Report No.	17-60
Information Only - No Decision Required	

RIVER AND DRAINAGE ENGINEERING REPORT (PRD 01 02)

1. PURPOSE

1.1. The purpose of this item is to report on progress with river and drainage activities for the period 16 February 2017 to 10 April 2017.

2. RECOMMENDATION

That the Committee recommends that Council:

a. receives the information contained in Report No. 17-60; and

b. approves the following additional expenditure requirements (transfers from reserves to operating expenditure):

   i. $120,000 for the Ohau-Manakau Scheme;

   ii. $12,000 for the Koputaroa Scheme;

   iii. $40,000 for the Moutoa Scheme.

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 2015-16; 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 Catchment Community Meetings. As necessary, other issues will be the subject of media releases or where necessary/ warranted specific community engagement (e.g. public meeting).

5. SIGNIFICANT BUSINESS RISK IMPACT

5.1. There are no significant risks inherent in the adoption of recommendations contained in this report. As previously reported there is a risk of the drawdown of an excessive proportion of individual scheme emergency reserve funds for the purpose of flood damage reinstatement relating to the June 2015 event. Realising this risk would require Council's application for assistance under the **National Civil Defence Emergency Management Plan (the Plan)** to be declined. This business risk has reduced substantially (approximately 75% of what is defined as claimable has been claimed and paid with few issues encountered) and is now noted for completeness only.

6. DISCUSSION

6.1. As noted in the body of this report, a number of Health and Safety initiatives have been advanced over the period. The first of these involves comprehensive water safety training for staff by way of an intensive, externally facilitated two day training course comprising a day of theory followed by a day of practice. The course was run jointly with Science/ Freshwater staff as a team-building opportunity. Although a refresher for many the course has been widely praised by staff as reinforcing how easy it is to get into difficulty. The course facilitator has also provided management with feedback around the nature and availability of personal protective equipment for staff.

6.2. Staff have also engaged an external Health and Safety provider to audit a number of Rural Upgrade Project contracts. Staff routinely undertake internal audits but the external perspective has added value in a range of ways. It identified one earthworks contractor who has successfully completed a number of RUP contracts as having very good systems and practises, contrasting with another, slightly smaller earthworks contractor who has more room for improvement.

6.3. Staff also make reference in the body of the report to Asset Management, specifically the impending replacement of Council's bespoke but slightly antiquated software, something that has been previously flagged by Audit NZ as an improvement item. The adoption of new software is likely to prove something of a catalyst for ensuring that asset management adds value to what we do, and that our approach is more organisationally consistent. In that vein Corporate and Governance group have established an Asset Management Steering Group, a first step for that group being a maturity assessment of Council's Asset Management Plans by an external consultant, timely given the impending update to Council's Long Term Plan and 30 Year Infrastructure Strategy.

6.4. As previously reported the weather has impacted operational activity for the group for much of the financial year to date; this reporting period is little different to that. The impacts both directly (Ohau-Manakau Scheme flood damage) and indirectly (increased O&M costs for some drainage schemes) are outlined in more detail in this report.

6.5. The Southern Area report provides more detail and context around the Ohau stopbank breach that occurred in February; on 7 March I met with the house owner directly impacted by that breach and their insurer's loss adjuster. While it is an understatement to describe the particular circumstances of that situation as unfortunate, I was also not able to provide the outcome he wanted (Horizons to cover the cost of raising the house), noting (amongst other things) the lack of due diligence that accompanied what was a relatively recent purchase.

6.6. That event also saw the inundation of a house beside the Waikawa River, a property that (in a similar vein to the Ohau property) has been flooded several times before. In that instance the matter is primarily one relating to the issue of a Building Consent; accordingly the house owner is in discussion with Horowhenua District Council staff.

6.7. Given the prevailing weather conditions and (at the time of writing) the potential threat associated with the remnants of Cyclone Debbie that impacted much of the central east coast of Australia in late March, most of the Rural Upgrade Project contracts that are still currently 'live' are likely to remain so until warmer (and hopefully drier) weather returns later in the calendar year. This gives more certainty that what was a 12 year works programme will require an additional (2018-19) year to complete. A more complete picture around programme and budget will be presented to Committee at the June meeting.

6.8. Community engagement has had a strong focus over the period, ranging from the engagement with the Whanganui community around river-related flood risk to the first of the annual Scheme Catchment Community meetings and staff participation with the Horizons exhibit of the Central Districts Field Days. Outcomes from the Whanganui flood risk community engagement will be reported separately and commentary on the other events is contained within this report. Two particular observations to note with the Scheme CCM's to date; the level of apparent ratepayer buy-in to extending the Matarawa Scheme

and the consternation expressed by Porewa Scheme ratepayers at the rate increase proposed for the 2017-18 Financial Year.

6.9. As an addendum to the February River and Drainage Committee report, the Chief Executive has written to his Whanganui District Council counterpart advising that Horizons intends retaining some flexibility around resourcing arrangements (essentially determining allocation based on the nature of the event). I'm not aware of that having caused any consternation within WDC.

6.10. In regard to flood risk for Foxton (specifically the Annual Plan target to "Investigate options for improving the level of flood protection service for Foxton township, through improvements to Foxton East Drainage Scheme infrastructure"), as previously reported technical work to date has largely ridden on the back of Catchment Management Plan work commissioned by the Horowhenua District Council. Although still provisional this work largely concurs with the views of staff as to what a long term solution might look like. It's anticipated that a more detailed report on this subject will be tabled at the June Committee meeting.

6.11. In a similar vein the current Annual Plan also contains references to the issue of berm siltation along the lower reaches of the Oroua River, the implications that has (if left unchecked) for flood protection levels of service in the future and the need to identify the suite of options that might most effectively address this issue. The comparison between the 2006 LiDAR survey and more recent data capture provides a degree of clarity around this issue that has not previously existed, highlighting the challenge that the Lower Manawatu Scheme faces. A first step was taken on 23 March with a workshop involving Horizons River Management and Science staff alongside LandCare Research and Massey University staff.

6.12. There are a range of potential options to address this issue, all of which ultimately involve significant expenditure for a scheme facing a considerable debt burden associated with the Rural Upgrade Project. In any event unless the community accepts the diminishment in level of service (an outcome that would seem unlikely given the sentiment expressed following the June 2015 floods) those sections of stopbanking affected may need to be depreciated, something that to all intents and purposes is already happening (the allocation of LMS funds to Oroua silt removal in the current financial year).

6.13. At a national level Horizons along with other Regional Councils has contributed toward the cost of a study intended to capture the value-add proposition at a national level as it relates to flood protection infrastructure. Not without it's challenges (one of which being delineating between flood mitigation and stormwater management, particularly in large urbans areas such as Christchurch and Auckland) the consultant engaged has to date drawn some useful conclusions. From a benchmarking perspective the work undertaken to date also provides some useful comparisons between Regional Councils.

6.14. In regard to staff, Jon Bell has been appointed Investigations and Design Manager, replacing Peter Blackwood.

7. INVESTIGATIONS AND DESIGN

INVESTIGATIONS

7.1. The 2016/17 Programme for the Investigations and Design Team includes 36 separate tasks. During this two month period a large number of assessments and design advice have been provided, alongside the completion of a number of designs.

LOWER MANAWATU SCHEME

7.2. The current summer construction season is Year 11 of the 12-Year Rural Upgrade Project programme. Works have been designed to achieve the Scheme's standard of 1% AEP (100 year) with 450 mm freeboard. During this reporting period design work has included:

- Site specific advice relating to temporary bunding required to facilitate the building of the concrete flood wall on the Oroua below Rangiotu.
- Advice about culverts associated with the Stansell's Drain pump.
- Design advice provided to assist with the development of plans for a Waka launching ramp for the Manawatu River in Palmerston North

7.3. DHI Limited are progressing modelling work to quantify the potential effects associated with the upgrade of stopbanks at Benmore Avenue.

7.4. In addition to the Rural Upgrade works, advice has also been given in relation to the alignment and construction of the rock lining at Hoults on the Manawatu River, the final part of the June 2015 flood damage repair work.

7.5. Further survey of the groynes at Fitzroy Bend has been commissioned in order to better assess the scale of rock armour loss at the toe of the groynes.

