

Report No.

20-33

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 December 2019 to February 2020.

2. RECOMMENDATION

That the Committee recommends that Council:

- a. receives the information contained in Report No. 20-33.

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. The sector nationally has been particularly active over the past few months on both key aspects of the five year business plan and central government funding. The five year business plan, amongst other things, highlights four key focus areas for the sector; working more effectively together, agreeing and driving a research agenda with tertiary institutes and CRIs, addressing capability and capacity issues and giving structure / focus to our communications and engagement (lifting our profile).
- 5.2. Flooding in the lower South Island has very much been in the news over the period, at one point completely cutting off transport links. That has served to highlight the benefit that river control and flood protection schemes provide to key national lifelines (road, rail, communications and power supply, amongst others).
- 5.3. A microcosm within our region is the Porewa Scheme centered on Hunterville, where flood protection infrastructure was built with the aid of significant central government assistance recognising the benefits to both State Highway 1 and the North Island Main Trunk Railway Line. Removal of the 50% funding for scheme operations and maintenance activity in the late 1980's loaded the full cost on to ratepayers. That scheme's particular circumstances saw an alteration to funding policy with the 2018 LTP to provide (in the absence of central government funding) more regional funding.

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- 5.4. These matters and the issue of crown-owned land that is currently not able to be rated were part of a wider suite of issues traversed with a range of government department representatives in a series of workshops in January. There appears to be new impetus at a high level to reinstate some form of central government funding for regional sector river management activity nationally, led by Taranaki Regional Council Chief Executive Basil Chamberlain, Nelson Mayor Rachel Reese and LGNZ President Dave Cull.
- 5.5. Members will no doubt be aware of the protests that took place in January around the construction of a new section of stopbank on the true (looking downstream) left or eastern side of the Oroua River between Awahuri and Feilding, part of the Rural Upgrade Project. The proposed alignment traverses a number of parcels of private land (in the main pastoral farmland with a section at the top end running through a golf course) requiring negotiations with a large number of landowners.
- 5.6. Many arrangements have taken the form of a land entry agreement between Horizons and the landowner; the landowner agreeing to the stopbank being built on their land subject to some standard clauses around reinstatement. Often those discussions have not involved compensation, the landowner affected recognising the benefit to their land and the wider community.
- 5.7. Arrangements have been more challenging around and downstream of Te Arakura Road; a more statutory process has been followed with one landowner with that section of stopbank completed in late 2019. Land parcels become smaller in and around where the stopbank crosses Te Arakura Road, with (in some cases) those owning an individual parcel numbering in the hundreds.
- 5.8. Horizons began discussions with the owners of the Te Arakura Road land parcels in 2017 both with a public meeting held at Awahuri Hall and discussion directly with Ngāti Kauwhata. The complexities of dealing with such a large number of owners and (in some cases) convoluted ownership and decision-making structures, and uncertainty around timeframes, resulted in Council in 2018 exercising its powers under the 1941 Soil Conservation and Rivers Control Act. Section 137 of that act, titled 'Notice in respect of works to be undertaken on private land', provides structure to progressing stopbank construction on private land.
- 5.9. Two objections were received – staff worked with those objectors on the matters raised and the objections were withdrawn. A number of discussions / meetings took place at Kauwhata Marae on Te Arakura Road with the trustees of the land parcels that were the subject of January's protests related to the detail around the proposed stopbank construction. With all of this in mind I did note to members at December's meeting about the potential for protest action, in part based on staff observation around the degree of functionality evident within some of the trusts.
- 5.10. As noted in the media, construction work has been suspended and the contractor has disestablished from site. There are some costs associated with the stand-down time but those are not significant in the context of the overall project; the buoyant local economy has meant little difficulty for the contractor in finding other work.
- 5.11. I have advised those trustees that we will reinstate the land to pasture and that we will not pursue stopbank construction along the alignment identified at this time. Staff have met with the trustees and others with an interest in the land at Kauwhata Marae twice since the January protests began; despite the strength of feeling evident with the protests those meetings have not been acrimonious.
- 5.12. Matters have not been helped by discussions the trustees and others have had with an adjoining landowner around alternatives to the alignment identified – misinformation that

Horizons could construct the stopbank off private land by building it hard up against the Oroua River. How extensive a large flood would be in this area and whether current gravel management practice is influencing likely flood extents are also issues being raised that further complicate matters.

- 5.13. This particular part of the upgrade, aside from being a new build as opposed to altering an existing structure, has a range of challenges to it. Those challenges are the relatively mobile nature of this reach of the river, capacity issues with the State Highway 3 Bridge a short distance downstream and the location of houses on both sides of the river. Constructing the stopbank beside the awa creates risks around integrity under flood conditions (risk of bank erosion undermining the stopbank) and ongoing operating costs (bank protection works). An alignment that hugs the left bank of the river also inevitably pushes more floodwater onto the opposing berm.
- 5.14. Complicating matters further, although this section of stopbank would only come into play in a large flood, breakout at this location has the potential to impact a significant number of properties as the breakout flow doesn't rejoin the awa until it reaches Rangiotu.
- 5.15. The way forward for a solution is complex; our first step is to revisit the technical work to a finer level of detail and to look at alternative alignments. Once we've done that we'll engage with each set of trustees and the landowners affected to find a way forward.
- 5.16. Not surprisingly the completion celebrations planned for this year for the **Rural Upgrade Project (RUP)** have been put on hold; the intention is to revisit planning for that event later in the calendar event.
- 5.17. From a staffing perspective Kyle Russell has joined Horizons as Operations Manager within the river management group. In the northern area Teresa Schulz was been appointed on a fixed term as Resource Management Adviser assisting with a wide range of consent-related matters.

6. INVESTIGATIONS AND DESIGN

- 6.1. 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 operational activity. The following summarises the work that the team has undertaken during this reporting period.

LOWER MANAWATŪ SCHEME – STOPBANKS THROUGH PALMERSTON NORTH

- 6.2. Following the work completed by Tonkin & Taylor, Investigations and Design staff have been working with the Central Area Team to develop a programme of investigative works that will support the operation, maintenance, and surveillance regimes that have been recommended. To facilitate this, a workshop was held with key members of staff to review the recommendations of the Tonkin & Taylor work. Following on from this staff have begun to scope the investigative programme of works to inform the next Long Term Plan.

SEDIMENTATION IN THE LOWER MANAWATŪ AND OROUA RIVERS

- 6.3. In partnership with the Science and Innovation Team, this work seeks to develop a Sedimentation Response Strategy for the long term management of sediment in the Lower Manawatu and Oroua Rivers.
- 6.4. A workshop will be held in March with key internal and external stakeholders to begin 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.

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- 6.5. In preparation for this workshop staff have met with the author of the recently completed sedimentation study to better understand the findings and recommendations of that work.

ARAWHATA STREAM & HOKIO DRAINAGE NETWORK STUDY

- 6.6. 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.
- 6.7. The Horizons Team working on this project has been made up of staff from the Investigations & Design Team and the Southern Area Team, as well as from the Science & Innovation Team.
- 6.8. During this reporting period, our consultants have begun reviewing data and information held by Horizons that relates to the area of interest to fully understand the issues, constraints, and opportunities that the study needs to address. It is anticipated that the findings from this review will be delivered in the coming weeks.

KOPUTAROA SCHEME REVIEW

- 6.9. Following consultation with a number of landowners, Iwi groups, and other key stakeholders, an initial draft of the Scheme Review has been completed. This is currently undergoing an internal review process before it is issued for comment from various stakeholders to ensure that it captures the significant issues for the long term management of the Scheme.

POHANGINA GRAVEL RESOURCE

- 6.10. Technical work on the Pohangina River Gravel Resource Study has now been completed, with detailed analysis of the surveyed cross sections having been undertaken. Staff are currently working on the report summarising the findings of this work, with the intention of presenting the findings to the next Committee meeting.

HAZARD MAPPING – UPPER MANGAONE & EAST OF LEVIN MODELLING

- 6.11. This modelling work is being done as part of the Hazard Mapping Project that is led by the Emergency Management Team. Engineering consultants Jacobs have been engaged to undertake this work, which will provide modelled information about the Flood Hazard in these two areas.
- 6.12. Unfortunately, work on this project has slowed during this reporting period, due to staff changes within the consultancy undertaking this work. However, a new project team is now in place to ensure that the project will be delivered to a high standard.

HAZARD MAPPING – OHURA

- 6.13. This modelling work is also being done as part of the Hazard Mapping Project. This model is being developed internally and staff have been working with the Survey and Information Management Teams to assemble and process the topography and elevation data that will underpin the model.
- 6.14. Additionally work has been undertaken, with assistance from the Environmental Data Team to develop the design flows and rainfall information for the model. It is anticipated that the final model will be completed within the next month.

LOWER KIWITEA – O&M MANUAL

- 6.15. Work has begun to develop an **Operations and Maintenance (O&M)** Manual for the Lower KIWITEA Scheme. This work forms part of the programme of Scheme Audits, Reviews and O&M Manual development that is in the Annual Plan.
- 6.16. To date staff have been working with the Central Area Team to understand the nature of the Scheme Assets and their maintenance requirements. This information will be used to inform the O&M Manual.

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MANAWATU DRAINAGE SCHEME MODELLING

- 6.17. Consultants Tonkin & Taylor have been awarded a contract for the modelling of this ~170 km² catchment. This will utilize the latest advances in modelling approaches and technology to formulate a better picture of just how the landforms within the drainage scheme will be impacted by future rainfall events. Where possible the work will utilize the findings from a study done after the 2004 floods, as well as taking on board the experiences of the June 2015 flood, when floodwater effects, in some locations, were actually more extensive than in 2004.
- 6.18. It is intended that the consultants will be available at the upcoming scheme meeting to discuss their work, as well as to gather information from the ratepayers with experience of flooding in the catchment.

