

Report No.	19-198
Information Only - No Decision Required	

RIVER AND DRAINAGE ENGINEERING REPORT

1. PURPOSE

- 1.1. The purpose of this item is to report on progress with river and drainage activities for the period September to November 2019.

2. RECOMMENDATION

That the Committee recommends that Council:

- a. receives the information contained in Report No. 19-198.

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 2018-28 **Long-term Plan (LTP)**; is covered by an approved carry-forward of unexpended budget from the 2018-19 financial year; or additional approval will be specifically sought by way of recommendation in the item.

4. SIGNIFICANT BUSINESS RISK IMPACT

- 4.1. There are no significant risks relating to the adoption of the recommendations contained in this report.

5. DISCUSSION

- 5.1. Resourcing has been a particular focus over the period; the development of key projects and the balancing of the associated staffing requirements. A particular pinch point exists within the Marton-based Northern Team - staff changes coinciding with an increased workload. That relates not only to the introduction of new schemes (Ruapehu district-wide and Ohakune) and the associated consenting challenges but also the development of a much-needed management strategy for the Rangitikei Scheme.
- 5.2. As noted over the course of the year, considerable effort has also been applied to endeavoring to secure **Provincial Growth Fund (PGF)** assistance for repairs to the training structures at the mouth of the Whanganui River, committing Council to an enlarged / accelerated work programme that adds to those resourcing pressures.
- 5.3. A range of fairly creative solutions have been applied to date, juggling the resources within the Group and leaning more heavily on consultant secondments, arrangements that present their own set of challenges. Staff are also exploring with Whanganui District Council staff what elements of resourcing relating to the Port Revitalisation / river training structures work can be shared to enhance efficiencies.

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- 5.4. Those resourcing pressures are beginning to create a something of a bow-wave in other areas, evident with the delays to the programme of scheme reviews and the production of **Operations and Maintenance (O&M)** Manuals. Implementation of the new asset management system has added to those pressures, although the demands on staff will reduce through 2020 as the new system becomes embedded, with a net efficiency beyond as we manage our assets in a more systematic fashion.
- 5.5. Advancing the Whanganui river training structures work remains something of a balancing act; progressing key elements without making commitments in advance of a central government decision on financial assistance through the PGF. There are considerable complexities to the consents / approvals required for this project other than those that are RMA-related; the 2017 Te Awa Tupua statute, the 2011 Marine and Coastal Area Act and the Heritage New Zealand Pouhere Taonga Act 2014.
- 5.6. 2020 will also be a notable milestone for another significant river management project – the completion of the Rural Upgrade Project. Staff have been undertaking some preliminary planning with the Communications Team around arrangements to fittingly celebrate this achievement, likely to take place in April / May of next year.
- 5.7. Initiatives to reduce the flood hazard risk for Foxton continue to progress; the issues / options report is currently being finalized by engineering consultant E2 Environmental. As noted previously inputs included reviewing both the 2019-20 Annual Plan and 2018-28 LTP submissions that referenced the proposals for Foxton and offered alternatives, as well as meeting with the Chair of the Foxton Community Board and others with views on what the best mitigation approach for the town might look like.
- 5.8. It seems likely that the mitigation approach for the town will move away from a Cook Street relief pipeline and toward a suite of measures that improve / strengthen flood flow conveyance in Kings Canal and divert floodwater further south and into Horizons Whirokino Drainage Scheme. Although that's likely to cost more than the original proposal the required pumping will improve levels of service for the Whirokino Scheme and accordingly enable costs to be shared more widely. My gut feel at this stage is that the targeted rate revenue requirement from the Foxton East Scheme will be broadly similar to the LTP provision already made although clearly consultation with Whirokino Scheme ratepayers will be required.
- 5.9. Updating members on matters relating to insurance discussed earlier in the year (28 May workshop), our insurer AON has confirmed premium increases larger than those budgeted and has reiterated the various market pressures that suggest further increases. A full revaluation of River Management assets is planned for 2020, likely to add further cost pressure.
- 5.10. Work to better quantify the level of exposure of stopbanks, dams, drains and pump stations to earthquake damage is progressing, building on the AON-funded Tonkin and Taylor work undertaken earlier in the calendar year. Crown Research Institute GNS Science are currently reviewing the Tonkin and Taylor work and I expect to have an offer of service from them early in the New Year for a comprehensive damage assessment. That work is unbudgeted and will therefore require Council approval to proceed.
- 5.11. Preparatory work continues on the update of the 30 year Infrastructure Strategy, a Local Government Act requirement that accompanies the update of the LTP. Policy staff have facilitated sessions with River Management staff groups with that work currently being summarised and next steps mapped. I've discussed the concept of a combined staff workshop with Hawkes Bay Regional Council, a process that I think will add value for both parties.

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- 5.12. For the benefit of the new members, the current Infrastructure Strategy identifies four significant issues for River Management activity; climate change, sedimentation effects on levels of service (reduction in flood flow conveyance due to sediment deposition on berms), operational reliability and population growth (the potential for that to increase operating risks). The response strategies for each issue differ, with the first two in particular linking to wider organisational initiatives. A copy of the Infrastructure Strategy can be found in Section 8 of the current Long-term Plan.
- 5.13. In October Investigations and Design Manager Jon Bell and I attended the NZSOLD/ANCOLD (Engineering New Zealand technical group relating to large dams and its Australian equivalent) Resilient Dams and Levees for Resilient Communities conference in Auckland. The joint NZSOLD/ANCOLD conference takes place in New Zealand every six years and brings together a wide array of practitioners both nationally and internationally.
- 5.14. Notwithstanding the large number of dams (54) that Council owns, the levees component was a welcome addition although somewhat disappointingly not widely supported (in the form of attendance) by the regional sector other than Horizons and Waikato Regional Council. One of the key note speakers for the conference was Elena Sossenkina, a US levees engineer and the Chair of the ICOLD (International Commission) technical committee on levees.
- 5.15. To some degree the genesis for the proposed regulatory framework for dams in New Zealand (other than the 1997 Opuha dam failure) is the technical committee work undertaken by ICOLD. It is likely that the work headed by Elena will ultimately lead to a more structured regulatory framework for stopbanks, a trend already evident in some parts of Australia.
- 5.16. I met with Elena during the conference to discuss the different approaches to levee / stopbank management in the US and New Zealand and to understand her general approach / direction. The meeting was a very productive one and gave me some comfort around where the work of the technical committee might lead; it also looks likely to be a foundation for closer ties between New Zealand practitioners and the US Army Corps of Engineers, who maintain much of the levee network in the US.
- 5.17. Other staffing matters of note; Gerry Linklater has been promoted from Works Supervisor to Engineering Officer within the Northern Team, replacing Daniel MacKay. A new Northern Team Works Supervisor is likely to be appointed shortly. A second round of recruitment for the position of Operations Manager has been undertaken, with an appointment also likely to be announced shortly.
- 5.18. Finally I'd like to acknowledge the efforts of Customer Services staff with the rates invoicing for the current financial year. The size of the river management activity and the complexity of many of the scheme targeted rate classifications make this a challenging task, with new initiatives like flood protection for Foxton adding to the number of enquiries received. Receipt of rating invoices generates a level of engagement much larger than the various initiatives run through Annual / Long-term Plan processes – Customer Services staff have done a sterling job in providing context around the drivers for what are sizeable rate increases for the town and adjoining farmland.

6. INVESTIGATIONS AND DESIGN

- 6.1. During this reporting period Julia Jung has joined the Investigations and Design Team as Design Engineer. Julia has a background in civil engineering and her addition builds the team's capability and capacity particularly in hydraulic modelling.
- 6.2. The team has also welcomed Dani Thompson who has joined us as a River Management Assistant over her summer break from the University of Canterbury, where she is studying Natural Resources Engineering.
- 6.3. The Investigations and Design Team has a large and complex programme of works for delivery this financial year. As well as a programme of Scheme and classification reviews, there are also a number of design tasks that are required to support the Area River Management Teams. The following summarises the work that the team has undertaken during this reporting period.

LMS – APPLICATION OF DAM SAFETY GUIDELINES TO PALMERSTON NORTH STOPBANKING

- 6.4. Consultants Tonkin and Taylor have completed the work on the assessment of the stopbanks through Palmerston North. Following on from this work staff have begun considering its recommendations to develop a programme of investigative works that are required as part of a robust inspection and maintenance regime. The development of this programme will be facilitated by a workshop involving staff from the Investigations and Design Team, as well as the Central Area Team and Tonkin and Taylor.

SEDIMENTATION IN THE LOWER MANAWATŪ AND OROUA RIVERS

- 6.5. In partnership with both the Science and Innovation and Land Management Teams, work has begun to develop a Sedimentation Response Strategy for the long term management of sediment in the Lower Manawatu and Oroua Rivers. To inform this strategy the first of a series of workshops, with internal and external stakeholders, has been held. The workshop looked at the findings of the sedimentation study that was recently undertaken by consultants Tonkin and Taylor, and considered the potential opportunities and challenges associated with the recommendations contained in that report.
- 6.6. The objectives of this work are to develop a suite of tools and interventions that may be implemented over the coming years to help address the issues associated with long term siltation in the lower reaches of the rivers.