7.6. Work has also progressed looking at the results from a LiDAR survey of the Oroua River. Contrasting this data set with that gathered in 2006 has already added value operationally, enabling the Oroua silt removal programme to target areas where more substantial accumulation has occurred. Further work is underway to analyse the data in greater detail to help improve understanding of the fluvial process and sediment sources.

TUTAENUI STREAM HYDRAULIC MODELLING

7.7. A detailed 2 dimensional model of the Tutaenui Stream has been built. This model has been calibrated with the June 2015 flood event and has produced a good representation of that flood event.

7.8. The model has produced outputs of a 0.5% AEP (Annual Exceedence Probability) (200 year) flood event. These results are currently being translated to maps and will be presented at the upcoming Scheme Catchment Community Meeting.

7.9. The results of this modelling work will be made available to inform flood risk advice in the area.

7.10. The model will be a valuable tool to assess any flood mitigation options that the Scheme may wish to explore as recommended by the 2016 Scheme Audit, including the capex Rangitikei District Council have allocated for improvements to Marton's stormwater network.

KAWHATAU STREAM GRAVEL ASSESSMENT

7.11. A detailed fluvial assessment of the Kawhatau Stream has been carried out based on an analysis of cross sectional surveys. A report detailing this work and its findings is currently in draft form.

OHURA / MANGAORA FLOOD MODELLING

7.12. Survey work of the Mangaroa and stream in Ohura has been commissioned and the results will be used to inform the modelling work.

UPPER WHANGANUI GRAVEL ASSESSMENT

7.13. A detailed fluvial assessment of the Upper Whanganui River has been completed. The work and its findings are presented in detail in a separate Agenda Item.

MAKIRIKIRI AUDIT

7.14. A scope has been developed to define the work required as part of this audit.

MANGATAINOKA RIVER

7.15. A detailed assessment of the gravel resource in the Mangatainoka River has been carried out. A report detailing the work and its findings is currently at a draft stage.

7.16. Work has commenced on an assessment of the Hamua Stopbanks on the Mangatainoka River. To date this work has involved the development of a hydraulic model of the reach of the river to determine the level of service provided by the stopbanking.

FISH PASSES

7.17. During this reporting period design advice has been provided for a number of fish passes around the region. This work has provided a range of site specific solutions and has been a collaborative effort with the Science and Freshwater teams.

REGULATORY ADVICE

7.18. During this reporting period advice was provided on a number of substantive matters. This regulatory work has included specialist advice on flood risk and the production of technical reports for consent applications, rezoning and subdivisions. Whilst this advice has been recorded, it has not been collated at this time due to workload.

LOWER MANAWATU SCHEME RURAL FLOOD PROTECTION UPGRADE PROJECT.

7.19. The following table schedules all current Rural Upgrade Project works and provides commentary on 2016/17 project status.

Project Title	Description	Status
Manawatu River Right Bank Stopbank Upgrade, Te Matai Rd	Upgrade 4,700m of stopbank on the right bank of the Manawatu River adjoining Te Matai Rd, Whakarongo	The major portion of this section is on hold pending landowner discussions around alternative alignments. Upgrading the remainder of the stopbank not affected by alignment considerations was completed in January.
Manawatu River Right Bank Stopbank Upgrade, Longburn Railway	Upgrade 1,600m of stopbank on the right bank of the Manawatu River along the railway line and adjoining farmland east of Longburn.	Construction work was completed in February 2017.

Manawatu River Right Bank Stopbank Upgrade, DOC Reserve, Springs Rd, Whirokino	Upgrade 930m of the Manawatu River right bank stopbank on Department of Conservation reserve land at two locations in the vicinity of Whirokino Rd and Springs Rd, Whirokino.	Construction work was completed in January 2017.
Manawatu River Left Bank Stopbank Upgrade, Koputaroa	Upgrade 200m of the Manawatu River left bank stopbank at three locations adjoining Koputaroa Rd.	Construction work was completed in March 2017.
Manawatu River Right Bank Concrete Floodwall, Ervine Property, Rangiotu	Construct 38m of concrete floodwall on the Manawatu River right bank at the Ervine property, Rangiotu.	Construction work underway, completion scheduled for mid April 2017.
Oroua River Left & Right Bank Stopbank Upgrade, Downstream of Awahuri Bridge	Upgrade 3,300m of existing stopbank and construct 1,300m of new stopbank on the left and right banks of the Oroua River immediately downstream of the SH3 bridge at Awahuri.	Construction work underway, completion scheduled for late April 2017.
Oroua River Left & Right Bank Stopbank Upgrade, Upstream of Awahuri Bridge to Feilding	Construct new stopbanks on the left & right banks of the Oroua River from the SH3 bridge at Awahuri up to Feilding. This project will extend over a river distance of approximately 6,000m.	Land entry agreement for a significant portion of the left bank work was not able to be concluded. Alternative land acquisition processes have commenced. Land ownership issues have also delayed right bank work, although in this case the difficulty has been establishing who owns the land. No work will be possible this season.
Oroua River Left and Right Bank Stopbank Upgrade, Rangiotu	Upgrade existing stopbanks on the left and right banks of the Oroua River from the Rangiotu Rd bridge to the Manawatu River confluence. Works will extend over a river distance of 3,000 m.	Construction work underway with completion likely late March 2017.

Oroua River Right Bank, Te Rangimarae Marae Concrete Floodwall, Rangiotu	Construct a 45m long by 2.6m high reinforced concrete floodwall on the Oroua River right bank adjoining the Te Rangimarae Marae. The marae building and narrow berm width at this location prevent the continuation of the upgraded stopbank past this point.	Construction work underway with completion likely April 2017.
Linton Main Drain Left and Right Bank Stopbank Upgrade, Tane Rd	Upgrade existing stopbanks on the left and right banks of the Linton Main Drain downstream of Tane Road. Works will extend over a river distance of 1,000 m. The right bank involves undertaking road re-construction along the crest of the upgraded stopbank.	Construction work underway. Should current weather conditions prevail work is unlikely to be completed this season, with work to recommence later in the calendar year.
Tokomaru River Left and Right Bank Stopbank Upgrade, Okuku Rd	Upgrade existing stopbanks on the left and right banks of the Tokomaru River from Okuku Pumpstation to a point immediately downstream of Opiki Road. Works will extend over a river distance of 4,000m.	Construction work underway. Should current weather conditions prevail work is unlikely to be completed this season, with work to recommence later in the calendar year.
Mangaore Stream Left and Right Bank Stopbank Upgrade, Shannon	Upgrade existing stopbanks on the left and right banks of the Mangaore Stream downstream of Otauru Road, Shannon. Works will extend over a river distance of 2,700m.	Construction work underway. Should current weather conditions prevail work is unlikely to be completed this season, with work to recommence later in the calendar year.
Protect Individual Property, J.Mason, Lockwood Rd	Lift the Mason house at 943 Lockwood Rd by 500mm to a height of RL 10.19m MSL.	This landowner has confirmed they want their house to be raised as per the resource consent conditions. Current in design/ building consent phase.
Protect Individual Property, Taonui Farms, Main Drain Rd	Provide flood protection to the Taonui Farms dairy shed to a height of RL 10.19m MSL.	Construction work underway with completion likely April 2017.

Protect Individual Property, Rangiotu Estates, Highway 56	Provide flood protection to the Rangiotu Estates dairy shed to a height of RL 10.19m MSL	Due to the floor height of this dairy shed being only slightly below the 1%AEP design height and the significant earthwork disturbance that would be required to bund this building, the landowner has indicated they do not require any mitigation work.
Protect Individual Property, P. Sales, Rangiotu Rd.	Construct a flood protection bund around the motorcycle workshop on this property where it adjoins the Oroua River left bank stopbank, Rangiotu	Originally programmed for 2017-18 this work was more efficiently carried out as part of the adjoining Oroua River left bank stopbank upgrade. The work is complete.
Foxton Storm Surge Repair	Stabilize erosion areas of the concrete floodwall where coastal erosion has been undermining the wall.	A rock supply contract was tendered in December 2016 but prices received were significantly higher than the estimate. The design of an alternative solution using geotextiles is close to being completed.
Oroua River Right Bank Stopbank Upgrade, Saunders Property, Kopane.	Raise a section of right bank stopbank and widen a localized area of river channel.	Construction work was completed in January 2017.
Feilding Golf Club	Repay Feilding Golf Course $75k for work advanced ahead of programme and paid for by them in 2013-14.	Repayment was made on 18 Oct 2016.
City Reach Project:Benmore Ave Stopbank Upgrade	Upgrade a section of the Flygers Line Spillway stopbank adjoining Benmore Ave, Palmerston North.	The analytical work required for this modification was outsourced to a modelling consultant. Delays in completing that work and the need to obtain resource consent will require this work to be completed in the 2017-18 Financial Year.