ASSET MANAGEMENT

- 6.19. During this reporting period staff have been inputting data from the old **Asset Management System (AMS)** into the new **Asset Management Information System (AMIS)**. Additionally the User Acceptance testing of desktop and mobile apps has continued alongside the compilation of feedback and working through Revaluation and Depreciation processes.
- 6.20. Following on from recommendations from the peer review of the revaluation exercise that was undertaken at the end of the last financial year, the Flood Loss Curves have been updated with new 2019 values to determine the Scheme Reserves targets.
- 6.21. Work has begun with engineering consultants AECOM to prepare a scope of works to undertake a review of the revaluation methodology that is applied to our infrastructural assets as well as the preparation of Insurance Valuations. The insurance valuations will be undertaken with the guidance of our insurer AON.

REGULATORY ADVICE

- 6.22. 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.

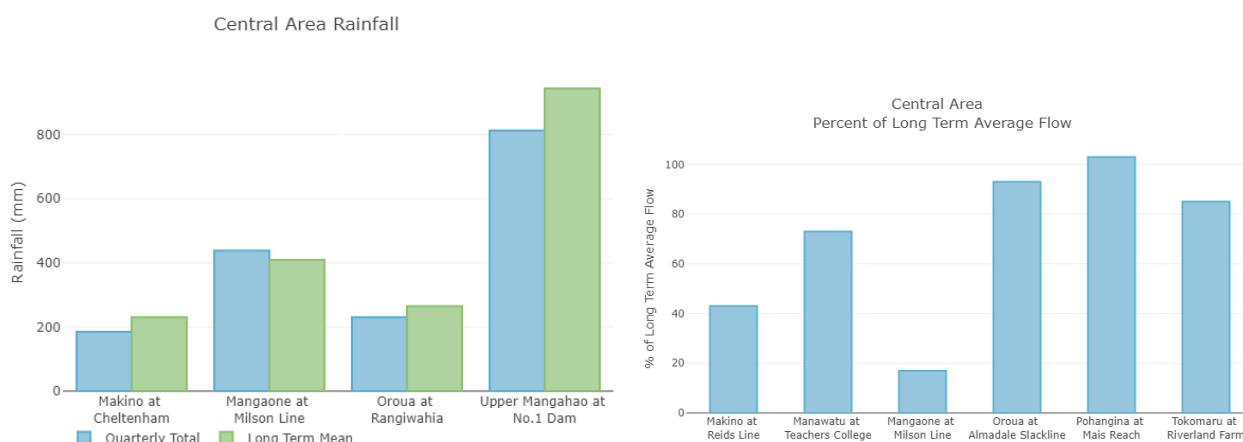
LOWER MANAWATU SCHEME RURAL FLOOD PROTECTION UPGRADE PROJECT

- 6.23. The continued dry weather through this reporting period has meant that good progress has been made on a number of the construction works within the RUP.
- 6.24. Works on the Himitangi Block Road Stopbanks on the Manawatu River have now been completed, and the earthworks on the Tokomaru stopbanks are due for completion in the next couple of weeks.
- 6.25. The upgrade of stopbanking on the right bank of the Oroua River in Feilding began in January. This is a technically challenging piece of work, in a tightly constrained area, and requires the construction of a concrete flood wall on the top of the stopbank. Considering the criticality of this asset in Feilding staff have spent time working with the designers and a peer reviewer to ensure that a robust solution has been developed. Construction work on this project is progressing well and should be completed towards the end of March.
- 6.26. As noted elsewhere work associated the completion of network extension north of Awahuri has been placed on hold while further technical/ options assessment work is carried out.

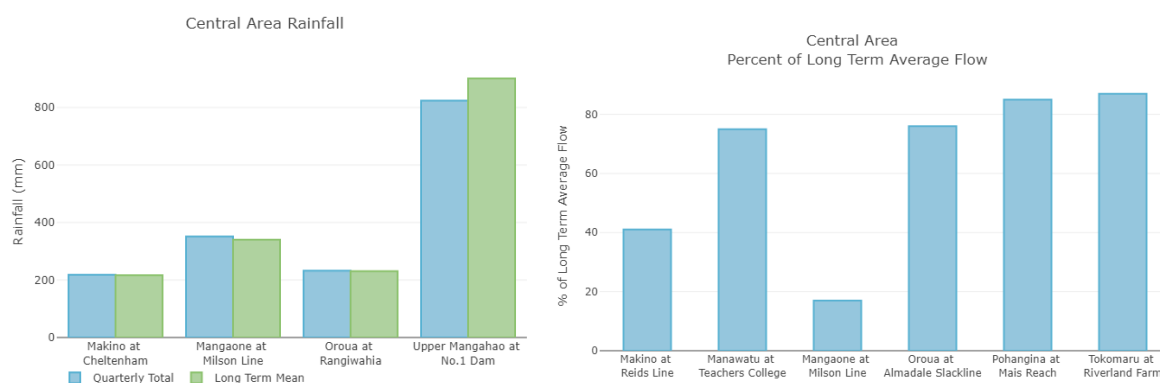
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7. CENTRAL

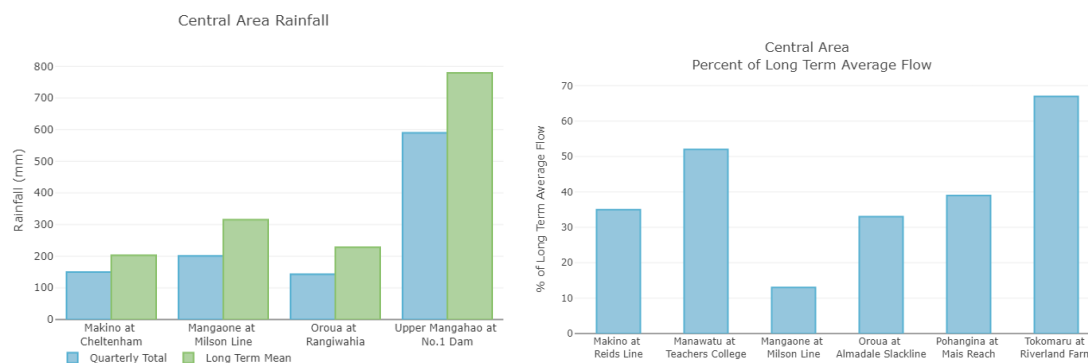
7.1. November Rainfall/Flow



7.2. December Rainfall/Flow



7.3. January Rainfall/Flow



7.4. This reporting period has seen very little rain through the system, and with strong winds has led to exceptional dry conditions. While this weather is good for earthworks, spraying is difficult.

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- 7.5. It should be noted that this reporting period was three months long, which highlights how little rainfall there has been during the period.
- 7.6. The total rainfall for this period (1 December 2019 to 14 February 2020) was: 94mm at Milson Line on the Mangaone; 89mm at Cheltenham; Makino; 237.5mm at Scott's Road, Kahuterawa; and 134.5mm at Rangiwahia, Oroua.
- 7.7. The Manawatu River, at Teachers' College, reached just over 2.1m on the 20 December (Opiki Floodway underwater at 4.2m). The Oroua River at Kopane peaked on the 21 December at 3.5m (Oroua Flood Action Plan is initiated at 6m). The Mangaone Stream, at Milson Line peaked on the 6 December at 0.3m (Mangaone Stream tip gates operate at 4.3m). The Makino Stream at Reid's Line peaked on the 9 December at 0.2m (Makino Flood Action Plan is instigated at 1.5m). The Tokomaru at Riverland Farm peaked on the 20 December at 2.2m
- 7.8. There has been a marked increase in the presence of rabbits and hares throughout the region. This is an issue for river management as the rabbits dig into stopbanks causing issues with structural integrity and stability.
- 7.9. 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 February. 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.
- 7.10. There have been a significant increase in enquires received from the public over this reporting period. These have included information requests around the city willow mulching programme, fire risks of unmown areas, fire risks of mown areas, weed control in the stream and weeds growing on council managed land, debris build up on bridges, pest control, particularly rabbits, boundary fence repairs, tree removal requests and works near or on the secondary stopbank. Staff have also worked with Horizons Science Team to respond to an accretion claim by **Horowhenua District Council (HDC)** / Crown at Waitarere Beach. This will see an area of sand dunes in front of the surf club and adjacent reserve land come under a title.
- 7.11. A workshop was held in December to critique the Tonkin & Taylor stopbank assessment report for Palmerston North City. This report will drive best practice risk and task management for the city's flood protection assets. The workshop included site visits to assess risk of some of the critical sites.
- 7.12. Staff have continued to assist the Project Team with the RUP contract works.

LOWER MANAWATU SCHEME

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

MANAWATU RIVER

- 7.14. The five yearly comprehensive secondary stopbank inspections were undertaken in November. This stopbank runs adjacent to the Palmerston North City Golf Club, through privately owned properties between Ruahine Street river access carpark and Ruamahanga Crescent. The stopbank has a lower allowable level of robustness than the primary stopbank, but must provide flood protection, therefore 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. The details of the inspection is covered in a separate Item in this Agenda.

