HAWKE'S BAY
REGIONAL COUNCIL
TE KAUNIHERA Ā-ROHE O TE MATAU-A-MĀUI

Meeting of the Cyclone Recovery Committee

Date: Wednesday 16 August 2023

Time: 9.00am

Venue: Council Chamber
Hawke's Bay Regional Council
159 Dalton Street
NAPIER

Agenda

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HAWKE'S BAY REGIONAL COUNCIL

CYCLONE RECOVERY COMMITTEE

Wednesday 16 August 2023

Subject: POLICY AND REGULATION WORK PROGRAMMES

Reason for Report

1. This report updates the Cyclone Recovery Committee on the Policy, Consents, Policy Implementation and Compliance work programmes of the Policy and Regulation Group.

Executive Summary

2. Cyclone Gabrielle has impacted the organisation's ability to implement aspects of resource management covered by the Regional Resource Management Plan (RRMP), Regional Coastal Environment Plan (RCEP) and other planning processes. It has also impacted the implementation of national direction and regulations. This affects work across the Consents, Compliance, Regulatory Implementation and Policy and Planning teams.

3. Over the next three years there will be an ongoing need to adjust the policy and regulatory focus and delivery of plans and work programmes, to utilise staff and resources effectively, to avoid unnecessary burden on tāngata whenua and the community and to ensure we are appropriately responding to the recovery of the region.

4. This report updates the Committee on those parts of the Policy and Regulation Group work programme including where changes are being proposed as part of the Council's Resilience Plan.

Strategic Fit

5. Cyclone Gabrielle has significantly impacted the Council's 'business as usual' planning programme and implementation of HBRC strategies, policies, plans and rules, including those giving effect to government policies and national environment standards.

6. As the Council begins to prepare its Environmental Resilience Plan (version two) to enable HBRC to deliver the Environmental Pou for the Regional Recovery Plan, the Policy and Regulatory Group of the Council is amending priorities and work programmes that will take account of the effect on our communities of Cyclone Gabrielle.

7. Our environment is not as it was before Cyclone Gabrielle, water quality has certainly been affected and it is still not clear to what extent. The fencing efforts of many landowners to exclude stock from waterways have been swept away and land slips have created ongoing erosion and sediment issues. The priority is plans that will address the ability for land to return to a productive use, after dealing with varying depths of deposited silt, as opposed to Farm Environment Plans that will be replaced in 2025 by a national Freshwater Farm planning system.

8. This paper is intended to provide an overview of what changes are being made to the Council's Policy and Regulatory operations to take account of these matters and the Council's own regulatory requirements from evolving central government priorities and policy direction.

Background

9. The Policy and Regulation Group's 'business as usual' (BAU) work programme has been adjusted as a consequence of the effects of Cyclone Gabrielle. The following summarises the current key work programmes of the Policy and Planning, Consents and Compliance teams. While the Regulatory Implementation team members have been seconded into other roles (Recovery Manager and Rural Recovery team) to support HBRC's wider Recovery effort, they are still involved in decisions and setting direction for regulatory implementation work.

Policy and Planning

10. The Policy and Planning team was engaged in development of the Kotahi Plan prior to the cyclone. This work has been largely paused while the team engages in the following significant work streams:

    10.1. working with Regulatory Implementation, Consents and Compliance staff, the Rural Recovery Team and MfE officials to understand the needs and content for Orders in Council to support recovery and manage impacts of current national regulation

    10.2. supporting the Recovery Manager and team in the development of the Environmental Resilience Plan

    10.3. ongoing work with the Rural Recovery and Asset Teams to support the development of the Rural Recovery Strategy (Primary Sector Pou) and Infrastructure Pou

    10.4. providing support to district and city councils community drop-in events and attending Land Categorisation meetings with affected communities

    10.5. working with the Regional Recovery Agency, territorial authorities, DPMC, Treasury and MfE on the development of Future of Severely Affected Land (FOSAL) Policy

    10.6. liaising with other teams and working with MfE, MPI, Gisborne District Council and several Crown research institutes to develop a relevant and recovery-centered response to the Panel's recommendations on the Ministerial Inquiry into Land Use in Tairawhiti and Wairoa Districts

    10.7. reviewing regional issues with respect to the impact of Cyclone Gabrielle and assessing options for faster resolution, such as the TANK Land Use Change rules, which is addressed later in this report

    10.8. commencing conversations with some of our Treaty partners as to how we might support them with development of their Locality Plans, how to best to include their voice in the second edition of the Environmental Resilience Pou; and how we can look at the synergies across this work and the visions and values work required for freshwater planning, including how this might be resourced and funded. This is an ongoing workstream and much more needs to be done in this space.

Kotahi and regional spatial planning

11. The Council has embarked on the Kotahi Plan preparation process that aims to combine all the Council's RMA plans (the Regional Policy Statement, Regional Resource Management Plan and Regional Coastal Environment Plan). This review is driven by the need to update some aging provisions across these separate plans and to give effect to government direction in several National Policy Statements especially the NPS for Freshwater Management which requires freshwater plans to be notified by 31 December 2024.

12. The Kotahi Plan preparation process has been temporarily paused while the Council and community focus on recovery from the recent severe weather.

13. The Policy team has been working closely with MfE officials to understand the options available for transitioning from a 'BAU' planning programme to one that reflects impacts to HBRC's work programmes and communities from Cyclone Gabrielle. This has included looking at opportunities for a regional spatial planning approach that may be provided through the proposed Spatial Planning and Natural and Built Environment legislation that Government has proposed to replace the RMA.

14. As part of recovery planning work, the Policy team, with support from the Māori Partnerships Team has been working with Post Settlement Governance Entities (PSGEs) and Taiwhenua entities to develop a pathway for mana whenua engagement. This pathway involves different options to provide resources and funding to help support the development of locality plans that we hope will include the provision of information required under the National Policy Statement

for Freshwater Management (NPS-FM) such as fresh water visions, values and Te Mana o te Wai Statements. This was always intended as a significant piece of work for the Kotahi Plan and will still be required for the development of a freshwater planning instrument. The conversations we hope to have will aim to support mana whenua in both the recovery and transition through to the delivery of a plan under the NPS-FM. There is still much to be done in this space but already, these conversations have commenced with some PSGEs to the extent that their own priorities, availability and capacity allows while they also have a focus on Recovery efforts.

Legislative Recovery Planning

15. The Policy team is working alongside Regulatory Implementation, Consents and Compliance and Rural Recovery teams with MfE officials to understand the need and content for Orders in Council to support recovery and manage impacts of current national regulation.

16. This had included timeframes for a variety of essential freshwater policies and regulations including:

    16.1. notification of a freshwater plan by 31 December 2024 by the Council

    16.2. implementing national regulations, including:

        16.2.1. Resource Management (National Environmental Standards for Freshwater) Regulations 2020

        16.2.2. Resource Management (Stock Exclusion) Regulations 2020 and

        16.2.3. Resource Management (Freshwater Farm Plans) Regulations 2023 (FWFPs).

17. On 26 July 2023, MfE announced that it was consulting on a package of 'Tranche 5' proposals for Orders in Council. Submissions on those proposals closed on 8th August. The OIC proposals include temporary law changes to the RMA in direct response to Cyclone Gabrielle to help communities continue to recover.

18. The proposals for Orders in Council which have a direct impact on the Policy and Regulation work programme are as follows.

    18.1. Proposal 1: to extend the statutory timeframe to take enforcement / prosecution action, from 12 months to 24 months.

    18.2. Proposal 2: to address late replacement applications that fall outside the RMA's s124 provisions due to delays caused by the cyclone by deeming a small number of water take consents to be permitted activities until replacement applications are determined. This would require them to meet the same standards as apply to their expiring consented water take activities. This proposal has been sought by HBRC. It provides for approximately 32 water permit holders who were affected by Cyclone Gabrielle and as a consequence were late submitting an application for the renewal of their consent. The RMA does not provide HBRC with any discretionary powers to accept those applications that were received outside statutory timelines. Consequently, this would result in those water permits expiring if an Order In Council did not grant them an extension. This OIC proposal allows approximately 32 consent holders to continue to operate as a deemed permitted activity using their consent conditions as the permissions until 31 May 2024 (although in HBRC's submission on the OIC proposal a different milestone was requested for when a new consent had been issued).

    18.3. Proposal 3: provide additional time to comply with the following national direction timeframes:

        18.3.1. National Policy Statement for Freshwater Management timeframe to notify freshwater planning instruments by 31 December 2027 (i.e. a three-year extension) and

        18.3.2. Resource Management (Stock Exclusion) Regulation timeframes to provide an

additional two years to exclude stock from waterbodies, until 30 June 2025 (all other farm types were set to 2025 already).

19. Submissions on these Order in Council proposals closed on 8 August 2023. A copy of the Regional Council's submission can be viewed online at www.hbrc.govt.nz (keyword search #hbrcsubmissions).

Resilience Plan (2nd edition)

20. Policy staff are supporting the development of the Council's Resilience Plan Edition 2. Staff are assisting with the drafting and compilation of the plan alongside the Recovery team.

21. Assistance with community meetings and community drop in sessions is being provided alongside other councils and welfare and insurance providers.

Plan content

22. Four significant regional issues that would have otherwise been part of the Kotahi Plan are being reviewed and prioritised for faster resolution, in light of the cyclone impacts and the development of the Council's Resilience Plan.

23. This work recognises that the Council, mana whenua and the community won't be able to do everything all at once, everywhere. And that strategies and plans will evolve from Recovery to transitional arrangements until we are back on track. The 'on-track' pathway might either be as envisaged previously through Kotahi under the RMA, or to a new regional planning approach consistent with the new national legislation (i.e. Spatial Planning Act and the Natural and Built Environment Act both expected to be passed into legislation later in August 2023).

24. Officers are considering how the work being developed by the Rural Recovery team through their Rural Recovery Strategy and projects like Land for Life (LfL) can be used to support the investments necessary at a property scale as we transition from farm recovery planning to freshwater farm plans (FWFPs) to a longer-term approach.

25. The significant issues being focused on currently include:

    25.1. freshwater quality management, including development of:

        25.1.1. understanding the impact of the cyclone on freshwater quality

        25.1.2. any necessary transitional arrangements for managing land use impacts on water quality and

        25.1.3. management options that support rural recovery as part of longer term NPSFM freshwater planning.

    25.2. regional policy direction for sustainable land use; appropriate land use of Category 3 areas, natural hazards, climate resilience, water security, etc.

    25.3. biodiversity – impacts of the cyclone on existing priority areas as well as opportunities for enhancing biodiversity as part of cyclone recovery.

    25.4. afforestation – understanding the impact of forested land on mitigating cyclone impacts and whether new policy direction or regulation is required, noting that included in the 49 recommendations of the Ministerial Inquiry Panel into Land Use, is a recommendation for improved national direction on forestry management, including on forestry slash.

TANK Plan Change 9

26. The TANK Plan Change (plan change 9) remains subject to wide-ranging appeals in the Environment Court; however, many of its provisions and rules do have some limited legal effect, despite those appeal proceedings.

27. The Environment Court appeal process has commenced and liaison with the Court about mediation procedures is underway. A topic order for scheduling the appeal mediations is being agreed and the Council has sought that those matters dealing with land use change and water

quality be scheduled last so that the impacts of the cyclone on water quality might be better understood.

Consents

28. The Consents team is handling a range of cyclone recovery matters but also has a significant amount of BAU work which continues in accordance with RMA requirements. The following are the main workstreams for the Consents team:

    28.1. BAU consent processing continues with timelines to be met

    28.2. managing consent processing demand for Emergency Works permitted by s330 of the RMA and the Severe Weather Emergency Legislation Act (SWELA) requiring consent and planning for BAU consenting following expiry of emergency legislation provisions

    28.3. meeting and advising parties on recovery options and the extent to which they may or may not require resource consents

    28.4. working with MFE and HBRC Policy, Compliance and Recovery teams, participating in an oral presentation to a Select Committee and responding to proposals for OICs that are being developed to address cyclone recovery issues in Hawke's Bay

    28.5. aligning consent requirements with decisions to transition FEMP (Farm Environment Management Plan) review in Tukituki to national FWFPs

    28.6. developing options for processing water permits and land use change consents in TANK catchments, while recognising that many of these properties have been impacted by Cyclone Gabrielle and may have differing recovery needs

    28.7. contributing to the development of the Council's Resilience Plan (2nd edition).

29. The functions of the consents team continue as normal for non-flood affected properties. We continue to process resource consents received within statutory timeframes and provide advice to the community regarding consent related queries.

TANK Land Use Change Rules 4 and 5

30. The TANK Plan Change (Plan Change 9) remains subject to wide ranging appeals in the Environment Court, however, its rules do have legal effect and its provisions are attributed significant weight in assessing resource consents, despite those appeal proceedings.

31. Staff have been considering the impact of the TANK Rules 4 and 5 (relating to land use change) on the community as a consequence of the cyclone.

32. The TANK Plan categorises land uses according to the level of risk of contaminant loss. Land use change that increases the level of nutrient loss risk require resource consent. For example, a change from pastoral or orchard land use to vegetable growing of more than 10 hectares requires resource consent.

33. The rules were intended to assist in preventing further degradation of water quality across the TANK catchments, but especially in lowland areas of the Heretaunga Plains where water quality in the Karamu and its tributaries was and is, particularly poor. Prevention of further degradation was aligned with objectives and rules that require landowners to work either individually or collectively through industry programmes or catchment-based collective groups to meet new water quality objectives.

34. The impacts of sediment on horticultural and agricultural production requires transitional land use activities as many orchards and vineyards require remediation and replanting.

35. This may require changes to land use activities, as land is managed effectively to ensure it becomes productive over time. Land use change through planting of interim crops and vegetation cover is likely before more long-term (and higher value) crops, trees and vines can be replanted. Transitional land uses may also need to be provided for where replacement trees and vines from nursery suppliers are not yet available to meet the unexpected demand.

36. The TANK Plan's land use change rules do not allow for impacts of a cyclone to be managed with transitional land uses over time; some aspects of the land use recovery regime may trigger the TANK Plan rules.

37. Currently, staff have not commenced the implementation of TANK Rules 4 and 5 for flood affected properties.

38. The proposed approach is to not immediately enforce these rules for flood affected properties, where land remediation requires a short-term land use change, provided certain requirements are met. The approach proposed is similar to those set out under s331B of the RMA, introduced under SWELA and includes applicants to:

    38.1. Provide notice to Council within 60 working days of the change in land use, with details of the previous/existing and proposed land use.

    38.2. Confirm timeframes for the proposed transitional change in land use, recognising that longer term changes in land use (to carry on after 1 April 2024[1]) will require consent. The following is currently the proposed approach, however, this may be refined as we get a better understanding of the impacts of the cyclone in the medium to long term and understand land owners requirements.

        38.2.1. Where applicants identify that the land use change will occur past April 2024, seek information on the timeframe for reverting to the original land use (as 2 May 2020), if proposed.

        38.2.2. Short term consents may be considered for continuing with the new land use for a specified period before reverting to the original land use, with consideration of conditions required to mitigate effects on waterways where applicable for that property.

        38.2.3. Where the change in land use is longer term or indefinite, a resource consent application will be required that provides a full assessment of environmental effects, including nutrient loss and cumulative effects in accordance with TANK Policy 20.

    38.3. Provide an easy-to-use online portal on the HBRC website by the end of August for providing the required notices (similar to the current s331B RMA notice process).

    38.4. Provide information and resources to the affected landowners on how the rules will be implemented and what information is necessary to support a consent application should the land use change continue. Have this information available by the end of August.

    38.5. Encourage landowners to use best practice measures to minimise the effect of cultivation. For example, Rule 7 of the RRMP has also been amended and introduces setbacks between waterways and cultivated areas (5 – 15m depending on slope).

    38.6. Review the notices and determine if any represent temporary or marginal non-compliance that could be afforded 'deemed permitted activity' status under s87BB of the RMA.

    38.7. Note that properties of less than 10 ha are not affected by TANK Rules 4 and 5.

    38.8. Note that land use change that is not related to land remediation will continue to be subject to rules 4 and 5.

39. This approach is recommended for the following reasons:

    39.1. Recognises that affected landowners need to make decisions on land use soon

    39.2. Recognises the pressures faced by landowners as they manage impacts of the cyclone and enables them to undertake immediate steps to aid in recovery, while recognising the

[1] The repeal date of s331B of the RMA

need to implement TANK over the longer term to maintain or enhance water quality

39.3. Is consistent with the ability of rural landowners to undertake some works under s331B of the RMA (as amended by SWELA).

S330 Emergency Works

40. S330 of the RMA allows specified agencies, such as local and consent authorities, network utility operators, lifeline utilities and persons in charge of public works, to undertake emergency works without the need to first obtain any required consents. Where there are ongoing environmental effects, retrospective resource consent is required to be sought.