8. CENTRAL AREA

GENERAL

8.1. The reporting period was characterised by variable weather which has typified much of the summer, providing challenging conditions for the wide range of operations and maintenance activities. The total rainfall for this period (1February 2017 to 23 March 2017) has been recorded as: 126.5mm at Milson Line, Mangaone, 146.5mm at Cheltenham, Makino, 289.0mm at Scott's Road, Kahuterawa, and 188.5mm at Rangiwahia, Oroua.

8.2. The Manawatu River experienced one significant flow peak at the Teachers' College recorder of 824 cumecs (4m) on 3 February, which triggered the 3.5m stage warning level. The berm at Opiki is typically underwater at 4.2m, dependant on flows from the Oroua.

The remainder of the reporting period saw the residual flow gradually decrease and from the twentieth of February it has remained mostly below the thirtieth percentile flow.

8.3. The Oroua River had consistently low residual flows over the reporting period. The largest peak flow of the period occurred on 2 February and saw a flow of 36 cumecs (1.8m) - first alarm is 3.2m.

8.4. Scheme engineers have continued to assist in the delivery of the Rural Upgrade Project (RUP). Consultation between the delivery team and LMS staff in regards to project work for the remainder of 2016-2017 RUP works has continued, especially with regard to aspects of the work that have implications for O&M activity.

8.5. Scheme staff assisted at the Central Districts Field Days held during March where the overall focus of the exhibit was water quality in our Regions' rivers and streams. Staff were able to inform those that visited the exhibition about the work that the River Management group does, in addition to core business, to assist with those wider outcomes.

8.6. During the last Lower Manawatu Scheme Liaison Meeting, it was suggested that an open day style event should be held at the Hoihere Road Barrier. The purpose was to provide an opportunity to inform members of the surrounding community, how the barrier is installed and to show how quickly this can be done when required. Despite the ppor weather, fifteen local residents attended. All were impressed with the barriers and welcomed the opportunity to catch up with staff.

8.7. Other training attended by Scheme Staff included: forklift operator course, Engineer's Representative workshop, swift-water safety course, building positive workplace relationships workshop and a risk management seminar.

8.8. A Swift Water Safety Training was run for Horizons staff by Rescue Three International involving most River Management staff. The course involved both a theory day and a practical day, held at Raumai Reserve on the Pohangina River. Every staff member had the opportunity to experience being rescued at some stage during the day. Feedback from staff about the course has been very positive.

8.9. During February, consultant Site Safe Audit was engaged to undertake audits of H&S practices various work sites. The purpose of this was to gauge how staff and contractors are managing site safety and to identify any areas for improvement. It was also used as a training opportunity for our own internal auditors. Overall the results were positive with relatively minor issues identified.

8.10. Repair works are continuing on the remaining June 2015 flood damage sites. The third claim will be submitted at the end of April to MCDEM for assessment to allow payments to be received by Council in this financial year

LOWER MANAWATU SCHEME

8.11. Lower Manawatu Scheme Annual Catchment Community meeting is scheduled to be held at Kairanga on 31st March. Minutes will be available on request after this date.

8.12. Works undertaken on the various rivers within the Scheme during this period include the following:

MANAWATU RIVER

8.13. Maintenance work throughout the City Reach is continuing and has included weed spraying, mowing, native plant freeing, and inspections.

8.14. The Mulching programme has continued with work being undertaken in three sites around the Moutoa area. Work involved the layering and/or mulching of the existing willows, using a 'long-reach' excavator. This river edge vegetation provides the first (and cheapest) line of protection for the adjoining flood defences. Mulching has been proven to encourage

vigorous root growth and therefore improve the effectiveness of willow trees as bank protection. Mulching in the rural areas usually occurs every 5 years while in the city, due to both the amenity value of the river and the criticality of the flood protection assets, mulching is undertaken every 2-3 years.

8.15. Waitoetoe Park has been a topic of discussion and development for several years. Scheme Staff are continuing to work with PNCC, Horizons Freshwater team and interested local community groups to assist in the development of an overall management plan for the area and provide planting advice. Horizons Staff remain interested in the development of the area due to the importance of managing berm flows to avoid erosion, and vegetation management so the flood carrying capacity of the channel is not adversely affected.

8.16. Scheme Engineers have been assisting PNCC with He Ara Kotahi, the shared path that will run along the Manawatu River and that crosses both the Kahuterawa and Turitea Streams. The working party, chaired by PNCC, involves NZ Army, Massey Farms, Rangitāne, NZTA, PowerCo and Horizons. Officers have been working with PNCC to design a suitable shared pathway crossing of the Kahuterawa Stream at Bells Road near the Linton Army Camp. This is particularly problematic as a cost effective low level bridge has associated risks of use due to the probability of it being submerged during relatively modest freshes.

8.17. Works to enable safe jet boat mooring at the Okatia Steps have been completed. Timber has been fixed to the front of the lower steps to act as a bumper for vessels and rings for a tethering rope has been installed. These relatively minor additions to the structure make the area safer for vessels to use at appropriate water levels, and to become a more useable attraction in the area.

8.18. Scheme staff met with two local Iwi representatives during February regarding the location of a whare near Fitzroy Bend as part of a Tu Te Manawa Project. Preferred locations were discussed onsite and promptly run past the River Management Design team with very few concerns being raised. Staff are looking forward to seeing construction work commence.

8.19. Officers have continued maintenance tasks along the Manawatu River, floodway and around the Moutoa Sluice Gates and Tower. These included inspecting and clearing floodgates and apron area, weed spraying, mowing, new fencing and maintenance, cleaning drains, minor stopbank repairs, ramp repairs and flood damage repairs to a guide bank in Himatangi.

8.20. The construction of bank protection works at Hoults Aggregates yard in Aokautere, is well underway and will be completed early next reporting period. The rock lining component has been completed with the rope and rail groynes currently under construction. Nearby vegetation will be secured to the groynes to increase the structures' effectiveness at being both a silt trap and flood flow deflector. This is the outstanding item of June 2015 flood damage repair work.

8.21. Final design details are currently being confirmed for the installation of sand filled mega containers to provide erosion protection to the Foxton Beach concrete surge wall foundations on Hartley Street. Rock supply tenders were initially sought for the replacement of the current concrete riprap in the area. Prices received were deemed to be too expensive, as a result of current rock shortages in the region, so alternatives were explored. The contingency plan and weekly inspection schedule that were put in place when the damage was first identified are continuing. A presentation to the Foxton Community Board on Monday 3 April has been arranged to inform them of the work.

OROUA RIVER

8.22. This year's silt removal from the Oroua berm land has been completed, with 7,300m³ of silt removed from the channel edge. Of the 7,300m³ of material, 2,700m³ was supplied to Mr Reesby, the adjacent land owner, to enable him to build an effluent pond on his property,

while the remaining 4,600m³ was used to increase the landside batter slope of a 300m section of stopbank from an existing 2:1 to a 7:1 batter. It is worth noting that this was initially proposed to occur on Brian Saunders', and then Chris Russell's property however, in both instances the threat of Field Horsetail resulted in the projects being abandoned. Work on Mr Reesby's property has allowed a stopbank fence to be permanently installed on the river side crest of the stopbank, enabling him to graze the landside of the stopbank all year round. Work is expected to continue on Mr Reesby's property in successive years to enable a seven to one batter on the landside of all of his stopbanks.

8.23. The remaining repair works following the June 2015 flood event are being undertaken on the Oroua, with all works expected to be completed by the end of March. Rock groynes which were designed by staff, and independently reviewed by Levin-based consultant Gary Williams, have been installed beneath the Aorangi Rail Bridge and Aorangi Road Bridge in Feilding. These have been designed to redirect flow paths and protect the stopbank running parallel to Feilding golf club on the true left bank. An additional rock groyne has been designed, and will be installed opposite Timona Park that will limit further erosion downstream.

8.24. There have been a number of culvert and stopbank maintenance repairs undertaken on the Oroua. These repairs do not fit in with the RUP scope, which concentrates on raising under-height stopbanks, but are critical for increasing the durability and factor of safety of stopbanks along the river. These works primarily address stopbanks that are up to height but have a narrow top width, in some cases less then 1m, which may not have the durability to withstand long flood peaks.

