rainfall recorded in the Eastern catchment over the last two month period was close to 550 mm, this was recorded at the Upper Mangahao hydro recording site in the Tararua Ranges, and is slightly less than the typical 700-800 mm that has fallen during the same period over the last two years.
- 10.3. During the last two months staff have been busy completing the flood damage works that were programmed for this season. This involved undertaking drain maintenance, finishing off earthworks contracts and generally ensuring the schemes are in a good condition going into winter.
- 10.4. Most insurance works for the Eastern area have been completed and the paperwork for the second claim is now being compiled.
- 10.5. Gravel extraction rates over the last two months have dropped off with the construction season coming to an end. Only 1,800 m³ of gravel was extracted this period, all of which was extracted from the South Eastern Ruahine Stream for concrete production.
- 10.6. It is now clear that the Giant Willow Aphid has had a large effect on a number of willow plantings during summer and autumn. Some breeds have been affected more than others, such as new plantings and those used in **Tied Tree Bank Protection Works (TTBPW)**. Those plantings that had not had a chance to establish before January have also been affected. Typically trees lose their leaves earlier than others, with some willows so badly affected that they appear to be dead. Although the aphid numbers drop off dramatically with the onset of the cold weather, staff will continue to monitor aphid populations and any apparent effect on tree health during winter and into spring when the effect is likely to be more obvious.

AKITIO SCHEME

- 10.7. During April and May the Akitio River has remained settled and continued to flow at a consistently low level.
- 10.8. Being a year of reduced work and with an agreement to simply monitor the debris at the river-mouth at this stage, little in the way of physical work has been undertaken this

reporting period. There was a concern that willow debris at the river mouth may have been interfering with sand movement along the foreshore and while there was a feeling that the debris might need removing, subsequent works and further consultation has since led to a 'wait and see' approach being adopted. One reason for leaving the debris is that this material may actually be helping to prevent foreshore erosion.

- 10.9. Going forward, staff will continue to monitor the river mouth and inspect the whole river channel for any issues that might arise as river levels fluctuate over winter.

EASTERN MANAWATU SCHEME

- 10.10. Like the Akitio, this reach of the Manawatu River has largely remained settled over the last two months with the only exception being a small fresh that occurred at the end of May.
- 10.11. This good weather has meant that staff have been able to get on with scheme works, such as removing a number of poisoned and over sized trees and have utilised the portion of the budget that is usually kept earmarked for debris dam removal, should it be needed.
- 10.12. As mentioned in the last bi-monthly, staff have been mindful of the potential for debris dams to form as sprayed willows go through the cycle of breaking down and rotting. Although there is sufficient funds available in the emergency reserve fund to deal with a significant blockage, staff have tried to manage the annual works budget in a way that there are sufficient funds to address most blockages in a normal year. This is done to allow the reserve funds to grow and be available for extreme events.
- 10.13. The scheme is currently in a good position going into winter, but staff will continue to undertake inspections for debris dams or any issues that might arise as river levels fluctuate over winter.

MANGATAINOKA SCHEME

- 10.14. This period the focus was on progressing through as much of the remaining programmed work as possible. The majority of the works programme is now complete, with only several small jobs still remaining. Works that were completed this period include; TTBPW, **Permeable Mesh Unit (PMU)**, rock, and channel shaping jobs, including a large channel realignment at Fonterra's O'Brien Farm. The annual drain maintenance programme has also been completed, involving the mechanical cleaning of approximately 4 km of drain and the chemical spraying of the remaining 45 km of scheme drainage channel. 70% of the flood damaged works which are to be claimed are now complete.
- 10.15. As mentioned in the past, this season's programmed scheme works included \$389,000 worth of extra flood damage repairs. Funding this required the reprioritisation of \$159,000 worth of budgeted funds and had originally required the addition of \$230,000 worth of emergency reserve funds. However, initial indications are that the scheme will receive funding through a Region-wide MCDEM claim for 60% of the cost of flood damage repairs, totaling \$206,500 for the Mangatainoka Scheme. This, combined with planned under-expenditure on flood damage repairs as a result of the postponement of a rock lining planned for Fonterra's property, has meant that there will be no requirement for the approved emergency reserve drawdown. This will mean that the scheme is left in a good financial position.
- 10.16. 100 m³ of gravel was extracted from the Mangatainoka River at Prenter's this period.
- 10.17. Staff have begun investigating and planning works to help alleviate the ongoing flooding problems caused by the Mangaramarama Stream, north of Pahiatua. Proposed works include the realignment of one meander, the excavation of two overflow channels in the stream, as well as a short stopbank to redirect the worst of the flood waters around several properties. Survey at select locations of the stream channel has been completed and the Design team have produced figures indicating the effect on channel capacity of some of