41. The RMA provided requirements for resource consent applications and timeframes for notification of emergency works undertaken under s330. As a result of severe weather events in the North Island in January and February 2023 (*affected areas see* s329A) SWELA has made changes to the existing provisions of RMA s330 for the period until 1 October 2024. These changes include:

41.1. extending the period within which actions have to be advised to the relevant consent authority under both s330A and s330B – from within seven working days (WDs) to 100 WDs of the date the emergency activity has been undertaken (i.e. from the day the activity commenced where the activity will last more than one day),

41.2. noting that for s330B the emergency provisions apply during both a state of emergency and the transition period that may follow a state of emergency

41.3. extending the period within which consent has to be obtained for works (if there are ongoing adverse effects) under both s330A and s330B – from 20 and 60 WDs respectively to 160 WDs after notification to the consent authority.

42. To date, the Consents team has had multiple notification of works under s330 of RMA from the following entities for cyclone related work:

42.1. Hawke's Bay Regional Council

42.2. Waka Kotahi

42.3. Hastings District Council

42.4. Wairoa District Council

42.5. Central Hawke's Bay District Council

42.6. Unison Networks Limited and

42.7. Napier City Council.

43. The notices of s330 that have been submitted to the Regional Council to date will not constitute all the emergency works that are being carried out across the region. As above, entities have 100 working days from the date of the activity being carried out. 100 working days from 14 February 2023 was 7 July 2023, however much of the emergency work will not have started immediately following the cyclone and we are expecting more notices under s330 of the RMA.

44. We have not received any resource consent applications for emergency works under RMA s330, however we have been in discussion with many of the above entities about what constitutes 'ongoing effects' and are expecting these consents to be lodged in due time (noting the entities have 160 working days following notification to lodge the resource consent applications).

45. Work is underway to assess the notices provided to determine which works will require retrospective resource consent.

Severe Weather Emergency Legislation Act 2023 (SWELA)

46. The Severe Weather Emergency Legislation Act 2023 (SWELA) has amended the RMA (s331B) to make provisions for landowners / occupiers to carry out some works on private rural land and

marae, papakāinga or urupā to relieve the flood and storm damage for approximately one year from 1 April 2023.

47. These landowners / occupiers will not be required to apply for resource consent for some activities undertaken to mitigate, prevent or remediate adverse effects which, as a result of the impacts of Cyclone Gabrielle, has caused, is causing, or is likely to cause:

    47.1. loss of life or injury to humans

    47.2. loss of life or serious detriment to the health or well-being of animals

    47.3. or serious damage to land or property.

48. Activities can be undertaken if the landowner / occupier consider that immediate works are required to avoid, remedy, or mitigate adverse effects caused by Cyclone Gabrielle and that the measures are proportionate to the associated adverse effect.

49. However, an activity cannot be undertaken as a permitted activity under s331B of RMA if it is not undertaken in a manner that avoids, remedies, or mitigates adverse environmental effects as far as reasonably practicable, and/or where there are significant adverse effects beyond the boundaries of the owner's/occupiers of the land. For these activities, the usual relevant provisions of the Regional Plan, any regulation, or National Environmental Standard (NES) apply to the activity (unless otherwise permitted by an Order in Council, such as burning of cyclone waste).

50. Before undertaking any work, a landowner / occupier must determine whether the activity is on or adjoining culturally significant land. If it is, notice must be given to the relevant iwi or hapu and written approval must be obtained from them before the activity can proceed. If written approval is not provided, then a resource consent will need to be applied for.

51. In addition, the activity cannot be undertaken if it is a prohibited activity in any regional, district or national plans, rules, regulations or legislation.

52. Written notice to Hawke's Bay Regional Council that the activity has been undertaken within 60 working days of the activity beginning.

53. We have provided a checklist available on the website which helps land owners define whether they can undertake works in accordance with this emergency legislation: https://www.hbrc.govt.nz/assets/Document-Library/Consents/Checklist-of-Whether-Activity-Can-Be-Carried-Out-Under-s331B-20042023.pdf

54. To date, we have received notices of works being undertaken under these provisions from Panpac Forest Products Limited and BioRich Limited. We expect much more work has occurred on rural land which has not been notified to us. As such we will continue to work with the Compliance and Pollution Response teams.

55. The Consents team have contributed to the development of various OICs that have been developed, often to lessen the consenting burden for people and properties impacted by Cyclone Gabrielle. As noted above at paragraph 18, Tranche 5 OIC proposals are making provision for late replacement applications to be able to continue being exercised while they are being processed. Also it is looking at the extension of time for people to meet their stock exclusion deadlines particularly where their riparian fencing has been impacted by the cyclone. HBRC's submission on those Tranche 5 OIC proposals can be viewed online at www.hbrc.govt.nz (keyword search #hbrcsubmissions).

Tukituki Production Land Use Consents

56. Production land use consents were required in 2020 for farms of more than 4 ha within dissolved inorganic nitrogen (DIN) exceeding sub catchments. Approximately 150 applications have been lodged since late 2019, with approximately 70% of these applications now processed and issued. Processing of the remaining applications is continuing, with applicants being contacted so that the effects of the Cyclone and the need to re-prioritise actions on the farm

can be taken into account.

57. In this catchment delays have occurred due to drought, COVID-19 and then nationwide uncertainty with the use of the Overseer model for regulatory purposes. With the inability to rely on Overseer, consents have mainly focused on locking in good practice actions, as set out in the FEMP for each farm. Consents have been issued for a short-term duration (expiring in May 2027).

58. The Tukituki Plan Change required FEMPs to be updated by 31 May 2024, however a decision was made to push this requirement back to 2025 to align with the nationwide requirement for landowners to have Freshwater Farm Plans (gazetted 8 June 2023). These FWFP requirements will be rolled out in Hawke's Bay (including the Tukituki catchment) in 2025.

59. Notification was sent to Tukituki landowners on 5 July 2023 informing them that the Council is not requiring Tukituki landowners to resubmit an updated FEMP by May 2024 but will instead provide advice on emerging FWFP roll-out in the future.

60. Where these landowners are in a DIN exceeding catchment, consents are still required.

61. Where consents have already been issued for Production Land Use, conditions are included which reflect the requirements to review and update FEMP before 31 May 2024. Council officers are not requiring this condition to be met. Officers will undertake a review of these existing consents as soon as practicable to align the requirement with the timing that will be established through the FW-FP regulations. Notification has been provided that the FEMP will need to be reviewed and updated if there is a material change in the farm system. New consents that are currently being processed and issued will have conditions which provide for alignment with the FW-FP process.

Heretaunga Plains Water Permit Replacement

62. Water permits across the Heretaunga Plains Groundwater Quantity Area have been expiring since 2019 and applications have been received to replace these since before November 2018. There are now applications to replace 854 consents within the Heretaunga Plains Groundwater Quantity Area. Most of these consents are able to continue to be exercised under s124 of the RMA while a decision on the application is made.

63. We are also processing smaller groups of applications for the Poukawa and Matapiro areas, and for surface water takes from the Karamu Streams and its tributaries.

64. The TANK Plan Change 9 decision was released in September 2022. It is currently subject to several Environment Court appeals. Given the plan change has made significant progress through the decision-making process, and because it introduces a significant change to the way water is managed across the Heretaunga Plains, the provisions of the plan change are considered worthy of considerable weight alongside operative provisions in the Regional Resource Management Plan.

65. For the Heretaunga Plains Groundwater Quantity Area, this includes establishing an interim allocation limit of 90 million m3/year, setting an allocation limit based on existing use (prior to May 2020) and reallocating water based on 'actual and reasonable' use.

66. The Consents team has now completed an initial assessment of the applications and their actual and reasonable water needs. Determining 'actual and reasonable' use requires an assessment of how much water was taken under each consent over the 10-year period leading up to May 2020, consideration of the previously consented volumes and the estimated crop water demand, with the lesser of these being the basis for what is to be considered actual and reasonable use.

67. Our preliminary assessment indicates that for the majority of consents, actual water use has the greatest impact on what could be re-allocated (i.e. it is typically the lesser volume).

68. The group of consents we are currently processing are currently allocated an estimated

65 million m^3/year of groundwater. Recorded actual use is approximately 30 million m^3/year (47%). Approximately 170 consents have no water use data to inform this assessment.

69. The next step is to advise each applicant of the result of the 'actual and reasonable' water use assessment and provide them the opportunity to respond with any comments or additional information they would like us to consider. We anticipate sending this information to applicants within the next four to six weeks, after finalising and further checking the data and, with help from our ICT team, developing a system for extracting and sending the relevant estimate to each applicant.

70. Consultation with tāngata whenua and relevant industry groups is ongoing. We are also considering methods for identifying cyclone affected applicants and providing for staged introduction of actual and reasonable volumes to provide time and scope for recovery and irrigation of alternative crops if required.

Compliance

71. There has been a significant increase in the number of potential breaches of rules in our regional plans as a consequence of Cyclone Gabrielle. Responding to Pollution Hotline call outs to activities such as burning of waste, unconsented works to stop banks and re-diversion of waterways has placed additional workload on the team.

72. The team is developing understanding about the nature and scale of issues arising as part of the SWELA legislation allowing people to carry out activities as it responds to issues where response and recovery actions have caused or are causing environmental effects. Compliance team staff currently do not know if this is a significant regional issue as landowners weren't required to advise the council of works that were carried out. The Compliance team has provided advice during the recovery phase where requested, about how recovery activities should be done to avoid creating on-going environmental effects.

73. The Compliance team is working with the region's territorial authorities to understand how the cyclone has impacted their ability to comply with existing consents and developing management solutions where necessary.

74. The impact of sediment on groundwater quality, including how sediment is affecting water supply bores is a matter of concern and is subject to further investigation work alongside the science team and the territorial authorities.

75. The cyclone has also impacted a number of water storage and dam structures. Monitoring these structures for safety has become a higher priority for compliance effort.

76. Monitoring of forestry activities has also been given a higher priority. While forestry activities are already subject to compliance to the extent of HBRC's powers under the NES for Plantation Forestry, the level of effort has been increased with additional staff time being allocated to this task. Any findings from this, the Compliance team will feed into scoping the review of forest activity management, including what Central Government might chose to do in terms of further amendments to the NES for Plantation Forestry.

Decision Making Process

77. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision making provisions do not apply.

Recommendation

That the Cyclone Recovery Committee receives and notes the *Policy and Regulation work programmes* staff report.

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Attachment/s

There are no attachments for this report.

HAWKE'S BAY REGIONAL COUNCIL

CYCLONE RECOVERY COMMITTEE

Wednesday 16 August 2023

Subject: BIODIVERSITY HAWKE'S BAY PRESENTATION

Reason for Report

1. This paper introduces the Biodiversity Hawke's Bay presentation.

Decision-making process

2. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision-making provisions do not apply.

Recommendation

That the Cyclone Recovery Committee receives and notes the *Biodiversity Hawke's Bay presentation*.

Authored by:

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Attachment/s

1 Biodiversity Hawke's Bay: Our Work and Our Value

biodiversity Hawke's Bay
Taiao Ora, Tangata Ora
Working Together for Better Biodiversity

Biodiversity Hawke's Bay: Our Work and Our Value
Support required for the future of Biodiversity Hawke's Bay
August 2023

Purpose

Biodiversity Hawke's Bay advocates for biodiversity in Hawke's Bay, and for the many benefits a healthy natural environment provides for the people of our region. Despite the enormous challenges of a pandemic and two natural disasters since 2019, our work in support of the *Hawke's Bay Biodiversity Strategy 2015 – 2050* (the *Strategy)* has continued to grow, as has our work with community groups which assists councils in meeting their environmental obligations. The Hawke's Bay Regional Council (HBRC) has been our keystone supporter to date, and this document requests ongoing support from the HBRC - $210,000 p.a to continue our current work, or ideally $270,000 p.a to increase our community facilitator resources to achieve the goals of the *Strategy*.

Our Mandate

In 2012 *The Land and Water Forum* noted the perilous state of biodiversity in Hawke's Bay. Acknowledging this finding, a working group was formed with representatives from 18 major bodies in our region - the HBRC, territorial local authorities (TLAs), tangata whenua, environmental NGOs, and industry bodies. This group subsequently agreed and launched the *Hawke's Bay Biodiversity Strategy 2015 - 2050*. An implementation plan was agreed, and in 2018, Biodiversity Hawke's Bay was launched.

The Need

The term *biodiversity* encompasses all life - individual organisms, species, ecosystems. As part of nature, humans are dependent on biodiversity, and yet the many impacts of humans on nature in Hawke's Bay undermine and threaten our wealth and our way of life. Over 75% of indigenous vegetation has been cleared, only 2% of our wetlands remain, and many dozens of species have become extinct.

A healthy natural environment is a necessity, not a luxury. Nature cleans our air and water, regulates our climate, locks up carbon, stores water, and supports our soils. Functioning ecosystem services enabled by healthy biodiversity are the natural infrastructure essentials to our key economies - agriculture and tourism. Restoring healthy biodiversity and ecosystem services is an essential element in recovery from Cyclone Gabrielle and in mitigating the ongoing effects of climate change.

How We Work

Biodiversity Hawke's Bay is the community-based umbrella organisation arising from the *Strategy* and reflects the commitment made in that to (1) restore and secure the future of biodiversity in our region, and (2) realise the benefits of a healthy nature to the people of Hawke's Bay.

Local councils and Central Government can't solve the biodiversity and climate change crises by themselves. The many aspects are far too big; a multi-stakeholder approach is required. Biodiversity Hawke's Bay works across the variety of stakeholders, connects people, and projects, and enables a coordinated community approach in a cost-effective, non-political, independent way. We are the *network of networks,* connecting and supporting community conservation groups, assisting Government and councils in ways that only a community-based group can.

The Value We Bring

We add value to Hawke's Bay by supporting and enabling community groups and individuals to "do the doing". We maximise the environmental benefits by providing, as needed, direct financial support through small grants, administrative, financial and project management, enabling community groups to focus on doing the on-the-ground work. Examples include:

1. ***Providing contestable small grants for biodiversity***: For the past four years we have allocated over $50,000 in support of 17 projects to advance biodiversity across the region. These projects have included plantings and restoration of ecological communities, pest eradication/control, environmental education and more. Funds are provided by other organisations, and we are seen as a credible, independent manager. HBRC have partnered with Biodiversity Hawke's Bay to pilot the Environmental Enhancement Contestable Fund this year, with a funding pool of $50,000 available to support community groups to advance biodiversity in the region, a figure which will hopefully grow in the coming years.
2. ***Attracting funds to support regional projects***: We assist groups to apply for external funds, develop project plans, and sometimes write applications for those groups. Successes include Te Uru Rākau funding for a Des Ratima memorial planting, the highly successful bat research in Central Hawke's Bay, and riparian revegetation at Lake Rotongaio, Wairoa.
3. ***Securing additional resources to increase project scope and impact:*** As a recognised regional biodiversity champion, we are approached by entities wishing to partner with, or donate to, regional projects. Examples include negotiating a three-year partnership between BUPA and Pirimai Residents ' Association to super-size the Cross-Country Drain plantings in Pirimai, and securing the products and services of a major nursery and retail operation to redevelop a community productive garden at Waiohiki.
4. ***As the 'go-to' source for biodiversity information, harnessing community resources and volunteers to support projects:*** Our recently established Project Portal is becoming the single source of information for connecting the conservation community, promoting collaboration, and coordinating biodiversity activities across the region. Through Facebook, Instagram, LinkedIn, and our website, we provide expert advice and use our networks to connect conservation workers to a range of experts.
5. ***Building partnerships that enhance and protect the environment:*** For example, our Te Taha project to restore a gravel beach ecosystem is being undertaken in partnership with Te Taiwhenua o Te Whanganui ā Orotu, with sponsorship from Hawke's Bay Airport Ltd, supported by Napier City Council and Hastings District Council, and with input from the Westshore Residents and Development Association, Napier Forest & Bird, the Rotary Club of Ahuriri Sunrise and their Interact Groups from local secondary schools.
6. ***Promoting environmental protection as an intergenerational commitment via education and participation:*** We hold community action events, for example, Restoration in Action – Little Bush, we encourage connection with nature through campaigns and events such as the Beautiful Bay in May campaign (a collaboration with the National Aquarium of New Zealand) and the City Nature Challenge, as well as running education sessions.
7. ***Celebrating successes to grow the conservation community:*** We use our social media presence, regular newsletters, and media contacts to recognise and celebrate success. Through our advice and encouragement, the Maraetotara Tree Trust won second place in the Supreme Award at the 2021 Cawthron New Zealand River Awards.
8. ***Maintaining an oversight of progress toward achievement of the goals of the Strategy, updating periodically as required:*** The ongoing work recommended by the *Strategy* is long-term and requires regular consultation with the wider Hawke's Bay community, especially the original signatories.