KOPUTAROA SCHEME REVIEW

- 6.7. Staff have continued work on this Scheme Review primarily looking at how the Scheme will need to function to meet changing and evolving expectations and demands over the coming years. These challenges include those driven by changing community expectations in terms of environmental management as well as those related to the predicted economic growth in the Horowhenua District.
- 6.8. Work on this review has been slow over the past couple of months, however, consultation with local Iwi groups has continued. It is anticipated that a draft of the report will be completed this calendar year with a view to informing the programmed Scheme Classification Review.

POHANGINA GRAVEL RESOURCE

- 6.9. Work on the Pohangina River Gravel Resource Study has begun with much of the data assimilation and cleansing now complete. This will enable a full analysis of the data to be undertaken with a view to completing the study early in the New Year.
- 6.10. Understanding the gravel resource in the Pohangina River has been given increased urgency by the demand pressure being applied, mainly relating to the major roading projects planned / underway throughout the region and the Lower North Island.

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REID LINE FLOODWAY

- 6.11. Technical work relating to the inundation extents associated with the Reid Line Floodway has been completed. A summary of this work and a project update are provided in a separate report.

ASSET MANAGEMENT

- 6.12. During this reporting period staff have been working closely with the Finance Team and an external Peer Reviewer to deliver (in effect) a full revaluation of Horizons Infrastructural Assets to inform the Annual Report.
- 6.13. Following recommendations from the peer review, staff have begun to look at the revaluation processes and are looking to engage a consultant to review the methodologies to ensure that Horizons asset valuations are suitably robust.
- 6.14. Staff have also been heavily involved with the migration of Horizons asset management data to the new AMIS. In addition to inputting river management data to AMIS staff have also been involved in the user acceptance testing of mobile and desktop applications, compiling feed-back, and working through revaluation and depreciation processes.

HAZARD MAPPING – UPPER MANGAONE & EAST OF LEVIN MODELLING

- 6.15. The modelling work is being done as part of the cross-organisational Hazard Mapping Project. Jacobs have been engaged to undertake this work, which will provide modelled information about the flood Hazard in these two areas.
- 6.16. Staff have been working with the consultants, and with Horizons Survey and Information Management Teams, to acquire the data necessary to build the models. This has involved the collection of additional survey information to both verify LiDAR elevation data as well as to be able to adequately describe bridges, culverts and other structures that may influence flood extents.

ARAWHATA STREAM & HOKIO DRAINAGE NETWORK STUDY

- 6.17. This project is looking at the Hokio Drainage network with a view to both increasing the level of service as well as seeking opportunities to reduce the sediment load in the drains that eventually flow into Lake Horowhenua. This project is again cross-organisational, primarily between the River Management and Natural Resources and Partnerships Groups.
- 6.18. A contract to undertake the work has been let to consultants Tonkin and Taylor. An initial project meeting was held to fully describe the issues to the consultants who have begun to assess the information held by Horizons. This review of information will enable them to undertake a gap analysis to identify areas where additional information may need to be gathered to support the development of a robust plan for the drainage network.

MANAWATU DRAINAGE SCHEME MODELLING

- 6.19. Following an interactive tender process staff have worked with three consultants to develop a **Request For Proposal (RFP)** that has now been issued to those consultants. Responses are due shortly to allow the contract to be awarded and work to begin before Christmas.

LOWER KIWITEA OPERATIONS AND MAINTENANCE MANUAL

- 6.20. Work has begun to develop an (O&M) Manual for the Lower Kiwitea Scheme. This work is being carried out alongside the Central Area Team to produce a document that captures the practical knowledge and experience of Scheme Operations, along with the statutory and regulatory requirements that influence operational activity.

REGULATORY ADVICE

6.21. 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.

LOWER MANAWATU SCHEME RURAL FLOOD PROTECTION UPGRADE PROJECT

6.22. This reporting period has been a busy time for staff involved with the delivery of the **Rural Upgrade Project (RUP)**. A number of the larger contracts remaining in the programme have been tendered, and contracts have been awarded. In addition to working on contracts and procurement of contractors, the start of the summer construction period has seen the start of physical works.

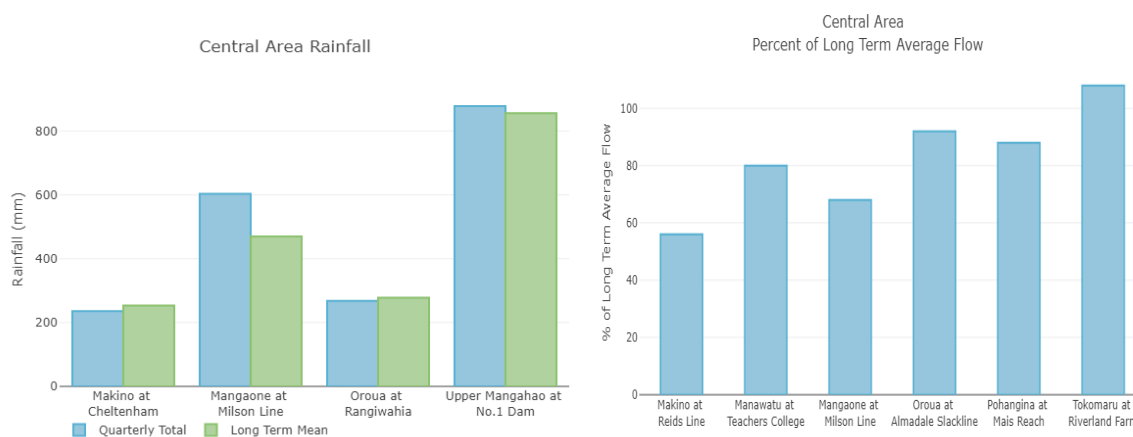
6.23. The largest single project remaining in the RUP is the construction of new flood defences on the true left bank of the Oroua River upstream of Awahuri. Over this reporting period staff focus has been on ensuring that all of the necessary permissions under the Soil Conservation River Control Act, as well as Archaeological Authorities, are now in place, to ensure that this important work can be completed this summer. The contractor engaged to build the stopbanks, Stringfellow Contracts Limited, has begun work.

6.24. Works on the Tokomaru River Stopbank Upgrade works began in late November and are also progressing well.

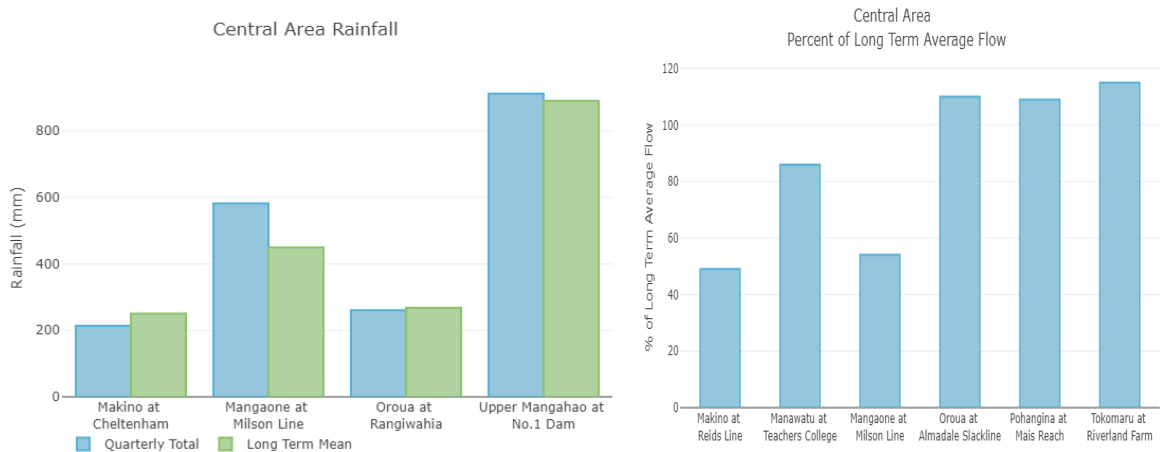
6.25. As well as the larger projects, there are also a number of smaller projects relating to the provision of flood protection to individual properties in the Taonui Basin that are programmed for delivery this financial year. The raising of a house has now been completed, and the construction of a bund around another house is currently out to tender.

7. CENTRAL

7.1. September Rainfall/Flow



7.2. **October Rainfall/Flow**



- 7.3. This reporting period has seen unsettled weather with an occasional fresh but no significant flows. Frequent rain events have provided good establishment conditions for new willow pole plantings, however this did contribute to the late start with access difficulties due to sodden ground conditions.
- 7.4. The total rainfall for this period (1 September 2019 to 18 November 2019) was: 182mm at Milson Line on the Mangaone; 230mm at Cheltenham; Makino; 349mm at Scott’s Road, Kahuterawa; and 432mm at Rangiwhia, Oroua.
- 7.5. The Manawatu River, at Teachers’ College, reached just over 3.0m on two occasions on the 6 and 23 October (Opiki Floodway underwater at 4.2m). The Oroua River at Kopane peaked on the 16 October at 5.4m (Oroua Flood Action Plan is initiated at 6m). The Mangaone Stream, at Milson Line peaked on the 6 October 1.7m (Mangaone Stream tip gates operate at 4.3m). The Makino Stream at Reid’s Line peaked on the 5 October at 0.9m (Makino Flood Action Plan is instigated at 1.5m). The Tokomaru at Riverland Farm peaked on the 17 November at 2.6m during heavy rain events over the southern parts of the Scheme.
- 7.6. A successful 2019 willow pole planting season has drawn to a close. After a slow start due to unsettled weather impacting on ground conditions and access, multiple sites have been planted with approximately 7000 poles being put in the ground across the Scheme. Live vegetation provides a first line of protection against river erosion and although it requires regular maintenance and can easily be damaged in a flood, it provides a cost effective asset when compared to other ‘harder’ bank protection options such as rock and concrete riprap.
- 7.7. The **River Asset and Amenity Partnership (RAAP)** meetings between Scheme staff and **Palmerston North City Council (PNCC)** are continuing, with the next scheduled for late November. These meetings provide a valuable opportunity for staff of both councils to stay up to date with activities planned for the city area, particularly those happening in and around the river corridors. They provide opportunity to meet with different staff members and build effective working relationships to assist both councils in undertaking their work successfully.
- 7.8. An internally run sedimentation workshop was held in October and attended by River Management and other staff to share and explore different issues faced in the Lower Manawatu Catchment, and attempt to propose solutions that could be considered. This was a good chance to work with different teams from within Horizons, share viewpoints of

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the works carried out by each part of the organisation; and what impacts these have on the work and scope of other teams and the catchment as a whole.