MANGAONE STREAM

8.25. Because of it's criticality the Mangaone Stream City Reach is frequently inspected by Scheme Engineers and is, in general, in good condition. Any areas where risk to stopbanks becomes imminent, works are undertaken immediately.

8.26. Maintenance work throughout the City Reach is on-going. This work includes tasks such as weed spraying, grass trimming and removing saplings before they grow to become an issue. After the stopbank and berm areas are mown, manual trimming with a weed-eater is undertaken around structures such as sign posts and areas too wet for the tractor. Officers monitor and undertake additional vegetation maintenance when possible along fence lines where fly tipping or hidden hazards are not an issue.

8.27. New gates and paling fences have been installed across the Benmore Avenue vehicular access points, in addition to a new fence along the stopbank toe to prevent access from Bisley Street. Unfortunately, within a week of completion, a vehicle attempted to use the stopbank as a shortcut from Rangitikei Line and rammed one of the upstream gates in an attempt to exit. When the gate held up to the impact, the vehicle reversed and smashed through the freshly painted wooden paling fence. Repairs are currently underway and similar gates will eventually be installed at both Rangitikei Line and Botanical Road.

8.28. Work on the walkway underpasses being constructed by PNCC at Botanical Road and Highbury Avenue is continuing. Staff have been monitoring progress and have raised concerns as to the length of time the work is taking. As a result, the project manager advised that extra resources had been brought in by the contractors to ensure the work is undertaken as quickly as possible.

8.29. Scheme Engineers continue to check the Flyger's Line Spill Gates at least once a week to make sure they will perform as designed in a flood event. This is necessary as the land around the gates is often grazed, occasionally resulting in gates being pushed over unintentionally. Additional inspections are undertaken prior to forecast severe weather events. A webcam will be installed shortly to automate this task and provide for easy checking during an event.

8.30. Staff continue to manage enquiries and requests from the public and neighbouring residents regarding the Mangaone Reserve, and work hard to respond to any concerns in a timely manner. It is also appreciated when members of the public alert staff when they notice anything of concern. An on-going issue that is brought to our attention is the digging of holes into the stream bank around Benmore Avenue which often occurs during school holidays. Holes are refilled with clay or available berm material to prevent collapse if run over by the mower.

8.31. Enquiries have also been received from neighbouring residents regarding vegetation removal and planting of natives in the reserve. It is encouraging that there are members of the public who wish to see the amenity values of the area improved. Staff are working towards solutions with a good neighbour attitude.

8.32. The remaining flood damage areas following the June 2015 flood event are being completed above the Flyger's Line Spillway. Machinery onsite has also allowed for routine maintenance to be undertaken with channel clearing and bend realignment works completed and paid for by the Scheme.

TURITEA STREAM

8.33. Two erosion sites on the Turitea Stream, within the AgResearch complex Tennent Drive, were repaired with rock linings. The works were designed and supervised by Horizons, while the cost was paid for by AgResearch.

MAKINO STREAM

8.34. Five erosion sites resulting from the June 2015 floods were repaired: two of these sites were within Kowhai Park, and both were completed using rock riprap; the other three sites were all upstream of the diversion structure. One completed using rock riprap; with another using stub groynes; and the third completed using anchored tree works.

8.35. A maintenance run was completed in the upper reach of the Makino Stream i.e. from Reid's Line West upstream to the Scheme boundary. This involved the layering and/or mulching of the existing willows; the clearing of flood debris from beaches; and the relocating of gravel point-bars, which were causing erosion problems.

8.36. There has been a number of building consent enquiries received for the Feilding area, both in town and to the north, reflecting the level of development activity in this area.

8.37. As part of the upgrade of the Makino Diversion Structure control building, webcams at Duke St and at the Makino Diversion Structure are now viewable on site at the Diversion Structure. This will ensure that gate operators are further informed of river levels in Feilding and onsite. Security grills have been installed on the windows and additional hand railing has been added to the diversion structure, to safeguard the safety of operators. The touch screen electronics situated in the control cabin have now been upgraded to allow remote control of the gates through the internet. This does not relieve staff of the requirement to be present at the structure when operating the gates, but does provide an additional method of gate operation as a backup.

DERBY CREEK. KIWITEA, STONEY CREEK

8.38. No works have been undertaken on Derby Creek and the LMS section of the Kiwitea in this reporting period. Rock has been stockpiled for works in Stoney Creek, programmed for April.

MANGAORE STREAM

8.39. All floodgates have been inspected, with no other works undertaken in this reporting period**.**

MOUTOA FLOODWAY

8.40. Inspection of all floodways, stopbanks and floodgates has been completed. Maintenance tasks have included spraying of lime on the tops of the piers, spraying on pier concrete, minor removal of silt and debris from the apron, general maintenance around the control tower, stopbank mowing and floodgate inspections.

TOKOMARU RIVER

8.41. Also as part of the vegetation maintenance programme, a stretch of the Tokomaru River, true left bank, from the confluence with the Manawatu River, upstream to the confluence with the Kara Creek had the existing willows mulched.

LOWER KIWITEA STREAM SCHEME

8.42. One erosion site, resulting from the June 2015 flood, was repaired. Works consisted of concrete blocks, driven anchors and rock riprap. A spray programme was completed, covering the total channel reach of the Scheme i.e. from Feilding upstream to the Cheltenham Cross Road. Gravel extraction was completed at one site.

KAHUTERAWA STREAM SCHEME

8.43. The Kahuterawa Stream is listed under the 'One Plan' as a 'Site of Significance – Aquatic'. Therefore, under the Resource Consent issued to Horizons Regional Council – Operations to undertake stream channel maintenance works, one of the conditions limits the time of year allowable for instream works i.e. January, February and March only.

8.44. Maintenance works for the financial year have just been completed. These included the layering of existing willows; the removal of flood debris and the relocating of gravel point-bars which were causing erosion.

8.45. All works this year were undertaken in the upper reach of the Scheme i.e. upstream of State Highway 57.

ASHHURST STREAM SCHEME

8.46. No works have been undertaken in this reporting period.

9. NORTHERN AREA

GENERAL

9.1. The unsettled weather patterns experienced this summer has, in general, not had a detrimental effect on our ability to deliver the required work programmes. All capital work is now complete as are many of our O&M activities.

9.2. Many of the Scheme Annual General Meetings in the Northern Area have been brought forward this year to better align with Councils Annual Plan process. By the end of March the Northern Area will have completed 4 of its 10 planned meetings.

Topics attracting the most public interest are;

- Adding the Matarawa Stream urban reaches that flow through Whanganui East to the Matarawa Scheme. Currently the channel is heavily congested with vegetation and urgent maintenance is required to ensure good flow conveyance is achieved with minimal bank erosion
- How the Taringamotu Scheme will look in the future. Phase one of work that concentrated on the clearance of debris blockage is now complete. We are asking the community if they wish to commit to phase two of work, and the establishment of a full scheme that will manage channel management and gravel extraction into the future.
- What financial impact proposed changes to the management of dams will have on four of our smaller schemes.

9.3. The recruitment process to replace Project Engineer Lew Marsh (now Eastern Area Engineer) was unsuccessful with no suitable applications received. We are to return to the market and advertise for an Engineering Officer and Engineering Cadet. The addition of younger staff to the Northern team will provide more depth for succession planning.

Training and Forums

9.4. Staff have been involved in the following training opportunities this period including:

- All staff attended a two day water safety training programme in February. Day one of the course comprised theory sessions where water risks and mitigation practices were covered. The second day had staff out and wet in the Pohangina River learning active survival techniques.

Community Involvement

9.5. Staff have been busy attending the following community meetings over the past two months;

- Two Wai Catchment Meetings in Ohakune where a Ruapehu District Council lead initiative, is pulling together interested parties to consider a catchment whole management approach for Whangaehu River.
- Working with Sports Whanganui to ensure good river access is available for the NZ Schools Triathalon Championships being held in Whanganui late March.
- Engagement with the Whanganui community around flood protection, held at various locations around the city during February and March.

RANGITIKEI RIVER CONTROL SCHEME

RANGITIKEI MAINTENANCE WORKS

9.6. Work progress over the past two months has seen the completion of all June 2015 flood insurance jobs and the final claim preparation for just over $600k is now underway. In total the Rangitikei Scheme will forward just under $1.7m of claims to MCDEM for consideration with $1.1m already paid.