Our Funding Request

We request an annual funding allocation from the HBRC throughout the 2024-2034 Long Term Plan. To maintain our current level of work we request $210,000 p.a. though ideally, we would welcome $270,000 p.a. to enhance our community facilitator resources. We are making additional requests from the four TLA's for specific work in each area.

We make this request while acknowledging the enormous and unexpected financial demands on Council funding resulting from the recent cyclone and pandemic. We emphasise that our request will support work that the HBRC itself does not do and would be consistent with the support regional councils such as Taranaki and Waikato provide to their local biodiversity organisations.

Our role is to bring benefits to the region that support achievement of the goals of the *Strategy*, to undertake work that we are uniquely positioned to provide, and this ensures that we are a wise investment for the Council. In supporting our work, HBRC is supporting the recovery of ecosystem services from which we all benefit and on which the future of Hawke's Bay depends. No other organisation does what we do, and if we are not able to continue, the many benefits that we bring to Hawke's Bay will be lost.

One final note on the context of our request. At present, we contract three part-time staff members: a General Manager, an Administration Manager, and a Biodiversity Community Facilitator. Our work is designed to meet the needs of Hawke's Bay and is modelled on recommendation of the 2017 *Taonga for an Island Nation: Saving New Zealand's Birds,* pp. 109-110, by the Parliamentary Commission for the Environment. The final sentence by the Commissioner states:

> *"I recommend that the Minister of Local Government, the Minister for the Environment, and the Minister of Conservation direct officials to work with councils to establish regional biodiversity hubs to coordinate and support community conservation groups."*

At present there is no other source of funding available to sustain us through the 2050 timeframe of the *Strategy.* We are and have been committed to seeking funding from other sources, including philanthropic, on an ongoing basis and will continue to do so - it is part of our ethic.

At present, our operational costs are paid by donations from the Hawke's Bay Biodiversity Trust Endowment Fund. The Endowment Fund includes funding received from HBRC between 2018-2021. This is being spent following feedback from the HBRC Council to spend existing funds before requesting more from Council. This situation is not sustainable. To continue operations, commit to future activities and achieve the goals of the *Strategy*, we need the certainty that inclusion in the HBRC LTP alone can provide. Core funding from HBRC will enable us to leverage funding from other sources including the Hawke's Bay TLAs and allow us time to focus on obtaining philanthropic and other specific project funding.

HAWKE'S BAY REGIONAL COUNCIL

CYCLONE RECOVERY COMMITTEE

Wednesday 16 August 2023

Subject: HBRC RECOVERY UPDATE

Reason for Report

1. This item provides an update on the various HBRC recovery activities underway.

Cyclone Recovery Committee: Recovery Activity Reporting for July 2023

Recovery work carried out by teams across the Council will be overseen by the Recovery Team. This is to support regional recovery coordination between the Regional Recovery Agency and territorial local authorities and provide the HBRC Cyclone Recovery Committee with a monthly update.

This report will follow the regional recovery framework set by the Regional Recovery Agency.

The Recovery Programme is the overarching project management framework used to support the work of HBRC's Recovery Team. Teams leading recovery workstreams will provide supporting updates on key activities achieved during this reporting period.

N.B. Not all recovery workstreams are fully active at this stage. Changes to the recovery initiatives are also expected since the release of the first edition of HBRC's Environmental Resilience Plan (Apr 2023).

Performance Indicators (RAG): Red = Off Track Amber = At Risk Green = On Track (Grey = Not started/On hold)
***Risk is inherent vs residual risk (i.e., RAG status prior to mitigations and controls implemented).**

Status Change Keys:

⇨	Unchanged since last report
⇩	Worsened since last report.
⇧	Improved since last report

	Recovery Workstream	Comments			Date
1	**HBRC's Recovery Programme**	**Schedule**	**Risks***	**Budget**	2 Aug 2023
					
		Recovery Team 1.1 Community engagement with severely affected communities is ongoing. Throughout June & July many meetings and drop-in sessions took place. Feedback and requests for re-categorisation was processed by our teams. All changes have been captured in updated maps and uploaded to the land categorisation website. TLAs are leading direct communication with affected residents/ communities on the outcomes of this process. 1.2 As part of the FOSAL process we have been able to release all but two 2C* (8 areas) to category 1 following the completion of the rapid flood protection work and assurance process. 1.3 Negotiations between the Crown and councils were concluded and offer presented to Councils for consideration. The deal included the voluntary buyout of residential Category 3 properties, flood protection, and transport infrastructure, including urgent roading			

	Recovery Workstream	Comments	Date
		and bridge repairs. 1.4 The Recovery Team & Comms Team is preparing for the next round of community engagement alongside HDC to speak with Category 3 affected communities. The team is also supporting community engagement work in Wairoa with the Wairoa professional pod (WSP) who are working to find solutions for 2A properties. 1.5 Regional Recovery Agency (RRA) submitted the Regional Recovery Plan to the Central Recovery Taskforce. Accompanying this is the draft Recovery Action Plan that outlines regional priorities from the Environmental Resilience Plan & Locality Plans. The Cyclone Recovery Unit (CRU) is presently reviewing the action plan with lead ministries, and will feedback to the RRA with recommendations by end of Aug/ Sep. 1.6 HBRC teams have helped to confirm recovery initiatives and reconcile funding received against what is still needed to undertake this work. This work also supported the development of the Regional Recovery Action Plan. 1.7 Risks include not being able to access external funding sources for some of the initiatives that were proposed in the first edition of the Environmental Resilience Plan. 1.8 Focus returns to the development of the next edition of the Environmental Resilience Plan and to understand how this will sit with the LTP and Strategic Plan. A cross-functional workshop has been planned. 1.9 A staff workshop to finalise the Recovery Programme Brief is scheduled.	
2	**Environmental Resilience: Catchment Management**	2.1 **Erosion control scheme:** Catchment Management Advisors continue to work with landowners on highly erodible land and support the development of remedial plans. 2.2 **Soil Nursery:** This month, our focus has been on completing pole harvest, and all regional deliveries have been completed. 2.3 Only a few remain pending small lifestyle block and gate sales, which will be completed over the coming month. 2.4 In terms of redevelopment work, work has begun by removing 3,600 old stool beds and replacing them with 3,800 new cuttings as per our redevelopment plan. 2.5 Additional to the redevelopment plan we have the extension into the radio paddock, where the levelling and draining work is underway. Planting in this area and the Harris block plantings are scheduled to occur by the end of next month. 2.6 As for infrastructure improvements, the construction of the new pole shed is still underway. Although we have experienced some delays, we are actively working on obtaining consent from HDC to install the kitchen and bathroom, which is currently in process. This is taking longer than usual due to the re-zoning issues. 2.7 **Nursery expansion:** We currently have a high-level plan and timeline in place and will be holding discussions this week to refine our parameters and then begin engagement with external stakeholders, along with finding some suitable potential sites across the region. 2.8 **Biosecurity**: Contaminated gravel: The *Controlled Area Notice* for a section of the Tukituki and Waipawa Rivers to allow small-scale gravel extraction within limits for on-farm recovery expires on 31 August. 2.1 The local Tukituki community is deeply frustrated that there is so	7 August 2023

	Recovery Workstream	Comments	Date
		much gravel in the river and many cannot use it. For them, this is adding costs and time delays in getting their farming operations up and running post-cyclone, which only adds stress to an already exhausted and financially struggling community. 2.2 We have contracted an independent consultant to review HBRC's Chilean needle grass programme. 2.3 In the interim, we will create a new Notice that will enable the continued movement of river gravel from the same area and widen the movement-controlled area from the previous 500m buffer zone to the whole of the Tukituki catchment to allow repairs to rural infrastructure arising from the effects of the cyclone. 2.4 Chilean needle grass is a real threat to on-farm production, and animal welfare and can spread easily. Still, in desperate and unusual times we need to be pragmatic and work with our community to help them recover.	
3	**Environmental Resilience: Resource Management & Land Use**	**Science Team** 3.1 Science is working with Manaaki Whenua Landcare Research to build our understanding of the region's landslide susceptibility to support catchment operations and land for life projects. 3.2 Science and GIS are working towards the procurement of full region LiDAR acquisition.	27 July 2023
4	**Environmental Resilience: Indigenous Ecosystems, Biodiversity, and Conservation**	**Catchment Operations** 4.1 The biodiversity team have been accessing Priority Ecosystem projects across the region. Cyclone damage was recorded at 6 sites primarily to deer fencing, and these are either already being remediated or planning for remediation is underway.	07 August 2023
		Science Team 4.2 The Environmental Science team continues to support collecting environmental data at increased frequencies to enable analyses of the effects of Cyclone Gabrielle on the region's air, rivers, lakes, land and coast. 4.3 The Manaaki Whenua team will be in Hawke's Bay the week of 31 July to work with HBRC to look at cyclone impacts on wetlands.	27 July 2023
5	**Environmental Resilience: Climate Change**	**Climate Action Ambassador** 5.1 Regional climate change vulnerabilities assessment tool: Presented to Māori Committee on 2 August for information and advice on Kaupapa Māori domain.	8 August 2023
		Science Team 5.2 Science continues to work with NIWA on flood frequency analyses which are likely due October 2023. 5.3 Science was successful in their application to MfE for funding for nature-based solutions for climate resilience for the Heretaunga Plains and Upper Tukituki catchment, and work will begin shortly to bring and oversight group together.	27 July 2023

	Recovery Workstream	Comments	Date
6	**Environmental Resilience: Waste**	**Operational Response Team** 6.1 The Taskforce has received 487 jobs to date and has completed 262 (158 completed and 104 requiring no further action). 6.2 The Taskforce currently has 221 jobs in progress. 6.3 Over 495,000m3 of silt has been removed so far, at a rate of around 25,000m3 per week. 6.4 There are currently 23 contractors in action collecting silt, 4 contractors processing wood waste and 7 contractors managing disposal sites. 6.5 A dedicated woodwaste team has been set up and is currently managing beach clean-ups at Wairoa, Mohaka and Mahia. Further works are underway to begin clean-up of wood waste under bridges. 6.6 The wood waste team has a dedicated contract manager who is coordinating woodwaste enquiries and collection activities. 6.7 Total costs for the collection of public silt and woodwaste through to the end of September are forecast to be around $42m. 6.8 Commercial grant applications are being processed currently and the public has been informed of the process through media releases via Facebook. 6.9 So far, 249 commercial grant applications have been received, with 135 applications assessed and 115 approved to date. 6.10 Total funds of $9m have been allocated to the approved commercial applications - $2.1m of which is comprised of the $40k (100% allocation) grant, with the remainder comprising the $170k (50% allocation) grant.	7 Aug 2023
7	**Environmental Resilience: Water Security & Health**	7.1 No update since last report.	9 June 2023

	Recovery Workstream	Comments	Date
8	**Primary Sector: Land Use Recovery**	**Rural Recovery Team** 8.1 Rural Recovery Team (RRT) delivery of Community Engagement events and workshops in collaboration with Rural Advisory Group and Territorial Authorities. 8.2 HBRC RRT worked closely with MPI to organise and coordinate a series of five Rural Recovery workshops under the banner of the Hawke's Bay Rural Advisory Group (RAG – HBRC, MPI, B+LNZ, Federated Farmers, Rural Support Trust, DairyNZ). 8.3 Workshops covered information and advice for dealing with erosion, plant and tree selection for remedial work, and presentations by farmers affected by other flood and extreme weather events (Chris Allen Mid-Canterbury Floods 2021, Andrew Stewart Rangitikei farmers 2004 and 2015) 8.4 RRT members have been attending Hastings District Council Community Hub events in Waikare/Puturino, Kereru and Pukehamoamoa. The collaborative approach enabled communities to engage across a range of issues. 8.5 RRT have identified the primary focus at Community Hubs/Groups events has been Communication (lack of), Roading and Infrastructure. Communities share that they continue to feel isolated through gaps in communication and surety of support 8.6 Rural Communities of mostly commercial farmers and networks, engaged through workshops and catchment groups raised issues relating to land use recovery and remediation. 8.7 Rural Advisory Group has remained active, although as members have reverted to their business priorities and differing customer groups, the foundation principle of RAG as a network of network has remained intact. Meeting frequency has shifted from weekly to currently fortnightly and is about to shift to monthly. 8.8 Horticulture Advisory Group has received strong industry support from NZ Apples & Pears Industry and funding from MPI. Primary focus has been in communicating to affected landowners support packages from government and seeking funding from MPI NIWE to engage specialist advisors to work with affected Horticulture business in recovery actions.	7 August 2023

	Recovery Workstream	Comments	Date
9	**Resilient Infrastructure: Flood Protection**	**Operational Response Team** 9.1 Around 119 work packages have been created to date from 1669 asset inspections (more than one asset is included in a work package). 9.2 It is expected that 125-130 work packages will be developed by the completion of asset inspection and prioritisation (AIP) process. 9.3 The majority of the work packages are considered 'major' and will require project management and appropriate design. It is expected that each major work package will take around 2 months to complete and a number will be completed concurrently. 9.4 The major work packages encompass large works associated with river edge protection, dam de-siltation, stopbank repairs, extensive drain slumping and remediation and beach and sea wall renourishment. 9.5 So far 54 minor work packages have been created and these are mostly associated with drain clearance and maintenance. It is expected that each minor works package will take around two weeks to complete. 9.6 The pumpstation review is underway and this is primarily focusing on two catchments associated with three pumpstations – Pakowhai and Brookfields-Awatoto. 9.7 Contracts have been awarded to Tonkin and Taylor to undertake reviews of the HPFC scheme and the UTT scheme. It is expected that the draft reports from these reviews will be available in the early new year 2024. 9.8 The scheme review will linked in with nature-based solution options review and help inform a holistic approach to flood management.	7 Aug 2023
		The Capital Delivery Team (Rapid Response) 9.9 In CHB work has been completed on the Walker Road Stopbank. Temporary edge protection work and channel realignment work has been undertaken to increase the buffer between the flowing channel and the river berm in this reach. All breaches and scour repairs that formed the original package of work are now nearing completion. Franklins, Kings and the Mangaonuku and Waipawa confluence breaches have come off hold and are now active projects. 9.10 Scour repairs in the Heretaunga Plains sites have been delayed by frequent rainfall. Most scour sites will be completed this month weather permitting. 9.11 AsBuilts and project completion reports are continuing to be submitted for completed repair sites for review by the Asset Management team. 9.12 Rapid Rebuild team effort is now transitioning to river management work packages provided by the AIP team.	7 August 2023

	Recovery Workstream	Comments	Date
10	**Resilient Infrastructure: Cycleways**	**Operational Response Team** 10.1 Initial inspections have been completed. Furter detailed inspections for optioneering of repairs is to be completed. 10.2 MBIE funding – first application of $300k has been approved and 90% of the works associated with this has been completed. 10.3 We are waiting for MBIE to approve the second tranche of funding, which is approximately $2m. 10.4 Work to open lower sections of the Ngaruroro and Tūtaekurī river corridors and repair underpass areas in river corridors on the Karamu, Tūtaekurī and Ngaruroro, Waimarama Rd and to resurface repaired stopbanks 10.5 Longer term work on the underpass in Waitangi in collaboration with NZTA/KiwiRail and the Tūtaekurī at Springfield Road in conjunction with NZTA and HDC is ongoing. 10.6 Total cost of repair is estimated at $2.3m and expected to be completed by June 2024.	7 August 2023
11	**Recovery Finance Update**	**CDEM – Welfare Claims** 11.1 Total CDEM – Welfare costs to date are **$8.4m and of this we have identified $5.8m is recoverable.** 11.2 We have claimed $5.8m to date with NEMA and a further $580k recoverable via Commercial entities, MSD and other Councils for oncharging of costs incurred by CDEM on behalf. 11.3 NEMA is currently assessing the most recent claim which was submitted 11 July for $3.1m so we are yet to understand the full extent of the recoverability on this amount just yet. 11.4 There is risk in recovering this $580k in full. We are aware of some entities that have had generators but claim they didn't use them and another was a generator provided for a swap in food for the Distribution Centre and we will need to weigh up whether these are worth pursuing or not. 11.5 We have been reimbursed by NEMA a total of $2.7m to date. 11.6 As part of this a 'Special Claim' was submitted to NEMA for the costs that sit outside the s33 criteria, however, this relates to Welfare costs servicing remote communities. These types of costs were not anticipated by the s33 legislation and have occurred due to the widespread impacts of Cyclone Gabrielle in Hawke's Bay. This was a total of $967k and has been accepted and reimbursed. **Infrastructure** 11.7 We are close to finalising the first claim to NEMA for Infrastructure costs. There have been delays here in trying to set up new processes here and also aligning the financial data with operational information to tell the 'full story' of the damage and repairs to date. 11.8 We have been working closely with the AIP team to understand what will be required for the next stage of asset repairs and funding required across the 780 assets identified needing repairs. 11.9 They have advised the quantum of the asset repair costs are likely to now be less than $180m however, this amount is yet to be confirmed. **Other response claim** 11.10 We intend to collate this once the Business Interruption costs have been claimed via insurance. Further updates pending.	