- 7.9. A series of infrastructure strategy workshops were held in all River Management team areas. The main challenges for the Central area are urban growth, robustness of flood protection assets, the renewal and replacement of aging infrastructure and climate change. The incorporation of recreational amenity and access to the river, together with opportunities to improve habitat values and biodiversity in rural areas, was an overarching theme that underwrites all challenges in the Central area.
- 7.10. Staff also assisted with an event organised and run by students of St Peters College, and attended by several schools from around the area. The event was designed to encourage and inspire more girls to pursue Science Technology Engineering and Maths (STEM) subjects. Staff set up a river table, kindly lent by Massey University, for the students to interact with and explore river behaviours, as well as different types of influences that people and structures can have on these systems.
- 7.11. Enquires have been made by **Historic Places Manawatu-Horowhenua (HPMH)** around undertaking maintenance or restoration of the Historic Tane Hemp Company Limited Suspension Bridge, near Opiki. Staff met with HPMH early last year to discuss this same issue and repeated previous responses that a contribution from the Lower Manawatu Scheme is beyond the scheme's mandate.
- 7.12. It was suggested at the time that HPMH meet with the relevant constituency councilors to discuss ways in which Horizons could assist and / or put in a submission to the LTP for funding to go towards development of a long term strategy for the structures preservation.

LOWER MANAWATU SCHEME

- 7.13. Works undertaken on the various rivers within the Scheme this period include the following:

MANAWATU RIVER

- 7.14. The annual inspections of Scheme assets was undertaken and the overall asset condition was generally fairly good. A number of erosion sites have however opened up over the winter, and a larger than usual planting programme has been implemented. Conversely, the spray programme that keeps the vegetation off the inside of the bends has not been as successful as in previous years, and will be stepped up this year to ensure that these bends are kept free of weeds and other colonizing vegetation.
- 7.15. Additional planting was completed between the rock groynes on the Manawatu River at the Ashhurst Domain. Inspections show that the top rock groyne is working hard and providing good protection to the domain, while the tied tree works upstream on the Manawatu remain effective in deflecting the flow away from the bank. Additional work including further tied tree groynes are planned for when river levels are lower, and rock is slowly being stockpiled in the meantime to repair the top groyne.
- 7.16. Engineers have continued maintenance tasks along the Moutoa floodway, and around the Moutoa Sluice Gates and Tower, including the scheduled general running checks and inspections. The six-monthly Moutoa Sluice Gates Electrical WOF was carried out in September. The rural stopbank mowing program has recommenced with over 100km being mown this period as conditions have improved and vegetation is enjoying the glimpses of warmer weather.
- 7.17. The willow mulching and vegetation maintenance programme has continued along the lower reaches of the Manawatu River, from the Koputaroa Pump Station 3, downstream

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past the Aratangata Drain to the boundary between the Kernahan and Guy properties. This work involves the layering and / or mulching of the existing willows to control their size while maintaining a strong root structure. This live vegetation provides cost efficient bank stability and is the first line of protection against river edge erosion.

- 7.18. Supplementary maintenance and repair works were undertaken at some sites during the programmed mulching. These included fence removal, repairs and reinstatement, berm and stopbank vegetation removal, pole planting, minor stopbank repairs and the hard facing of ramps. Three erosion sites on the Kernahan property were repaired using concrete rip rap material.
- 7.19. High flow channels that were created at several sites earlier in the year worked well overall throughout the winter months. These high flow channels were shaped across several gravel beaches that are building up on the inside bend. Widening beaches increase the pressure on the opposite riverbank causing extensive areas of erosion. The high flow channels allow freshes and floods to cross the beach, reducing bank erosion.
- 7.20. Works to replace the Whirokino Trestle Bridge are nearing completion. The major structural elements of the bridge have been installed and the temporary bridge across the Manawatu has been removed. The contractor has not finalised the methodology for removing the existing bridge across the Manawatu, but believes it is unlikely that a temporary bridge will be built, preferring the option of working from the river edge.
- 7.21. The removal of the existing bridge is programmed for mid-February to the end of April, which may restrict river movements at this point during this period. The road to the Whirokino boat ramp is being sealed, and this work will continue through January. The contractor will keep access to the Whirokino boat ramp open at all times during the works. The works in the Moutoa spillway are expected to be finished by the end of April. The bridge is expected to be open to traffic in January.
- 7.22. The eel viewing platform at the Tiritea Stream and Manawatu River confluence has been granted a resource consent and works will commence in the New Year. This is part of the He Ara Kotahi walkway and will provide an additional river amenity enhancement in the city.
- 7.23. PNCC has had their consent provisionally granted for the parking of campervans at Ahimate Park overnight. Scheme staff have worked with PNCC throughout the development of this area, through vegetation clearance and advice, and have enjoyed seeing its transformation. Staff will be working with PNCC in the final stages of this, to ensure the proposed flood contingency plan is appropriate and achievable.
- 7.24. Scheme staff have been involved in the early planning stages of restoring the Awapuni Quarry site in the city, which will involve PNCC importing topsoil and drawing up a native tree planting plan. To understand whether the site is contaminated either by activities on the berm or by leachate from the landfill site, PNCC have undertaken testing of water quality in the ponds.
- 7.25. Somewhat surprisingly native fish were found in the ponds in the quarry. The site is on the inside of a bend and it is important to allow flood flows to cross this berm to reduce the pressure on the cliff on the true left bank, which is owned by **New Zealand Defence Force (NZDF)**. The NZDF have a road at the top of the cliff at this location and are concerned that the cliff is showing signs of erosion. Scheme staff have provided some historical cross-sections that show the bank is relatively stable, but demonstrates the importance of keeping the inside bends relatively clear of vegetation.

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- 7.26. A meeting with TMI Rangitāne was held to discuss the proposed works programme, planned gravel extraction for river management purposes and opportunities for native tree planting and stream enhancements for the year.
- 7.27. A submission of support has been made to PNCC in regard to their proposal to undertake a land swap with the **Manawatu Golf Club (MGC)**. The proposed swap is to tidy up the boundary issues that have given rise to the 16th tee to be located on council reserve land and a section of the river pathway to be on MGC land. The swap will clarify responsibilities in the area, to enable both PNCC and Horizons to manage and develop their respective assets with a little more certainty.
- 7.28. There have been several other activities that have occurred within the city reaches this reporting period that have involved PNCC and Horizons collaboration in some way. These include staff having met with PNCC to discuss heavy vehicle crossing requirements along sections of He Ara Kotahi, which are planned to be upgraded from limestone to asphalt in the coming year, and a new toilet block near the pedestrian bridge being constructed, with Scheme staff sign off as to location.
- 7.29. The planting of wild flowers along some of the cities open spaces is being trialled by PNCC this year; area of scheme interest is a section of berm land and stopbank batter at the downstream end of Waterloo Park. In general Scheme staff appreciate, and are supportive of, any efforts to improve the biodiversity and aesthetics of the cities river corridor, however there are some concerns around stopbank vegetation coverage and its ongoing robustness if wildflowers are introduced to the current tried and true clover / rye mixture. Good grass cover is essential for stopbanks to resist scour in flood. Frequent monitoring of the trial areas will be undertaken before support for further wild flower plantings along more of the city's flood protection infrastructure will be provided.
- 7.30. A section of willows at the end of Whitmore Road, near Linton, have been mulched along with the adjacent berm land. The maintenance of this section of protection planting was moved up the priority list to assist Horizons Freshwater Team, and was extremely well timed with contractor availability. The local land owner had approached Freshwater wanting to plant the significant area of gorse and blackberry with natives. Freshwater Team hope to assist with providing native plants in approximately two years' time, once the land owner has the weeds under control. Now that the Scheme has heavily mulched the area, the landowner will have a much better prospect of undertaking this task.
- 7.31. A drone flight over a section of the Turitea, through Massey Farms, was arranged by Scheme staff to assist in creating a plan for clearing and planting the reach, in partnership with the Freshwater Team. The proposal that will be developed will then be taken to Green Corridors and Massey to assist in creating an overall native tree planting plan for the reach going forward.
- 7.32. A short section of stopbank at the AgResearch facility at Massey has been added to the mowing programme. The berm area between the kindergarten and the main road was planted in natives a few years ago and has removed the option of grazing the area. Grass had become rank but has now been mown with a plan to remove remaining tree stumps along the section in the future.
- 7.33. A comprehensive inspection of the secondary stopbank along Ruamahanga Crescent is scheduled for November. Over 75 property owners have been contacted and advised of the inspection. The stopbank has a lower allowable level of robustness than the primary stopbank, but must provide flood protection so the crest height must be maintained and the structural integrity of the bank must not be compromised by the many varied structures on this stopbank.