these proposals. A staged approach to the works has been adopted, and it is anticipated work on the upstream overflow and channel realignment will be undertaken next financial year.

SOUTH EASTERN RUAHINE SCHEME

- 10.18. Programmed work continued on the South Eastern Ruahine Scheme during this period. As a result, the majority of the works programme is now complete with only a few minor jobs still to go in locations where wet weather conditions will not be an issue.
- 10.19. The scheme's works this year included \$421,911 worth of flood damage repairs. It was planned that funding this would require the reprioritisation of budgeted repairs and maintenance and capital works funds as well as the addition of \$347,500 worth of emergency reserve funds. However, it appears likely that a claim to the MCDEM will result in \$101,213 of funding for flood damage repairs. This means that the emergency reserve drawdown is now planned to be \$190,000.
- 10.20. In this scheme the June 2015 flood caused damage to 39 sites, 36 have now been completed and the remaining three are programmed to be repaired next month. This will mean that all sites that can be claimed for will be done this season, nicely tidying up this extra workload.
- 10.21. A particularly interesting piece of work to be completed this period has been the 10 ha of OMB control. The South Eastern Ruahine Stream has a relatively high infestation of OMB and while the area the scheme occupies was, up until recently, in a containment zone (OMB not addressed by the Plant Pest team) this has changed so that staff have been working together to address the problem in the area between the bush edge and State Highway 2. This will mean that there should be less cross pollination, or supply of seed between the river corridors and other private stands of bush.
- 10.22. At the end of April it was clear that two pieces of river work that were being undertaken in streams valued for trout spawning were needing to run briefly into the trout spawning period which starts 1 May. However, good communication with the Consents department and Fish and Game saw concession given for these two pieces of work to be completed.
- 10.23. Going forward, staff will continue to be busy completing the remaining works on the works programme, while also updating asset inspection records.

IHURAU SCHEME

- 10.24. Ongoing inspections show that the Ihurau Stream channel is still clear and free flowing. Previous years efforts to clear the constrictions that were identified in the 2011 scheme audit have clearly been of benefit and staff are currently busy organising a channel spraying programme for the coming month to clear this season's weed growth.

TAWATAIA - MANGAONE SCHEME

- 10.25. As with the Ihurau, the schemes channels are still working very well. Chemical spraying of weed growth in the scheme drainage channels has been completed. A section of the Mangaone Stream has also been spot sprayed where one landowner had been in touch concerned about self seeded willow growth, which is what congested the channel back in the 1980s.
- 10.26. Physical works on this scheme are now complete for the season, though staff will continue to monitor channel performance over winter in preparation for next year's works.

UPPER MANAWATU – LOWER MANGAHAO SCHEME

- 10.27. The works programme for the Upper Manawatu/Lower Mangahao Scheme was completed this period. This included some rock work, TTBPW and willow layering, along with chemical spraying of all drains that were not mechanically cleaned. 70% of the flood damage works which are to be claimed are now complete.
- 10.28. The Upper Manawatu/Lower Mangahao Scheme has been affected by the significant issues Horizons has had with the supply of rock which meets our specification for bank protection work. As a result, two rock riprap works on this scheme have been undertaken using lime rock with an amended design to account for the different properties of the replacement rock. While the situation is not ideal, the significantly cheaper rate and close proximity of the lime rock has meant that a high standard of protection has still been able to be achieved at a similar cost.
- 10.29. The scheme's works this year include \$186,230 worth of flood damage repair. It was planned that funding this would require the reprioritisation of budgeted repairs and maintenance and capital works funds as well as the addition of \$128,245 worth of emergency reserve funds. However, it appears likely that a claim to the MCDEM will result in \$111,738 of funding for flood damage repairs. This, along with savings in other areas means that the emergency reserve drawdown is planned to be only \$5,000. This will mean that the scheme is left in a better financial position than expected, given the flood damage that needed to be addressed coming into the season and the generally poor reserves position that this scheme has.