9.7. At this time of the year we implement the annual beach spraying programme to control vegetation within the river ‘fairway’. This is a proactive activity aimed to maintain gravel movement through the scheme and reduce bank erosion, keeping the river flowing along preferred alignment paths within a managed zone.

9.8. Staff have assisted the Councils survey team undertake river cross sections from the river mouth at Tangimoana upstream to Vinegar Hill. Information derived from this work is used to assess the gravel reserves within the system and any changes that may be taking place with river morphology. Further survey is expected upstream of Mangaweka next month.

RANGITIKEI CAPEX WORKS

PAREWANUI STOP BANK UPGRADE FOR 2016-17

9.9. This year the Parewanui stop bank upgrade work is located on the Walmac Farm near Scotts Ferry between River Distance 5km and 6km. Work on the 750m length of stopbank upgrade was completed in early March with the fencing contractor completing all reinstatement of fences two weeks later.

WILSON ROCK RIPRAP TOE LINING

9.10. The rock lining flood damage at the Wilson site at river distance 27.4km LB of the Rangitikei River has now been completed to a very high standard in early February. In addition to 230m of rock lining (3250 tonnes of rock riprap) used, eight rope and rail groynes were installed along with placement of 300 tonnes of rock at the head of the groynes to protect against outflanking. These rope and rail groynes were constructed on a gravel platform that has been formed immediately behind the rock lining.

HASTINGS ROCK RIP RAP TOE LINING

9.11. Council approved a variation to the Wilsons Rock Lining contract to allow John Ray Ltd to supply and place approximately 840 tonnes of rock riprap for the repair of Hastings rock flood damage. This week all the flood damage repair works involving approximately 150 metres of rock lining on the Rangitikei River at 23.5 km left bank, was completed.

RANGITIKEI RIVER ENHANCEMENT

9.12. No enhancement work undertaken this period

GRAVEL EXTRACTION

9.13. No gravel extraction has taken place from Council's consents in the reporting period.

POHANGINA-OROUA RIVER CONTROL SCHEME

9.14. Aerial spraying of the beaches and other vegetated areas for lupin and wattle growth on the lower sections of the Oroua and Pohangina Rivers has been completed in late March and an overfly via helicopter has revealed that the river is in good shape.

POHANGINA RIVER

9.15. Work has also been completed at the Eales property on the Pohangina where a small hole had developed and some tree bank protection work was required. We are also looking at a few isolated areas of channel maintenance along this section which will attempt to realign the channel and keep the main flow out in the main channel and avoid the direct impact into some of the existing meanders along this section of the Pohangina.

GRAVEL EXTRACTION

9.16. No gravel extraction during the period.

OROUA RIVER

9.17. Work is now complete at the McDougal property near Kimbolton on the Oroua River, although it's expected that there may be a requirement to construct additional groynes on the right bank to further protect a 200m section of eroded bank edge. The property owner is currently watching and considering what other work can be done to protect the area but its looking like another three groynes may need to be constructed further downstream of the existing construction work. One rope and rail groyne has already been constructed and appears to be working well.

9.18. Channel maintenance work consisted of constructing a small diversion channel and depositing the gravels up to the eroded edge in an effort to allow the plateau to silt up and provide a platform for vegetation regrowth. It's expected that additional willow poles will need to be planted along this section of the river to aid protection of the banks at this location. The stony nature of the topography along this river section makes for an easily eroded material, thus causing some distress to the river banks.

9.19. Tree bank protection work and some channel maintenance work has been done at the Pettigrew's property at London's Ford. This was a small hole and a repair to previous damage that occurred some years ago along this section of the river. The owners have all expressed appreciation to Horizons for getting the repairs done quickly, thereby minimizing the extent of the damage and hence the cost.

GRAVEL EXTRACTION

9.20. A total of 1,150m³ extracted during the period.

TOTARA RESERVE

9.21. Work shortly to commence on several groyne structures to protect the banks from further erosion. The long term plan at the repair site in the Gilchrist Track area is the addition of more walking tracks as well as a possible cycling trail, hence the reason to protect the banks at this location. In addition some channel works are planned to realign the channel and to encourage the river away from the protection areas.

UPPER WHANGANUI RIVER MANAGEMENT SCHEME

9.22. The Annual General Meeting for the scheme was held on the Thursday 23 March at the Central Park Motor Inn. This year's presentation discussed the early completion of Ongarue work and the consequential reduction in next year's operations budget.

Scheme Reserves at June 2017 will stand at nearly $290k – nearly double the recommended levels. Those attending the meeting concurred with the views of staff that it would be prudent use of $100k from the Reserve account to reduce debt.

TARINGAMOTU RIVER MANAGEMENT SCHEME

9.23. The Annual General Meeting for the scheme was held on the Thursday 23 March at the Ngakonui Hall. This year's presentation discussed the future direction the scheme may take and the importance of ratepayers having their say through submissions to the Councils Annual Plan. The discussion at this meeting proved a little fractious at times, similar to the previous years' meeting and reflecting the somewhat contentious evolution of this Scheme.

9.24. All planned maintenance work for this year is now complete.

MATARAWA FLOOD CONTROL SCHEME

9.25. The Annual General Meeting for the scheme was held at the Whanganui East Club on Monday 20 March. A generally supportive crowd of sixty plus residents were presented with a proposal to add the Matarawa Stream urban reaches to the existing scheme. If successful, the initial $344k work programme would concentrate on a two year channel clearing exercise funded by a scheme loan. Once completed the follow up maintenance works would continue annually on a $10k budget.

9.26. Work is now complete on this year's major scheme task. A rock lining on the Gudsell property upstream of the diversion structure is now in place. This lining is required to protect the toe of the stopbank between the railway and the diversion structure that prevents flood flows from overtopping the bank and heading towards Whanganui East.

TUTAENUI FLOOD CONTROL SCHEME

9.27. General maintenance work over the period has included drain spraying around Bulls, and channel clearing along selected reaches between Curls Bridge and Bulls.

9.28. Work is now complete on the two significant studies for the Tutaenui Scheme this year. The first being the scheme audit that reviewed performance objectives against those delivered and also investigated the potential to increase the flood protection standard to the community. The second was an exercise looking at flood plain modelling, with a particular interest in flood mitigation options for Marton and Bulls. A presentation on both will be made at the Scheme Annual General Meeting on Monday 3 April.

MAKIRIKIRI FLOOD CONTROL SCHEME

9.29. No Scheme work undertaken in this period.

MAKIRIKIRI EGRESS GATE

9.30. Resulting from significant flood events in the Turakina River in October 2013 and again in June 2015, the need to construct a flood egress gate through the Makirikiri Scheme stopbank has become a high priority. The flooding on these occasions closed the Turakina Beach Road for several days isolating the Koitiata community. Floodwater from the Turakina River overflowed the surrounding farmland, causing extensive ponding against the outside of the Makirikiri Stream stopbanks. With no natural drainage options the rising flood level closed Turakina Beach Road. To mitigate extended road closures the Makirikiri Stream stop bank was mechanically breached to quickly lower the flood levels to ensure the Koitiata community was not isolated and subjected to an unacceptable risk to their wellbeing.

9.31. The installation of the flood egress structure was seen as a good solution to mitigate these risks by allowing drainage to occur immediately there is a water level difference between the Makirikiri Stream and the ponded floodwater. This will reduce road closure times to hours rather than days. At the same time the Schemes flood protection capability is not compromised.

9.32. ABC Contractors Ltd commenced construction on 9 January 2017. Progress was hampered with wet weather, but the construction work was finally completed on 10 March 2017. Work was completed to budget, an excellent result given the range of inherent challenges with this project. Now constructed, the flood egress gate will become a Makirikiri Scheme asset with inspections and maintenance undertaken by Horizons staff. That Scheme will also fund the structure's depreciation.

POREWA FLOOD CONTROL SCHEME

9.33. The Annual General Meeting for the scheme was held on the 28 March in the Hunterville town hall. Much of the discussion focussed on the expenditure proposed relating to dam management.

9.34. A tremendous effort has been made undertaking channel clearance work through the urban reaches of Hunterville. This is a challenging task for the team as they must fell tall trees in a constricted work zone surrounded by buildings and fences.