Recovery Workstream Initiatives (as outlined in the Environmental Resilience Plan – edition 1)	
1	**Catchment Management: (Catchment Operations/ Science)** 1.1 Erosion Control: Erosion Control Scheme re-establishment 1.2 Land for Life 1.3 Build nursery capability 1.4 Sediment & erosion control 1.5 Biosecurity, pest & predator control 1.6 Effectiveness of existing erosion control work 1.7 Erosion Control Scheme – post-cyclone project audit 1.8 Hapara Takatu (shovel ready) fencing repairs 1.9 Biosecurity post-cyclone auditing 1.10 Contaminated gravel
2	**Resource Management & Land Use: (Science)** 2.1 LiDAR capture 2.2 Quantification of land damage
3	**Indigenous Ecosystems, Biodiversity, and Conservation: (Science & Catchment Operations)** 3.1 Cyclone impact assessment on natural environment (freshwater, lakes, marine & coast, terrestrial ecosystems) 3.2 Biodiversity Protection and Enhancement programme recovery design 3.3 Implementation of Priority Ecosystem Programme 3.4 Implementation of Protection and Enhancement Programme
4	**Climate Change (Science & Climate Ambassador)** 4.1 Flood frequency analysis 4.2 Greenhouse gas inventory 4.3 Natural attenuation potential 4.4 Regional climate change vulnerabilities assessment 4.5 Assess impacts on air quality
5	**Waste (Asset Management: Operational Response Team)** 5.1 Silt & mixed waste 5.2 Woody debris
6	**Water Security & Health (Science & Regional Water Security Programme Manager)** 6.1 Changes in groundwater recharge dynamics 6.2 Assessment of spring feed flows 6.3 Re-assessment of low flows 6.4 Groundwater quality 6.5 Water Storage - feasibility study
7	**Land Use Recovery (Rural Recovery Team)** 7.1 HBRC Rural Recovery Strategy development 7.2 Building resilient rural businesses 7.3 Water quality for primary sector 7.4 Individual SLUI -style recovery farm plans which will transition to NPSFM freshwater planning 7.5 Incentive Scheme funding

Recovery Workstream Initiatives (as outlined in the Environmental Resilience Plan – edition 1)	
8	**Flood Protection (Asset Management: The Capital Delivery Team - Rapid Response)** 8.1 Rapid rebuild of stopbanks 8.2 Heretaunga Plains Flood Control Scheme 8.3 Upper Tukituki Scheme 8.4 Pumpstation review 8.5 Wairoa (new scheme) 8.6 Replace and improve drainage pumpstations 8.7 Support for private land owners with river damage, edge protection, stabilisation of river course 8.8 Gravel extraction 8.9 Cycleways repairs (Open Spaces)

Decision-making Process

2. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision-making provisions do not apply.

Recommendation

That the Cyclone Recovery Committee receives and notes the *HBRC recovery update*.

Authored by:

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Attachment/s

There are no attachments for this report.

HAWKE'S BAY REGIONAL COUNCIL

CYCLONE RECOVERY COMMITTEE

Wednesday 16 August 2023

Subject: RECOVERY UPDATES FROM CENTRAL GOVERNMENT

Reason for Report

1. This item provides the means for staff to update the Committee on central government announcements and related activities.

Legislation and Orders in Council

2. Orders in Council (OICs) are a legislative tool that can temporarily suspend or relax requirements of existing legislation to support recovery in districts and regions impacted by 2023's severe weather events, including Cyclone Gabrielle. Table 1 outlines current and upcoming known OICs relevant to the Regional Council's activities and interests (NB: Table 1 does not include OICs relating to activities outside of HBRC's roles and interests).

Table 1 – Overview of Severe Weather Recovery-related Orders in Council relating to HBRC's activities

What	Status
Local Government Act – simplifying annual planning and rate-setting processes; and extend statutory timeframe for approving local governance statements and triennial agreements. https://www.legislation.govt.nz/regulation/public/2023/0120/latest/LMS852076.html	In effect
Outdoor burning of cyclone waste on rural land that would otherwise be prohibited under national regulations or regional rules. https://www.legislation.govt.nz/regulation/public/2023/0167/latest/LMS865005.html	In effect
Waste management for landfills, silt disposal sites, and temporary waste collection, sorting and processing facilities.	Proposal
Waka Kotahi repair works – streamlining approvals required for specific identified locations of repair work on state highways, including streamlined RMA consenting. https://www.transport.govt.nz/assets/Uploads/OiC-Engagement-Document.pdf	Proposal
Kiwi Rail repair works – streamlining approvals required for specific identified locations of repair work on the rail network, including streamlined RMA consenting. https://www.transport.govt.nz/assets/Uploads/OiC-Engagement-Document.pdf	Proposal
Extend statutory timeframe for Gisborne DC and HBRC to take enforcement/prosecution action (from 12 months to 24 months) under RMA. https://environment.govt.nz/assets/what-government-is-doing/recovering-from-recent-severe-weather-events/mfe-oic-tranche-5-consents-compliance-and-plan-changes-engagement-materials.pdf	Proposal
Deem a small number of water take consents issued by HBRC to be permitted activities until replacement applications are determined. https://environment.govt.nz/assets/what-government-is-doing/recovering-from-recent-severe-weather-events/mfe-oic-tranche-5-consents-compliance-and-plan-changes-engagement-materials.pdf	Proposal
Provide additional time to comply with the following national direction timeframes: - NPS for Freshwater Management timeframe to notify freshwater planning instruments in Gisborne and Hawke's Bay (+3 years to be 31 December 2027) - National stock Exclusion Regulation timeframes to exclude stock from waterways in Gisborne and Hawke's Bay (+2 years) - National Planning Standards implementation timeframes for Hastings District Council (+2 years). https://environment.govt.nz/assets/what-government-is-doing/recovering-from-recent-severe-weather-events/mfe-oic-tranche-5-consents-compliance-and-plan-changes-engagement-materials.pdf	Proposal

What	Status
Empowering councils to do faster RMA policy statement and plan changes for enabling permanent housing and papakāinga. https://www.hud.govt.nz/our-work/consultation-enabling-faster-plan-changes-to-support-cyclone-recovery/	Proposal
Replace the 2024 Long Term Plan with a three-year plan under LGA and no requirement for LTP audit. https://www.dia.govt.nz/Local-Government-Cyclone-Response	Proposal

3. Copies of any submissions made on behalf of HBRC on OIC proposals can be viewed at www.hbrc.govt.nz (keyword #hbrcsubmissions).

Decision-making Process

4. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision-making provisions do not apply.

Recommendation

That the Cyclone Recovery Committee receives and notes the *Recovery updates from central government*.

Authored by:

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GROUP MANAGER CORPORATE SERVICES

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CHIEF EXECUTIVE

Attachment/s

There are no attachments for this report.

HAWKE'S BAY REGIONAL COUNCIL

CYCLONE RECOVERY COMMITTEE

Wednesday 16 August 2023

Subject: NATURE-BASED SOLUTIONS - VERBAL UPDATE

Reason for Report

1. This Report Introduces a verbal update by the science team on nature-based solutions.

Recommendation

That the Cyclone Recovery Committee receives and notes the *Nature-based solutions verbal update*.

Authored by:

Anna Madarasz-Smith
MANAGER SCIENCE

Approved by:

Iain Maxwell
GROUP MANAGER INTEGRATED CATCHMENT MANAGEMENT

Attachment/s

There are no attachments for this report.

HAWKE'S BAY REGIONAL COUNCIL

CYCLONE RECOVERY COMMITTEE

Wednesday 16 August 2023

Subject: MANAAKI WHENUA - RAPID ASSESSMENT OF LAND DAMAGE

Reason for Report

1. This report presents a summary of the work undertaken by Manaaki Whenua – Landcare Research on behalf of Ministry for the Environment on a Rapid Assessment of Land Damage – Cyclone Gabrielle.
2. The report provides valuable information on considerations for land management in the region's recovery.

Executive Summary

3. Cyclone Gabrielle caused severe landsliding in several zones along the east coast of the North Island. As part of the cyclone response, the Ministry for the Environment contracted Manaaki Whenua – Landcare Research to do a rapid assessment of the damage in hill country (Land Use Capability classes 6 and 7) resulting from the landsliding.
4. The extent of severe damage was large, ranging from the Gisborne district, through Hawke's Bay, and down to the Wairarapa. The total number of landslides, each typically comprising a thousand tonnes of soil, was over 300,000.
5. Landsliding has removed productive soil from farms and deposited sediment on floodplains. The total mass of landslides is estimated at 300 million tonnes, with an economic cost of approximately $1.5 billion (conservatively estimated at $5 per tonne of eroded soil).

Discussion

6. The physical mechanism for landslide initiation is well understood. Intense rainfall increases the pore water pressure in the soil, which reduces the effective weight of soil at the failure plane between soil and regolith. On steep hill slopes this often results in shear stress exceeding shear strength, causing slope failure. If there is woody vegetation growing on the soil, then roots growing through the soil/regolith boundary will increase the shear strength and reduce the probability of failure. These mechanisms are generally sufficient to explain the spatial distribution of landslides in Cyclone Gabrielle; that is, landslides mostly occur where intense rainfall has fallen on steep land without protective forest cover.
7. The reduction in landslide probability by woody vegetation is modelled at 90% by commonly used regional soil erosion models. In the southern Hawke's Bay – northern Wairarapa hill country, this expected reduction was largely observed for both indigenous forest (90% reduction) and exotic forest (80%).
8. However, in northern Hawke's Bay, exotic forestry was less effective than expected (60%), while indigenous forest maintained normal reduction (90%). In the Gisborne coastal hill country, exotic forestry was ineffective at reducing landslide probability, with indigenous forest resulting in only a moderate reduction (50%).
9. Possible causes for the low effectiveness of exotic forestry for reducing landslide probability in northern Hawke's Bay and Gisborne include:
    - 9.1. forestry management, such as non-thinning
    - 9.2. multiple rotations of forestry
    - 9.3. thin soils caused by a long erosion history.

10. Staff are working with Manaaki Whenua to consider further investments to better understand the northern Hawke's Bay questions.

Decision-making Process

11. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision-making provisions do not apply.

Recommendation

That the Cyclone Recovery Committee receives and notes the *Manaaki Whenua - Rapid Assessment of Land Damage* staff report.

Authored by:

Anna Madarasz-Smith
MANAGER SCIENCE

Approved by:

Iain Maxwell
GROUP MANAGER INTEGRATED CATCHMENT MANAGEMENT

Attachment/s

There are no attachments for this report.

HAWKE'S BAY REGIONAL COUNCIL

CYCLONE RECOVERY COMMITTEE

Wednesday 16 August 2023

Subject: TELEMETRY REVIEW

Reason for Report

1. This item updates the committee on progress of two telemetry reports that were requested by HBRC and received post Cyclone Gabrielle.

Background

2. Cyclone Gabrielle was a significant event and caused power and communication issues across the region. Two reports were commissioned to examine and understand the nature and cause of the power failure at a repeater site and to consider how the hydrometric telemetry system performed during the period 13 February to 15 February 2023.

Discussion

3. Two independent subject matter experts were engaged to conduct reviews and provide written reports on their findings.
4. The telemetry performance review was written by Graeme Horrell who has over 50 years of hydrology experience gained with the Ministry of works, Canterbury Catchment Board, Environmental Canterbury and NIWA providing consulting services to regional councils and the Government.
5. The HBRC radio and repeater review was written by David Walker. He began his radio serviceman's apprenticeship in 1967and has worked in the radiocommunications industry ever since, starting his own radio business in 1992. David is familiar with our systems at HBRC and the Kahurānaki site.
6. HBRC leases equipment and a site at Kahurānaki from Vital a New Zealand based communications service provider.
7. The Vital Kahurānaki repeater failed when mains power to the site was lost, the site generator then failed and the batteries were drained in very short time. The power loss at Vital's Kahurānaki site resulted in HBRC channel one telemetry equipment in the field being unable to transmit data back to Dalton Street. A smaller generator was flown into the site on 15 February by Vital but was unable to power HBRC equipment. Mains power was restored on 18 February and the data stored on the field loggers that were still at sites was able to be automatically retrieved.
8. Since this event HBRC has purchased a portable repeater, upgraded the Mt Misery repeater in the north and is going through an upgrade at Kahurānaki where we will own and maintain our equipment. The critical field sites have also had extra communication paths installed so we will have at least two forms of communication at each site.
9. In response to the damage to bridges in particular, new technology is being installed at critical sites that is not mounted on bridges, but well above any future flood heights and is able to take real-time pictures to give measurements of flow and also inform the public via a web page.
10. Staff will present a summary of our communications systems and telemetry network alongside the findings of the two independent reports. Staff will also outline remedial work carried out to implement the recommendations partially or fully from the two reports.

Decision-making process

11. Staff have assessed the requirements of the Local Government Act 2002 in relation to this item and have concluded that, as this report is for information only, the decision-making provisions do not apply.

Recommendation

That the Cyclone Recovery Committee receives and notes the *Telemetry review* staff report.

Authored by:

Peter Davis
MANAGER ENVIRONMENTAL INFORMATION

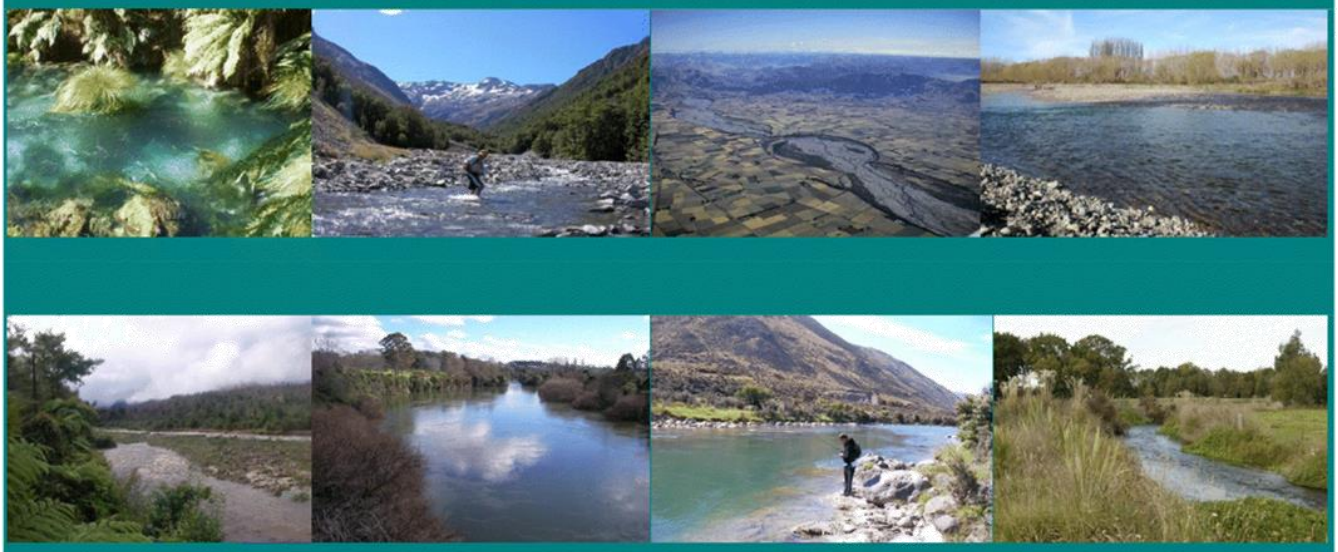
Approved by:

Iain Maxwell
GROUP MANAGER INTEGRATED CATCHMENT MANAGEMENT

Attachment/s

1 Graeme Horrell review

2 David Walker review



Review of Hawkes Bay Regional Council telemetry system

REPORT: **GHCL Report 2023-001**

TITLE: **Review of Hawkes Bay Regional Council telemetry system**

PREPARED FOR: Hawkes Bay Regional Council

PREPARED BY: **Graeme Horrell**

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DATE: May, 2023

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Review of Hawkes Bay Regional Council telemetry system

1 Introduction

The Hawkes Bay Regional Council (HBRC) operates a flood monitoring telemetry system as part of a comprehensive flood protection program for Hawkes Bay. Through the use of water level and rainfall monitoring this system provides alarm notification to HBRC staff that a flood event may be imminent. Downloaded data can then be entered into data models to provide forecast river levels thus enhancing the ability to predict a flood event.
Telemetry is essential to this flood warning system. It is used when there is a need to collect and transmit water level and rainfall data from remote sources of the flood warning network; it is also used for day to day monitoring.

Cyclone Gabrielle tested the HBRC flood warning capability, specifically the telemetry system. As a follow up after the flooding, HBRC have requested an independent review of the telemetry system performance.