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- 7.15. The city rock spraying programme has had delays due to Contractor workload and persistently windy conditions during November and December. Unfortunately the pre-Christmas spray was unable to be completed with the summer school holidays further delaying this maintenance work. Contractors have advised that these areas are at the top of their priority list and will be undertaken as soon as possible.
- 7.16. The spray programme that keeps the vegetation off the inside of the bends and keeps the beaches clear of vegetation has also been delayed due to the windy conditions for much of this reporting period.
- 7.17. The Fitzroy Bend Groynes were cleaned of debris early this reporting period. Debris is stacked on the berm nearby to dry in preparation for disposal at the end of summer when conditions allow. The piles are usually burnt by Palmerston North City Council in the Okoro Matariki Puanga bonfire in July.
- 7.18. Discussions have been had with staff at PNCC to remind their contractors to mow to the edge of the river berm areas. If these areas are not mown, the grass grows long and rank and is more likely to catch debris which can cause a band of silt build up on the berm. Over time, this silt build up can impact the carrying capacity of a river and interfere with flow patterns potentially causing scour damage and channelling. The edge of the beach adjacent to Waterloo Park is an area that has become increasingly unmown. Horizons have occasionally mown this area to knock it back into shape but mowing on a regular basis is the responsibility of PNCC.
- 7.19. The city mowing contract which was put out to tender in June was withdrawn due to significant scope changes occurring during the tendering process. Scheme staff are currently working with several teams at PNCC to put together overall city mowing maps and new documents for both councils. The new request for tender is planned to be advertised in April.
- 7.20. A topographical survey is being undertaken late this reporting period around the Teacher's College Monitoring Station. The purpose of this survey is to ascertain any opportunities to improve the section of stopbank upstream of the flow recorder site by removing the planter box and trees on the stopbank batter slope. The timber planter box requires repairs, the trees prevent the stopbank from being mowed, and their roots could undermine the stopbank.
- 7.21. Construction of the eel viewing platform at the Tiritea Stream and Manawatu River confluence has started. This is part of the He Ara Kotahi walkway and will provide an additional river amenity enhancement in the city.
- 7.22. Staff have continued discussions with PNCC staff around the removal of debris from the He Ara Kotahi pedestrian and cycling bridge. The build-up of debris has started to cause minor erosion around the left bridge abutment. As PNCC are the consent owners for this structure they have confirmed they will undertake the works required. Horizons engineers have and will continue to work with PNCC regarding further works along the pathways and around the various bridge structures.
- 7.23. Over the last few months PNCC have been working to replace the lime pathway along the river berm at Dittmer Drive with concrete. Scheme staff have been monitoring the site and meet with PNCC and their contractor's onsite to discuss and agree on locations for reinforced sections for heavy vehicle access, sediment control, flood mitigation measures, design solutions at pinch points, the overall contouring and finishing of the path and how it integrates with the surrounding ground. Similar onsite discussions have been had for the new patterned path downstream of Albert Street.
- 7.24. Just downstream from Dittmer Drive is Ahimate Park. PNCC are continuing their beautification works in the area as part of their river corridors plans and the area is continuing to grow in popularity, particularly with swimmers at this time of year. Horizons Communications Team are currently running public consultation around 'sprucing up' the

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swim spot and scheme staff look forward to assisting with and seeing progress in this space.

- 7.25. Inspections of the Ashhurst Domain area are ongoing with recently planted willow poles sprouting well so far. Further works are planned for this year, particularly upstream of the rock groynes on the Manawatū River to reduce the risk of the river outflanking the rock groynes. Since vehicle access has been returned to the river at the road bridge the number of vehicles accessing the river from the new carpark ramp seems to be returning to levels similar to or greater than before erosion first cut off access. With the increase in traffic, staff are hopeful that users of the area will recognise and refrain from damaging the protection works that have been put in place. These include placed rock, gravel bunds, willow pole planting and tied tree works.
- 7.26. City willow mulching and vegetation maintenance works will be commencing late this reporting period on the true left, Aokautere side, of the Manawatu River starting at ANZAC Cliffs and working upstream. Erosion repairs will be undertaken during this work as required which includes a section of erosion just upstream of ANZAC Cliffs. Mulching is also scheduled to be completed along the Ashhurst shared pathway below the road bridge. While there is a contractor in the vicinity, steel debris which appear to be from the previous bridge, will be removed. These navigational obstructions have appeared as a result of low water levels and changing beach topography in the area.
- 7.27. Staff have continued maintenance tasks along the Moutoa floodway, and around the Moutoa Sluice Gates and Tower, including the scheduled general running checks and inspections. All spillway stopbanks have been mown. Six new covers have been installed on the Moutoa Gate piers replacing the heavy metal covers, which previously required three people to be safely removed. Hoists have also been installed on each pier to assist with removing the covers.
- 7.28. Three painting contractors have been invited to tender for painting the Moutoa gates. It is expected that at least two gates will be painted this financial year. The gates are subject to extremely harsh conditions, with the paint having to resist abrasion from windblown silt and salt, being battered with debris during floods, and harsh weather conditions.
- 7.29. Two culverts under stopbanks have been extended and fitted with new floodgates. The first was along the Manawatū River on the Phillips property and has been extended by seven pipe lengths while the second was in the Moutoa spillway and was extended by three pipe lengths and fitted with a new floodgate. The culvert located in the spillway was discovered to have a concrete haunch under the old floodgate and for the length of the pipe which added to the effort required to undertake the works.
- 7.30. The rural willow mulching and vegetation maintenance programme has continued along the lower reaches of the Manawatu River. 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-effective bank stability and is the first line of protection against river edge erosion. Areas of work were on both sides of the Manawatu River at the bottom end of the Scheme. On the true left bank, works continued on downstream from the Kernahan / Guy boundary, past the Koputaroa Pump Station No. 4, down to State Highway 1, then across the State Highway, through the Lewis property to conclude at the start of the sand dunes and forestry block. On the true right bank, works were completed from State Highway 1 downstream to the Whirokino Boat Ramp.
- 7.31. It should take approx. six years to undertake tree maintenance works along the Manawatu River from Ashhurst to Foxton. Unfortunately, due to flood damage diverting funds from this programmed maintenance, this programme has never been completed, until now. For the first time, all trees have been maintained on the Manawatu River. The contractor will now be sent to Ashhurst to start working down the river again. Feedback from landowners is extremely positive, especially from the properties that have never seen our contractors working along the river.

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- 7.32. 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; hard facing of ramps.
- 7.33. High flow channels that were created at several sites earlier in the year have worked well overall throughout the winter months are currently being maintained. These high flow channels are shaped across several gravel beaches that are building up on the inside bend. Wide 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.
- 7.34. CCTV inspections of three culverts between 11km and 12km were undertaken. This is necessary to determine the internal condition of the culvert and whether they pose a threat to the integrity of the stopbank network.
- 7.35. General inspections and maintenance tasks, including spraying of gorse and goatsrue are continuing along the length of the Manawatū River. Approximately 18km of Manawatū River stopbanks have been mown across ten properties this reporting period.
- 7.36. Discussions with NZTA have started over access to Parahaki Island at Ashhurst. As part of the Te Ahu a Turanga gorge road project, the trustees of Parahaki Island would like an alternative access provided, and one possibility maybe by way of land that Horizons owns and leases. NZTA are preparing details to discuss with the leasee.
- 7.37. PNCC are progressing the design of the walkway along the river at Te Matai Road. The adjacent landowner has some specific concerns over privacy and security, and together with the extremely narrow berm, some modification of the stopbank will be required to enable the shared pathway to progress. PNCC are consulting with Horizons and have engaged GHD to design a solution, using the same engineers that have designed the stopbank and flood protection through Feilding.
- 7.38. The Whirokino Trestle Bridge Project contractor are in discussions with Horizons as to how the old Trestle Bridge is to be demolished and where the concrete will be disposed of. Ruakawa iwi have approached the contractor to secure some concrete to use as bank protection downstream of the bridge on the left bank.
- 7.39. Discussions over works on the Manawatu River are on-going with Ngati Whakatere. An initial meeting has been held between River Management and Whakatere in Shannon and further meetings are planned to discuss the location and type of works that the Scheme will be undertaking.

OROUA RIVER

- 7.40. A new drainage culvert was installed in the recently constructed stopbank, true left bank of the Oroua River downstream of Feilding.
- 7.41. Scheme staff helped with the completion of the Bailey stopbank on Daltons Road, plus the initial planning and property access agreements for the new stopbank at Awa Street, Feilding.
- 7.42. Mowing of several stopbanks has been undertaken in the system. This is required as long grass on stopbanks encourages linear stock movements which can cause damage to the bank and can also be a fire risk. A manageable level of grass also allows for easier inspection with defects being more readily seen.
- 7.43. New stopbank grazing guideline pamphlets have also been handed out, along with one on one conversations with several land owners regarding best practices for grazing stopbanks.
- 7.44. A repair of two scour holes and longitudinal bank erosion between 31km and 33km has been completed. A vertical section of bank has been battered to a stable angle and

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willows have been planted to promote stability. 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

- 7.45. The mulching and layering programme has continued on the true right bank from 36km upstream to 38km finishing at the Aorangi Bridge. 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 extreme wind conditions but has since been completed.
- 7.46. Due to constant silt build up on the mid to lower section of the Oroua River, a silt removal contract has been put out to tender. This contract is designed to remove silt from the bank and berm area of highly aggrading stretches of river, leaving steep banks. The main outcome of this is to increase the flood channel capacity which has been lessened through the silt build up. The steep banks also allow a more natural and consistent movement of silt through the system which discourages rapid build-up. This contract has been awarded and work is due to start in the last week of February.
- 7.47. Stopbank repairs have been undertaken on the true right bank from 9km-11km. These 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 cause weakness in a flood event, and are also difficult in regard to day to day maintenance.
- 7.48. General spraying and maintenance work has also been completed around Hoihere Road Bridge structures.