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- 7.34. A meeting of the Horowhenua Shared Pathway Network group is scheduled for 22 November, and will include discussion about the provision of shared pathways on the stopbanks around Foxton Town, Foxton Beach, the Whirikino Trestle Bridge the Moutoa spillway and the lower reaches of the Manawatu River.
- 7.35. A Scheme Liaison Committee meeting is scheduled for 25 November, and will cover the Scheme works programme, the findings of the gravel and silt study on the Manawatu River, the silt removal contracts on the Oroua, the Rural Upgrade Project and the challenges for the Scheme over the next decade.

OROUA RIVER

- 7.36. A repair of two scour holes and longitudinal bank erosion between 31km and 33km had been put on hold due to river conditions. Rope and rail groynes have been installed with tied tree works and concrete rip rap. Willow poles have also been planted for added protection. Willows that were encroaching onto the beach, interfering with flood flows and causing erosion issues have been mulched. These willows have started to leaf and have been sprayed.
- 7.37. Two 70m sites of erosion have been battered and planted opposite Timona Park (true left bank 40.5km). Four hundred poles were harvested on site and planted, and both sites were grass seeded. A grassed batter slope is much more stable than an exposed vertical edge and will offer added protection while the willows establish themselves.
- 7.38. The mulching and layering programme has continued on the true right bank from 34km upstream to 36km. This is undertaken to maintain the vegetation at a manageable level, while retaining the root structure which is important for the stability of the river bank. This work was temporarily halted due to poor weather conditions but will continue when conditions allow.
- 7.39. Gorse spraying has been carried out on the Oroua true right stopbank from 17km-18km. This will be accompanied by spot spraying on both banks from 10km-24km as small amounts of gorse are beginning to appear in the system. A follow up spray has been undertaken to ensure any gorse that was missed or did not die is taken care of.
- 7.40. A silt removal contract for a section of the Oroua River has been put out to tender. This work is a component of the annual maintenance programme intended to address parts of the river corridor particularly prone to silt build-up.
- 7.41. New ramps on the stopbank adjacent to the waste water treatment plant on Kawakawa Road (34-35km true right bank) are due to be constructed in collaboration with the **Manawatu District Council (MDC)**. The work will be undertaken by the MDC, with engineering input and supervision from Horizons engineers.
- 7.42. Stopbank repairs have been undertaken on the true right bank from 4km-7km. These repairs are batter improvements due to localised slumping, and crest width improvements. The work carried out increases the robustness of the stopbank network, as narrow crests and uneven batter slopes can be potential failure points.
- 7.43. The Oroua Flood Action Plan is in the final stages of review, as the Rural Upgrade Project has had a significant effect on the potential issues and surveillance required during a flood event. With the Rural Upgrade Project due to be completed in the upcoming construction season, areas potentially affected by a flood less than or equal to a 1% AEP will be greatly reduced which is reflected in the updated Flood Action Plan.

MANGAONE STREAM

- 7.44. The Mangaone Stream continues to be inspected regularly by Scheme Engineers, and overall, remains in a good condition.
- 7.45. Efforts to eradicate, or at least significantly reduce the rabbit population above Rangitikei Line are continuing. Repairs and fumigation of the burrows were initially undertaken in August, when evidence suggested the problem was not going to be an easy or quick fix with burrows being re-dug soon after the repairs were completed. Different poisoning techniques are being utilised with some success. Horizons Pest Team are assisting.
- 7.46. Vegetation has been mulched and cleared along a section of the right bank, from the confluence to the old bridge at the downstream end of the race course. This work was supervised by Scheme staff and done on behalf of PNCC for future native planting. Not all of the desired area could be cleared at this time due to neighbouring property owners not having suitable fences in place. A small amount of channel clearing was also undertaken while the contractor was onsite. More is required, but this will be carried out in summer when water levels are low and the weather is more settled.
- 7.47. The opposite bank, cleared of vegetation some time ago, has recently been planted in natives by PNCC and Rangitāne. Similar planting will be done on the right bank in the future.
- 7.48. A section of erosion, opposite to where the Milson Drain runs under Apollo Parade and joins the Mangaone Stream, is continuing to be monitored by staff. The erosion first started after the completion of drain stabilisation works by PNCC. As the erosion is occurring on the berm along the inside of a bend there is very little risk to the adjacent stopbank being undermined, however bank reshaping will be take place in the summer months to retain the current channel alignment.
- 7.49. Along with general maintenance tasks, both Lupin and Lilies have been sprayed along the river corridor near Flyers Line in an attempt to prevent these weeds from spreading throughout the City reach. Ongoing maintenance is required to keep these, and other species, contained.

MAKINO STREAM

- 7.50. High winds during October put an old Macrocarpa tree down across the stream. This was promptly cut up and removed.
- 7.51. A change in ownership of a property adjacent to the Makino Stream, off Awahuri Road, initiated a request for river edge fencing and / or native tree planting.
- 7.52. An update on the Reid Line Floodway upgrade project is provided as a separate agenda item.

STONEY CREEK

- 7.53. All assets were inspected and found to be in a good condition. Repairs to a damaged floodgate on Stoney Creek were completed.

KARA CREEK & MANGAPUKATEA

- 7.54. Annual inspections of floodgates and assets have been completed. A large log was also removed from the channel near a flood structure.

MANGAORE STREAM

7.55. Annual inspections of floodgates and assets have been completed. Spraying of gorse and the removal of weed from channel has been undertaken.

LINTON MAIN DRAIN

7.56. Annual inspections of floodgates and assets have been completed.

TOKOMARU RIVER

7.57. Annual inspections of floodgates and assets have been completed.

LOWER KIWITEA STREAM SCHEME

7.58. The Scheme Liaison Committee meeting was held on the 30 October 2019. Main issues discussed were the Scheme Budgets, Loans and Reserves, as well as the proposed budget for 2020-21. General discussion included erosion repairs and the state of the Scheme at present.

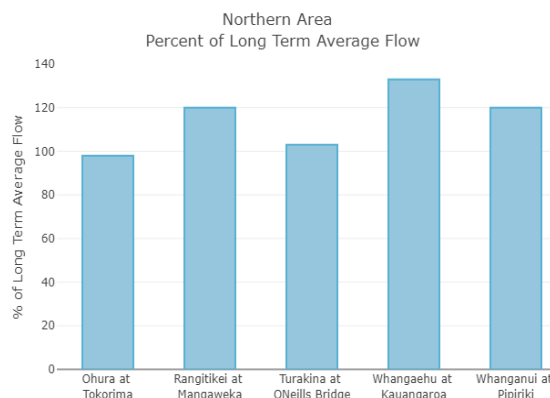
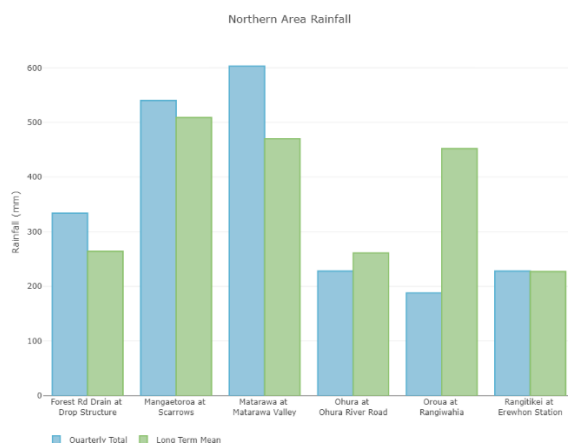
7.59. Gravel extraction was completed at two sites to correct the stream alignment.

ASHHURST STREAM SCHEME

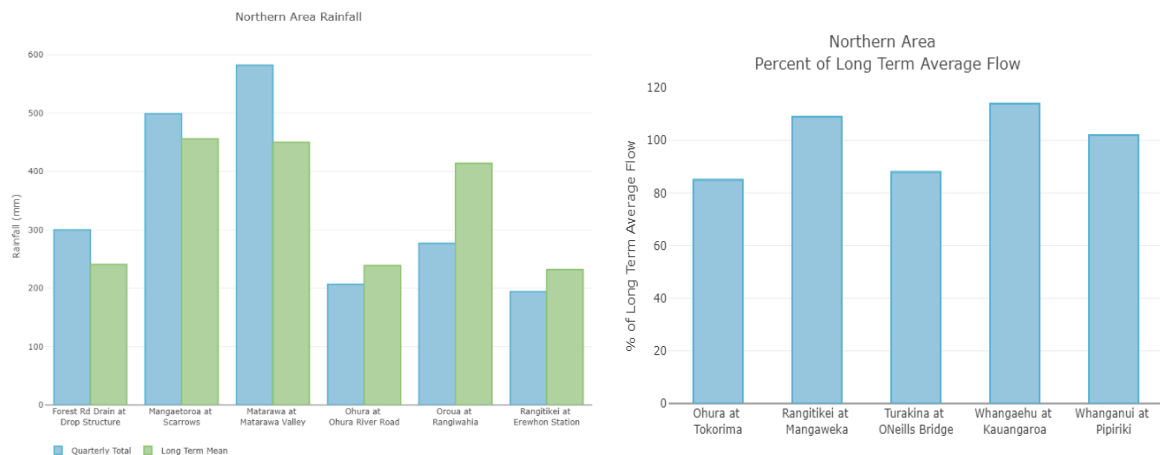
7.60. The programme of inspecting and reporting on the 'condition' of all Scheme assets was completed.