This study is not a spatial review of HBRC's flood warning network, rather it but focusses on the operational flood warning provided by HBRC's telemetry system during cyclone Gabrielle.

2 HBRC flood monitoring network

The HBRC flood monitoring network consists of the following components:

- Telemetry base station (Napier office)
- Backup telemetry base station (Guppy Road Taradale)
- Radio repeater stations Kahauranaki (radio channel 1) and Mt Misery (radio channel 2)
- Radio link stations (LK3 Burns, LK4 Ngaroto Road, LK5 Bird Road, LK6 Guppy Road, Burnt Bridge Link and Kahatanui Link)
- 84 Rainfall sites
    - Rainfall backup sites with alternative sensors and communication method
- 32 Water level sites
    - Water level backup sites with alternative sensors and communication method
- 25 sites measuring both water level and rainfall, included within the totals above.
- 16 Climate stations, also included within the totals above.
- Dual sites where a water level or rain gauge sensor has another (backup) sensor installed, with both are connected to one, two or even three forms of communication. This is to ensure data is received at the base station from a working sensor and via an operational form of communication. These are identified in Appendixes 2 and 3.
- Four methods of telemetry communications are employed; radio, digital mobile radio (DMR), cell phone and satellite.

3 Methodology

This will include component vulnerabilities, component reliability and communication accessibility and reliability. It will include an assessment of the reliability of repeaters, Link stations and backup, while also including the availability and performance of individual sites.

Any problems with the current system along with any risks related to equipment and methods in use, will be identified.

In addition, reporting will include best practice and methods used by other New Zealand regional authorities to monitor sites and retrieve data during flood events.

Other water level sites, also telemetered but not essential to the flood warning system will be listed in Appendix 1but not assessed.

4 Results

This review relied upon the detection work of HBRC staff. It is acknowledged that one or two sites may be miss-reported below but this will not detract from the overall finding to any extent.

Detecting the reliability of the telemetry system is made difficult by the important role the hydrology team has to have complete records. As an inspection of the current records will display that they are approximately 99% complete. So no telemetry issues appear to have occurred, although many are hidden.

To explain this difficulty further; if a site could not send data back to base any time during the Cyclone Gabrielle time period selected (for this review 13 February 00 hour to 15 February 00 hour), then it was determined as a failure to retrieve live data. However if the communication issue was rectified shortly after these dates, then this key 13th -15th period data is actually now complete.

Many sites have multiple sensors and methods of telemetry communication. The logic applied in this review is that if live data was received at the HBRC base station from a working combination of one sensor and one form of communication then it was deemed successful (Appendix 2 and 3). A fail was no data was defined if received from the site setup for all or part of the Cyclone Gabrielle period.

4.1 Telemetry base station (Napier office)

The telemetry base in the Napier office performed reliably throughout the flooding period.

4.2 Backup telemetry base station (Guppy Road Taradale)

This backup station was not required due to the reliability of the Napier Office base station.

4.3 Telemetry communications

HBRC uses 4 forms of telemetry communication to share and reduce the risk of losing communication with any sites during flood events.

4.3.1 Radio repeater stations (Kahauranaki and Mt Misery)

Data was received up to approximately 1 a.m. on the 14th February when the Kahauranaki repeater (channel 1) stopped operating. What caused the repeater fail is unknown to the author.

Mt Misery (channel 2) operated reliably throughout the entire flood event.

4.3.2 Digital mobile radio (DMR)

The DMR was used as a backup communication method for a number of rainfall and water level sites. These radios locate an available repeater to send the required data back to the HBRC base. During this event data was available via the Gisborne Hub, which was reliant on fibre cable to enable transmission to Hamilton, and then forwarded to the HBRC server. Unfortunately the bridges north and south of the Gisborne Hub were damaged by flooding which severed the cable in two places. This most probably occurred late on the 13th February. Sites affected were Porongahau at Saleyards rainfall and water level (primary communication), Terapatiki rainfall, Waipatiki rainfall, Esk at Waipunga (primary) although secondary communications worked until the sensor was damaged by flooding. Also Tutaekuri Waimate at Chesterhope rainfall and water level (primary communication) with evidence it failed late on 13th February, Ngaruroro at Kurikapango third site (waterlevel) failed although the secondary site functioned throughout.

4.3.3 Satellite

Satellite was employed at a total of 12 rainfall (or combined water level and rainfall sites). Ten sites received data throughout this event and data from 2 sites did not come in due to internet failures. Two of the 10 successful sites that received data were using satellite as backup communication and could cover for the faulty Kahauranaki (Channel 1) radio repeater.

4.3.4 Cell phone

Cell phones were used as backup at a total of 26 rainfall (or combined water level and rainfall sites). Twenty three sites received data throughout this event and 3 sites did not retrieve data due to the cell phone coverage going down. Three of the 23 sites that successfully received data were using cell phone as backup communication to cover for the faulty Kahauranaki (Channel 1) radio repeater.

4.3.5 Dual communications

In order to maintain high reliability of telemetry communications some sites have additional sensors with dual communication at 13 HBRC raingauges. An example of this could be using radio through Kahauranaki repeater (Channel 1) and if down then GDSP cellphone takes over; this is typical of a number of sites. The one restriction with the GDSP is that it will send data back, but only at a 1 hour intervals. In many situations this interval may be adequate, however, when a flood peak is rising very rapidly data is required at much shorter intervals to inform those monitoring the flood. While the Kisters developers state that these shorter interrogations are possible, the information on how this can be achieved is not clear.

4.4 Radio link stations

- Lk1 Doneraille closed
- Lk2 Otoi closed
- LK3 Burns Link provides a radio link for the Ngaruroro at Kuripapango water level and rainfall (HBRC), as well as Poporangi at Ohara site.
- LK4 Ngaroto Road, is a rainfall site only and doesn't act as a link for any other sites.
- LK5 Bird Road provides a radio link for Wallingford water level and rainfall site and would have received data throughout. However Channel 1 Kahuranaki repeater failed.
- LK6 Guppy Road provides a radio link transfer to Napier office base for sites coming in via Mt Misery channel 2. This link also transmits Guppy Road (backup base) voltage status to the Napier office base for monitoring.
- Burnt Bridge Link provides a radio link for the Waipawa at Fletchers Crossing water level and rainfall site and Makaroro at Burnt Bridge (backup site) and would have received data throughout the event. However Channel 1 Kahuranaki repeater failed.
- Kohatanui Link provides a radio link for the Ngaruroro at Whanawhana (backup) and would have received data throughout the event. However Channel 1 Kahuranaki repeater failed.
- In summary, all of the above HBRC link stations operated during Cyclone Gabrielle.

4.5 Rainfall sites

Rain gauges that were listed as non-flood warning sites have been included in this review (Appendix 2), due to valuable live spatial information they provide when tracking such events. This information supplies knowledge which infills detail by informing what depth of rainfall has occurred and where and when this occurred. This is in contrast to water level non-flood warning sites (Appendix 1), as it has been determined that these rivers do not pose a threat to life or infrastructure during a flooding event.

Of the 84 rainfall sites available:

- 41 sites successfully measured rainfall with their sensors and the data was received via a telemetry communications method at the Napier office base station. See Appendix 2. Therefore no sites had rainfall sensor faults while the communication continued to function.
- Another 42 sites failed to send data to the base due to a communication failure. However their sensors continued to record rainfall data only available after the flood when the communication issue was resolved.
- 1 site had both a faulty rainfall sensor and a communication failure.
- Overall this resulted in just under 50% of sites providing live rainfall data throughout the event.

Of the 42 sites with failed communications 38 (90%) occurred due to the Kahauranaki repeater (channel 1) failure.

Of the 16 priority rain gauges listed by Gary Clode in Appendix 4 , 9 provided live rainfall data throughout the Cyclone Gabrielle event. Of the remaining 7 sites all were directly affected by the Kahauranaki repeater (channel 1) failure.

Many (45) of the HBRC rainfall sites are setup with a backup sensor as this is a sound practice to assure rainfall records are complete. The Rain o Matics are employed as the backup sensor for the majority of sites mainly due to their low cost. However in this event they appear to have experienced reliability issues as 16 of the 45 sites using the Rain o Matic's as a backup sensor were found to be faulty, mostly due to two common problems; failure to record and erroneous rainfall totals which disagreed considerably when with the OTA primary sensor.

4.6 Water level sites

Of the 32 water level sites identified in the HBRC spreadsheet as being used for flood warning:

- 12 sites successfully measured (Appendix 3) the water levels with their sensors and the data was received via a telemetry communications method at the Napier office base station throughout the event.
- Two sites had sensors damaged by the flood while the communication continued to function.

- Another 12 sites failed to send data to the base due to communication failures while their sensors continued to record giving data available after the flood when communication problems were resolved.
- Another 6 sites had both sensor damage by flooding and communication failures.
- This resulted in just under 40% of sites providing live data throughout the event.

Of the 12 sites with failed communications 10 (83%) were due to the Kahauranaki repeater (channel 1) failure. Of the remaining sites one had DMR communications while the other had Cell phone. One with channel 1 failure also had a backup failure with satellite.

Of the 9 priority water level sites listed by Gary Clode in Appendix 4 , 3 provided live water level data throughout the Cyclone Gabrielle event. Of the remaining 6 sites, 3 would have provided data if Kahauranaki repeater (channel 1) functioned , while the remaining 3 sites were damaged by flooding.

5 Best practice and methods used by other New Zealand regional authorities

There is no National Environmental Monitoring Standard (NEMS) documentation regarding flood warning site set up methodologies to assure permanent live access to/from the field stations and their data.

It is important for the flood warning system to be robust and have as much redundancy as possible. To that end it is considered sound practice to have at least two sensors for measuring rainfall and water level with a minimum of two methods of communication for data transfer at key flood warning sites. It is suggested that cell phones should not be employed as the primary form of communication.

6 Discussion

6.1 Communication failures

With over 50% of the telemetered sites failing to provide live data throughout the Cyclone Gabrielle event due to the Kahauranaki repeater (channel 1) malfunction, consideration should be given to the practice of contracting out components of the telemetry system as this was the only component of the flood warning system not under direct control by HBRC staff.

Experience at other regional councils also highlights this issue as shown below:

Jeff Watson (retired), Horizons
Lessons learnt from Manawatu River floods in 2004 (Jeff Watson email) :

- DO NOT USE ANY COMMERCIAL COMMUNICATIONS PROVIDERS FOR YOUR HYDROLOGICAL PURPOSES (EXCPT MAYBE YOUR WATER METERING PROGRAMME). ENSURE THAT YOU HAVE THE NECESSARY TECHNICAL ABILITY IN HOUSE, AT ALL TIMES.

- More power at repeaters is required. Over-kill is great.

- Our radio telemetry network was(is) far more reliable than the commercial operators when the going gets tough. You must have complete control of your repeaters so that you can carry out repair work when it needs doing, as it probably won't be someone else's priority.

- Have at least one, and maybe two, spare repeaters already configured in an aluminium hut, with solar panels and a collapsible aluminium lattice mast, all sitting on a pallet ready to be helicoptered to any hill that will provide coverage to somewhere that needs communications. They need to be tested regularly and not forgotten about.

Brent Watson, Horizons

- Horizons lost cell phone coverage during Cyclone Gabrielle, a repeat problem to that which occurred in the large Manawatu floods of 2004.
- Horizons had repeater problems during Cyclone Gabrielle and were able to send staff to the repeater. Brent Watson (pers com) "It is easier to fix a repeater if you own it, renting a repeater is not an option".

Stefan Beaumont, Nelson City Council.

Auckland City Flood controller duties during Cyclone Gabrielle

- Many sites could not send in data due to 17 cell phone towers going down

6.2 Water level site damage or destruction

It is always disappointing when water level sites are damaged or destroyed during such events as Cyclone Gabrielle. Sites located in river gorges have some form of natural protection in large events. The recently revised NEMS water level document provides a method for approximating water level during a 200 year (ARI) flood (Horrell et al, 2022). This may be useful when re-installing permanent water level sites following this event.

It is the lower reaches, especially plains sites that have less natural protection and suffer damage or destruction during large floods. The cost of building such structures (while avoiding attachment to bridges) is often seen as prohibitive cost wise. However consideration of this fact must still be undertaken.

6.3 New systems and enhancements

- Wireless data link networks are available and receive data from a site via microwave dish. This has the capability to transmit data every 2 minutes, with the option of an additional webcam. Battery life is up to 3 years.
- Internet of things (IOT) is data over a network, with smaller/less expensive sensors e.g. IOT battery powered (3 years battery life) radar. An option is to pay for one gateway/repeater (Iorawan IOT) and have several hundred devises linked back wirelessly, requiring only one Sim card.

- Satellite communication for remote sites using new options such as Swarm/starlink, provide connections under $10 per month.
- It may be possible to upgrade existing VHF radio networks to Scada networks, so telemetry data can be transmitted 'real-time' back to base.
  Contact person for all of the above is Nathan Penney at Remote Networks Limited, Palmerston North.

- The Broadband global area network (BGAN) is a global satellite network with telephony and data transmission capability (owned by British telecommunication company Inmarsat) and using portable terminals. Employed to connect a laptop computer to broadband Internet in remote locations as long as line of sight to one of their three geostationary satellites exists.

- One enhancement to improve the resilience and reliability of cell phone communications would be when One.NZ upgrade to satellite in 2024. These improvements will occur when a site searches for the nearest cell tower, thereby avoiding their dependence upon fiber cables.

6.4 HBRC experienced staff

An observation worth mentioning is that the flood warning system is made up of four components;

- sensors at sites
- telemetry system communications
- internet informing staff and the public
- experienced staff at the council who know their rivers and can make informed decisions.

In the latter component HBRC is rich with experienced and knowledgeable engineers and hydrologists. One must pause to consider the outcomes if all engineers and hydrologists had only 2 years' experience in this region (as is occurring at some other regional councils). It is my view that the experienced staff at the HBRC are the most valuable component of the flood warning system.

7 Recommendations

- Investigate how HBRC can have more control over the repeater located at Kahauranaki (radio channel 1), or seek an alternative.
- That the new communication systems described in Section 6.3 be investigated, especially the wireless data link networks.
- Ensure that at least a minimum of two sensors and two forms of communication (cell phone not to be primary) are established at flood warning sites.
- Suggest looking into an alternative backup rainfall sensor to replace Rain o Matics, due to their unreliability. While these are low cost an alternative may incur additional costs to the flood warning system but reliable data should not be undervalued.
- Revisit the listed priority flood warning sites (Appendix 4) following the learnings from Cyclone Gabrielle.

- Approach Kisters cell phone telemetry developers to understand if or how when set up in a dual system this can be enhanced to retrieve data at shorter intervals via the cell phone, or when required.
- Have a readily configured spare repeater kept in storage, to be installed during any event when required.
- Plan for a fall back last resort option, as all regional councils do (probably already set out in the HBRC flood manual) for site observations geared with; satellite phone, spotlights, staff gauges. These person observations may indicate that risk of stop bank failure is imminent.
- When developing a more robust flood warning system, capital expenditure may well be found for replacements/upgrades/new sites. But consider the continued annual non capital costs involved for the hydrology team such as the correct level of staffing to build and maintain sites, processing data, auditing data and undertaking flood and regular flow gaugings to maintain current rating curves.

8 Acknowledgements

I would like to thank Kim Coulson for the spreadsheets (rainfall and water level) which enabled the detection of the telemetry system reliability which this review was dependent. I would also like to thank Pete Davis and Paul Hodgkinson for answering questions about the telemetry system.

