Meeting of the Regional Planning Committee

Date: Wednesday 12 September 2018

Time: 11.00am

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

Agenda

Parking

There will be named parking spaces for Tangata Whenua Members in the HBRC car park – entry off Vautier Street.

Regional Planning Committee Members

Name	Represents
Karauna Brown	Te Kopere o te Iwi Hineuru
Tania Hopmans	Maungaharuru-Tangitu Incorporated
Nicky Kirikiri	Te Toi Kura o Waikaremoana
Jenny Nelson-Smith	Heretaunga Tamatea Settlement Trust
Joinella Maihi-Carroll	Mana Ahuriri Trust
Apiata Tapine	Tātau Tātau o Te Wairoa
Matiu Heperi Northcroft	Ngati Tuwharetoa Hapu Forum
Peter Paku	Heretaunga Tamatea Settlement Trust
Toro Waaka	Ngati Pahauwera Development and Tiaki Trusts
Paul Bailey	Hawkes Bay Regional Council
Rick Barker	Hawkes Bay Regional Council
Peter Beaven	Hawkes Bay Regional Council
Tom Belford	Hawkes Bay Regional Council
Alan Dick	Hawkes Bay Regional Council
Rex Graham	Hawkes Bay Regional Council
Debbie Hewitt	Hawkes Bay Regional Council
Neil Kirton	Hawkes Bay Regional Council
Fenton Wilson	Hawkes Bay Regional Council

Total number of members = 18

Quorum and Voting Entitlements Under the Current Terms of Reference

Quorum (clause (i))
The Quorum for the Regional Planning Committee is 75% of the members of the Committee

At the present time, the quorum is 14 members (physically present in the room).

Voting Entitlement (clause (j))
Best endeavours will be made to achieve decisions on a consensus basis, or failing consensus, the agreement of 80% of the Committee members present and voting will be required. Where voting is required all members of the Committee have full speaking rights and voting entitlements.

Number of Committee members present	Number required for 80% support
18	14
17	14
16	13
15	12
14	11

HAWKE'S BAY REGIONAL COUNCIL

REGIONAL PLANNING COMMITTEE

Wednesday 12 September 2018

Subject: FOLLOW-UPS FROM PREVIOUS REGIONAL PLANNING COMMITTEE MEETINGS

Reason for Report

1. There are no outstanding follow-up items as the items from previous meetings have all been reported to the Committee and removed from the list.

Authored by:

Leeanne Hooper
PRINCIPAL ADVISOR GOVERNANCE

Approved by:

Tom Skerman
GROUP MANAGER STRATEGIC PLANNING

Attachment/s

⇩**1** RPC Followups for 12 September 2018 meeting

Follow-ups from Previous Regional Planning Committee Meetings

Meeting held 14 August 2018

	Agenda Item	Action	Responsible	Status Comment
1	Receipt of draft TANK plan change	1. Staff to prepare and present further reports to the RPC on the TANK Group's non-consensus matters. 2. Staff to prepare and present further reports as directed by the Chief Executive on other TANK plan change matters that may be identified by the tangata whenua members or council members of the RPC following the 14-15 August 2018 workshops, provided those requests for further information and/or reports is to be brought forward through the Chairs or Co-Chairs then to the Chief Executive to be discussed and then accepted or rejected.	T Skerman (GMSP)	Refer further information follow-up report as separate agenda item for RPC meeting on 12 Sept 2018. That report covers three matters of non-consensus amongst the TANK Group. Further reporting still to come on s32 evaluation report, PC9 implementation plan, mandatory pre-notification requirements, plus timeframes and arrangements for PC9's hearing phase. GMSP and Chief Executive have received nominations (via Tania Hopmans) of matters that the tāngata whenua members request further reporting on. GMSP and CE are reviewing those nominations.

HAWKE'S BAY REGIONAL COUNCIL

REGIONAL PLANNING COMMITTEE

Wednesday 12 September 2018

Subject: CALL FOR ITEMS OF BUSINESS NOT ON THE AGENDA

Reason for Report

1. Standing order 9.12 states:

   "*A meeting may deal with an item of business that is not on the agenda where the meeting resolves to deal with that item and the Chairperson provides the following information during the public part of the meeting:*

   (a) the reason the item is not on the agenda; and

   (b) the reason why the discussion of the item cannot be delayed until a subsequent meeting.