MANGAONE STREAM

- 7.49. Scheme staff assisted the Horizons Projects Team with the final completion of the new stopbank adjacent to Flyers Line, Palmerston North.
- 7.50. A start has been made on the site of the proposed new drainage pipes and stopbank along the rear of the houses in Benmore Avenue, Palmerston North. The site has been cleared of vegetation ready for the earthworks and work is programmed to start late February, early March.
- 7.51. The Mangaone Stream continues to be inspected regularly and overall, remains in a good condition. There is a large amount of growth on the beaches at this time of year and contractors are working to get on top of this. Mechanical channel maintenance and gravel relocation works are planned to commence early next reporting period.
- 7.52. A particular 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 undertaken as part of the above mentioned works to retain the current channel alignment.
- 7.53. The Tremaine Ave gabion baskets have further deteriorated and are in a poor condition. The gabion baskets are a PNCC asset, being within 20m of the Tremaine Avenue Bridge. As such scheme staff are awaiting decisions from PNCC as to how they wish to proceed with the replacement of this asset. Recent activity in the area has seen the baskets being used as proxy ladders for members of the public to gain access to the stream bed and gravel beach below, this has led to a section of vegetation loss on the downstream left bank and this may accelerate the deterioration of the asset further.
- 7.54. Efforts to eradicate, or at least significantly reduce the rabbit population above Rangitikei Line are continuing. The number of rabbits this year is significantly higher than in recent years. Repairs and fumigation of the burrows were initially undertaken in August, and the problem has proven not to be an easy or quick fix. Horizons Pest team are assisting.

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- 7.55. The berm areas in the lower reaches of the Mangaone Stream that were cleared by PNCC over the last year have been sprayed for weeds and preparation for planting the right bank. Some vegetation clearing remains to be done however only once neighbouring fence lines have been addressed. Additional channel clearing works are planned for this reach later in the season, if budgets and contractor availability allow.
- 7.56. This reporting period saw three requests for contributions towards repairs or replacement of boundary fences along the Mangaone Stream reserve. One was due to a large fallen willow branch. The fence was repaired and an approximately 40m section of unwanted vegetation on the landside berm was removed. Adjacent landowners had previously requested this vegetation be removed so the opportunity was taken to complete this work at the same time. One complaint was received after the works were completed from a non-adjacent landowner that had preferred the privacy provided by the vegetation. The remaining two replacement requests all stemmed from one particularly strong wind event in early January. The previous backlog of tree removal requests along the Mangaone Stream have now also been completed.

MAKINO STREAM

- 7.57. High winds during January resulted in several large trees falling into the Makino Stream. These were promptly cut up and removed to ensure they would not cause erosion or a blockage in the stream.
- 7.58. Discussions held with **Manawatu District Council (MDC)** regarding the proposed walkway along the Makino Stream in the vicinity of Rata Street, Feilding are on-going.
- 7.59. The recently purchased property on Reid's Line spillway at Pharazyn Road has a substantial shelter belt that restricts the flow along the spillway. An agreement was reached with the tenant currently in the Horizons property on Pharazyn Road and the neighbour to remove this shelter belt.
- 7.60. Horizons staff have observed that when the Reid's Line spillway operates, there appears to be flow on the land side of the stopbank. A contractor with a ground penetrating radar was engaged to locate any buried tile drains that may run under the stopbank. Several drains were located, and will be sealed off.
- 7.61. Maintenance spraying and debris clearing around spillway structures has been undertaken.

STONEY CREEK

- 7.62. All assets were inspected and found to be in a good condition. General maintenance including spraying around floodgates has been undertaken.

TURITEA STREAM

- 7.63. On the Turitea Stream, upstream of the Lower Manawatu Scheme, a length of erosion had been repaired using a rock lining. The works were organised and supervised by Scheme staff on behalf of PNCC, the landowner.
- 7.64. Upgrade work has been planned by PNCC around the Tenant Drive shared pathway underpass. Scheme staff have considered the design and the proposed planting plan and will work with PNCC and monitor the site to ensure a positive solution for all parties.
- 7.65. Scheme staff and the Freshwater Team are continuing work on the Turitea Stream enhancement project. At a recent meeting, an agreement was reached with Massey that they will contribute up to \$10,000 per year for five years to remove willows, clear vegetation and plant natives between the campus and Old West Road. The work will be undertaken by River Management with the Freshwater Team, and could involve Green Corridors and PNCC, with space being left for a shared pathway in the future.

KARA CREEK & MANGAPUKATEA

- 7.66. General maintenance spraying has been completed around the five floodgates.

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MANGAORE STREAM

- 7.67. Spraying of gorse and the removal of weed from the channel has been undertaken. Both stopbanks have been mown through the Ryder property.

LINTON MAIN DRAIN

- 7.68. Linton Drain Road stopbanks have all been mown.

TOKOMARU RIVER

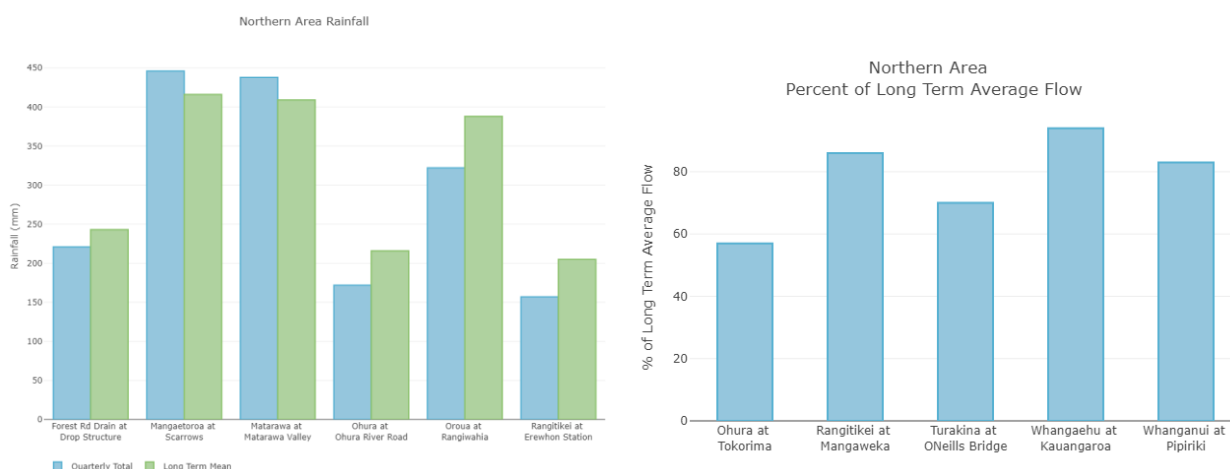
- 7.69. Nine kilometres of stopbank mowing has been completed along the Tokomaru River. Stopbank spraying has been undertaken near the wetland to help control weeds.

LOWER KIWITEA STREAM SCHEME

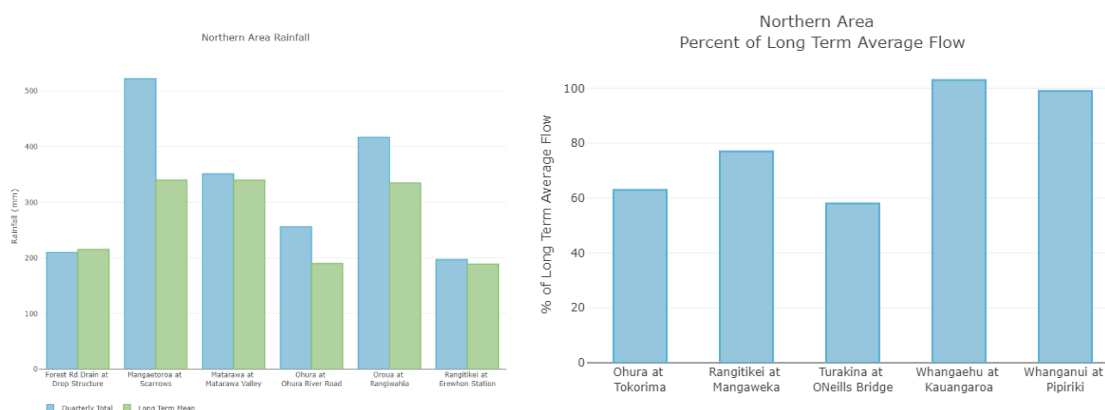
- 7.70. Maintenance works were completed of the full reach of the Kiwitea Stream. Works consisted of the following: clearing flood debris from the beaches; gravel relocation and / or extraction from any beach build ups causing erosion problems on the opposite bank; removing any heavy vegetation growing on beaches and / or inside bends of the stream; layering of existing willows where appropriate.
- 7.71. Several existing erosion repair sites were 'beefed up' using concrete rip rap material.
- 7.72. Several new erosion sites were repaired using concrete rip rap material.

8. NORTHERN AREA

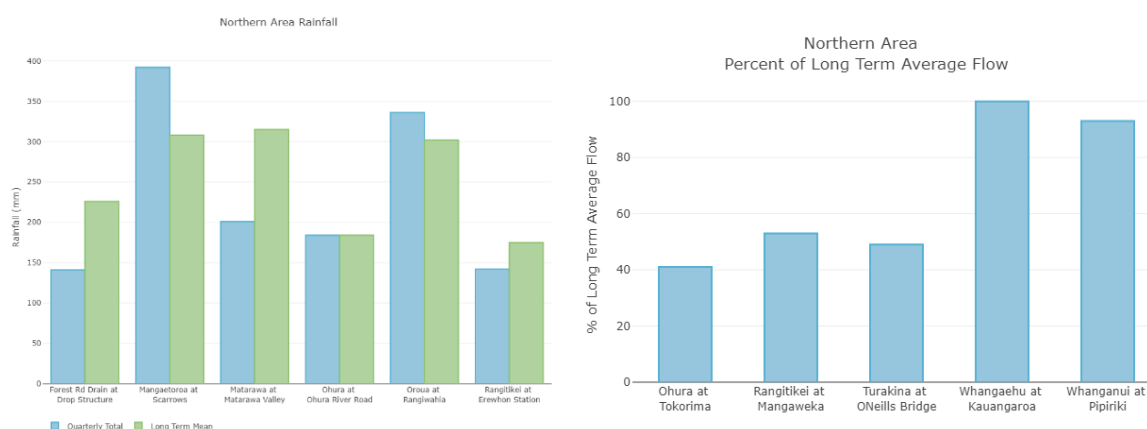
8.1. November Rainfall/Flow



8.2. December Rainfall/Flow



8.3. January Rainfall/Flow



8.4. Summer months are now with us and very low rainfalls totals over the past two months have seen many rivers in the area at record lows for the time of year.