9 References

Horrell, G., Rowland, M., Peters P., (Sept 2022) National environmental monitoring standards for water level version 4. For MFE. 110 p

Appendix 1 HBRC non flood warning water level sites

Site name	River	Catchment	Highest recorded during Cyclone Gabrielle
McVicars Bridge	Mohaka	Mohaka	yes
Poronui Station	Mohaka	Mohaka	no
Raupunga	Mohaka	Mohaka	no
Henrys Bridge	Taharua	Mohaka	no
Forest Glade	Pakuratahi	Central Coastal	no
Clarkes Weir	Irongate	Ngaruroro	yes
Floodgates	Karamu	Ngaruroro	yes
Napier Road	Mangateretere	Ngaruroro	no
Weir 2	Paritua	Ngaruroro	no
Douglas Road	Poukawa	Ngaruroro	no
Ormond Road	Raupare	Ngaruroro	no
Goods Bridge	Tutaekuri Waimate	Ngaruroro	no
Limeworks Stn Road	Maharakeke	Tukituki	yes
McBains	Te Aute Main Drain	Tukituki	yes
Access Bridge	Cochranes	Tukituki	no
Ongaonga Road Bridge	Kahahakuri	Tukituki	no
Dam No.1	Makara	Tukituki	no
Charlotte Road	Te Matau	Tukituki	no
Ashcott Bridge S.H. 50	Tukituki	Tukituki	no
Aniwaniwa	Aniwaniwa	Wairoa	yes
Terapatiki	Waikaretaheke	Wairoa	yes
State Highway 38	Te Kumi	Wairoa	no
Railway Bridge	Wairoa	Wairoa	no
Waimarama Road	Waingongoro	Southern Coastal	yes
Mangaorapa Road	Mangaorapa	Porangahau	yes

Appendix 2 Rainfall sites

Site name	River	Catchment	Rainfall only or combined	Flood Warning site: No, Yes, Priority	Comms - Primary	Comms - Secondary	Sensor - Primary	Sensor - Backup	Largest 48 hour total recorded	Reason for loss of data during event	Other comment
Railway Bridge	Kopuawhara	Northern Coastal	Water level	No	GDSP		OTA 0.5		No		Received OTA data throughout
Railway Bridge	Kopuawhara	Northern Coastal	Water level	No		Satellite		Rain-o-Matic (1.0mm)	No		Received Rain-o-Matic data throughout
Pukeorapa Climate	Nuhaka	Northern Coastal	Climate	Priority backup	CH2	No	TB3 0.2	No	Yes		Received TB3 data throughout
Pukeorapa Station	Nuhaka	Northern Coastal	Rainfall	Priority	Ch2 (dual)		OTA 0.5		Yes		Received OTA data throughout
Pukeorapa Station	Nuhaka	Northern Coastal	Rainfall	Priority		Ch2 (dual)		Rain-o-Matic (1.0mm)	Yes	Rain-o-Matic faulty	
Off Harrison Rd	Waikatuku	Northern Coastal	Rainfall	No	CH2	No	OTA 0.5	No	?		Received OTA data throughout
Aniwaniwa Park HQ	Wairoa	Wairoa	Rainfall	No	Satellite	No	OTA 0.5	No	No		Received OTA data throughout
Bushy Knoll	Wairoa	Wairoa	Rainfall	Priority	CH1 (dual)		OTA 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Bushy Knoll	Wairoa	Wairoa	Rainfall	Priority		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed, Rain-o-Matic faulty	
Cricklewood	Wairoa	Wairoa	Climate	No	CH2	No	TB3 0.2	No	No		Received TB3 data throughout
Fairview	Wairoa	Wairoa	Rainfall	Yes	CH2 (dual)		OTA 0.5		Yes		Received OTA data throughout
Fairview	Wairoa	Wairoa	Rainfall	Yes		CH2 (dual)		Rain-o-Matic (1.0mm)	Yes		Received Rain-o-Matic data throughout
Doneraille Park	Hangaroa	Wairoa	Water level	Yes	Satellite	N	OTA 0.5	No	No		Received OTA data throughout
Gorge	Mangapoike	Wairoa	Water level	No	CH2	N	Rain-o-Matic (1.0mm)	No	Yes		Received Rain-o-Matic data throughout

Site name	River	Catchment	Rainfall only or combined	Flood Warning site: No, Yes, Priority	Comms - Primary	Comms - Secondary	Sensor - Primary	Sensor - Backup	Largest 48 hour total recorded	Reason for loss of data during event	Other comment
Mt Manuoha	Wairoa	Wairoa	Rainfall	Yes	CH1 (dual) GDSP (dual)		TB3 0.5		no		Received TB3 data throughout
Mt Manuoha	Wairoa	Wairoa	Rainfall	Yes		CH1 (dual) GDSP (dual)		Rain-o-Matic (1.0mm)	No		Received Rain-o-Matic data throughout
Mt Misery Repeater	Wairoa	Wairoa	Rainfall	No	GDSP 3G	No	OTA 0.5	No	No		Received OTA data throughout
Nga Tuhoe	Wairoa	Wairoa	Rainfall	Yes	CH2 (dual)		OTA 0.5		No		Received OTA data throughout
Nga Tuhoe	Wairoa	Wairoa	Rainfall	Yes		CH2 (dual)		Rain-o-Matic (1.0mm)	No		Received Rain-o-Matic data throughout
Rocky Pad	Wairoa	Wairoa	Rainfall	Yes	Satellite (dual)		TB3 0.5		No		Received TB3 data throughout
Rocky Pad	Wairoa	Wairoa	Rainfall	Yes		Satellite (dual)		TB3 0.5	No		Received TB3 data throughout
Tauwharetoi	Ruakituri	Wairoa	Climate	Yes	CH2	No	TB3 0.2	No	No		Received TB3 data throughout
Monarae	Waiau	Wairoa	Rainfall	Priority	CH2 (dual)		OTA 0.5		No		Received OTA data throughout
Monarae	Upper Waiau	Wairoa	Rainfall	Priority		CH2 (dual)		Rain-o-Matic (1.0mm)	No	Rain o Matic faulty	
Ardkeen	Waiau	Wairoa	Water level	Priority	CH2 (dual)	Satellite (dual)	OTA 0.5	No	No		Received OTA data throughout
Terapatiki	Waikaretaheke	Wairoa	Water level	Yes	DMR (dual)		OTA 0.5		No	DMR comms down	Recorded OTA data throughout
Terapatiki	Waikaretaheke	Wairoa	Water level	Yes		DMR (dual)		Rain-o-Matic (1.0mm)	No	DMR comms down	Recorded Rain-o-Matic data throughout
Waimaha	Wairoa	Wairoa	Rainfall	Yes	CH2 (dual)		OTA 0.5		Yes		Received OTA data throughout
Waimaha	Wairoa	Wairoa	Rainfall	Yes		CH2 (dual)		Rain-o-Matic (1.0mm)	Yes		Received Rain-o-Matic data throughout
Marumaru	Wairoa	Wairoa	Water level	Priority	CH2 (dual)	GDSP (dual)	OTA 0.5	No	No		Received OTA data throughout
Railway Br. RADAR	Wairoa	Wairoa	Water level	No	CH2 (dual) GDSP (dual)		OTA 0.5		No		Received OTA data throughout

Site name	River	Catchment	Rainfall only or combined	Flood Warning site: No, Yes, Priority	Comms - Primary	Comms - Secondary	Sensor - Primary	Sensor - Backup	Largest 48 hour total recorded	Reason for loss of data during event	Other comment
Railway Br. RADAR	Wairoa	Wairoa	Water level	No		CH2 (dual) GDSP (dual)		Rain-o-Matic (1.0mm)	No		Received Rain-o-Matic data throughout
Kotemaori	Mohaka	Mohaka	Climate	Yes	CH2	No	OTA	No	Yes		Received OTA data throughout
Taharua	Mohaka	Mohaka	Climate	No	Satellite	No	TB3 0.2	No	No		Received TB3 data throughout
Te Haroto	Mohaka	Mohaka	Climate	No	CH1	No	TB3 0.2	No	No	Ch 1 Kahuranaki repeater failed	TB3 data recorded throughout
Glengarry	Esk	Esk	Rainfall	Yes	CH1 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki failed just after red alarm at 00:51 14/2	OTA data recorded throughout
Glengarry	Esk	Esk	Rainfall	Yes		CH1 (dual)		Rain-o-Matic (1.0mm)	Yes	Ch 1 Kahuranaki failed just after red alarm at 00:51 14/2	Rain o Matic data recorded throughout
Kaiwaka Tareha	Esk	Esk	Climate	No	CH1	No	OTA	No	Yes	Ch 1 Kahuranaki failed just after red alarm at 00:03 14/2	OTA data recorded throughout
Maunganui	Esk	Esk	Rainfall	Priority	CH1 (dual) GDSP (dual)		OTA 0.5		Yes	No alarms or data as Ch 1 failed.	GDSP cell phone worked throughout, received data
Maunganui	Esk	Esk	Rainfall	Priority		CH1 (dual) GDSP (dual)		Rain-o-Matic (1.0mm)	faulty	Rain-o-matic faulty throughout	
Te Pohue No.2	Esk	Esk	Climate	No	CH1	No	TB3 0.2	No	Yes		Received TB3 data throughout
Te Rangi	Esk	Esk	Rainfall	Yes	CH2 (dual) GDSP (dual)		TB3 0.5		No	No alarms received	Received TB3 data throughout
Te Rangi	Esk	Esk	Rainfall	Yes		CH2 (dual) GDSP (dual)		Rain-o-Matic (1.0mm)	No		Received Rain-o-Matic data throughout
Fishers	Esk	Central Coastal	Rainfall	No	DMR	No	OTA 0.5	No	No		Received OTA data throughout
Napier CBD	Napier City	Central Coastal	Rainfall	No	GDSP ICE3 (dual)		OTA 0.5		No		Received OTA data throughout
Napier CBD	Napier City	Central Coastal	Rainfall	No		GDSP ICE3 (dual)		Rain-o-Matic (1.0mm)	No		Received Rain-o-Matic data throughout

Site name	River	Catchment	Rainfall only or combined	Flood Warning site: No, Yes, Priority	Comms - Primary	Comms - Secondary	Sensor - Primary	Sensor - Backup	Largest 48 hour total recorded	Reason for loss of data during event	Other comment
Newstead	Wharerangi	Central Coastal	Rainfall	No	GDSP iCE 4G (dual)		OTA 0.5		Yes		Received OTA data throughout
Newstead	Wharerangi	Central Coastal	Rainfall	No		GDSP iCE 4G (dual)		Rain-o-Matic (1.0mm)	Yes		Received Rain-o-Matic data throughout
Glenstrae	Tahekenui	Central Coastal	Rainfall	No	CH2 (dual)		OTA 0.5		Yes		Received OTA data throughout
Glenstrae	Tahekenui	Central Coastal	Rainfall	No		CH2 (dual)		Rain-o-Matic (1.0mm)	?	Rain o Matic faulty due to loose wire	
Waipatiki	Waipatiki	Central Coastal	Rainfall	No	DMR		OTA 0.5		?	Comms failed, OTA stopped recording	
Waipatiki	Waipatiki	Central Coastal	Rainfall	No		GDSP (dual)	OTA 0.5		?	Comms failed, OTA stopped recording	
Waipatiki	Waipatiki	Central Coastal	Rainfall	No		GDSP (dual)		Rain-o-Matic (1.0mm)	No	Comms failed, Rain o Matic data faultly	
Chesterhope	Tutaekuri Waimate	Tutaekuri	Water level	Yes	DMR		OTA 0.5		Yes	DMR comms failed	Recorded OTA data throughout
Chesterhope	Tutaekuri Waimate	Tutaekuri	Water level	Yes		DMR (dual)		Rain-o-Matic (1.0mm)	No	DMR comms failed, Rain-o-Matic faulty	
LinK4 Ngaroto	Tutaekuri	Tutaekuri	Rainfall	Priority	CH1 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
LinK4 Ngaroto	Tutaekuri	Tutaekuri	Rainfall	Priority		CH1 (dual)		Rain-o-Matic (1.0mm)	Yes	Ch 1 Kahuranaki repeater failed	Recorded Rain-o-Matic data throughout
Ngahere HBRC	Tutaekuri	Tutaekuri	Rainfall	Priority	CH1		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Ngahere HBRC	Tutaekuri	Tutaekuri	Rainfall	Priority		Satellite		OTA 0.5	Yes		Received OTA data throughout
Puketapu HBRC	Tutaekuri	Tutaekuri	Water level	No	CH1	No	Rain-o-Matic (1.0mm)	No	Yes	Ch 1 Kahuranaki repeater failed	Recorded Rain-o-Matic data throughout
Waihau	Tutaekuri	Tutaekuri	Climate	No	CH1	No	TB3 0.2	No	Yes	Ch 1 Kahuranaki repeater failed	Recorded TB3 data throughout

Site name	River	Catchment	Rainfall only or combined	Flood Warning site: No, Yes, Priority	Comms - Primary	Comms - Secondary	Sensor - Primary	Sensor - Backup	Largest 48 hour total recorded	Reason for loss of data during event	Other comment
Flume	Awanui	Ngaruroro	Water level	Yes	GDSP iCE3 4G (dual)		OTA 0.5		Yes	Cell phone down no Comms	Recorded OTA data throughout
Flume	Awanui	Ngaruroro	Water level	Yes		GDSP iCE3 4G (dual)		Rain-o-Matic (1.0mm)	Yes	Cell phone down no Comms	Rain o Matic data recorded throughout
Bridge Pa	Ngaruroro	Ngaruroro	Climate	No	CH1	No	TB3 0.2	N	No	Ch 1 Kahuranaki repeater failed	TB3 data recorded throughout
Crownthorpe	Ngaruroro	Ngaruroro	Climate	No	GDSP	No	TB3 0.2	N	Yes		Received TB3 data throughout
Farndon Rd Pump Station	Ngaruroro	Ngaruroro	Rainfall	No	GDSP iCE3 4G (dual)		OTA 0.5		Yes		Received OTA data throughout
Farndon Rd Pump Station	Ngaruroro	Ngaruroro	Rainfall	No		GDSP iCE3 4G (dual)		Rain-o-Matic (1.0mm)	Yes		Received data throughout
Greenhill Ridge	Ngaruroro	Ngaruroro	Rainfall	No	GDSP iCE3 4G (dual)		OTA 0.5		No		Received data throughout
Greenhill Ridge	Ngaruroro	Ngaruroro	Rainfall	No		GDSP iCE3 4G (dual)		Rain-o-Matic (1.0mm)	No		Received data throughout
Kaiapo Road	Ngaruroro	Ngaruroro	Rainfall	No	GDSP iCE3 4G (dual)	No	OTA 0.5		No	OTA faulty	Comms ok
Kaiapo Road	Ngaruroro	Ngaruroro	Rainfall	No		GDSP iCE3 4G (dual)		Rain-o-Matic (1.0mm)	Yes		Received data throughout
Keirunga	Ngaruroro	Ngaruroro	Rainfall	Yes	CH1 (dual)		OTA 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Keirunga	Ngaruroro	Ngaruroro	Rainfall	Yes		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed	Rain o Matic data recorded throughout
Kohatanui	Ngaruroro	Ngaruroro	Rainfall	Priority	Ch 1 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Kohatanui	Ngaruroro	Ngaruroro	Rainfall	Priority		Ch 1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed, Rain O matic faulty	
Kopanga	Ngaruroro	Ngaruroro	Rainfall	No	CH1 (dual)		OTA 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout

Site name	River	Catchment	Rainfall only or combined	Flood Warning site: No, Yes, Priority	Comms - Primary	Comms - Secondary	Sensor - Primary	Sensor - Backup	Largest 48 hour total recorded	Reason for loss of data during event	Other comment
Kopanga	Ngaruroro	Ngaruroro	Rainfall	No		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed, Rain O matic faulty	
LK3 Burns Ngaruroro	Ngaruroro	Ngaruroro	Rainfall	No	CH1 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded data throughout
LK3 Burns Ngaruroro	Ngaruroro	Ngaruroro	Rainfall	No		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed, Rain o Matic faulty	
LK7 Poporangi	Poporangi	Ngaruroro	Water level	No	CH1		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
D/S Tait Rd	Maraekakaho	Ngaruroro	Water level	No	CH1 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
D/S Tait Rd	Maraekakaho	Ngaruroro	Water level	No		CH1 (dual)		Rain-o-Matic (1.0mm)	Yes	Ch 1 Kahuranaki repeater failed	Rain o Matic data recorded throughout
Moteo	Ngaruroro	Ngaruroro	Rainfall	No	CH1	N	OTA 0.5	No	No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Kuripapango	Ngaruroro	Ngaruroro	Water level	No	Ch 1 Analoge (via link) (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Received OTA data throughout, via Gisborne Hub.
Kuripapango	Ngaruroro	Ngaruroro	Water level	No		DMR (dual)		Rain-o-Matic (1.0mm)	No	Rain-o-Matic faulty	
Ohiti	Ngaruroro	Ngaruroro	Water level	Yes	CH1 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Ohiti	Ngaruroro	Ngaruroro	Water level	Yes		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed, Rain o Matic recorded faulty data throughout	
Otutu Bush	Ngaruroro	Ngaruroro	Rainfall	Priority	CH1 (dual)		TB3 0.5		NA	Ch 1 Kahuranaki repeater failed,OTA blocked faulty record	
Otutu Bush	Ngaruroro	Ngaruroro	Rainfall	Priority		CH1 (dual)		Rain-o-Matic (1.0mm)	Yes	Ch 1 Kahuranaki repeater failed	Rain o Matic data recorded throughout
Parks Peak HBCB	Ngaruroro	Ngaruroro	Rainfall	Priority	CH1 (dual) GDSP (dual)		OTA 0.5		No		Received OTA data throughout
Parks Peak HBCB	Ngaruroro	Ngaruroro	Rainfall	Priority		CH1 (dual) GDSP (dual)		Rain-o-Matic (1.0mm)	No		Received Rain-o-Matic data throughout