WHANGAEHU MANGAWHERO RIVER MANAGEMENT SCHEME

9.35. 25km of river frontage has been flown as a recent willow control operation and although the level of re-infestation was what would have been expected since the last maintenance spray a new Acacia brush weed was identified, something that will have to be maintained closely in the future. Some banks were heavily infested from what was a zero population four years ago.

TURAKINA RIVER MANAGEMENT SCHEME

9.36. There are still blockages to clear at Pat O'Neill's property but the principal focus of this years works programme was the aerial willow spraying operation. 19km has been flown and all of the reach first treated in 2011-12 has now received a maintenance spray.

LOWER WHANGANUI VEGETATION MANAGEMENT AND FLOOD PROTECTION PROGRAMME

9.37. Considerable progress has been made this year on a number of vegetation issues particularly those surrounding bamboo encroaching into the Kowhai Park stopbanks. The presence of bamboo has long been a contentious issue in Kowhai Park but few understood that the extensive network of rhizomes leaves the soil with a similar water holding capacity to a sponge.

9.38. A recent inspection of the culverts at Balgownie has highlighted the worsening problem of foreshore silt deposition. Some of the flaps, wing walls and pipes are now only inches from disappearing beneath the silt altogether, and the flimsy retaining wall structure alongside Karoro Road have become enveloped.

PAKIHI SCHEME

9.39. The Scheme will now have a biennial works programme commencing 2017/18.

FOREST ROAD DRAINAGE SCHEME

9.40. No work undertaken this period

HAUNUI DRAINAGE SCHEME

9.41. Two thirds of scheme drains were sprayed in February to remove the build up of weed growth. The remaining one third will be addressed later in the year once farmers have harvested adjacent crops. A mechanical clean of a section of Haunui Road drain is planned in the coming month.

OTHER WORKS

NORTHERN ANNUAL SCHEME REPORT

9.42. Each year an Annual Report is prepared outlining the activities, and financial standing of the fourteen schemes in the Northern Area for the previous financial year. Work on the 2015/2016 report is now 25% complete.

THE BIG FIVE

9.43. No update this period

ENGINEERING ADVICE

9.44. During the last two months there has continued to be several requests for advice. Two of these have involved confirming catchment boundaries and information around effluent consent conditions.

9.45. In Ohakune, staff have been working in partnership with Ruapehu District Council and a private land owner to redevelop a section of waterway that was rerouted as a drain many years ago during railway development. The teams vision is to reinstate the drain to as close as possible to a natural stream environment and to enhance the banks with native plantings.

OTHER PROJECTS

MOAWHANGO RIVER

9.46. This year's works programme has concentrated on maintaining the previous clearing work carried out by Wildland Consultants (Rotorua). A total of 13.75km of river has been canoed and the regrowth willow sprayed or basal barked. Much of the work involved some complex health and safety planning for a contractor spending two days in a confined gorge with limited communication options.

MISCELLANEOUS

9.47. The 2015-16 financial year Annual Report for the Northern area is underway with 25% completed. This report gives a record of the activities of each of the fourteen Schemes for the Northern area.

9.48. Currently staff have commenced investigations for preparing an application for a global resource gravel extraction consent for both the Rangitikei River and Tutaenui Stream Schemes. Staff are currently obtaining quotes from a consultant for the preparation of these consent applications.

10. EASTERN AREA

GENERAL

10.1. The late summer to date has continued to be a wet and warm although there have been some short periods of hot weather. The rivers have continued to fluctuate and paddocks have remained wet which has caused some delay to river maintenance repairs and flood damage work, particularly for the Upper Manawatu-Mangahao and Mangatainoka Rivers. On the other hand work programmed for the smaller rivers such as those in the South Eastern Ruahine Streams has been able to be completed ahead of schedule.

10.2. The total rainfall recorded in the Tararua Ranges during the last two months was close to 590mm, recorded at the Upper Mangahao hydro recording site. This is significantly higher than the average of the previous four years which is 233mm for the two months of February and March.

10.3. This period, while primarily undertaking river works, including completing outstanding claimable flood damage works, staff have also been busy managing gravel extraction and attending to non scheme enquiries. Such enquiries include liaising with KiwiRail who have recently commissioned the underpinning of the Ngawapurua Rail Bridge. It is expected that the underpinning will be completed by the end of April. However further, complementary, channel alignment works are planned and a consent application has been granted. KiwiRail are hoping to have all of this work completed this season.

10.4. With Annual Community Catchment meetings about to commence, preparations are well in hand for preparing the presentations for the four scheme meetings in the Eastern area. These include the Akitio Scheme, a combined meeting for the Eastern Manawatu and South East Ruahine Schemes, the Upper Manawatu-Lower Mangahao Scheme and the Mangatainoka Scheme.

Giant Willow Aphid (GWA)

10.5. Last year there were mass infestation levels on most willows, which in some cases killed the willow trees. This year only minor infestation levels have been observed. Reports from around NZ are all similar. Various agents seem to have influenced the population of the GWA and continued studies will give a clearer understanding in time. The combined effects of climate, insect, bird predation and some unknown fungi attack has reduced the GWA population when compared to last year. Wasp numbers, which were a problem last year as they were feeding on the “honey dew’ food from the aphid, have not been replicated this year. It is important to observe the influences and adapt practices to minimize any adverse effects to our planted willow assets. The policy of having at least 20% of planted species other than willow is proving to be a worthwhile resilience strategy.

Buddleia

10.6. This colonizing weed in the braided river channels of this region is being markedly reduced by a recently introduced (Oct 2006) natural predator, the Buddleia Leaf Weevil (Cleopus Japonicus). This weevil is now wide spread throughout NZ.

Old Mans Beard (OMB)

10.7. Willows in the Eastern area are being infested to a greater extent each year with OMB. As yet no natural predator has been introduced that is having a notable effect. More researching work on bio controls is required. Staff have given some resources to cutting and pasting/spraying of OMB as a holding effort, and feedback from ratepayers has been positive for this work. This includes working closely with pest control staff.

AKITIO SCHEME

10.8. The Akitio catchment has had unsettled weather over the last two months, with four rainfall events where the rainfall intensity has varied between 4.5mm and 8mm per hour. The river has settled into a stable condition and ratepayers are comfortable with the way in which the channel has been working.

10.9. This year is another season of reduced works, with no maintenance works being required. Consequently there has been no expenditure. However, staff will continue to undertake inspections to ensure that the situation does not change and ensure that the scheme continues to work as efficiently as possible.

EASTERN MANAWATU SCHEME

10.10. Like the Akitio, the Eastern Manawatu has again remained very settled over the last two months. While no maintenance work has been completed this period, aerial spraying of willow regrowth will commence in early April.

10.11. The scheme is in a good position and with minor clearing and respraying work completed from time to time, and the scheme will continue to head in the right direction.

IHURAUA SCHEME

10.12. During the period, the Ihuraua Stream has had 13km of its channel chemically sprayed. This has ensured that the channel remains clear and free flowing. There is however, some programmed maintenance work over the coming month. This work includes some substantial works to widen the channel in several locations, which was identified in the last audit but was postponed in order to allow a sufficient accumulation of funds to become available.

MANGATAINOKA SCHEME

10.13. February has finally seen the arrival of summer weather and lower river levels, with levels reaching their lowest point since May 2016. The management team have taken full advantage of this with multiple contractors having worked at full pace at various locations throughout the scheme.

10.14. Many of the larger programmed works have now been completed, as well as a variety of other jobs that have arisen due to the consistently high river levels. These are sites that were seen as urgent and were re-prioritized in order to stabilize portions of the river. All of the claimable flood damage sites from the June 2015 flood are either completed or are well underway and will meet the deadline. The total cost is $22k and this will be largely reimbursed by the payout to come from the Ministry of Civil Defence and Emergency Management (MCDEM).

10.15. Over the next month it is proposed to aerial spray vegetation regrowth of the river beaches.

10.16. There have been some enquiries from the public around the silt content of the river in recent weeks. These have been expeditiously addressed by staff with the explanation being that it was a temporary dis-colouration of the water due to bank protection works at the upstream end of the Pahiatua township. The feedback from one member of the public that expressed his concern has been positive.

SOUTH EASTERN RUAHINE SCHEME

10.17. With the majority of the programmed works being completed earlier in the season, there has been a small amount of work completed this period which has included clearing 120m of Mangapapa Stream channel, clearing some debris and repairing a grade control on the

Rokaiwhana Stream, gravel extraction on the Tamaki River along with some cut and paste of Old Man's Beard and chemical spraying of 20km of scheme drains.