8.5. The Northern team has experienced some changes in the past two months. Teresa Schulz commenced with the team as our Resource Management Advisor for a fixed term. This new position provides her with some exciting challenges, as we seek a raft of new resource consents to undertake work and commence the process to renew many more that are at the end of their regulatory life. We also have Nigal Jordon join us as our new Works Supervisor. Nigal replaces Gerry Linklater who was promoted to Engineering Officer towards the end of 2019.

RANGITIKEI RIVER CONTROL SCHEME

8.6. With dry weather conditions persistent in the Rangitikei, the river remains low, nearing record breaking lows.

RANGITIKEI MAINTENANCE WORKS

8.7. Taking advantage of a low river we worked to clear blockages and debris from the usually deeper reaches of the Rangitikei River at Walmac Farm and Parewanui farm. Following this we repaired tracking hollows on the crest of the stopbank along a 2km reach, repaired wearing of the stopbank around gates and fixed a bull hole on the landward side of the stopbank on Walmac farm caused by a leaking water pipe.

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- 8.8. Stopbanks were routinely mowed in December. Gorse, fennel, bamboo and willow sprayed on the side of the stopbanks during December /January. Fencing was re-erected along Te Hou, where 'bottleneck vegetation' had previously been removed.
- 8.9. The Taylor Road guide bank over ramp was raised to address vehicle wear.
- 8.10. Parewanui No. 3 Drain, was mechanically cleaned from the stopbank to the river and inspected / sprayed on the landwards side of the stopbank.
- 8.11. Parewanui No.5 Drain and Parewanui No.1 Drain where also inspected / sprayed.
- 8.12. A mechanical drain clean of Amon Drain has just been completed. An extra labourer was employed to preserve the aquatic life in the drain. A total of 917 tuna were placed back into the drain.
- 8.13. Aerial Spray notifications were published in the newspapers and sent out to all affected land owners early January. The planned spray will be completed by end of February.
- 8.14. In our nurseries, we have worked hard to clean them up ready for an autumn harvest. General maintenance includes; mowing, blackberry removal, spraying, and pruning.
- 8.15. Parewanui Stopbank upgrade work planned this year crosses over the national gas main feeding the Lower North Island. New Zealand Gas have insisted an engineered concrete wall be installed as part of the upgrade work to ensure the loading conditions on the gas main remain at acceptable levels. After ongoing design approval delays we are now in a position to begin contract documentation for the wall installation which is planned for completion this financial year. However due to these delays the planned stopbank earthworks upgrade will need to be carried over to next year.
- 8.16. **Gravel Extraction – GBC Winstone** - 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.

POHANGINA-OROUA RIVER CONTROL SCHEME

- 8.18. Scheme work for the year is now completed with only subsidized river bank erosion repairs to complete. This work is funded 60% by the landowner and 40% by the scheme with Horizons Engineers managing the work.
- 8.19. River levels are very low in keeping with this time of the year and no significant work is being planned until these improve. Work is planned under our subsidized erosion control budgets to carry out possible repairs at the Beveridge, Ward, Eales and Fairless properties. These works will involve rope and rail groyne installation and some associated tree work. These works will have a higher chance of success if we wait until wetter ground conditions are experienced to ensure transplanted trees do not die off. We are monitoring the situation and if we get early rain they will commence then.
- 8.20. **Gravel Extraction** - 200m³ of gravel extraction has occurred from the Pohangina River this reporting period.

OROUA RIVER

- 8.21. Again river levels are very low however all of our significant repairs on the Oroua have been completed prior to this report. We have had queries involving gravel removal at some sites but the low river levels seem to make the situation appear more apparent than normal. These beaches are normally in accretion areas in any case and are of little significance unless they impact adjoining erosion repair sites.
- 8.22. **Gravel Extraction** - 1,863m³ of gravel extraction has occurred from the Oroua River this reporting period.

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TOTARA RESERVE

- 8.23. Over the Christmas period an accident involving injury to the public occurred at Camp Rangi Woods due to tree fall. It has therefore been decided that all of the remaining Lombardy poplars need to be removed as soon as possible in the interests of public safety. These will be removed over the next month and native trees planted in their place. River Management are working closely with other groups in Horizons to safely manage and improve this situation with as little disruption as possible.

UPPER WHANGANUI RIVER MANAGEMENT SCHEME

- 8.24. A Hui was held at Cherry Grove in Taumarunui with Ngāti Hāua representatives and was successful in identifying wāhi tapu. An agreed pathway has now been established to enable the coppicing of vegetation along the left bank of the Ongarue River and the removal of a willow build-up within the channel.
- 8.25. A number of Lombardy poplar trees were removed from the river berm area adjacent to the “The Channels” swimming area. These trees had developed rotten cores and were becoming unstable posing a risk to recreational users of the site.
- 8.26. The river berm area at the end of Porou Street has been fenced to prevent cattle reaching the waterway. This was funded through an Environmental Grant jointly supported by the **Ruapehu District Council (RuDC)**, the Horizons Freshwater Team and the River Management Team. This collaboration between Councils and internally between Horizons activity teams highlights the successes that can be achieved by working together.
- 8.27. Stop bank mowing was completed through Taumarunui during the latter part of January.
- 8.28. **Culvert Upgrades** – Horizons has been providing RuDC with engineering advice on the upgrade of 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 RuDC has asked Horizons to assist them in having consultant DHI rerun the stormwater runoff model to assess the effects of the planned upgrades. Progress towards this goal has been delayed temporarily while an important RuDC contact overcomes an illness.
- 8.29. **2019 Swim Spot Spruce Up** - Following consultation with Ngāti Hāua it has now been agreed to move the 2019 Swim Spot Spruce Up to the “Snookerbob” site on the Makotuku River in Raetihi. This is an excellent location and sited amongst the fabulous river bank development work undertaken by Raetihi Promotions. Work should commence here early in March.

MATARAWA FLOOD CONTROL SCHEME

- 8.30. Maintenance work on this scheme has again been quiet over the past two months.

MATARAWA URBAN

- 8.31. Maintenance work has been somewhat reactive this year, other than a few remaining jobs from last financial year.
- 8.32. Three more trees causing channel congestion have been removed in the esplanade on Raine Street. Remedial work on another property on Raine Street, and Ikitara Road have been completed.
- 8.33. A Bamboo spray, and remedial work at the Whanganui District Council Flats on Ikitara Road as well as vegetation removal and grassing on the stretch of the stream immediately downstream of the Anzac Parade Bridge in Kowhai Park is commencing.

TUTAENUI FLOOD CONTROL SCHEME

- 8.34. The annual urban inspection of the stream through Marton is due to be undertaken over the next few weeks. Prior to this inspection the Scheme Engineer will send out courtesy letters to adjacent landowners advising that the activity is taking place. Historically this was not required but in more recent times home owners have become sensitive about people walking down the stream at the back of their properties.
- 8.35. We are also programming areas of drain clearing and some tree removal work in the State Highway 3 area north of Bulls.
- 8.36. Mechanical drain cleaning has also been done in Johnston Street Bulls on the weed infested Hanratty's Drain. This has been greatly appreciated by the local landowner and phone calls of appreciation on the work done have been received by the Scheme Engineer.

MAKIRIKIRI FLOOD CONTROL SCHEME

- 8.37. There has been no work completed here over the past few months. Stantec visited from Christchurch to inspect the Mangatikitiko Dam, as part of completing a **comprehensive dam safety review (CDSR)**. A contractor has been engaged to drain clean the Mangitikitiko Drain.
- 8.38. Makirikiri programmed scheme work will be completed April / May.

POREWA FLOOD CONTROL SCHEME

- 8.39. Maintenance work on this scheme has again been quiet over the two months.

WHANGAEHU MANGAWHERO RIVER MANAGEMENT SCHEME

- 8.40. An inspection has been completed on the Whangaehu between the Kauangaroa Bridge and the State Highway 3 Bridge. This was done primarily to generate a plan for this year's aerial spray programme. The opportunity was also useful to evaluate the possible issue of Acacia trees starting to grow on the banks where willow removal has occurred. This appears to be a legitimate threat so will be discussed with the scheme stakeholders.

TURAKINA RIVER MANAGEMENT SCHEME

- 8.41. Preparations have taken place for aerial spraying on the Turakina scheme. The proposed spray area is from the State Highway 3 Bridge, downstream to the river mouth.

LOWER WHANGANUI VEGETATION MANAGEMENT AND FLOOD PROTECTION PROGRAMME**Scheme Works**

- 8.42. Monthly inspections of the floodgates are on-going.
- 8.43. Routine stop-bank mowing has been recently completed.
- 8.44. A knee breaker fence along Karoro Road was repaired along with weed eating completed.
- 8.45. The timber planter box along Gilbert Street was damaged from the fire of a burnt out car. A contractor has been engaged to complete the repair.
- 8.46. Regular discussions are continuing with Tupoho regarding river works with the aim of building a closer working relationship. An agreed process in these discussions is to provide a detailed work programme at the beginning of each new financial year.
- 8.47. Whanganui City Bridge enhancement project is in planning stages, with ideas to create a wall of flood history and information along the popular river walkway.
- 8.48. Papaiti vegetation clearance has been delayed along with other work until a consent has been applied for and granted.