   Items not on the agenda may be brought before the meeting through a report from either the Chief Executive or the Chairperson.

   Please note that nothing in this standing order removes the requirement to meet the provisions of Part 6, LGA 2002 with regard to consultation and decision making."

2. In addition, standing order 9.13 allows "*A meeting may discuss an item that is not on the agenda only if it is a minor matter relating to the general business of the meeting and the Chairperson explains at the beginning of the public part of the meeting that the item will be discussed. However, the meeting may not make a resolution, decision or recommendation about the item, except to refer it to a subsequent meeting for further discussion.*"

Recommendations

1. That the Regional Planning Committee accepts the following "Items of Business Not on the Agenda" for discussion as Item 11:

   1.1. ***Urgent*** items of Business *(supported by tabled CE or Chairpersons' report)*

	Item Name	Reason not on Agenda	Reason discussion cannot be delayed
1.			
2.			

   1.2. ***Minor*** items for discussion ***only***

Item	Topic	Councillor / Staff
1.		
2.		
3.		

Leeanne Hooper
PRINCIPAL ADVISOR GOVERNANCE

Liz Lambert
GROUP MANAGER REGULATION

HAWKE'S BAY REGIONAL COUNCIL

REGIONAL PLANNING COMMITTEE

Wednesday 12 September 2018

Subject: OIL & GAS PLAN CHANGE OPTIONS

Reason for Report

1. This report outlines the Government's recent announcements on oil and gas exploration in New Zealand in the context of Council's proposed Oil and Gas plan change. This report outlines several options for the Committee to consider (including a summary of pros and cons). Finally, the paper will seek direction from the Committee as to next steps regarding the Oil and Gas plan change project.

Background

Government announcements

2. On 12 April 2018 the Government announced that there will be no further offshore oil and gas exploration permits granted, with the exception of the 2018 block offer which will be limited to onshore acreage in Taranaki alone. Onshore block offers will continue in Taranaki for the next three years and will be reviewed after that. The announcement does not impact upon the 31 active exploration and mining permits (22 of which are offshore).

3. Further to this, on June 5 Government released a series of documents generated by officials in reaching this decision. This bundle of documents consists of details around the current state of the oil and gas industry in New Zealand, further information around the upcoming onshore Taranaki block offer, and emails between officials released in the Hawke's Bay.

4. In regards to Hawke's Bay, there is only one currently active permit located offshore that overlaps into the jurisdiction of Council- (permit 57073 held by OMV New Zealand Limited) as shown in Figure 1 (note that the dotted blue line denotes Council's regional boundary out to the 12 nautical mile limit). That permit is due to expire in 2030.

Figure 1 – location map of Exploration Permit #57073 held by OMV New Zealand Limited

5. For the avoidance of doubt, in 2012 an exploration permit was granted to TAG Oil limited for onshore exploration in the Central Hawke's Bay region, but that permit expired in 2017.

What is unknown?

6. Despite the further release of background information in early June, there is still a level of uncertainty concerning the Government's announcements. Based on our most recent contact with MBIE officials (24 August) we understood that legislative change is being progressed. No further information is available regarding the nature and extent of those changes.

7. A key question is whether or not these proposed legislative changes will elevate the status of the ban from policy decisions to legislation. Once in legislation, this would be extremely difficult to reverse by future Governments. Staff will remain in contact with MBIE officials.

Current situation

8. At the March 21 RPC meeting staff provided a recap and update on the Oil and Gas plan change project. To broadly summarise that recap report, feedback had been sought on the proposals through a series of meetings with targeted stakeholders. Council also had an online feedback form on its website in order for the public to express views on oil and gas exploration in the region.

9. In mid- late April, staff in conjunction with relevant tangata whenua representatives were in the process of organising three Hui-a-iwi across the northern, central and southern parts of Hawke's Bay. However, in light of the announcements made by the Government and discussions with several RPC members, it was decided not to proceed with the hui until further information about implications of the Government's announcement were better understood.

10. Fundamentally, the Government's announcements would mean no new offshore or onshore oil and gas exploration permits would be granted for the Hawke's Bay region. That broadly aligns with the Committee's earlier preferred proposition to prohibit oil and gas exploration activities in specified parts of the region, including marine areas.

11. It appears that the Committee's pre-emptive move to propose prohibiting oil and gas exploration activities in the region's sensitive aquatic and marine areas, is now overtaken by the Government's broader sweeping policy shift on oil and gas exploration in New Zealand.