8. NORTHERN AREA

8.1. September Rainfall/Flow



8.2. October Rainfall/Flow



8.3. Like the other operational teams in the Group, the warmer temperatures and more settled weather that accompanies the second quarter of the financial year is the time for a higher level of operational activity for the Northern Team. That coincides with some staff changes which have had something of an impairing effect on that gearing up, requiring some agility both within the team and the group.

COMMUNITY INVOLVEMENT

8.4. No Community Involvement activities this period.

RANGITIKEI RIVER CONTROL SCHEME

8.5. Improving weather conditions have allowed staff to inspect the scheme assets by jet boat. Information collected from these on-water inspections is invaluable in understanding the changes the river has made over the winter months and in finalizing work priorities for the summer. The big focus at present is in the completion of the new Rangitikei River Management Strategy report which will be taken to a Council workshop in December. This report is looking holistically at the river, its history, its future and its needs to develop a more sustainable management philosophy

RANGITIKEI MAINTENANCE WORKS

- 8.6. **Onepuhi** - Work to open up Paul Murphy's existing irrigation channel as high flow channel is working well with more than one third of the flow now using this channel and starting to erode the beach for a more favourable river alignment.
- 8.7. **Campion Road/ Tonui Farm Emergency Works** - This area was planted with willow trees to try and enhance the stabilization of the bank behind the tied tree works. Willow growth appears positive at this stage.
- 8.8. **Tied Tree Works Behind CMP** – Approximately 50m of tied tree works were completed to combat erosion at a site behind CMP (approximately 29.5km RB). During this job some work was completed to enhance protection of the end of the Kakariki stopbank. This was to make access easier for machinery as trees were utilized from the Kakariki field nursery.
- 8.9. **Tied Tree Works On Walkers Farm** – Approximately 70m of tied tree works were completed to combat erosion at a sit on Walkers Farm, Parewanui Road (Approximately 18.5m RB).
- 8.10. **Planting & Nursery Maintenance** – Harvesting work is completed at Haylock's Nursery.
- 8.11. **Forestry**- Insurance and Revaluation 2019.
- 8.12. **Rangitikei River Enhancement** - Nil

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- 8.13. **Te Hou Vegetation Clearance** – Work was undertaken by a contractor to clear some vegetation between the Parewanui stop bank and the river. This vegetation was in the flood plain area and had created a bottleneck which was causing issues with scouring during flood events. The vegetation has been put into piles ready for burning, however the piles were not dry enough to burn before fire restrictions. The burning will be scheduled for autumn.
- 8.14. **Te Hou Tied Tree Works** – Approximately 80m of tied tree works were completed to address erosion on the right bank at approximately the 9km mark. Further layering work up-stream will be considered in due course once the tied trees become established

RANGITIKEI CAPEX WORKS

8.15. 2019-20 Capital Work

Concrete Floodwall

Engineering consultants GHD were engaged to design a concrete wall to span the section of stopbank that intersects the high pressure gas main. Given the criticality another consultant (Beca) was engaged to peer review the design with final design work now being completed. Construction of the wall will begin early in the New Year.

Parewanui Stopbank Upgrade

The next stage of the Parewanui stopbank upgrade is on Horizons leased land just upstream of Scotts Ferry from river distance 2.5km to 3.5km. It is estimated that the contract will see 1,000m of stopbank upgraded. Tender documents will be compiled before Christmas, and contractors will be invited to tender in the New Year. Work will be completed in the summer of 2019-20.

- 8.16. No gravel extracted from the scheme consent this reporting period.
- 8.17. **Rangitikei River Global Gravel Extraction Consent** - Work on this initiative to enable gravel extraction, for river management purposes, from the Rangitikei River over a series of reaches extending from the Makahikato Stream to the mouth of the river is now on hold. Work will resume once the new Rangitikei River Management Strategy Report is adopted and resourcing issues are addressed.

POHANGINA-OROUA RIVER CONTROL SCHEME

- 8.18. Scheme work for the year is now well advanced with over half the planned work programme already completed. Requests from landowners for the undertaking of river bank erosion repairs on their land remains high. This work is funded 60% by the landowner and 40% by the scheme with Horizons engineers managing the work. It is intended to consult on (through the next Annual Plan) adjusting this to 50:50.
- 8.19. Most of the planned erosion control and repair work is complete as we head into summer. When the river levels drop and stabilize we intend carrying out the repairs at the Ward property. This involves rope and rail groynes and some tree bank protection works. This is shortly to be priced up for construction prior to December.
- 8.20. All of the willow planting has been completed with the most recent being the work carried out at the Passey property in the northern part of the scheme. The only other tree bank protection work left to do is situated at the Fairless property opposite Wards. This is currently being identified and will be under discussion with the owner. Layering at the Gayler property has been completed along with some minor pole planting and we are shortly to look at layering work at the Edwards and MacDonald's property in the lower reaches of the scheme if the weather is suitable.
- 8.21. To date 7,165 willow poles have been planted on the Pohangina River.
- 8.22. 300m³ of gravel extraction has occurred from the Pohangina River this reporting period.

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OROUA RIVER

- 8.23. Work on the Oroua River is on track with a number of the programmed works having been completed. It has been gratifying to see our contractors completing these jobs in a speedy manner and with the appreciation also of the property owners, bearing in mind it's a busy time of year with lambing and calving on most farms.
- 8.24. The remaining programmed work to be actioned is the erosion protection work on the Hoggard property which also has the addition of some minor channel realignment works and some pole planting. This is all expected to be done by mid-October.
- 8.25. PAMU (Landcorp) repairs have also been completed along with a large number of new willow poles planted at this site to replenish our stocks of trees after the damage which was sustained along this reach. Some 350m of protection work has also been completed at Genet's property which is directly opposite the PAMU Cheltenham Downs property. The newly appointed Manager has also been very proactive in getting repairs done and has been a pleasure to work with.
- 8.26. Work has also just started on a significant erosion site at the Manville property which will also need some channel maintenance work.
- 8.27. In late October additional work has been identified at Crothers property which is being repaired now. In addition 80m of new work at the upstream area of Landcorps Cheltenham Downs property has also been identified and Landcorp have requested we repair this while we are working at Crothers.
- 8.28. It is anticipated that all of these projects will be completed by the end of November 2019.
- 8.29. To date 10,300 willow poles have been planted on the Oroua River

TOTARA RESERVE

- 8.30. The programmed repairs at the Old Camp Ground have now been completed and the embankment protection work planted with willow poles. In behind this repair approx. 1200 willow poles have been planted for a sustainable repair stock in future years. The small channel diversion has also been completed to take some of the erosion pressure off the above repair site.

UPPER WHANGANUI RIVER MANAGEMENT SCHEME

- 8.31. Maintenance work this year will focus around coppicing the poplar trees on the Ongarue River near Cherry Grove. This work was first undertaken about four years ago and the rapid regrowth is now obstructing views of the waterway from the walking path. A buildup of willow growth in the Ongarue River channel is forming an island and redirecting flow towards the river banks. If not maintained there is a risk channel blockages and flooding. Staff are actively engaging with Ngāti Hāua on this matter.
- 8.32. **Ruapehu District Council (RDC)** have engaged Horizons to provide engineering services to upgrade a number of stormwater culverts under the stopbanks in Taumarunui. The first of these is on Taupo Road and known as the Tuku Street culvert. An indicative engineer's estimate for this project has been provided along with an analytical assessment of the inundation levels. Service locates have been completed and preliminary plans have been developed. Before going to tender for the work RDC has asked Horizons to assist them in having consultants DHI rerun the stormwater runoff model to assess the effects of the planned upgrades on the town.
- 8.33. The 2019 Swim Spot Spruce Up process is progressing well. All components for the upgrade are now fabricated and staff are only awaiting the final Ngāti Hāua approval before undertaking the build.
- 8.34. A very strong message received from the community at the open day was a desire to see the grazed berm area adjacent to the swim spot fenced to prevent cattle entering the waterway. Through a joint venture with the Freshwater Team this has now been achieved.

MATARAWA FLOOD CONTROL SCHEME

- 8.35. Maintenance work on this scheme has been quiet over the past two months as staff wait for the ground conditions to dry out from winter. With the exception of some minor drain spraying works the only work undertaken was the regular inspection of dams.

MATARAWA URBAN

- 8.36. Spraying has been undertaken at two properties on Raine Street in consultation with the property owners to coincide with other site works.
- 8.37. Some fallen willow trees have been cut, mulched and removed from Kowhai Park by a contractor in an effort to keep them away from the stream while enhancing the area.

TUTAENUI FLOOD CONTROL SCHEME

- 8.38. General channel clearing work continues to be done on the Tutaenui Stream with additional clearance work being programmed for the summer months when stream levels drop.
- 8.39. The Rangitikei College planting of 150 native trees has been completed at the Lost Acre in the urban section of the stream. The supply of native trees was funded by Horizons and the planting carried out by the Marton Lions Club in association with school pupils. Thanks must go to the Lions Club which have done all the preparation work on the stream banks prior to planting work.
- 8.40. There has been approximately 600m of fencing completed to protect the stop banks from stock damage at dams E3 and E4. These dams are situated on the north eastern area of Marton. A fencing contractor was engaged for this work with a planned completion date in early November.
- 8.41. We are also investigating various section of channel which may need clearing over the summer months to the north of Marton and South of Bulls.
- 8.42. Several requests per month are being received from landowners with river bank erosion problems on the Tutaenui Stream. Although this is not an activity that the scheme rates for staff are proactive in providing advice to these landowners.