Lower Whanganui River Infrastructure

- 8.49. **Sailing Club Rock Lining** - 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, and 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. The resource consent application will be lodged once approval is obtained from Ngā Tangata Tiaki.
- 8.50. **South Spit LiDAR** - After growing concerns of prolonged erosion on the South Spit (embayment) a LiDAR survey was flown in September. This data has shown a general enlargement over time of the embayment which is now being used in work priority programming.
- 8.51. **Balgownie Floodwall – Flood Barrier** - The Te Kaihau o Kupe Waka Ama group has approached Horizons for advice in regards to an access gate through the floodwall asset 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.

Lower Whanganui River Training Structures

- 8.52. 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;
 - A PGF funding application has been submitted with an update expected from the Ministry in late February.

Tasks that will continue to be progressed over the next two months include:

- Progress the development of the Waitahinga Quarry for commercial operations;
- Progress the application for a resource consent from Whanganui District Council to store rock in the North Mole area;
- Notification of identified claimants for customary marine title and seek opinions; and

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- Seek opinion and approval from Te Pou Tupua around specific proposals at the two works sites.

OHAKUNE SCHEME

- 8.53. Work this year will largely focus on a resource consent application to allow scheme work to be undertaken.

RUAPEHU DISTRICT WIDE SCHEME

- 8.54. Work this year will largely focus on a resource consent application to allow scheme work to be undertaken.

PAKIHI SCHEME

- 8.55. No work undertaken in this reporting period.

FOREST ROAD DRAINAGE SCHEME

- 8.56. No work completed over the last few months drain spraying is programmed for March / April.

HAUNUI DRAINAGE SCHEME

- 8.57. No significant work programmed over this period due to the Christmas and New Year holiday period. However due to high winds in the area over January we were required to engage a local contractor to clear windblown tree debris from some roadside drains which Horizons maintains. Dependent on scheme finances a spray is due in March / April period.

NORTHERN ANNUAL SCHEME REPORT

- 8.58. Each year an annual report is prepared outlining the activities, and the financial standing of the 15 schemes in the Northern area for the previous financial year. Work on the 2016-17 report remains underway.

ENGINEERING ADVICE

- 8.59. During the last two months there have been continued requests for advice on a variety of issues including rural flooding in non-scheme areas, clearing blocked culverts, clearing stream channels of vegetation and fallen trees, diversion queries, compliance issues and flood damage work. Specifically, these include wind-blown trees around water courses, river bank erosion problems on the Pungapunga River east of Taumarunui, several sites on the Taringamotu River, various queries from RuDC, and a land drainage dispute between landowners up the Turakina Valley.

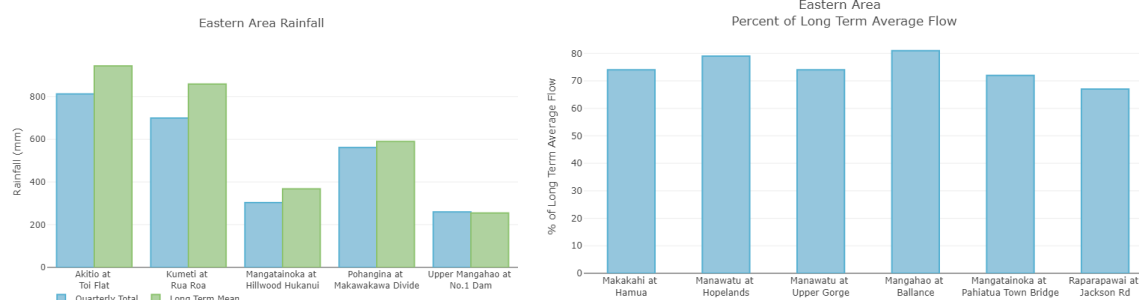
OTHER PROJECTS

MOAWHANGO RIVER

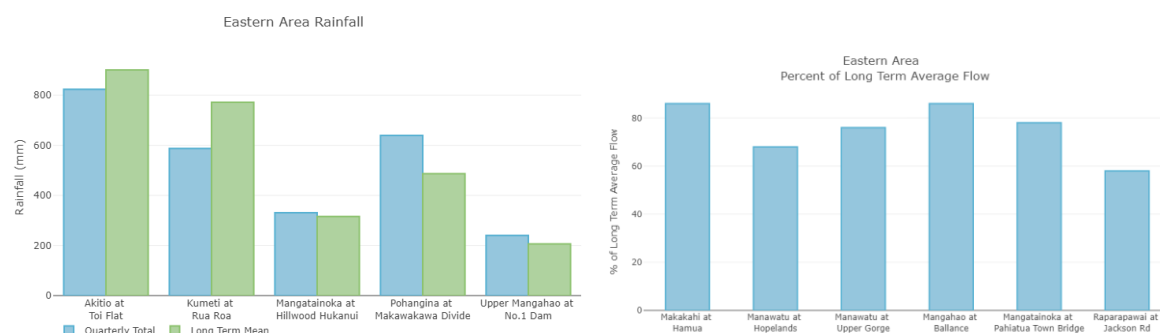
- 8.60. Inspections by kayak of the Moawhango River have taken place. This identified two partial blockages that need clearing and highlighted the regrowth of willow that forms our spraying programme. This inspection also highlighted how effective the spraying has been in the past with a large number of dead willow trees clearly visible. Genesis are currently evaluating their budget constraints before the work plan is finalised.

9. EASTERN AREA

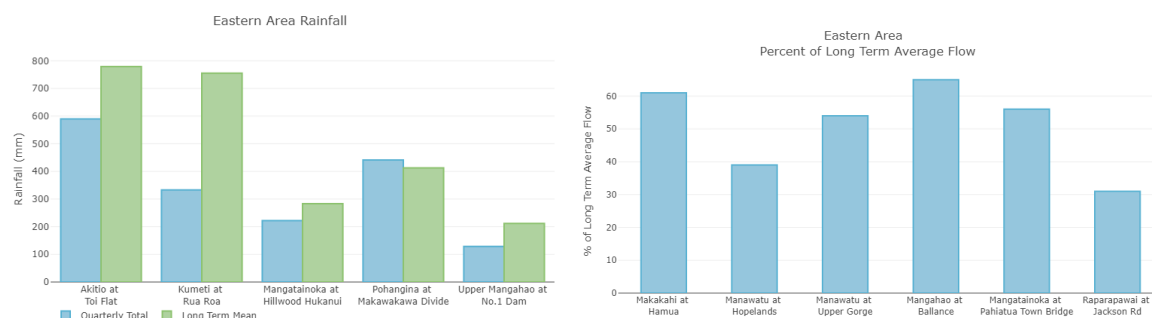
9.1. November Rainfall/Flow



9.2. December Rainfall/Flow



9.3. January Rainfall/Flow



9.4. In contrast to last year, this year has had a dry lead in to summer, with sporadic rainfall in most parts of the district. The summer period has been extremely dry, with almost no rainfall in the district east of Woodville and Pahiatua. As a result, river levels in the district, particularly in the headwaters, are extremely low. There have of course been exceptions, particularly in the headwaters of the Mangatainoka where in the 2 weeks leading up to Christmas, periods of intense, localised, short duration rainfall resulted in very rapid rises in river levels

9.5. Works within the Mangatainoka scheme get fully underway, post-Christmas, as most reaches within the Mangatainoka river have values for Trout Spawning and Dotterel Nesting - which means that work activities are avoided between the start of May and end of December each year. The focus so far has been on the southern headwaters, with works moving steadily downstream.

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- 9.6. The South Eastern Ruahine scheme by contrast has had an extremely busy year to date. The scheme comprises 21 separate waterways, all of which have differing river values and as such, times in which work can be carried out. It is satisfying to note that the last of the flood repairs from the floods of June 2019 were completed in the Oruakeretaki River in January. This was due to the values in this particular section of the river precluding any work being completed between the start of May and the end of December.
- 9.7. A large tranche of maintenance work is being undertaken on two streams that border Dannevirke. It is unusual for river management to be undertaken in urban environments in the Tararua District. As such, some significant effort has been undertaken to communicate the work with the community. This has involved letter drops to affected landowners, notifying elected representatives and working with **Tararua District Council (TDC)**. TDC have been very helpful, placing information about the work on their website and making use of their social media resources to notify the community of Horizon's work.
- 9.8. A range of different works have been completed in the Tararua River Management scheme, and its particularly exciting to note that river management will partner with land management staff to undertake an erosion and river congestion control programme in the Tiraumea River, to attempt to improve overall river flow and sediment loads. The Tiraumea has extremely high suspended sediment levels and is particularly prone to congestion.
- 9.9. On top of this, there have been the usual inquiries around willow control, erosion, and fencing. Inquiries around access to water, particularly stock watering where wells have dried up or low river levels have prevented abstraction, have become common.
- 9.10. Also, engineering advice is in demand from both TDC and the Tararua Alliance as work programmes for both of these groups ramp up with various capital projects starting within the district, such as the Pahiatua main street upgrade, the Eketāhuna water treatment plant and the Pahiatua water treatment plant.