Site name	River	Catchment	Rainfall only or combined	Flood Warning site: No, Yes, Priority	Comms - Primary	Comms - Secondary	Sensor - Primary	Sensor - Backup	Largest 48 hour total recorded	Reason for loss of data during event	Other comment
Ohara Stn.	Poporangi	Ngaruroro	Rainfall	No	CH1 Link 7 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Ohara Stn.	Poporangi	Ngaruroro	Water level	No		CH1 Link 7 (dual)		Rain-o-Matic (1.0mm) at WL site	Yes	Ch 1 Kahuranaki repeater failed	Rain o Matic data recorded throughout
Te Koau	Ngaruroro	Ngaruroro	Rainfall	Yes	CH1 (dual)		TB7 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded TB7 data throughout
Te Koau	Ngaruroro	Ngaruroro	Rainfall	Yes		CH1 (dual)		OTA 0.5	No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Glenwood HBRC	Tukituki	Tukituki	Rainfall	Yes	CH1 (dual)		OTA 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Glenwood HBRC	Tukituki	Tukituki	Rainfall	Yes		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed	Recorded Rain-o-Matic data throughout
Gwavas HQ Climate	Tukituki	Tukituki	Climate	No	CH1	No	TB3 0.2	No	Yes	Ch 1 Kahuranaki repeater failed	Recorded TB3 data throughout
Haumoana Pump Station	Tukituki	Tukituki	Rainfall	No	GDSP (dual)		OTA 0.5				Received OTA data throughout
Haumoana Pump Station	Tukituki	Tukituki	Rainfall	No		GDSP (dual)		Rain-o-Matic (1.0mm)		Rain o Matic faulty	
Limeworks Stn Rd	Maharakeke	Tukituki	Water level	No	GDSP (dual)		OTA 0.5		No		Received OTA data throughout
Limeworks Stn Rd	Maharakeke	Tukituki	Water level	No		GDSP (dual)		Rain-o-Matic (1.0mm)	yes		Received Rain-o-Matic data throughout
Dam No.1	Makara	Tukituki	Water level	No	CH1	No	OTA 0.5	N	Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Burnt Bridge	Makaroro	Tukituki	Water level	No	CH1 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Burnt Bridge	Makaroro	Tukituki	Water level	No		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed, Rain-o-Matic faulty	
Moorcock	Tukituki	Tukituki	Rainfall	Priority	CH1 (dual)		TB3 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded TB3 data throughout
Moorcock	Tukituki	Tukituki	Rainfall	Priority		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed	Recorded Rain-o-Matic data throughout

Site name	River	Catchment	Rainfall only or combined	Flood Warning site: No, Yes, Priority	Comms - Primary	Comms - Secondary	Sensor - Primary	Sensor - Backup	Largest 48 hour total recorded	Reason for loss of data during event	Other comment
Ohutu	Tukituki	Tukituki	Rainfall	No	GDSP (dual)		OTA 0.5		No		Received OTA data throughout
Ohutu	Tukituki	Tukituki	Rainfall	No		GDSP (dual)		Rain-o-Matic (1.0mm)	No		Received Rain-o-Matic data throughout
Omakere	Tukituki	Tukituki	Climate	No	CH1	No	TB3 0.2	No	No	Ch 1 Kahuranaki repeater failed	Recorded TB3 data throughout
Onga Onga Climate	Tukituki	Tukituki	Climate	No	CH1	No	TB3 0.2	No	No	Ch 1 Kahuranaki repeater failed	Recorded TB3 data throughout
Te Kaihi	Tukituki	Tukituki	Rainfall	No	CH1	No	OTA 0.5	No	Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
State Highway 50	Tukipo	Tukituki	Water level	Yes	CH1 (dual)		OTA 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
State Highway 50	Tukipo	Tukituki	Water level	Yes		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed, Rain-o-Matic faulty	
Folgers	Tukituki	Tukituki	Water level	No	CH1	No	Rain-o-Matic (1.0mm)	No	Yes	Ch 1 Kahuranaki repeater failed	Recorded Rain-o-Matic data throughout
Shagrock	Tukituki	Tukituki	Water level	Yes	CH1 (dual)		OTA 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Shagrock	Tukituki	Tukituki	Water level	Yes		CH1 (dual)		OTA 0.5	No	Ch 1 Kahuranaki repeater failed, OTA faulty	
Tapairu Rd	Tukituki	Tukituki	Water level	Priority	GDSP (dual) CH1 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Tapairu Rd	Tukituki	Tukituki	Water level	Priority		GDSP (dual) CH1 (dual)		OTA 0.5	Yes		Received OTA data throughout
Waipukurau	Tukituki	Tukituki	Climate	No	FTP	No	OTA 0.2	No	No		Received OTA data throughout
Ben Nevis	Porangahau	Porangahau	Rainfall	Yes	CH1 (dual)		OTA 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Ben Nevis	Porangahau	Porangahau	Rainfall	Yes		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed	Recorded Rain-o-Matic data throughout
Flemington	Porangahau	Porangahau	Rainfall	Yes	CH1 (dual)		OTA 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout

Site name	River	Catchment	Rainfall only or combined	Flood Warning site: No, Yes, Priority	Comms - Primary	Comms - Secondary	Sensor - Primary	Sensor - Backup	Largest 48 hour total recorded	Reason for loss of data during event	Other comment
Flemington	Porangahau	Porangahau	Rainfall	Yes		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed, Rain-o-Matic faulty	
LK5 Bird Road	Porangahau	Porangahau	Rainfall	No	CH1		Rain-o-Matic (1.0mm)		No	Link 5 worked but Ch 1 Kahuranaki repeater failed	Recorded Rain-o-Matic data throughout
Mangaorapa	Porangahau	Porangahau	Rainfall	Priority	CH1 (dual)		OTA 0.5		Yes	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Mangaorapa	Porangahau	Porangahau	Rainfall	Priority		CH1 (dual)		Rain-o-Matic (1.0mm)	Yes	Ch 1 Kahuranaki repeater failed	Recorded Rain-o-Matic data throughout
Porangahau	Porangahau	Porangahau	Climate	No	CH1	No	TB3 0.2	No	Yes	Ch 1 Kahuranaki repeater failed	Recorded TB3 data throughout
Saleyards	Porangahau	Porangahau	Water level	No	DMR	No	OTA 0.5	No	Yes	DMR comms failed	Recorded OTA data throughout
Wallingford	Taurekaitai	Porangahau	Water level	Yes	CH1 (dual)		OTA 0.5		No	Ch 1 Kahuranaki repeater failed	Recorded OTA data throughout
Wallingford	Taurekaitai	Porangahau	Water level	Yes		CH1 (dual)		Rain-o-Matic (1.0mm)	No	Ch 1 Kahuranaki repeater failed	Recorded Rain-o-Matic data throughout
Waimarama Road	Maraetotara	Maraetotara	Water level	Priority	CH1	No	OTA 0.5	No	No	Ch 1 Kahuranaki repeater failed	Ota recorded throughout
Waimarama	Maraetotara	Southern Coastal	Climate	No	CH1	No	TB3 0.2	No	No	Ch 1 Kahuranaki repeater failed	Recorded TB3 data throughout
Waipoapoa	Makara	Southern Coastal	Rainfall	Priority	GDSP (dual) CH1 (dual)		OTA 0.5		No		Received OTA data throughout
Waipoapoa	Makara	Southern Coastal	Rainfall	Priority		GDSP (dual) CH1 (dual)		Rain-o-Matic (1.0mm)	No	Rain o Matic faulty	

Flood warning	Priority

	Received data from the site throughout the event
	Comms failed but sensor recorded rainfall
	Comms and sensors failed

Appendix 3 Water level sites

Site name	River	Catchment	Flood warning category	Repeater	Link	Comms Primary	Comms Secondary	Comms Third	Highest level recorded	Sensor type	Reason for not receiving data during event	Additional comment
Railway Bridge	Kopuawhara	Northern Coastal	Flood warning			GDSP 350fx			No	OTT CBS Bubbler		Received data throughout
Railway Bridge	Kopuawhara	Northern Coastal	Flood warning				Satellite		No	Radar		Received data throughout
Railway Bridge	Kopuawhara	Northern Coastal	Flood warning					none	No	Hobox2		No plot
Ardkeen	Waiau	Wairoa	Priority	Mt Misery	No	CH2			Yes	HS40 gas purge bubbler		Shows comms with satellite as a dual system with Ch2 , all worked sensors and comms worked
Ardkeen	Waiau	Wairoa	Priority				Satellite		Yes	OTT CBS Bubbler		Received data throughout
Ardkeen	Waiau	Wairoa	Priority					GDSP	Yes	Hobo		Received data throughout
Otoi	Waiau	Wairoa	Flood warning			Satellite			No	OTT CBS Bubbler		Received data throughout
Otoi	Waiau	Wairoa	Flood warning				Satellite		No	Radar		Received data throughout
Railway Br. RADAR	Wairoa	Wairoa	Flood warning	Mt Misery	No	Ch 2			Yes	Radar		Received data throughout
Railway Br. RADAR	Wairoa	Wairoa	Flood warning				GDSP		Yes	Radar	Second Radar sensor missed the peak	Comms worked but sensor issues
Tauwharetoi Climate	Ruakituri	Wairoa	Flood warning	Mt Misery	No	Ch 2			Yes	OTT CBS Bubbler		Received data throughout
Tauwharetoi Climate	Ruakituri	Wairoa	Flood warning				None		Yes	Hobox2?		
Marumaru	Wairoa	Wairoa	Priority	Mt Misery	No	CH2			Yes	Radar	Sensor damaged	Comms throughout
Marumaru	Wairoa	Wairoa	Priority				GDSP		Yes	Radar	sensor damaged by flood	GDSP working full period
Marumaru	Wairoa	Wairoa	Priority					GDSP-ISCO	Yes	OTT CBS Bubbler	Sensor gave incorrect values after 3 am 14th	Comms throughout

Site name	River	Catchment	Flood warning category	Repeater	Link	Comms Primary	Comms Secondary	Comms Third	Highest level recorded	Sensor type	Reason for not receiving data during event	Additional comment
Gorge	Mangapoike	Wairoa	Flood warning	Mt Misery	No	Ch 2			Yes	OTT CBS Bubbler		Received data throughout
Doneraille Park	Hangaroa	Wairoa	Flood warning			Satellite			Yes	HS40 gas purge bubbler		Received data throughout
Doneraille Park	Hangaroa	Wairoa	Flood warning				Satellite		Yes	Radar	Radar smashed off by flood	
Doneraille Park	Hangaroa	Wairoa	Flood warning					Satellite		Hobo x2?		
Berry Road	Esk	Esk	Priority	Kahuranaki	No	Ch 1			Yes	OTT CBS Bubbler	Lost comms Ch1 then sensor flood damage	Sensors stored data but incorrect levels
Berry Road	Esk	Esk	Priority				GDSP 350fx		Yes	Used primary site sensor	Cell phone down then sensor flood damage	Sensors stored data but incorrect levels
Berry Road	Esk	Esk	Priority					Satellite	Yes	OTT CBS Bubbler	Satellite down as internet down, then senor flood damage	Sensors stored data but incorrect levels
Waipunga Bridge	Esk	Esk	Flood warning			DMR radio			Yes	HS40 PT/Sutron 15mGas purge bubbler	Sensor flood damaged at peak, DMR failed	
Waipunga Bridge	Esk	Esk	Flood warning				GDSP 350fx		Yes	Radar1	Sensor flood damaged at peak	
Chesterhope	Tutaekuri Waimate	Tutaekuri	Flood warning			DMR radio			Yes	OTT CBS Bubbler	One alarm 13/2 at 22:45 then comms failed.	Sensor recorded throughout, data retrieved later
Ngaroto	Tutaekuri	Tutaekuri	Priority	Kahuranaki	Yes	Ch 1			Yes	OTT CBS Bubbler	Ch 1 Radio failed early hours 14/2/2023 then sensor failed	
Ngaroto	Tutaekuri	Tutaekuri	Priority	Kahuranaki	Yes		None		Yes	Radar	Sensor damaged	

Site name	River	Catchment	Flood warning category	Repeater	Link	Comms Primary	Comms Secondary	Comms Third	Highest level recorded	Sensor type	Reason for not receiving data during event	Additional comment
Puketapu	Tutaekuri	Tutaekuri	Flood warning	Kahuranaki	No	Ch 1 (dual)			Yes	OTT CBS Bubbler	Ch 1 Radio failed just after orange alarm 14/2 at 01:03 and before red (20y) could be received. A few hours later bridge has been washed away (at approx 50 y level) along with sensors	
Puketapu	Tutaekuri	Tutaekuri	Flood warning	Kahuranaki	No		Ch 1 (dual)		Yes	Radar	Ch 1 Radio failed just after orange alarm 14/2 at 01:03 and before red (20 y) could be received. A few hours later bridge has been washed away (at approx 50 y level) along with sensors	
Puketapu	Tutaekuri	Tutaekuri	Flood warning					none	Yes	Hobo		
Rissington	Mangaone	Tutaekuri	Flood warning			GDSP			Yes	Radar	Cell phone operated throughout flood, all alarms received, but sensor didn't last full period.	
Rissington	Mangaone	Tutaekuri	Flood warning	Kahuranaki	No		Ch 1		Yes	OTT CBS Bubbler	Lost comms Ch 1 before sensor flood damaged although full flood period not stored	
Fernhill	Ngaruroro	Ngaruroro	Flood warning			GDSP			Yes	Radar True Left	Received all alarms, but Radar failed to measure flood peak	
Fernhill	Ngaruroro	Ngaruroro	Flood warning				GDSP		Yes	Encoder/Tower	Recorded throughout, however alarms not driven by this site	Sensor and coms worked
Fernhill	Ngaruroro	Ngaruroro	Flood warning					GDSP	Yes	Radar Stilling Well	Radar failed to measure flood peak	
Kuripapango	Ngaruroro	Ngaruroro	Flood warning	Kahuranaki	Yes	CH1-Analoge			No	Bubbler /HBRC	Comms ch 1 failed before 50 year alarm	Sensor and coms worked until ch 1 failed

Site name	River	Catchment	Flood warning category	Repeater	Link	Comms Primary	Comms Secondary	Comms Third	Highest level recorded	Sensor type	Reason for not receiving data during event	Additional comment
Kuripapango	Ngaruroro	Ngaruroro	Flood warning				Satellite		No	Bubbler/NIWA		Sensor and coms worked throughout
Kuripapango	Ngaruroro	Ngaruroro	Flood warning					DMR	No	Bubbler/NIWA		Sensor and coms worked but only recorded rainfall, failed as Gisborne hub down
Ohiti	Ngaruroro	Ngaruroro	Flood warning	Kahuranaki	No	Ch 1			Yes	OTT CBS Bubbler	Ch 1 Radio failed early hours 14/2/2023	Sensor recorded throughout
Flume	Awanui	Ngaruroro	Flood warning			GDSP 350fx/iCE3-4G Cell phone			No	OTT CBS Bubbler	Cell phone down. No Comms	Alarms of 13th and 14th not received live. Received data and alarms 1 and half days later via Poukawa wetlands
Flume	Awanui	Ngaruroro	Flood warning				none		No	Hobo		
D/S Tait Rd	Maraekakaho	Ngaruroro	Flood warning	Kahuranaki	No	Ch 1			No	Encoder/tower	Ch 1 Radio failed just after orange alarm 14/2 at 00:00 and before next alarm level	Sensors worked
D/S Tait Rd	Maraekakaho	Ngaruroro	Flood warning				None		No	OTT CBS Bubbler		
Whanawhana	Ngaruroro	Ngaruroro	Priority	Kahuranaki	Yes	CH1			No	Radar	No alarms on Ch 1 due to repeater down	Sensor worked throughout
Whanawhana	Ngaruroro	Ngaruroro	Priority				Satellite		No	OTT CBS Bubbler	First Blue alert 13/2/23 23:30 but then comms down missed Green and Orange alerts in the following hours due to internet issues	Sensor worked throughout
Ohara	Poporangi	Ngaruroro	Flood warning	Kahuranaki	Yes	CH1			No	OTT CBS Bubbler	Ch 1 Radio failed just after orange alarm 14/2 at 01:09 and before next alarm level	Sensor worked throughout
State Highway 50	Tukipo	Tukituki	Flood warning	Kahuranaki	No	Ch 1			Yes	Encoder/Tower	Ch 1 Radio failed early hours 14/2/2023	Sensor recorded throughout
State Highway 50	Tukipo	Tukituki	Flood warning	Kahuranaki	No		None		Yes	Hobo		