MAKIRIKIRI FLOOD CONTROL SCHEME

- 8.43. Following on from drain cleaning which was done earlier this year, the drains were sprayed to combat willow re-growth on the Redmayne property. Other small willows were also sprayed along the sides of the drain through the Major and Redmayne properties in what is an ongoing effort to limit willow congestion.

POREWA FLOOD CONTROL SCHEME

- 8.44. Maintenance work on this scheme has been quiet over the past two months as staff wait for the ground conditions to dry out from winter. Two slash piles near Queens Park in Hunterville have been burnt and regular dam inspections have been undertaken.

WHANGAEHU MANGAWHERO RIVER MANAGEMENT SCHEME

- 8.45. A new resource consent for aerial spraying of the Whangaehu-Mangawhero scheme has been granted. Work is now expected to commence early in 2020 to control willow regrowth in the scheme.

TURAKINA RIVER MANAGEMENT SCHEME

- 8.46. A log in the Turakina River, downstream of the SH3 road bridge was removed by contractors. This had taken some time to commence as the conditions of the paddock were such that the property owner wouldn't allow access to the blockage during the winter months.

8.47. LOWER WHANGANUI VEGETATION MANAGEMENT AND FLOOD PROTECTION PROGRAMME

- 8.48. Monthly inspections of the floodgates are on-going.
- 8.49. Routine stop-bank mowing has been recently completed.
- 8.50. Papaiti vegetation clearance has been delayed along with other work until a maintenance resource consent has been granted.
- 8.51. Maintenance of the rock lining at the sailing club has been postponed due to consenting issues surrounding the Lower Whanganui Scheme. A consent application has been compiled over the months of June and July. The work was discussed at a Hui between Te Runanga o Tūpoho and Horizons with approval granted following this. A response is still to be received from **Ngā Tangata Tiaki (NTT)**. The resource consent application will be lodged once approval is obtained from NTT.
- 8.52. In response to concerns around the enlargement of an erosion embayment in the South Spit an aerial LiDAR survey of the coastline either side of the river mouth took place in September. This data is now being analysed and will be used to quantify changes since 2015.
- 8.53. The Te Kaihau o Kupe Waka Ama group has approached Horizons for advice in regards to an access gate through the floodwall on Wharf Street in Whanganui. This will permit direct access to the slipway for Waka launching. Costs have been forwarded to the group and Horizons staff now await their reply before commencing any work.
- 8.54. Following the transfer of assets from Whanganui District Council to Horizons, the assets (predominantly bank protection) located on the South Spit have now been surveyed and condition rated for addition into Horizons asset management system.
- 8.55. The North Mole and South Spit Interface Wall investigations have been completed with design of both commencing in July 2018. PGF funding is still uncertain but project work is continuing as if construction were to occur in summer 2019/20. To that end:
- Investigation and surveying of existing rock structure below and above water has been completed;
 - Wave height modelling and assessment for rock sizing calculations has been completed;
 - Conceptual design profile sketches for various batter treatment of the North Mole have been completed;
 - Development of plans for the repair / strengthening of the South Spit Interface Wall and the reinstatement of the Tanae Groyne have been completed;
 - The survey and associated construction drawings for the interface wall and Tanae Groyne are completed;
 - Public consultation has commenced;
 - Terrestrial and Aquatic Ecological Assessments have been completed with final reports received in May 2019;
 - The identification of resource consent requirements is completed and the draft consent application is complete;
 - Consultation with Maritime NZ is substantially complete;
 - Final design of the North Mole and revetment;
 - Construction methodologies and estimates have been finalised;

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- A PGF funding application has been submitted.
- A determination from Te Pou Tupua has been formally sought.

8.56. Tasks that will be progressed over the next two months include:

- Progress the development of the Waitahinga Quarry for commercial operations;
- Notification of identified claimants for customary marine title and seek opinions.

PAKIHI SCHEME

8.57. Planned regular dam inspections have been completed. The task of mowing of the Punch's dam crest was undertaken using a local contractor. This is now necessary as the entire embankment is fenced off from stock and no longer in the farm grazing cycle.

FOREST ROAD DRAINAGE SCHEME

8.58. Drains were all sprayed in spring, although there was limited access to some areas due to farming activities. These areas will be visually inspected and will be targeted in the autumn spray.

8.59. Fence / gate repairs were completed by a fencing contractor to the satisfaction of the property owner at Te Hou farms.

HAUNUI DRAINAGE SCHEME

8.60. A mechanical clean has been completed on the Atkinson and Baberfelds sections of the drain on Ruatangata Road in late September. Some 950m of drain has been cleared of weed. The work was done by a local operator who is resident in the area and he has expressed an interest in becoming spray qualified. This operator will be a great asset to the scheme as it's been historically difficult to obtain suitably qualified contractors to operate in this locality.

MOAWHANGO RIVER

8.61. A project on a tributary of the Moawhango River, at Mark Chrystal's property has been completed. This involved two separate contractors, working in unison, to remove bank vegetation by machine and by chainsaw. This work is funded by Genesis Energy as a condition of resource consent.

NORTHERN ANNUAL SCHEME REPORT

8.62. 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. Work on the 2016-17 report remains underway.

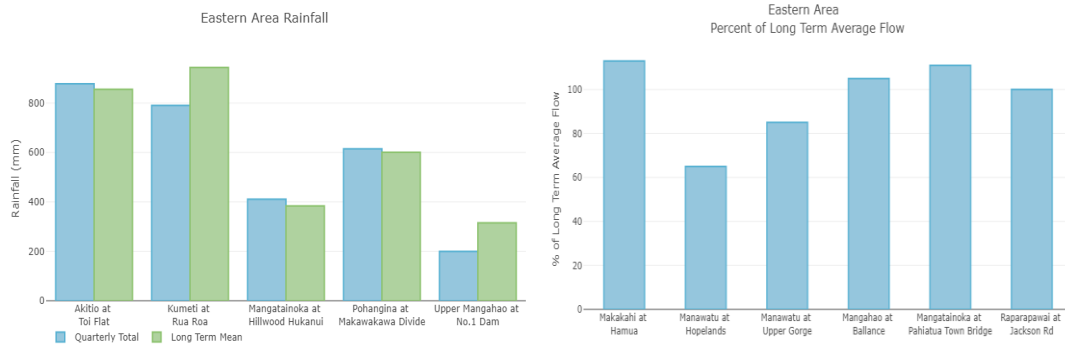
ENGINEERING ADVICE

8.63. 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, diversion queries, compliance issues and flood damage work. Specifically, these include the Rowing Club berm upgrades in Whanganui, two technical erosion advice sites on the Pungapunga River east of Taumarunui, several sites on the Taringamotu River, various queries from RDC, and a land drainage query up the Turakina Valley.

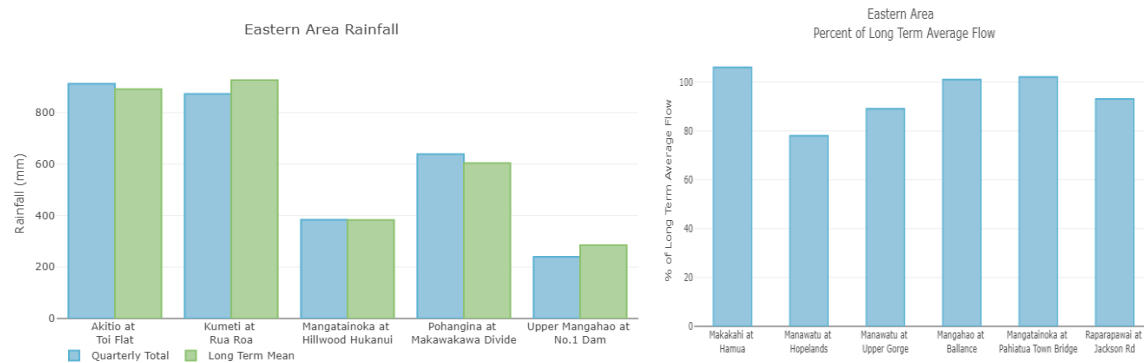
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9. EASTERN AREA

9.1. September Rainfall/Flow



9.2. October Rainfall/Flow



9.3. The period from September through to October has seen some steady rainfall in all catchments within the Tararua District. This has meant that river levels are running slightly higher than average, which a good sign coming into summer. There haven't been any large scale events which have caused major damage, so work has been able to focus on flood repairs for those schemes affected by the June storm.

9.4. The conditions have been almost ideal for pole planting. This has been undertaken on all schemes and good results have been had to date, with high strike rates achieved.

9.5. Staff have been busy completing the works programme for the year, which was distributed to key stakeholders in September. October saw a number of Scheme Liaison Committee meetings held and community meetings were also held at Akitio and Alfredton. There was general positive feedback from the community about the work being undertaken so far and the team will be doing their best to ensure that this continues.

TARARUA DISTRICT RIVER MANAGEMENT SCHEME

9.6. Amenity works were completed at Bluff Road Whare (Whare #2, Ngaawapurua, Te Kauru Taiao) with the carpark area limed over to prevent weed growth, and a limed path placed down towards the Manawātū river beach to help improve access.