TARARUA DISTRICT RIVER MANAGEMENT SCHEME

- 9.11. A large amount of channel clearing and beach maintenance has been completed on the Upper Mangahao near Kopikopiko Road. This work has helped to give considerably more flow capacity, as the channel in this section of the river was becoming constricted in places and prone to becoming destructive during high flows.
- 9.12. Channel clearing and some bed shaping has also been completed on the Otope Stream, a tributary to the Manawatū River, to increase flood capacity and mitigate bank overtopping and erosion occurring on two bends, just upstream of the confluence with the Manawatū.
- 9.13. Further channel clearing works are planned next month for a large section of the Tiraumea and tributaries to the Ihuraua. This work is being done in partnership with land management and is designed to remove river congestion, improve channel carrying capacity and improve soil stability – through removal of overgrown vegetation and the targeted placement of soil stabilising vegetation. The Tiraumea is the most silt laden waterway within the district and this work is being undertaken in high erosion areas to improve river quality overall.
- 9.14. In the eastern areas of the district, vegetation clearance is being planned on the bed of the Tautane Stream at Tautane station – east of Herbertville. Vegetation clearance work will also be undertaken on a flat section of the bed of the Mangahei Stream – around where it crosses Mangahei Road – to prevent the regular flooding events which result in the closure of Mangahei Road and threaten two nearby houses.

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MANGATAINOKA SCHEME

- 9.15. The past couple of months have seen prolonged low flow rates which, although it has been good for completing works, has made the river appear quite murky at the edges with algae growth. There have also been a couple of incredibly fast climbs in river level due to sudden downpours. Just before Christmas the measuring station at Larsen Road hit 3415mm; a height not seen since September 2017.
- 9.16. The main focus for works in this Scheme over the period has been in the southern most reach. This has consisted of maintenance and installation of tied tree works, as well as large sections of vegetation clearance on the built up beaches. Several extremely large trunks have been uncovered during this process. They have been removed from the edge of the bed as they are more than likely the cause of a lot of the erratic bends in this reach. Protection works are being either built or repaired in conjunction with this removal so the course of the river is not drastically altered. Once the excavator work is complete a team will go through the reach with a quad-bike mounted spray rig and kill off the remaining, smaller, beach vegetation. This will hopefully lead to a decrease in gravel build up on these particular beaches.
- 9.17. With the tied tree works we are seeing a very positive success rate with tree survival. The works completed before Christmas are already covered in fresh shoots, which is very promising.
- 9.18. Investigations have begun on the current state of the scheme stopbanks, as a follow up to the survey work undertaken earlier in the year. Advice was sought from the Central Team, as they have much more experience and practical knowledge in the maintenance of such structures. After a meeting and site visit with Paul Turner, a contractor has been engaged to start work on vegetation management and any resulting repair works for the Kamos Bend stopbank. Depending on how efficiently this work is completed we may also be able to look at resurfacing sections of the Hamua stopbanks this financial year

SOUTH EASTERN RUAHINE SCHEME

- 9.19. The last of the flood damage repairs required after the June 2019 flood event in the lower part of the Scheme has been completed on the Oruakeretaki River, after access restrictions due to Trout Spawning and Galaxiidae Spawning ended. This work was completed at the beginning of February and comprised PMU gates and Tied Tree Works at a particularly narrow stretch of the Oruakeretaki River where the river had eroded a significant section of an outside bend. The works involved working with the newly developed width in the river to encourage full channel flow across the bed – thereby increasing channel carrying capacity. The placement of the PMU gates and tied tree works allows for training of the river and protects outside bends from further erosion.
- 9.20. Scheme works have moved into Channel Clearing and Maintenance with a large amount of work planned to be undertaken in the Tapuata and Mangatera Streams surrounding Dannevirke. Like much of the Scheme, these streams are overgrown and require tree maintenance to open up the channel and improve flow and flood carrying capacity. The congestion to these streams has seen significant amounts of erosion developing along multiple stretches on both waterways. The congestion has had a detrimental effect on the flood carrying capacity on both waterways and this has been particularly noticeable recently on the Tapuata Stream.
- 9.21. Work has started in the Tapuata Stream, near to its confluence with the Mangatera Stream at the south eastern corner of Dannevirke. It was envisioned that both the Tapuata and Mangatera Streams will be completed this financial year. However progress has been slow so far on the Tapuata Stream (due to it being severely overgrown), so as such the scheme may not have sufficient funds to complete both the Tapuata and Mangatera Streams as planned this financial year.

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- 9.22. A tender for Drain Spraying on the Scheme is currently being drawn up to send out to contractors. This will also include the Upper Manawatu / Lower Mangahao scheme drain spraying.
- 9.23. Drain maintenance has been programmed to start in late March.

TAWATAIA - MANGAONE SCHEME

- 9.24. Monthly inspections of the dam are being completed as per the Stanec dam recommendations.
- 9.25. The Stanec report identified significant scouring of the tail-race immediately downstream of the culvert on the dam, which needed repair to prevent damage to the toe of the dam. As a result, in the last financial year, a rock lining was installed to protect against further erosion. This has had limited success
- 9.26. Investigations undertaken with the Engineering Investigations and Design Team have identified that the scouring seen in the tail race is most likely caused by flow restriction, where the tail race completes a 90 degree bend, shortly after exiting the dam.
- 9.27. As such a plan is being developed to create an overflow channel on the tail race to relieve the pressure at the bend during high flows. A consent application is currently being drafted for this work and costings are being sought.

UPPER MANAWATŪ– LOWER MANGAHAO SCHEME

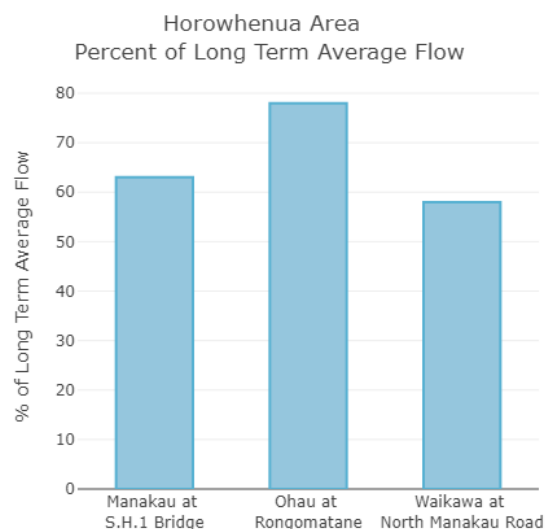
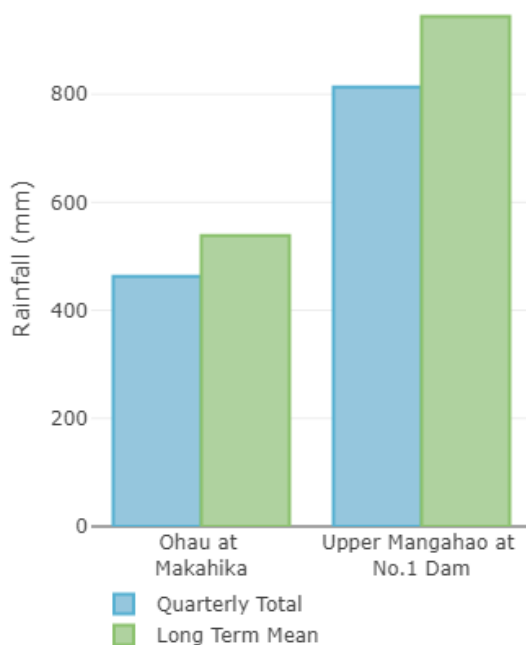
- 9.28. Bank erosion was repaired on the Manawātū River near the top of the Scheme below Oringi, through the use of tied tree works and tree groynes utilising willow plantings within the area. It was noted that there has been either a significant aggradation of metal, or a combination of aggradation of metal and channel degradation in this area.
- 9.29. Erosion repair works have been planned for the Manawātū River on Oete Road and upstream of Oete Road. Both areas have large holes in the banks caused by trees being washed away in flood events.
- 9.30. Bank strengthening works are also being considered at the confluence of the Manawātū and Tiraumea Rivers in anticipation of the Tiraumea River cutting through its own true right bank and into the Manawātū River on its true left bank. This would be done as a preventative measure against erosion on the true right bank of the Manawātū River – directly opposite the Tiraumea River, as the orientation of the Tiraumea River when it breaks through to the Manawātū River will be at 90 degrees to the Manawātū River. As such, this is of concern to the land owners on the true right bank of the Manawātū River, who have fears of seeing significant erosion of their banks should the Tiraumea break through during a high flow event.
- 9.31. Work is also to begin shortly on the lower stretches of the Mangahao River which will entail bank protection works and spraying of vegetation on the bed of the river.

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10. SOUTHERN AREA

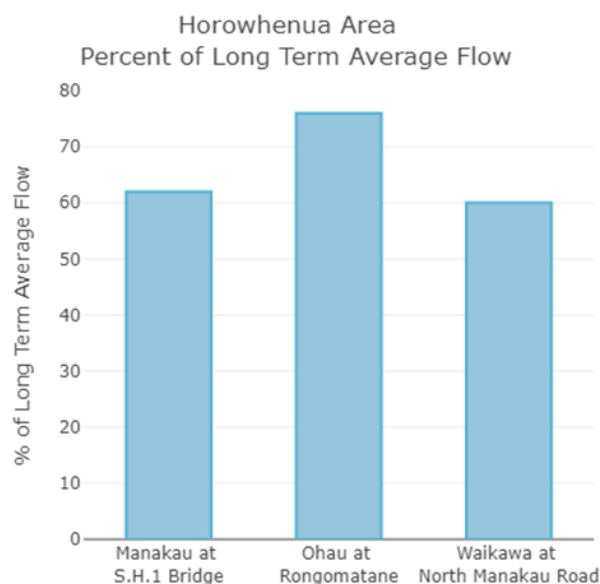
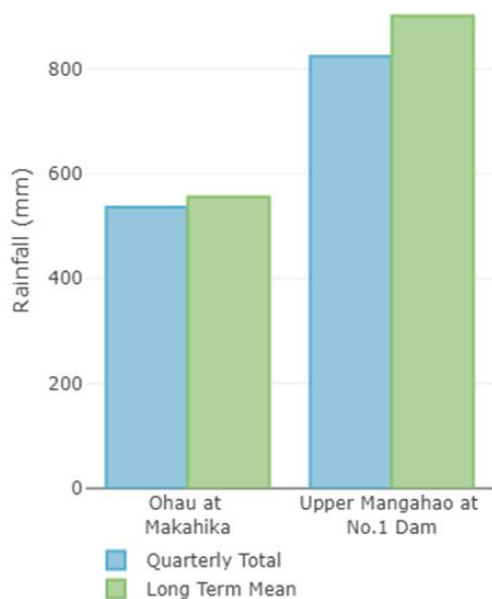
10.1. November Rainfall/Flow.