Site name	River	Catchment	Flood warning category	Repeater	Link	Comms Primary	Comms Secondary	Comms Third	Highest level recorded	Sensor type	Reason for not receiving data during event	Additional comment
Red Bridge	Tukituki	Tukituki	Flood warning	Kahuranaki	No	Ch 1			Yes	OTT CBS Bubbler	Ch 1 Radio failed early hours 14/2/2023	Sensor recorded throughout
Shagrock	Tukituki	Tukituki	Flood warning	Kahuranaki	No	Ch 1			Yes	HS40 PT/Sutron 15mGas purge bubbler	Ch 1 Radio failed early hours 14/2/2023	Sensor recorded throughout
Fletchers Crossing	Waipawa	Tukituki	Flood warning	Kahuranaki	No	Ch 1			Yes	OTT CBS Bubbler	Ch 1 Radio failed just after Blue alert, 3 following alerts or data not received,	Fletchers Bridge damaged but sensors remained working.
Fletchers Crossing	Waipawa	Tukituki	Flood warning	Kahuranaki	No		None		Yes	Hobo		Not sure if Hobo worked throughout
RDS/SH2	Waipawa	Tukituki	Priority	Kahuranaki	No	Ch 1			Yes	HS40 PT/Sutron 15mGas purge bubbler	Ch 1 Radio failed just after Blue alert, 4 following alerts not received, sensor worked.	Sensor worked throughout
RDS/SH2	Waipawa	Tukituki	Priority				GDSP - SH2		Yes	Radar (SH2)		Sensor and comms worked throughout
RDS/SH2	Waipawa	Tukituki	Priority					none	Yes	Hobox2		
Burnt Bridge	Makaroro	Tukituki	Flood warning			GDSP 350fx cell phone			Yes	OTT CBS Bubbler		Sensor and cellphone worked throughout
Burnt Bridge	Makaroro	Tukituki	Flood warning				Satellite		Yes	Radar	Radar malfunction	Satellite comms worked throughout
Burnt Bridge	Makaroro	Tukituki	Flood warning		Yes			Channel 1 - RF OnlYes	Yes	Hobo	Not on plot	
Folgers	Tukituki	Tukituki	Flood warning	Kahuranaki	No	Ch 1			Yes	Radar	Ch 1 failed no alarms or data sent after about 14/2 01:00	Sensor recorded throughout peak
Tapairu Rd	Tukituki	Tukituki	Priority	Kahuranaki	No	Ch 1			Yes	Sutron	Ch 1 failed no alarms or data sent after about 14/2 01:00	Sensor recorded throughout peak
Tapairu Rd	Tukituki	Tukituki	Priority				GDSP/Camera		Yes	OTT CBS Bubbler		Sensor recorded throughout and data came in on GDSP cellphone
Tapairu Rd	Tukituki	Tukituki	Priority					none	Yes	Hobo		

Site name	River	Catchment	Flood warning category	Repeater	Link	Comms Primary	Comms Secondary	Comms Third	Highest level recorded	Sensor type	Reason for not receiving data during event	Additional comment
Waimarama Road	Maraetotara	Maraetotara	Priority	Kahuranaki	No	Ch 1			Yes	OTT CBS Bubbler	Ch 1 failed and few hours later sensor failed due to flood damage	
Waimarama Road	Maraetotara	Maraetotara	Priority	Kahuranaki	No		Ch 1		Yes	Radar	Ch 1 failed and few hours later sensor failed due to flood damage	
Wallingford	Taurekaitai	Porangahau	Priority	Kahuranaki	Yes	Ch 1			Yes	OTT CBS Bubbler	Ch 1 comms failed after 14/2/2023 00:10	Sensor recorded throughout flood
Wallingford	Taurekaitai	Porangahau	Priority	Kahuranaki	Yes		None		Yes	Hobo		
Saleyards	Porangahau	Porangahau	Flood warning		No	DMR radio			Yes	Radar	DMR failed throughtout event , radar recorded rising limb then failed before peak	
Saleyards	Porangahau	Porangahau	Flood warning				None		Yes	Hobo		

	Priority

	Received data from the site throughout the event
	Comms throughout but sensor faulty
	Comms failed but sensor recorded water level
	Comms and sensors failed

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Appendix 4 Gary Clode's Critical sites (26/6/2001).

(Please note: referred to in this report as Priority sites)

CRITICAL SITES: Rainfall and water levels

The following critical telemetered sites (rainfall and water level) have been selected on the following basis

- They provide the earliest, most complete information for an early warning.
- They are generally less readily accessible for maintenance in an emergency
- They can be combined with other site information to give a better picture of the situation

It has been assumed that other sites, if out of action, can be easily accessed and manned by staff with a radio link where necessary. These other sites provide essential information particularly at later stages of a managed flood event.

Bushy Knoll	rainfall
Wairoa @ MaruMaru	water level + rainfall
Pukeorapa	rainfall
Upper Waiau	rainfall
Waiau @ Ardkeen	water level + rainfall
Maunganui	rainfall
Esk @ Berry Rd	water level
Tutaekuri @ Ngaroto	water level + rainfall
Ngahere	rainfall
Otutu Bush	rainfall
Ngaruroro @ Whana Whana	water level + rainfall
Parks Peak	rainfall
Tukituki @ Tapairu Rd	water level + rainfall
Moorcock	rainfall
Waipawa @ RDS	water level
Waipoapoa	rainfall
Porangahau @ Wallingford	water level
Mangaorapa	rainfall
Maraetotara @ Waimarama Rd	water level + rainfall

Apex Communications Limited

Telecommunications

10 Murray Place

Camberley

Hastings

Review of HBRC Radio and repeaters.

Hawke's Bay Regional Council (HBRC) operates a flood monitoring system as part of a comprehensive flood protection program for Hawke's Bay. Through the use of water level and rainfall monitoring the system provides alarm notification to HBRC staff that a flood event may be imminent. Downloaded data can be entered into data models to provide forecast river levels thus enhancing the ability to predict a flood event.

The HBRC flood monitoring network consists of:

- Telemetry base (Napier office)
- Back up telemetry station (Guppy Road Taradale)
- Radio repeater stations (Kahuranaki and Mt Misery)
- Radio link stations (LK4 Ngaroto Road, LK5 Bird Road, LK6 Guppy Road, Burnt Bridge Link)
- Rainfall sites
- Water level sites
- Dual water level and rainfall sites
- Climate stations

Radio telephone Repeater site, Kahuranaki HB

At 2224ft (681m) asl Kahuranaki HB was established in 1962 as a Land Mobile Radio (LMR) repeater site in the Tukituki Valley South of Hastings and remains in that service today for two still valid reasons:

1. It is geographically well positioned for very broad HB coverage.
2. It is of ideal altitude to give good wide area coverage without being too high causing inter provincial interaction issues or interference.

Originally established by the NZ Post Office, it is a site operated these days by Chorus and Vital (for telephone/microwave and LMR services respectively).

HBRC originally owned the CDEM repeater equipment for ESB1 & ESB133 and housed it in the Telecom facility at Kahuranaki and paid a nominal rental fee for use of their aerial and housing. In July 2011 HBRC sold the following equipment to Team Talk:

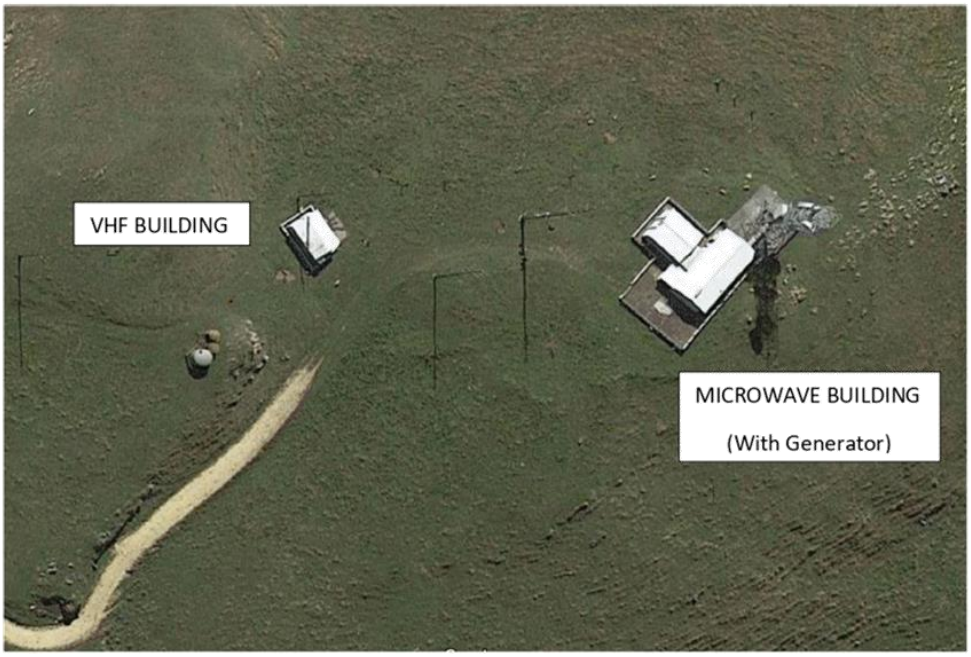
- 2 x 25Watt Repeater Station complete with receiver, transmitter, microphone, speaker panel, rack frame and wiring.
- 2 x Power Supply 230v 22 Amp
- 2 x Aerial Filter – 8 Cavity MD146/8

All future repairs and maintenance costs of the above equipment became the responsibility of Team Talk from the date of the letter – 21 July 2011

(Letter attached from Andrew Newman Ref:ADM27)

Site Usage

The repeater service was established (by Vital's predecessors) several decades ago for telemetry services from field sites back to the HBRC base/office (Napier town). A change of LMR Band has occurred during this time for technical/regulatory reasons (i.e., from B Band to EN Band).



The VHF building is where equipment and batteries are housed that provide the link required by HBRC telemetry. (Photo above)

Radio rack inside VHF building (Photo below)

Recent Fault History

During Cyclone Gabrielle (14 February 2023) the site back up mains supply generator (operated by Chorus) broke a shaft between the engine and the generator putting the entire site 'off air' except for those services which had back up batteries. Battery back-up should have kept the radios going for several days but the batteries were old and needed replacing. Due to the Cyclone, Unison mains supply was lost earlier in the day. Historically the generator had been sufficient back up for services on site (notwithstanding the break between mains fail and generator service coming online). Power to HBRC equipment failed at 00:30, contact was established with Vital at 07:15 and all devices at Kahuranaki power down at 11:00.

15th February - Vital confirms site owner Chorus are attempting to fly generators into site as road access is cut off and power lines are down.

16th February - Smaller genset installed and partial services at main building stood up.

17th February - HBRC is updated that 12v supply has a fault.

18th February - Vital confirms HBRC channel working after on-site power is restored and channel faults resolved.

On 10 April 2023, the service failed again. With Downers/Vital staff (from Palmerston North, as local contractors Downers were not available), David Walker, Apex Communications, Hastings attended on site on 12 April 2023 to investigate.

It was discovered that the DC supply to the LMR repeater receiver had failed due to a defective DC supply termination on a circuit breaker for the equipment. It was discovered that the screw termination was tightened onto the wire plastic covering rather than the wire proper, but it had been in service like that for many years before finally giving up a 'push/proximity connection' to the channel EN121 receiver.

It should be recognised that both services had been operating successfully for years and in both above cases it was not the radio equipment proper that failed but rather the power supply system. The batteries and radios needed replacing and a regular schedule of checks and replacements needed to be in place.

Possibilities Going Forward

It is recognised that the two above LMR repeater service failures caused considerable disruption to the telemetry service operated by HBRC. The solution to this could be further back up measures for Kahuranaki off site. This could be made available by the 'Tier Three DMR' service available via Colvin's Communications, Gisborne. HBRC has started upgrading both its fleet and telemetry network to the latest DMR (Digital Mobile Radio) system.

A single LMR repeater can be a risk for radio traffic whether it is for voice or telemetry. This is a technical and electronic circumstance and the nature of the LMR repeater service. Having a back-up/secondary LMR repeater service raises the question of how to enable it should the primary LMR repeater service fail. This usually means that someone must go to an alternative location to turn on the back up service or having the ability to control it on/off remotely. This service would sit established somewhere doing nothing but waiting to be commanded on in case the primary repeater should fail. Generally, LMR repeaters are so reliable to not justify commanded hot standby

equipment. As a back-up HBRC have purchased a portable repeater that can be easily transported and set up anywhere. (photo below)

To establish a standby back up LMR repeater would not guarantee a complete duplication of coverage (again a quirk of radio/electronics and geography) as not all sites maybe in range, but it is accepted that most field sites could be accessed depending on where the secondary/back up repeater was established (this could be somewhere other than Kahuranaki).

An option is for HBRC is to establish their own LMR repeater or invest in a portable repeater. A battery/charging system to power the LMR repeater would be required in the instance of mains failure (if mains power were supplied at a secondary repeater).

Another option is that HBRC and Vital agree for example, that HBRC financially support Vital with the provision of a battery back-up service at the Kahuranaki site along with a solar charging system on site for:

a. Just the HBRC equipment or

b. Some 'bigger picture' battery service to support the entire site. - Shared cost.

Vital have the remainder of the infrastructure established and online and it could be a better option to financially support this rather than create a whole new repeater off site. The routine support given by Vital to the site or if they have a routine replacement schedule is not known but it is likely that neither is conducted as they are probably at the site frequently enough to identify issues as they arise and respond to them as and when required. HBRC would need to add Kahuranaki repeater to their current monthly maintenance schedule.

Only so much pre inspection and maintenance can be done. Vital have a 'bigger picture' view of the service whereas the HBRC have only their requirements to consider.

Back up capability

While mains power with a back-up generator is an ideal arrangement it is not without its own

problems such as the need to replenish the diesel which might not be possible if road/access has become unavailable (e.g., due to weather) as happened during Cyclone Gabrielle but I understand Colvin's have a header tank arrangement. The independence of batteries and solar makes this combination very attractive. With normal systems of LMR repeaters there is no usual need for a night-time service so the LMR repeater can rest at idle for the night period with minimal battery drain. The HBRC telemetry requirement however is that the service runs for twenty-four hours a day meaning that relying on the batteries during the night (when solar charging cannot occur) needs to be considered.

It is likely that Vital would come to an arrangement with HBRC to allow the use of their Kahuranaki infrastructure and allow access for HBRC staff or contractors to do routine inspections of the site/equipment. A pre and post winter inspection sequence is adequate at LMR repeater sites. This allows work to be done prewinter (should it be necessary) and after winter should anything have happened during the winter period.

The current generation of radio equipment in use at Kahuranaki is of a low current consumption type which is highly suitable for a site using battery and solar as a power supply source. There is however a newer model which again is capable of low standby current consumption. This means that replacement equipment (if required/desired) could be made available as a back-up or spare.

Another newer type/model of dual, DMR/analogue capable equipment uses more power and is not ideal for a battery/solar/wind site without considerable battery backup capacity.

Summary

It should be noted that in both of the failure times noted previously the problem wasn't with the radio equipment proper, but the 12-volt power system (s) supplying it. A bank of fully charged batteries will alleviate this problem, or at least give HBRC several days to get to site and solve any power issues.

Recommendations

1. It is recommended that HBRC negotiate with Vital for a continuing Kahuranaki analogue service where more direct finance and involvement with Vital is made available from HBRC for example, HBRC provide batteries and solar facilities only for their own LMR repeater equipment on site and support same at their cost. Vital would provide the remainder of the infrastructure required.

   It may also be possible for backup/spare radio equipment to be made available to Vital by HBRC should the need arise.

2. It is recommended that HBRC negotiate with Vital for a local arrangement backup for an alternative local contractor to be allowed on site to support only HBRC's equipment should the need arise and further to this allow the local contractor on site to do inspections of the HBRC equipment only (perhaps with HBRC staff). To note: Apex Communications staff are doing this already at the Kahuranaki site for other people pre and post Winter. Apex Com's is well known to Vital staff in the industry.

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HAWKE'S BAY
REGIONAL COUNCIL

Our Ref: ADM27

21 July 2011

Grant Domigan
General Manager Sales
Team Talk
PO Box 9345
WELLINGTON

Dear Grant

CHANGE OF OWNERSHIP OF RADIO EQUIPMENT

This is to confirm the change of ownership of the following equipment currently owned by the Hawke's Bay Regional Council to Teamtalk, with Teamtalk providing four months free rental per repeater in exchange.

The Council will sign a 36 month contract effective from 1 July 2011, based on a new rate of $500+gst per month per channel, with review 6 months in advance of end date to ensure necessary budgeting.

List of equipment accommodated at Kahuranaki (ESB1) &Taraponui (ESB133)

- 2 x 25Watt Repeater Station complete with receiver, transmitter, microphone, speaker panel, rack frame and wiring
- 2 x Power Supply 230v 22 Amp
- 2 x Aerial Filter – 8 Cavity MD146/8

All future repairs and maintenance costs of this equipment will be the responsibility of TeamTalk from the date of this letter.

Nevertheless the Council will retain ownership of the existing radio licences as it continues to pay the Ministry of Economic Development radio licence fees for both its emergency services channels run from the repeaters at Kahuranaki & Taraponui.

Yours sincerely

Andrew Newman
CHIEF EXECUTIVE