Options

12. Staff are of the view that in light of the announcements there are predominantly two options. An assessment of each option along with a summary of pros and cons is outlined following.

Option 1: Proceed with Oil and Gas plan change i.e. 'status quo'

13. This option recognises that despite these announcements, Council has embarked on a programme of plan change work that reaches back to a decision by the Regional Planning Committee in November 2016. In this option, staff would continue with the existing project plan and recommence stakeholder consultation including consultation hui and eventually drafting a stand-alone plan change to notify, call for public submissions, hold hearings, issue Council's decisions on those submissions and deal with potential Environment Court appeals.

14. Proceeding with the work would result in unnecessary effort and expenditure, given that the Government has effectively curtailed any such activities in the region. Furthermore, there is a risk that Council proceeds without having the benefits of more detail from NZP&M regarding the implications of the Government's announcement.

Option 2: 'Shelve' the current project and incorporate into the future regional plan reviews (preferred option)

15. This is the preferred option of staff. Council is scheduled to commence parallel reviews of the Regional Resource Management Plan (RRMP) and Regional Coastal Environment Plan (RCEP) in 2020. Under this option, staff would wrap up current work on the plan change and re-purpose the intel for informing the future RRMP and RCEP review projects.

16. The upside to this approach is that Council does not need to replicate efforts unnecessarily and would avoid further expenditure of Council's resources to regulate an activity that is already curtailed by Central Government. This approach also allows for a consideration of the effects of oil and gas exploration within the wider context of the RRMP and RCEP, particularly as they relate to other activities in the plans. It also allows time for more detail on the Government's position to emerge, which in turn will ensure Council is better equipped to understand impact and implications of these decisions.

17. It is noted that the RRMP and RCEP Reviews are not due to commence until 2020. While it would be several years until any new rules came into effect, the Government's announcement clearly indicated Block Offer processes over the next three years will be open for onshore Taranaki only. The likelihood of new oil and gas exploration permits being issued and activities occurring in the Hawke's Bay region in the meantime is considered minimal.

Comments on risks

18. There are both perceived and actual risks associated with closing the Oil and Gas plan change project. Firstly, a perceived risk is that if the plan change is halted, a company may still be granted a permit by NZP&M to explore in Hawke's Bay for oil and gas onshore, albeit granting any such permit would be contrary to the Government's own recent announcements. However, it is important to recognise that the only method to apply for exploration permits is to bid in the Block Offer process administered by NZP&M.

19. The proposed release area for Block Offer 2018 is limited to the onshore Taranaki Basin, owing to its known productivity. Under current rules in the RCEP and RRMP, it is also very likely that oil and gas drilling exploration activities would need to obtain a resource consent from the Regional Council in addition to any exploration permits from NZP&M.

20. It follows that the only feasible way for exploration permits to be granted in Hawke's Bay is if in the first instance, the Government was to hold a block offer offering acreage in this region. It is fair to say that the chances of this occurring are relatively low, given that onshore Taranaki has been specifically targeted due to its known productivity (in comparison with Hawke's Bay). It would also run counter to the Government's widely signalled aspirations for addressing climate change, namely through the Zero Carbon Bill, which would set a new 2050 greenhouse gas emission reduction target in law.

21. As noted above, NZP&M officials have advised that legislative change is being progressed, however, the For now, the extent of proposed changes to the Crown Minerals Act and associated regulations remains uncertain.

Financial and resourcing implications

22. If the Committee prefers to proceed with option 1 (the status quo project plan), then there are no further extraordinary financial and resourcing implications arising from a decision in favour of Option 1.

23. However, there are two notable financial and resourcing implications for Council to consider if the Committee were to decide that Option 2 is its preferred approach.

24. Firstly, Option 2 would effectively cease further work on preparing a stand-alone oil and gas plan change. The 'ring-fenced' financial resourcing for this project originates from a Council loan specifically targeting regional strategic energy initiatives. The current unspent budget stands at approximately $85,000 (from the original $200,000 loan).

25. Secondly, ceasing further work on a stand-alone plan change would require an amendment to the Council's Long Term Plan to remove the plan change from the Strategic Planning Group of Activities. Assuming the Committee agrees to Option 2, then both of these financial and resourcing matters can be 'tidied-up' at the next Council meeting (26 September).