ENVIRONMENTAL GRANT WORKS AND ENGINEERING ADVICE

- 10.30. Again, this period there have been few new enquiries for environmental grant assistance. However, it was satisfying to see the works planned for the 4 Mile Bush Reserve at Pongaroa finally brought to completion. This was a community group project that required volunteering time from the Pongaroa The Way-To-Go Group, a consent and much negotiation to undertake a series of works to protect the reserve from being cut off by an avulsion of the Pongaroa River.
- 10.31. The status of all environmental grant works will be further reported on in a separate item in the agenda document.

SOUTHERN AREA**GENERAL**

- 10.32. The weather over this period has been fairly settled which has enabled staff and contractors to make good progress with their maintenance work.
- 10.33. Heavy rainfall towards the end of May has kept staff and contractors busy cleaning the weed build up of the pumpstation screens. The first decent rainfall normally results in weed from both scheme and private drains being dragged down to the pumpstations and having to be either mechanically or manually removed from the screens. The next few freshes will continue to keep everyone busy pulling weeds after which things will hopefully settle down.
- 10.34. Horizons' staff accompanied staff from HDC and personnel from Barnett & MacMurray Limited on a site visit around the Koputaroa Stream to discuss the potential issues that may be caused if HDC decide to increase the discharge of stormwater from the North East residential area of Levin into the Koputaroa Stream. Barnett & MacMurray Limited have been engaged by HDC to undertake flood modelling of the Koputaroa Stream to determine what adverse effects might result from the proposed activity.

- 10.35. Staff are working with members of the Freshwater team to address issues regarding increasing need for landowners to have riparian management plans for their properties. Issues being discussed are around the ability to maintain scheme assets, the need to minimise operational impact and their impact on overland flow paths around the drains. Other issues discussed were around the responsibility of any ongoing maintenance of the plantings and fencings and the need to make the landowners aware of their responsibilities. This period has seen staff attend at least three site visits in May and the number of these meetings are expected to increase.
- 10.36. Staff have been working with several local engineering firms to design and install new safety barriers and catwalks at Cooks Pumpstation. A decision has been made to address all of the hazards at this site and then to invite members of the Scheme Liaison Committees, who currently have pumpstations within their schemes, to attend a site visit to discuss the safety measures taken. The opportunity will be taken to discuss various issues around health and safety at the pumpstation and to obtain feedback on the measures taken before rolling them out to other scheme pumpstations.

OHAU-MANAKAU SCHEME

- 10.37. This period continues to be relatively dry with only a few high flow events occurring, enabling work to be undertaken un-impeded by high channel flows. The highest flows this period were: on the Ohau 1.3 m (81m³/s), the Waikawa 1.15 m (25m³/s) and the Manakau 1.6 m (5.8m³/s). Apart from the higher flows at the beginning and end of May, the channels were quite low due to a lack of rain.
- 10.38. Continued maintenance of the willow protection within the scheme is an important task in maintaining adequate edge protection whilst minimising the impact on flood flows. This period saw several trees which were impeding flow removed from the Manakau and Waikawa Streams. Sections of willows on the Ohau River from 5.5 km to 6.2 km and the Waikawa Stream from 4.5 km to 5 km were mulched in order to maintain the low level growth.
- 10.39. Several large willows on the Waikawa Stream were layered to improve low level growth.
- 10.40. 3.5 km of drain was machine cleaned this period.