10.18. It was reported late last year that survey and design work had been carried out to address a flooding issue near State Highway 2 just south of Woodville. This issue relates to Sinclair's Creek, in part caused by a reduction in channel capacity and exacerbated by the damming effect that the State Highway. At the upper reach of Sinclair's Creek there is a proposal to upgrade a diversion structure which will lesson the discharge of flood flows down Sinclair's Creek and minimize flooding in the lower reaches of the creek near Dodds Road. Along with this will be some channel clearing works to improve the capacity and bring it in line with a 10 year AEP. The proposed activities to achieve this are being priced this season for implementation next season. Productive discussions have been held with several of the property owners along Sinclair's creek about these mitigation works.

10.19. Recently NZTA and their contractors (Higgins) have completed an overlay of SH2 through the flood prone area. As agreed by both NZTA and Horizons staff, a short length of highway near Dodds Road has been left low in order to allow flooding to dissipate.

10.20. I&D staff have been asked to investigate further flooding issues related to the lower Manga-atua Stream; gravel deposition is apparently reducing the flood carrying capacity of the Stream between Davey and Troup Roads. The key questions for this reach are what is the current channel capacity; would further meander cuts downstream of Broomfield Road help mobilise gravel build up, and whether the current stopbank system is sufficient. Remedial work on the lower Manga-Atua Stream could also minimize flooding in Sinclair's Creek.

TAWATAIA - MANGAONE SCHEME

10.21. All eleven scheme drains totalling nearly 15km have been sprayed along with spot spraying of about 3km of willow and weed regrowth on both the Mangaone and Tawataia streams.

10.22. Going forward staff will continue to monitor channel performance and plan next seasons programmed works.

UPPER MANAWATU – LOWER MANGAHAO SCHEME

10.23. After a period of unstable weather conditions during the early summer months, some headway has been made, with the June 2015 claimable flood damage works now being completed for this scheme including six bank protection repair works on the Upper Manawatu River, and three repair works sites on the Lower Mangahao River along with channel clearing work and some layering of willow trees.

10.24. The claimable flood damage repair works have been undertaken utilizing Emergency Reserve funds that were approved last season. This totals $29k, and is to be reimbursed by the payout to come from the Ministry of Civil Defence and Emergency Management (MCDEM) later in the season.

10.25. Going forward, staff will continue to focus on scheme works including the aerial spraying of regrowth of vegetation on the rivers beaches and carrying out of inspections to enable proposed works programmes to be as up to date as possible.

11. SOUTHERN AREA

GENERAL

11.1. A more settled weather pattern for this period has allowed staff to progress work on a number of projects. The settled weather has also allowed some of our spray contractors to

make good progress on the scheme maintenance programs; however we are now finding that because of the warmer weather and damp ground conditions we are seeing very rapid weed growth in the drains.

11.2. Staff have met with representatives from HDC to discuss a number of projects that they have underway including the North East Levin Stormwater discharge, and the construction of a new permanent pumpstation at the end of Stansell's Drain in Shannon.

11.3. Staff met with several members of the Waikawa Beach Community Committee and the Horowhenua District Mayor to look at some coastal erosion that was occurring south of the Waikawa Stream mouth. Heavy storm surges last year have exposed the dune frontage to the elements and ongoing high tides and strong winds are continuing to erode the dune back towards beachside properties. Staff have arranged for a representative from our land management team to visit the property affected to provide some advice around planting options.

11.4. Staff attended a meeting with some of our freshwater team and representatives from Dairy NZ, Landcare, Federated Farms and members of the local Iwi to discuss a possible joint venture to improve the water quality within the Waikawa and Manakau Stream catchment.

OHAU-MANAKAU SCHEME

11.5. This period started off wet with a flood event on the 3 February, resulting in a 50m breach of the Ohau stopbank at Burnell's.

11.6. The highest recorded flood levels this period were the Ohau at 2.7m (263m³/s), Waikawa 1.7m (97m³/s) and Manakau 2.2m (21.5m³/s).

11.7. In 2008 Horizons presented a proposal to the scheme ratepayers for an upgrade of the Scheme stopbanks that would achieve a 20 year Return Period standard of flood protection. The proposal also included upgrading several culverts and drop gate structure as well as the lowering of the berm around Catley and Burnells bends. The estimate for the upgrade was around $2.7m with works spread over a two year period. Objections from the affected landowners saw the scope of the project reduced significantly with the budget being dropped to $700k with work to be completed over a three year period.

11.8. Over the next four years 4.5km of stopbank was upgraded to a sub-20 year RP standard (no freeboard) plus the construction of two new drop structures and the extension of the existing drop structure. This left approximately 6km of stopbank well below the 20 year RP standard.

11.9. The February event saw approximately 600m of stopbank over topped on the left bank and a further 300m of bank on the right bank all of which had not been upgraded during the earlier upgrade program. Those banks upgraded during the earlier program had on average 0.5m margin between the flood peak and the stopbank crest.

11.10. The overtopping of the right bank resulted in a significant failure of the bank with approximately 50m of bank being eroded down to ground level. The failure resulted in significant flooding of surrounding farm land and roads and at least one residential property being flooded. Temporary repairs to the breach were completed within a week of the failure and a permenant repair is expected to start in early April.

11.11. The February flood resulted in significant damage not only to the stopbank but to existing protection works along the Ohau River and Waikawa and Manakau Streams. The estimated cost of all of the damage is approximately $180k. While it is unlikely that there will be time in this current financial period to complete all of the repair work it is expected that we can complete some of the more significant repairs including to the stopbank. To achieve this, the scheme will need to increase its works budget by a further $120k by taking the funds out of the Emergency Reserve Fund. This increase will allow the scheme, if approved; to undertake the repairs and complete its annual maintenance program.

11.12. Gravel was removed from the confluence of the Manakau and the Waikawa streams. The build-up was causing the Manakau to back up and not let water out of the surrounding drains. The gravel was stockpiled to the side for the landowner to utilise.

11.13. A floodgated culvert that was in the tide at Tahamata on the Ohau River was reconstructed. This floodgate was previously not a scheme asset but due to it being in a scheme stopbank and of poor repair it needed attention; at the request of the landowner it was decided it needed to be in the scheme. The landowner is paying half the cost of the reconstruction and the scheme will take on the future maintenance.

11.14. Following the flood at the start of the period, a large section of erosion occurred downstream of the Ohau Bridge at Tahamata. The work to repair this will be completed by the end of this period which will be by laying concrete riprap, backfilling and the planting of willows sourced from nearby.

MANAWATU DRAINAGE SCHEME

11.15. Along Tockers Drain, willows were removed from the edge of the drain and the drain machine cleaned through Kathy Buchanan's property.

11.16. A large washout occurred along a section of Whiskey Creek, where a 50m section of land was lost on Timmons property. Concrete blocks and railway irons were used to reinstate the bank with subsoil drainage lines installed before the site was reinstated.

11.17. A 1km section of McCullock's drain has been machine cleaned.

11.18. Along Cloverlea Road drain, trees had become overgrown and therefore blocking the channel. The trees were removed along the fence line and the fence reinstated. The culvert leading into this drain was replaced.

11.19. Burkes drain has been machine cleaned for a 5km length to remove the large blocks of weed that had formed. A new 600mm culvert has been installed through the Burkes drain in Hockley's property to allow for more drainage of his property.

11.20. Along a 2km section of the Aorangi No 1 drain, Pampas grass and weed blocks have been removed from the drain. They had been holding up the water flow from Hockley's property until the drain meets up with the Burkes drain.

11.21. A new 700mm culvert was installed along Oroua Road to increase the capacity of water flow through an access way culvert.

11.22. This period has seen approximately 72km of scheme drains sprayed.

MAKERUA DRAINAGE SCHEME

11.23. Donnelly's Pumpstation has had a new roof fitted with hatches installed to ensure easy access to the pump when they need pulling for maintenance. The number one pump has also been reinstalled after being out for servicing.

11.24. At Bernie Coombs Pumpstation a new concrete block and winch was fitted to the main outlet floodgate.

11.25. A section of the left bank of Rowlands stopbank was dismantled and stumps removed then the stopbank was reinstated and compacted with roller.