9.7. Work at the Ormondville Domain to clear willows from the river bed and mitigate bank erosion through channel shaping and willow planting was also completed. This was undertaken at the request of the Ormondville Domain Board, specifically to prevent erosion of an access track and road bridge abutments. The finished work also helps to prevent

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erosion loss of native trees planted in key areas of the domain. Conversations with the locals have indicated that there is a large amount of interest within the community for doing works to improve the amenity value of the domain and to make the river more swim friendly.

- 9.8. The second semi-annual community group meeting for the Tararua River Management Scheme was held on the 25 October. This went well and a range of topics were covered in discussion – particularly forward planning of works for the coming year.
- 9.9. Community meetings were also held at Akitio on the 19 October, and at Alfredton on the 21 October.
- 9.10. The Akitio meeting was a fact finding mission to understand the implications of a proposal to remove two weirs from the Akitio River, to return the river back to a more natural state and allow for the natural migrations of native fish species. This meeting was co-presented with Logan Brown – Freshwater Manager. It engendered a great deal of discussion.
- 9.11. The meeting at Alfredton was with the Ihuraua-Tiraumea Community Catchment Group and was co-presented with Mike Paterson – Senior Scientist. This meeting was to provide advice to the community around a range of activities that they could undertake to improve the water quality of the Ihuraua and Tiraumea rivers.

MANGATAINOKA SCHEME

- 9.12. The work completed for the year so far has consisted of pole planting and tied tree works. This has primarily been carried out around Bridge Road, Te Hawera Road and the Fonterra site at Pahiatua. Tied tree work has also been completed at the headwaters of the Mangatainoka and near to its confluence with the Tiraumea River.
- 9.13. A scheme liaison committee was held on the 29 October, with good participation from all. The key topics under discussion were the repair philosophies on the grade control devices in the Mangatainoka River and the purpose of the stopbanks at Hamua.

SOUTH EASTERN RUAHINE SCHEME

- 9.14. Planting has been in progress on a number of river stretches with the scheme, with approximately 5000 trees of varying species planted this financial year.
- 9.15. Repairs were undertaken on “Colin Bonds” Weir on the Rokoiwhana Stream, to bring the height of the weir up by approximately 800mm. The intention behind this work was to return the weir to its original height and to encourage deposition of sediment upstream of the weir. This effectively required completely rebuilding this weir from the riprap that was already in place with the addition of limestone rock. It was made into more of a “rock fall” type weir instead of the traditional stepped weir, making it more resilient to foundation scour and enhancing fish passage.
- 9.16. Extensive channel clearing works were completed on the little Rokoiwhana branch to improve flood-carrying capacity and move the active channel back to its original position. The stream had become very perched (hence its change in active channel direction as the stream fell off the side) and it is hoped that by clearing vegetation this bed material will be able to move down through the confluence and into the main channel filling in areas of over extraction of the stream bed near Laws Road. This extraction was abated by Compliance in August.
- 9.17. Kumeti No.4 Weir was also repaired – effectively reinstating it as it had been fully undermined and pushed to the true left side of the river. It is not anticipated that this will

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slow down the movement of gravel which is accumulating at Top Grass Road, but it may help alleviate degradation upstream of the weir. There are another three weirs downstream of this one.

- 9.18. Flood damage works are almost completed from the June event with all works required finished on the Mangapapa Stream. This channel was very congested and has also had significant channel clearing undertaken on the upper reaches. All that remains is works delayed by Galaxia spawning on the upper reaches of the Oruakeretaki River.
- 9.19. A new method of bank protection is being trialled at the base of a very large clay slip on the Mangatewai-iti River to the west of SH2 where very large willow poles approximately 150mm in diameter and 2m long were rammed into the papa / mudstone stream bed at the toe of the slip. These larger poles should take off quickly forming bank protection to keep the river in its current course. It is hoped that this may also slow the slip from moving and therefore decrease sediment load in the river.
- 9.20. Channel clearing and shaping work was completed on the Makirikiri Stream / Glengarry drain to help improve flow of the drain into the stream and to help mitigate flooding of the new subdivision area on Tapuata Rd behind Turtons farm Supply on SH2. Blockage by willow growth in the bed of the stream had also caused erosion upstream on the upper reach of the drain.
- 9.21. Large poplars on the Mangamanaia were coppiced or cut to stop them from falling in the wind. The plantings upstream of this area will be affected by the new state highway in the future.
- 9.22. Gravel extraction has been completed by the Golf Course on the Tamaki River, an area that hasn't been extracted from in some time. Gravel is still being extracted from the Law's Road/Smith Road area of the Tamaki as well.
- 9.23. Extraction has been put on hold on all of the Rokoiwhana and on the Oruakeretaki to allow the movement of gravel from the recently opened gravel reserves to be observed. This should be more noticeable on the Rokoiwhana after channel clearance has occurred between the opened reserve and the main channel.
- 9.24. The scheme liaison Committee meeting was held on 29 October. All of the above topics were covered at the meeting with good discussion on the need for a holistic view of the scheme and looking at reviewing the purpose of the scheme works.

TAWATAIA - MANGAONE SCHEME

- 9.25. Monthly visual inspections of the detention dam have taken place over the period. No further works are planned until January – February 2020.

UPPER MANAWATU – LOWER MANGAHAO SCHEME

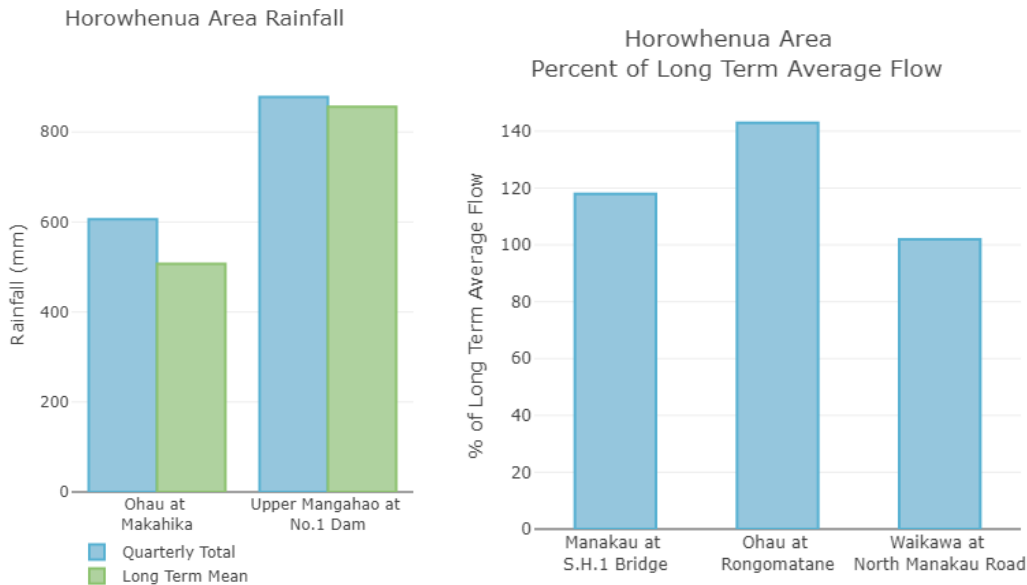
- 9.26. Gravel extraction was completed at "Beatsons Corner" on the Manawatū River by Stringfellows, with contractors taking a beach further upstream than usual due to easy access with a low river. This may help alleviate pressure from the beach directly upstream, as that sediment moves down to fill that spot taking pressure off of the true right bank.
- 9.27. The area surrounding the confluence of the Manawatū with the Tiraumea / Mangatainoka is being closely monitored as the Tiraumea continues to erode its right bank. It is expected that the Tiraumea will break through into the Manawatū in the near future upstream of its current confluence.

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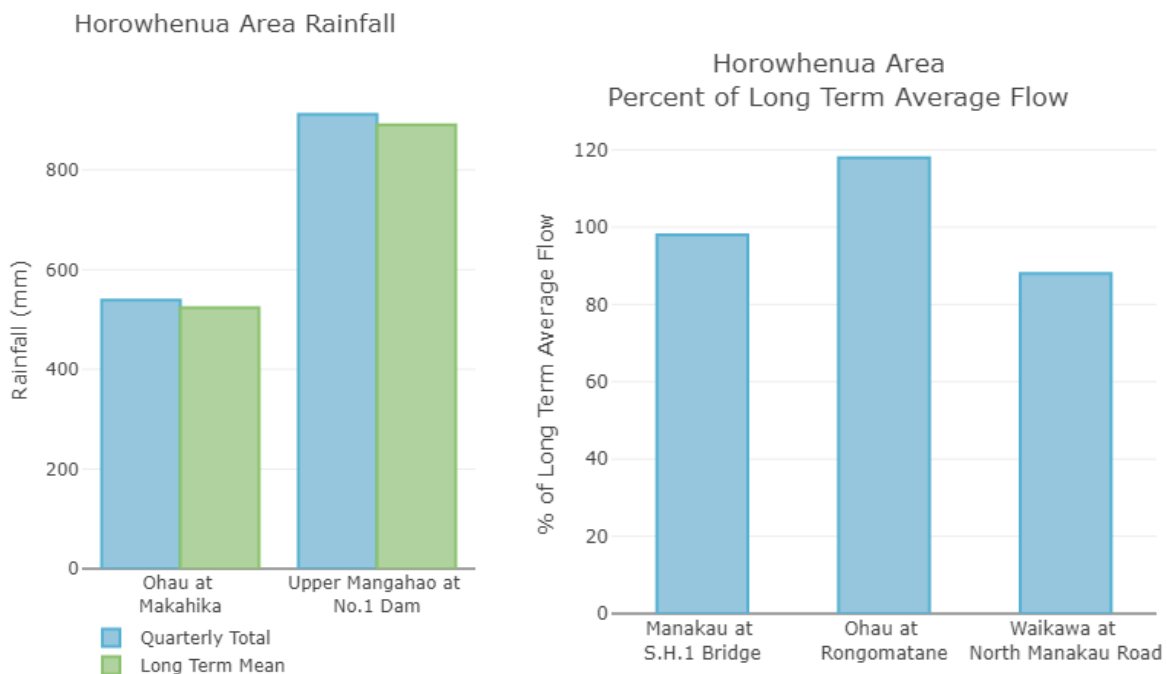
9.28. This, and gravel extraction, was a topic of discussion at the Scheme Liaison Committee Meeting held on the 25 October.