MANAWATU DRAINAGE SCHEME

- 10.41. Over a two year period, floodgated culverts have been inspected to determine their condition. Last year we completed the CCTV inspections of all the floodgated culverts along Burkes Drain. In February, all 21 floodgated culverts along the Manawatu Main Drain were inspected by CCTV. This period we will inspect by CCTV the remaining five culverts along the bottom end of Whiskey Creek that feeds into the Manawatu Main Drain. This information will then be used to determine the potential risk failure of the structure and the consequence of such failure. The result of the risk failure and the consequence failure will then be combined to provide a culvert priority repair program.
- 10.42. A new 900 mm culvert pipe was installed throughout the Manawatu Main Drain stopbank in Fell's property adjacent to Calleson's Cut. The purpose of this culvert is help drain the water from Fell's property quicker during a heavy rainfall event and in particular the water that can be trapped behind this stopbank as the results of the Mangaone floodway operation.
- 10.43. Repair work was carried out on a culvert along Mitchell's Creek that had been washed out in Anderson's property.

- 10.44. In Kevin Argyle's property a large wash out had occurred in a section of the Whiskey Creek Drain. Concrete was carted to site and placed to repair the wash out. Also, a new pipe had to be laid through this repaired section of the drain.
- 10.45. A section of willows were removed from the Taonui Stream, and a total of 95 km of scheme drains have been sprayed with herbicides during the period.

MAKERUA DRAINAGE SCHEME

- 10.46. This period has seen drain maintenance continue with Waterfall Creek having 1.5 km machine cleaned to remove weed blocks. Linton Main Drain has been machined cleaned with a long reach machine, and a total of 32 km of scheme drains have been sprayed with herbicides during the period.

KOPUTAROA DRAINAGE SCHEME

- 10.47. Autumn drain maintenance is under way with both machine cleaning and spraying being undertaken.
- 10.48. The winch for the K5 Drain floodgate fell off the top of the pipe due to corrosion on the sides of the gate. A new headwall was constructed with railway irons and timber so that when the winch was re-installed the same problem would not occur.

MOUTOA - WHIROKINO DRAINAGE SCHEME

- 10.49. This period has been quiet up until the end of May which brought heavy rainfall causing the drains to fill and draw significant amounts of weed to the pumpstations.
- 10.50. Spotlights were installed at Bowler Pumpstation to assist staff working at this site at night.
- 10.51. A number of large willows on the stopbank at the entrance to Cooks Pumpstation were removed. The trees were affecting access to the pumpstation and were not aesthetically pleasing. After discussion with the area engineer central, it has been agreed that the area will be planted with some small natives to increase the aesthetic value of the site.
- 10.52. Repairs were carried out to the stopbank adjacent to the Duck Creek spillway. Stock tracking and erosion around the concrete structure has been repaired and the area re-grassed.

TE KAWAU DRAINAGE SCHEME

- 10.53. S19 culvert was replaced, due to the end pipes becoming disjointed from the rest of the culvert pipes. A new 450 mm culvert line was installed with a new floodgate.
- 10.54. A kilometre section of Railway Drain was machine cleaned, and a total of 51 km of scheme drains have been sprayed with herbicides during the period.

HIMATANGI DRAINAGE SCHEME

- 10.55. A section of the Radio Station Drain was machine cleaned.
- 10.56. Ongoing issues with an access culvert on Palmers Drain has resulted in the culvert being upgraded to a 450 mm diameter culvert.

FOXTON EAST DRAINAGE SCHEME

- 10.57. A section on Kings Canal besides the Kindergarten in the Robinson property was sprayed for blackberry.

HOKIO DRAINAGE SCHEME

10.58. Two Culverts were upgraded under Bruce Road and one under CD Farm Road in conjunction with HDC. This is part of the Wider Drainage Scheme Upgrade which will be carried out over the coming years. HDC carried out the work with the drainage scheme reimbursing the Council a portion of the costs.