Considerations of Tangata Whenua interests

26. In considering whether or not to proceed with the consultation hui discussed in paragraph 7, staff conferred with relevant tangata whenua RPC representatives. The two principal options outlined in this report have considered the interests of tāngata whenua. It should be noted that the Crown (i.e. central government and its ministries) has its own duties and obligations regarding partnerships with tāngata whenua. Furthermore, section 4 of the Crown Minerals Act requires NZP&M and the Minister of Energy and Resources when exercising functions and powers under the Crown Minerals Act to have regard to the principles of the Treaty of Waitangi.

27. Those duties are not to be confused with the duties and responsibilities on regional councils (for example under the RMA and the Local Government Act). Having considered the matter in its entirety it is the view of council staff that there are no extra special considerations for interests of tāngata whenua in this matter that need to be addressed at this stage.

Decision Making Process

28. Council is required to make every decision in accordance with the requirements of the Local Government Act 2002 (the Act). Staff have assessed the requirements in relation to this item and have concluded:

    28.1. The decision does not significantly alter the service provision or affect a strategic asset.

    28.2. The use of the special consultative procedure is not prescribed by legislation.

    28.3. The decision does not fall within the definition of Council's policy on significance.

    28.4. The persons affected by this decision are all persons with an interest in the region's management of natural and physical resources under the RMA;

    28.5. The decision is not inconsistent with an existing policy or plan.

    28.6. Given the nature and significance of the issue to be considered and decided, and also the persons likely to be affected by, or have an interest in the decisions made, Council can exercise its discretion and make a decision without consulting directly with the community or others having an interest in the decision.

Recommendations

1. That the Regional Planning Committee receives and notes the ***"Oil & Gas Plan Change Options"*** staff report.

2. The Regional Planning Committee recommends that Council:

    2.1. Agree that the decisions to be made are not significant under the criteria contained in Council's adopted Significance and Engagement Policy, and that the Committee can exercise its discretion and make decisions on this issue without conferring directly with the community and persons likely to be affected by or to have an interest in the decision.

    2.2. Agrees to cease further work on preparation of the Oil and Gas plan change with a view to incorporating this work, as appropriate, in future upcoming reviews of the Regional Resource Management Plan and Regional Coastal Environment Plans, except that:

        2.2.1. Staff may wrap-up and close works on the current stand-alone oil and gas plan change project to enable smooth assignment of the project's current intelligence over to the future plan review projects.

    2.3. Amends the 2018-28 Long Term Plan to remove the oil and gas plan change project from the Strategic Planning Group of Activities.

Authored by:

Rina Douglas
SENIOR PLANNER

Gavin Ide
MANAGER POLICY AND PLANNING

Approved by:

Tom Skerman
GROUP MANAGER STRATEGIC PLANNING

Attachment/s

There are no attachments for this report.

HAWKE'S BAY REGIONAL COUNCIL

REGIONAL PLANNING COMMITTEE

Wednesday 12 September 2018

Subject: TANK PLAN CHANGE FURTHER INFORMATION

Reason for Report

1. To provide background information, options considered and recommendations in respect of matters the TANK group did not reach consensus on. These include;
   - 1.1. high flow allocation limits
   - 1.2. flow enhancement of the lowland streams affected by groundwater depletion
   - 1.3. the flow regimes (and associated allocation limits) for the Ngaruroro and Tūtaekurī Rivers
2. This report follows on from earlier presentations and workshops provided to the Committee in recent months. The technical reports prepared in support of the TANK decision making are being added to the Council's TANK resources website. Further briefing reports are being prepared in order to complete and refine details that the TANK group did not have the time to turn its collective attention to including;
   - 2.1. managing nutrient loss as a result of land use change
   - 2.2. final recommendations from the Joint Working Group for drinking water
   - 2.3. final details regarding stormwater management (which were also discussed during RPC workshops)
   - 2.4. further refinement of some rules to ensure consistency and clarity
3. A further version (V8) of the Draft Plan will be prepared following further workshops and any decisions and instructions agreed by the Committee.
4. Committee members will recall that the TANK Group set itself a high threshold in terms of its process, and the Group's Terms of Reference provide that consensus required agreement from all TANK Group members, such that one representative could prevent consensus being achieved. For the most part, in relation to issues where consensus was not able to be reached, there was a significant majority of TANK Group members who had reached agreement. Often, there were only one or two members who did not agree, and for a couple of issues the range of non-consensus between TANK Group members was narrowed significantly.