Horowhenua Area Rainfall

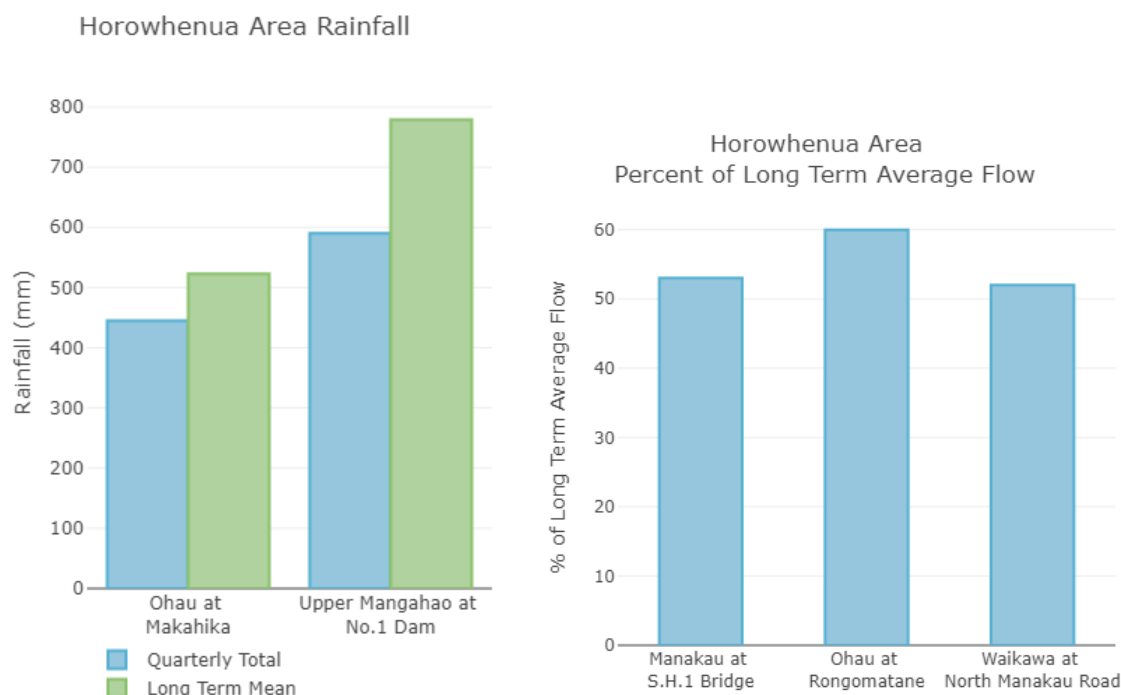


10.2. December Rainfall/Flow

Horowhenua Area Rainfall



10.3. January Rainfall/Flow



- 10.4. 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.
- 10.5. Staff have been working closely with the Corporate Assets Team around the proposed upgrade of the Kairanga Depot. The main focus over this period has been the construction of the new heavy vehicle access and stormwater drainage alongside Kiwi House and the new heavy vehicle turnaround at the back of the depot.
- 10.6. Request for engineering advice has continued over this period including a number of request from District Council Staff around who is responsible for maintaining various drains around the area.
- 10.7. Staff are assisting the Freshwater Management Team with the construction of a new fish passage out towards Linton.
- 10.8. Representative from both Southern and Central River Management Staff have held preliminary meetings with representative from Te Roopu Taiao o Ngati Whakatere Trust to discuss opportunities for information sharing and collaborative working arrangements regarding ongoing maintenance works within their area of interest. Further meetings are being arranged to continue these discussions and to build a shared understanding between River Management and the Trust.
- 10.9. Staff continue to work closely with various other teams from within Council and consultants regarding the implementation of the new Asset Management Information System (AMIS). Current focus at the moment is on trialling the task scheduling module of the system.

OHAU-MANAKAU SCHEME

- 10.10. This period has been dry with all channels experiencing very low flows. Some channels that were sprayed during the previous period are experiencing a lot of weed growth and may need to be sprayed again.

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- 10.11. Changes with the Ohau River channel alignment on the Kilsby property between the quarry and State Highway 1, distance of 14km has resulted in some erosion just downstream of the previous edge protection works. Concrete riprap was placed along the eroded bank and a high flow diversion was cut into the gravel beach opposite the damaged site to take the pressure off repair works.
- 10.12. A large willow that had fallen across the Waikawa Stream and had started to collect debris has been removed. Several willows were also layered at this site to provide protection of the bank from future erosion.

MANAWATU DRAINAGE SCHEME

- 10.13. Staff have been working with the Freshwater Team to sign off two fencing and planting plans for this scheme. A 300m section of Chittack's drain which runs through Fonterra's new farm in the Longburn area currently has Pampas and willows growing along the edge of the drain. These will be removed after which the drain will be fenced and one side planted up with low growing shrubs.
- 10.14. The Manawatu Drainage Scheme occupies an area of land that is under increased development pressures, from semi-rural and lifestyle properties and subdivisions. We want to ensure the scheme is future proofed. This requires better knowledge of flooding and the ability to communicate that knowledge to internal and external stakeholders, and the local ratepayers. Existing residents often raise maintenance queries about weed growth and dredging / clearing, and it would also be useful to understand the capacity of the drainage network and the impacts of these effects.
- 10.15. As part of the management of the Scheme, ensuring that it continues to deliver its levels of service, as well as looking at developing pressures on the Scheme, it was decided there was a critical need to develop a hydraulic model of the Scheme that will help to identify potential problem areas and solutions.
- 10.16. Tonkin & Taylor were awarded a contract to develop this hydraulic model. Horizons Staff took two staff from Tonkin & Taylor on a tour of the key parts and pinch points of the scheme to help in their development of a model for the catchment.

MAKERUA DRAINAGE SCHEME

- 10.17. 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.
- 10.18. 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 10km of scheme drains have been sprayed so far during the last weeks settled weather.
- 10.19. At the Makerua East pump station a new concrete path and step were constructed to ensure the station was maintained to a high standard and give easier access for staff to maintain it.
- 10.20. In a section of Akers drain had willow trees removed that were becoming overgrown.

KOPUTAROA DRAINAGE SCHEME

- 10.21. A gate was installed in the boundary fence behind Koputaroa No.3 pump station. This gate will enable easier access to the gravity outlet the next time any work is needed to be done
- 10.22. Some work was also completed around the No.3 pump station, this is to make the fences and gates work better, enabling easier use of machines to clean the drain in front of the station and keep sheep out of the drain.
- 10.23. Staff have removed the first of the 2 pumps at the Koputaroa No.1 pump station for servicing.

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MOUTOA - WHIROKINO DRAINAGE SCHEME

10.24. A quiet period with focus on pump station screen clearing.

TE KAWAU DRAINAGE SCHEME

10.25. 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.

10.26. The first spray of the season is nearly completed, the settled weather has allowed for the successful good run of spraying of the scheme drains. A few access issues have been identified along some of the drains that we will work to addressing the coming period, these include an old culvert crossing and boundary fences.

HŌKIO CATCHMENT DRAINAGE SCHEME

10.27. The dry period has meant not much drain maintenance needing to be undertaken.

10.28. A tree that had fallen into the channel of the Hōkio Stream was removed. The tree looked as though it was left over from trees being felled for fire wood adjacent to the channel

10.29. The access culvert to 539 Hōkio Beach Road was lowered due to being slightly higher than its upstream neighbours. The landowner carried out the work and the scheme contributed some costs.

FOXTON DRAINAGE SCHEME

10.30. Drain spraying and inspections of drains within this scheme has continued this period to ensure that the drains are maintained in a good condition.

HIMATANGI SCHEME

10.31. Drain spray maintenance undertaken.

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11. ENVIRONMENTAL GRANT WORKS AND ENGINEERING ADVICE

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

2019 – 2020 Environmental Grant work

<i>Name</i>	<i>River or Stream</i>	<i>Job No.</i>	<i>Type of work</i>	<i>Work status</i>	<i>Estimated work cost (\$)</i>	<i>Value of grant (\$)</i>
D Lyons	Tapuata Stream	IN1506	Bank Protection through the construction of a timber wall on the Tapuata Stream	Completed September 2019 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	Approved	\$25,000	\$7,500
Waller	Taringamotu		Rock Lining	Cancelled		
Te Rongaroa Marae	Ongarue		Rock Lining, Layering Planting	Approved		
Morrison	Mangara		Vege Clearance	Application being prepared		
Palmer	Okahukura Saddle Road		Vege Clearance	Application being prepared		
RuDC	Mangahowhi			Application being prepared	\$11,600	\$3,480
RuDC	Mangateitei		Erosion Repair	Application being prepared	\$7,000	\$2,100

12. SIGNIFICANCE

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

Ramon Strong

GROUP MANAGER RIVER MANAGEMENT**ANNEXES**

There are no attachments to this report.