11. ENVIRONMENTAL GRANT WORK

11.1. The status of grants approved during the 2015-16 year to date, together with those approved last year but deferred, is as shown in the table below:

Name	River	Type of Work	Date Approved	Work Status	Estimated/ Actual Works Cost (\$)	Value of Grant
N Tripe and T Mathews	Mangatipona Stream	Grade control repairs	30/4/2015	Completed	\$25,000	\$7,888
Blackfern Lodge	Ongarue River	Remove debris blockages	12/8/2015	Completed	\$1,800	\$540
M&N Stewart	Porewa Stream	Erosion protection	21/9/2015	Completed	\$7,8071	\$2,234
C Williamson	Waituna Stream	Erosion protection	21/9/2015	Completed	\$11,713	\$4,433
S Dittmer	Kiwitea Stream	Erosion protection	21/9/2015	Completed	\$5,4721	\$1,835
E Brook	Kiwitea Stream	Erosion protection	21/9/2015	Completed	\$16,433	\$4,790
C Nagel	Tutaenui Stream	Erosion protection	21/9/2015	Completed	\$5,852	\$1,756
D Voelkerling	Porewa Stream	Erosion protection	30/10/2015	Completed	\$11,754	\$4,283
Kym Black	Oroua River at Rangiwahia	Erosion protection	30/10/2015	Carry over to 2016-17	\$13,000 estimated	\$3,900 estimated
W Blakely	Porewa Stream	Erosion protection	16/12/15	Completed	\$28,624	\$9,094
Fullerton-Smith	Tutaenui Stream	Erosion protection	2/12/15	Completed	\$13,530	\$4,973
Curwen Hare	Kiwitea Stream	Erosion protection	16/12/15	Completed	\$6,771	\$1,858
Redmayne	Mangatikotoko Stream Turakina	Channel grade control	5/2/2016	Partly deferred to next year	\$41,000 estimated	\$15,885 estimated
C Hayes	Tutaenui Stream	Erosion control	30/3/2016	Yet to commence	\$14,200 estimated	\$4,206 estimated

15 June 2016

RDC	Koitiata	Flood protection	21/4/2016	Completed	Grant contribution not required.	
Alex & Sue McKay	Kiwitea Stream	Bank Flood Damage Repairs	4/5/2016	Completed	\$3,500 estimated	\$1,050 estimated
N Randell	Tutaenui Stream	Erosion Control	24/5/2016	Yet to commence	\$7,000	\$2,110
Tunnel Hill	Makirikiri Stream	Flood water egress structure	29/7/2015 & 2/6/2016	Yet to commence.	\$124,550 estimated	\$37,365 estimated
Bird and Brown	Kiwitea Stream	Erosion protection	31/7/2015	Completed	\$2,962	\$890
J Heald	Manawatu River at Oringi	Erosion protection	4/9/2015	Completed	\$23,628	\$7,102
N Short	Tapuata Stream	Erosion protection	21/9/2015	Completed	\$6,959	\$2,088
K Norman	Upper Mangahao River	Erosion protection	17/7/2015	Completed	\$5,166	\$1,550
G Bennett	Upper Mangahao River	Erosion protection	12/6/2015	Completed	\$25,611	\$5,910
Pongaroa Way –To-Go Community Group	Pongaroa River	Erosion protection/channel control	4/2/2016	Completed	\$8,737	\$2,463
Jarrold Drysdale	Mangaroa Valley	Erosion control	1/3/2016	Unlikely this FY	\$5,860 estimated	\$1,750 estimated
Hooper-Smith and Taylor	Mangatoro Stream	Erosion protection	4/2/2016	Works partially completed. Works now on hold and to be completed next FY.	\$8,000 estimated	\$2,400 estimated
Total Estimated Grant Commitment To Date						\$132,353

11.2. The Annual Plan budget for environmental grants (Rivers Fund) during the current year is \$60,000. Having considered a paper to the Strategy and Policy Committee on 8 December 2015, Council approved an additional \$50,000, giving a total budget of \$110,000.

11.3. While that budget appears to be over committed (refer table above), a handful of projects, most notably the Makirikiri gate structure, will not commence until next financial year. The year end result will therefore be around \$95,000.

12. SIGNIFICANCE

- 12.1. This is not a significant decision according to the Council's Policy on Significance and Engagement.

Ramon Strong
GROUP MANAGER RIVER MANAGEMENT

ANNEXES

- A Schedule of Completed Works 1 April - 31 May 2016