11.26. Several scheme drains along side SH56 through the Opiki Basin are being machine cleaned.

11.27. Machinery was also used within the scheme to remove several weed blockages within scheme drains caused by weed being washed down the drains and catching on culverts.

11.28. This period has seen approximately 12km of scheme drains with submergent weeds in them being sprayed.

KOPUTAROA DRAINAGE SCHEME

11.29. Kane's spillway no.1 floodgated culvert was reconstructed and lengthened due to poor pipe alignment and the headwall collapsing. Following on from the CCTV work of inspecting the scheme's floodgated culverts this culvert was found to have pipes that were poorly aligned. The headwall was also in poor condition making full replacement the best option, also allowing it to be lengthened to allow better alignment with the stopbank.

11.30. The floodgated culvert at the end of the B11 drain has been extended by placing an extra pipe on the end. This work now allows machinery to get passed easier by improving the track alignment at the toe of the stopbank. This work was necessary so that work could be carried out at Kane's spillway no.1 and no.2 floodgates.

11.31. Modifications to the surge chamber at Koputaroa No.3 pump station has seen the standing pipe removed and replaced with a pressure hatch. During the hazard review of the pumpstations the standing pipe was classified as a potential hazard. For work to be undertaken within the surge chamber, extensive scaffolding and a working platform would have to be erected before staff could entre the confined space within the surge chamber.

11.32. Rather than go to this expense a decision was made to remove the stand pipe and replace it with a hatch. This would make it easier to provide a safe environment for staff to enter into the surge chamber. The new hatch has been imported from Australia and will completely seal the surge chamber preventing landowners from entering the chamber whilst allowing the pumps to continue to operate against the head of the Manawatu River.

11.33. This period has seen approximately 8.7km of drains machine cleaned and a further 24.2km of drains sprayed.

MOUTOA DRAINAGE SCHEME

11.34. Works undertaken to improve the safety around both Cooks and Diagonal Pumpstation as well as ongoing costs to operate the Scheme pumps during this wet year, have significantly exceeded the original budget. As a result, for the scheme to complete its annual maintenance program it will require the current budget to be increased by $30k. Funding for this increased expenditure, if approved, will need to come from the scheme's emergency reserve fund.

11.35. This period saw the Diagonal pump station get a new weed screen installed. This screen has been waiting since last financial year to be put in due to budget constraints and poor weather conditions. However increasing gaps in the existing screen made it impossible to defer any longer; screen aperture is in accordance with the manufacturer's specifications and gaps larger than that risks allowing objects through that the pump cannot pass, potentially damaging the pumps. The station was required to be de-watered and an inspection of the pump chamber was also carried out.

11.36. The weed fence at the Pleuger pump station was repaired. Holes have been developing in the fence that retains large amounts of weed from floating down the drain and directly into the pump station. New mesh was rolled out and hung onto the old mesh with weights to hold it in the water. There are still some small holes at the end of the fence which will be repaired in the near future.

TE KAWAU DRAINAGE SCHEME

11.37. Floodgated culvert S26 has been replaced with a new 450mm diameter floodgated culvert.

11.38. This period has seen approximately 32km of scheme drains sprayed with herbicides.

HOKIO CATCHMENT DRAINAGE SCHEME

11.39. This period has seen the fish-pass to Lake Horowhenua weir constructed. This work is part of the wider enhancement project and is funded through the Horizons freshwater team. The fish-pass is 3m wide and enables fish to bypass the weir even when the stream levels are low.

11.40. The contract for the construction of the Sediment Trap which will be situated alongside the Arawhata Drain just upstream of Lake Horowhenua has been awarded to AG Gibson Ltd. A blessing of the site by the Tangata Tiaki and members of the local iwi will occur on the 3 April prior to works commencing later that week.

11.41. During this period a portion of the Kimberly drain was widened and deepened. This was done to tie in the existing drain with the culvert under Bruce Rd that was upgraded last year.

11.42. A section of Joblins drain on Kane's property was widened along with the reconstruction of a culvert. This work was done as part of the wider Hokio drainage scheme upgrade and will allow a greater volume of water to flow into the Arawhata stream.

HIMATANGI DRAINAGE SCHEME

11.43. This period has seen approximately 12km of scheme drains sprayed.

12. ENVIRONMENTAL GRANT WORK

Name	River	Description	Application Status	Estimated Cost	Expected Subsidy Cost	Work Status
N Randell	Tutaenui Stream	Bank Protection work	Approved	$7,000	$2,100	Approved May 2016 - All work completed. Yet to be invoiced (2015-16 Carry over)
Rangitikei DC & Redmayne	Makirikiri Stream	Construct Flood Gate Egress Structure	Approved	$125,000	$37,500	Approved - Construction near completion (2015-16 Carry over)
C McConachy	Tributary of Porewa Stream	Bank Protection & channel clearing work	Completed & Paid	$4,000	$1,046.25	Completed & Paid
G Waller	Taringamotu River	Bank Protection & diversion work	Completed & Paid	$27,000	$7,471.20	Completed & Paid
Whenuatupu Ohinemoa Trust	Ohinemoa Stream	Willow Clearing work 525m	Completed & Paid	$33,000	$9,900	Completed but work yet to be invoiced.
Ruapehu District Council	Makotuku River	Removal of 2.3km of willow congestion	Approved	$45,000	$13,500	Approved and work yet to commence

Robb	Mangamaiti & Mangaetoroa Streams	Removal of willow congestion	Approved	$34,050	$10,215	Application approved - 1st year of 3 year programme - Work in progress
N Kelland	Ongarue River	Remove poplars from river banks	Application being prepared	$10,000	$3,000	Application being prepared
Walker & McKean	Mangawharariki Stream	Bank Erosion Works	Approved	$27,000	$8,100	Application Approved. Resource consent application prepared. RC yet to be granted before work can commence.
D Smith	Tutaenui Stream	Bank Protection work	Application being prepared	$12,000	$3,600	Property owner has put Job on hold at present
R Redmayne	Mangatikotoko Stream	Construct concrete weir & timber retaining wall at Tunnel Hill flume	Application being prepared	$18,000	$5,400	
J Patel	Tutaenui Stream	Rock lining bank protection work	Application being prepared	$45,000	$13,500	Discussing design with Consultants
R Lee	Urban drain	Repair flood damage bank erosion	Application being prepared	$10,000	$3,000	
J Allen - Kauangaroa Marae	Whangaehu River	Ring Bank Flood Protection	Application being prepared	$90,175	$27,053	Iwi Funding becoming highly possible
Marton Motel	Tutaenui Stream	Rock Lining Bank Protection Work	Application being prepared	$20,000	$6,000	Client to get independent design
K Black	Oroua River	Black - Repair Bank Erosion	Work Cancelled	$13,000	$3,900	Work Not Proceeding
M Carte	Mangataua Stream	Removal of 3km willow congestion	Work Cancelled	$33,000	$9,900	Work Not Proceeding - withdrew application
S Glasgow	Kahurauponga Creek	Channel willow clearing Work	Work Cancelled	$11,000	$3,300	Work Not Proceeding
Richard Redmayne	Mangatikotoko Stream	Weir repairs and bed control structure at Tunnel Hill	Approved	11,490	3,447	Approved
M Short	Tapuata Stream	Rock Lining	Work completed and paid	$8,000	$2,088	Finished off and invoice paid.

K Norman	Mangahao River	R&R Groynes, Planting	Proposed Work	$5,000	$1,500	To be investigated
Hooper-Smith	Mangatoro Stream	TBPW, Mulching	Approved	$8,000	$3,715	Grant Approved, Works currently in progress
G Bennett	Upper Mangahao River	TBPW, RipRap and Planting	Approved	$23,691	$7,107	Application approved
RDA	Mangaramarama Stream	Stopbank	Proposed Work	$5,000	$1,500	To be investigated
PNCC	Manawatu River	Bank Protection - Rock Riprap, Rope and Rail Groynes and Tied Tree Work	Approved	$258,100	$80,000	Application approved
Lahmert Rock Lining	Tokomaru River	Rock Lining - cut diversion chanel , use gravels to set up batter-slope, construct new rock lining	Approved	$75,000	$22,500	Application approved
TOTAL (All Items Listed)				**$958,506**	**$290,343**	

13. SIGNIFICANCE

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

Ramon Strong
GROUP MANAGER RIVER MANAGEMENT

ANNEXES

There are no attachments to this report.