Summary of reporting officers' recommendations in this report

5. For the Committee members' ease of reference, recommendations made by the report's authors are summarised following.
6. **Non-consensus issue 1** (high flow allocation limits for Ngaruroro River and Tutaekuri River in PC9 Policy 51)
   - 6.1 **Adopt** Option B, being a high flow allocation limit of 8 m^3/s (6.3% change to the Fre[3])
7. **Non-consensus issue 2** (flow enhancement of lowland streams affected by groundwater abstraction)
   - 7.1 **Adopt** Policy 35 in draft PC9 (v7) and associated rules
8. **Non-consensus issue 3** (minimum flows and allocation limits for Ngaruroro and Tutaekuri Rivers)
   - 8.1 In relation to the Ngaruroro River, **adopt** Option A, being:
     - 8.1.1 Retaining the RRMP's existing minimum low flow of 2400 l/s at Fernhill

8.1.2 Signaling a commitment to investigating/developing storage options to provide for low flow enhancement

8.1.3 Setting a target allocation limit of 1300 l/s (down from 1580 l/s)

8.1.4 Reallocation of surface water will be on basis of historic actual and reasonable use with a sinking lid approach also adopted.

8.1.5 Emergency water takes will not be specifically provided for.

8.2 In relation to the Tutaekuri River, **adopt** Option B, being:

8.2.1 Increase the RRMP's existing minimum low flow from 2000 l/s to 2500 l/s at Puketapu

8.2.2 Setting a target allocation limit of 1140 l/s (down from 1536 l/s).

ISSUE 1 HIGH FLOW ALLOCATION IN NGARURORO AND TUTAEKURI RIVERS

***Table 1**; Outline of non-consensus issue 1 - high flow allocation limits for Ngaruroro and Tutaekuri Rivers*

Issue	What are the high flow allocation limits that should be incorporated into Policy 51 and schedule 7 for the Ngaruroro River and Tutaekuri River?
Options	A – high flow allocation limit of 6 m3/s at 4.8% of the Fre[3] B – high flow allocation limit of 8 m3/s at 6.3% of the Fre[3] C – high flow allocation limit of 12 m3/s at 10% of the Fre[3]
What Group has agreed	▪ That a volume of water be available for allocation at high flows in the Ngaruroro River and Tutaekuri River ▪ That policy be incorporated in PC9 that enables high flow allocation for water storage ▪ That the FRE_3 statistic +/- 10% was appropriate for setting a high flow allocation limit. ▪ That damming be prohibited on the mainstems of the Ngaruroro and Tūtaekurī River and four of their tributaries
Reporting officers' recommendation	Adopt Option B (8 m3/s high flow allocation limit) and incorporate into Policy 51 and schedule 7.

9. It is recognised that there is ongoing demand for water for a range of end uses including for urban development and primary production, and associated commercial and industrial activities and the river is a valuable source of recharge for the Heretaunga aquifer.

10. The Ngaruroro run-of-river[1] allocation for surface water abstraction is now determined to be over-allocated, and there is increasing demand for high flow allocation that provides for harvest of water for storage. A high flow allocation has a cease-take trigger flow that ensures low flows in the river are not affected, but this also results in the reliability of supply being much less than a run-of-river allocation. Thus, the purpose of a high flow allocation is to provide water for a storage facility, so that water may be released or used later when there is demand or need.

[1] Run-of-river means that abstraction is taken directly from river flow without any benefit from storage