10. SOUTHERN AREA

10.1. September Rainfall/Flow.



10.2. October Rainfall/Flow



10.3. Overall this has been a fairly quiet period work wise with the weather remaining fairly settled for this time of the year, with focus mainly on tidying up Annual Report information and undertaking some preliminary work for the next Annual Plan.

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- 10.4. A meeting was held with the Koputaroa Liaison Committee on 29 October. The main focus of this meeting was to discuss **Horowhenua District Council's (HDC)** Resource Consent application to discharge part of Levin's stormwater to a tributary of the Koputaroa Stream. A number of committee members expressed concern at this proposal – potential impacts on the lower sections of the Koputaroa stream both in terms of storage capacity and water quality - and the mitigation measures that HDC are proposing.
- 10.5. River Management has submitted in opposition to the application, in part reflecting the views of scheme ratepayers but also reflecting some concerns around the discharge, particularly as the northeastern part of the town continues to grow. An initial meeting to discuss the River Management submission and what form of offsetting would be acceptable to Horizons (as submitter) is set down for 4 December.
- 10.6. Staff have been working closely with the Corporate Assets team around proposed upgrade of the Kairanga Depot. The main focus over this period has been the construction of the new heavy vehicle access into the depot. River Management staff and contractors have been working together to ensure that this new culvert is in place prior to the arrival of the old Kiwi House building.
- 10.7. Staff had a two day visit to Waikato Regional Council to look at how their asset management system operates and discuss some of the issues they are having regarding fish passage within their scheme networks.
- 10.8. Request for engineering advice has continued over this period including a number of requests from district council staff around who is responsible for maintaining various drains around the area
- 10.9. Staff continue to work closely with various other teams from within Council and consultants regarding the implementation of the new AMIS current focus at the moment trailing the task scheduling module of the system.

OHAU-MANAKAU SCHEME

- 10.10. Relatively low flows have prevailed over the period limiting the number of issues that have arisen. Limitations associated with fish spawning have also meant only limited works were undertaken during the last couple of months.
- 10.11. A collapse of a culvert pipe half way along the pipe line on Kidds No.1 culvert on the Kuku Stream occurred. Discussions with the landowner has seen the total length of this culvert reduced and the damaged section of pipe replaced.
- 10.12. 3km of drain was machine cleaned this period.

MANAWATU DRAINAGE SCHEME

- 10.13. There were a number of floodgates flagged as requiring repair or replacement due to their deteriorating conditions identified during recent inspections. Some of this work required immediate attention while the rest will be complete over the summer period.
- 10.14. Two access gates were installed between neighboring properties along the Taonui Stream to make sure spray trucks can move quickly and easily through property boundaries.
- 10.15. Staff have been working with the Freshwater Team to sign off two fencing and planting plans for this scheme. A 275m section of Walsh drain is to be fenced off to exclude stock from entering the drain.
- 10.16. A 1.3km section in the Murray Cheetham property of the Taonui Stream will be fenced with a 2 wire electric with the purpose of excluding cattle from the stream.
- 10.17. Two large piles of willows that had been removed from Whiskey Creek in the previous period were burned so the landowner could crop his paddocks. A 250m section of slumping that had occurred along Whiskey Creek was also repaired with more soil and rock being brought in.

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10.18. A 200m section of willow trees were removed in Neville Webb's property along the Whiskey Creek due to them congesting the channel.

MAKERUA DRAINAGE SCHEME

- 10.19. This period has seen the pump stations up and running keeping staff busy with manual and machine cleaning of the weed build up at the pump station screens to ensure the pumps can operate efficiently.
- 10.20. The first spray of the season has begun in this scheme. We have been using the current spray contractor to train up our own staff on our new spray rig so this has meant a 5km of scheme drains have been sprayed so far during the last weeks' settled weather.
- 10.21. At the Makerua pump station a new concrete path and step were constructed to ensure the station was maintained to a high standard and make it easier access for staff to maintain it.
- 10.22. A section of Akers drain was machine cleaned due to a large block of weed that had formed.
- 10.23. A 2km section of intersecting channel had the drain cleanings that were piled up alongside smoothed off with an excavator to ensure the spray rig can have easy access this season.
- 10.24. Center drain was machine cleaned.

KOPUTAROA DRAINAGE SCHEME

- 10.25. This period has seen the beginning of the spring drain maintenance program with the majority of drains marked as requiring a spray with herbicide.
- 10.26. The guard rail on the platform at Koputaroa no.1 pump station was replaced with a new rail that can be easily swung out of the way to allow easier access for a small digger to remove weed from the screen when required instead of having to use a large digger.
- 10.27. The Aratangata drain no. 4 floodgate was refurbished with the landside pipe re-installed and new concrete bags placed for the headwall. The floodgate was removed and recoated and new arms installed. The condition of the pipe has also been recorded with CCTV.

MOUTOA - WHIROKINO DRAINAGE SCHEME

- 10.28. General pump station maintenance was carried out this period with spraying of herbicide around the buildings and along the access tracks.

TE KAWAU DRAINAGE SCHEME

- 10.29. There were a number of floodgates flagged as requiring repair or replacement due to their deteriorating conditions that were brought to our attention during asset inspections. As a result we replaced two floodgates and repaired the concrete outlet structure of another.
- 10.30. Culvert number S6's floodgate was leaking due to not sealing properly as the hinges had come away. So a new gate was custom built to fit and installed.
- 10.31. Along Main Drain there were two main sections where willow trees had become over grown and were impacting of the flow of the water through the drain. One was adjacent to Taikorea Bridge and the other by S2 flood-gated culvert. Traffic management was required at both sites due to an excavator being used to pull the felled trees back up over the stopbanks, where they were then carted away to burn piles.
- 10.32. Staff have been working with the Freshwater Team to sign off three fencing and planting plans for this scheme. Firstly, fencing Main Drain to exclude stock 1.2km section- set back margin of the fence will be an average of 5 meters back from normal water levels to allow for long reach digger access which is required to maintain the channel (undertaken by Horizons). Placement of fence to be checked by Horizons River Management staff prior to fence being erected. The conventional fencing may be less than 5 meters from water edge as the setback margin on the other side of the drain is greater.

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10.33. The second scheme drain to be planted and fenced is a 500m section of Saunders drain. Fencing of Saunders Drain is to exclude stock – the fence set back will be at least 3 meters from the edge of the bank to allow for planting along one side. The other side will be a minimum of two meters. It is estimated that Saunders Drain is less than 1 meter in width on average by land owners.

10.34. The third scheme drain is an 890m section of Lanes No.1 drain, there is a section which is overgrown with blackberry this will be sprayed off. Then planting will commence along sections of the drain to shade the water and improve instream habitat. Planting will only be on one side of the drain so that access can be maintained to the drain for maintenance purposes.

HOKIO CATCHMENT DRAINAGE SCHEME

10.35. The headwall of a culvert crossing on the Arawhata was refurbished. The scheme supplied the materials required and the landowner carried out the work.

FOXTON DRAINAGE SCHEME

10.36. A quiet period for this scheme with just the drain cleanings along Kings Canal tidied and rubbish pulled out.

10.37. As the weather is starting to warm up a section of the King Canal has also been sprayed to maintain capacity within the channel.

11. ENVIRONMENTAL GRANT WORKS AND ENGINEERING ADVICE

11.1. The status of all Environmental Grant works is as follows:

2019 – 2020 Environmental Grant work

Name	River or Stream	Job No.	Type of work	Work status	Estimated work cost (\$)	Value of grant (\$)
D Lyons	Tapuata Stream	IN1506	Bank Protection	Completed and Invoiced	\$6,323	\$1,896.9
Manning	Kiwitea		Tree work groynes	Approved	\$15,304	\$4,592
Cvitanovech	Makiriki		Tree work groynes	Pending approval	\$20,572	\$6,172
Turakina Church	kahuraponga		Retaining Wall	Pending Approval	\$9,115	\$2,735
Murphy	Ohakune		Retaining Wall	Declined	\$7,720	\$2,316
Tripe	Mangatipona		Grade Control	Application being prepared	\$25,000	\$7,500
Waller	Taringamotu		Rock Lining	Application being prepared		
Te Rongaroa Marae	Ongarue		Rock Lining, Layering Planting	Application being prepared		
Morrison	Mangara		Vege Clearance	Application being prepared		
Palmer	Okahukura Saddle Road		Vege Clearance	Application being prepared		

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12. SIGNIFICANCE

12.1. 11.1. 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 for this report.