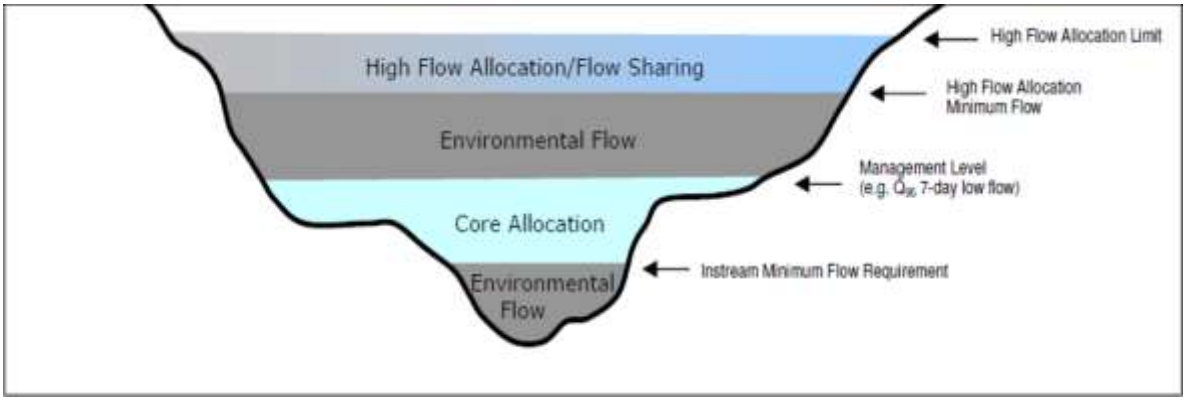

***Figure 1**; The Idealised River flow Allocation (Harkness 2010)*

11. A detailed assessment of the Ngaruroro River high flow allocation was undertaken by MWH in 2010, with the objective of investigating the potential high flow water allocation to allow water harvesting from the Ngaruroro River, including particularly during the winter and spring months (June to November when typically the river flows are higher), and to determine whether there were any effects on instream values. In conjunction with the hydrological and ecological analysis, MWH also modelled high flow allocation scenarios to determine a sustainable flow above which high flow allocation could be made available without adversely affecting the instream ecology requirements and flow variability. Some of the more pertinent findings are summarised in the overview document (attachment 1) and key supporting technical documents[2].

12. The FRE_3 statistic is a measure of flow variability, being the number of times per year the flow exceeds three times the median flow. The FRE_3 statistic is a measure of a river's ability to maintain ecological (benthic) values by flushing periphyton and turning cobbles. FRE_3 incorporates both a frequency and intensity component and its application in New Zealand rivers has identified correlation with instream biological variables, such as periphyton and macroinvertebrate community structure.

13. The RRMP seeks to maintain or improve existing aquatic ecosystems and as such any high flow allocation regime needs to be set in the context of instream management objectives. There are three principal components of a flow regime requirement for ecological values (MfE 1998), namely:

    13.1. Flow variability

    13.2. A minimum flow for water quality

    13.3. A minimum flow for habitat requirements.

14. It was recommended to the TANK Group that the FRE_3 value for the Ngaruroro River shall not vary from the FRE_3 calculated using naturalised flow by more than 10%. It was determined by Harkness (2010) that 10% limited the impact on the aquatic environment and was an acceptable threshold. The cease-take trigger flow for high flow abstraction was proposed to be set at 20 m^3/s, to ensure protection of the low flow and reliability of run-of-river takes.

15. It should be noted that the council is currently applying an informal high flow allocation for the Ngaruroro River of 2 m^3/s with a trigger flow equal to the median (20m^3/s). Increases will be subject to contest and demand without clearer policy and rules in the Plan.

16. The options presented to the TANK Group identified that there were high flow allocation options that offered suitable water for storage, but which also did not modify the FRE_3 by more than 10%, and therefore were considered appropriate for maintaining the aquatic ecosystems and hydrological functioning.

High Flow Allocation (l/s)	Percentage Change of FRE_3 from Zero

[2] 2008, 2010 HBRC Ngaruroro River High Flow Allocation MWH. Available online

	High Flow Allocation
2,000 (existing high flow allocation)	1.9%
4,000 (existing + 2,000)	2.3%
6,000 (existing + 4,000)	4.8%
8,000 (existing + 6,000)	6.3%

17. As noted above, the purpose of a high flow allocation is to provide water for storage, so that water may be released or used later when there is demand or need. In determining what amount of high flow allocation was deemed appropriate it was important to consider the amount of storage that could be achieved, whilst still maintaining the instream values for the aquatic ecosystems. Pickens (2010[3]) considered that potential new irrigation demand for the Heretaunga Plains and Ngaruroro flats could be in the vicinity of 3,500ha, and that this demand could be met by 17.5 million cubic metres (Mm^3) of storage. The high flow allocation scenarios were considered in terms of this potential storage capacity. It should be noted that this potential storage demand was not intended to predetermine the end use of the stored water but provided context for what a comparable water demand may equate to in real terms (in volume).

18. A modelled analysis of the ability of the proposed high flow allocations to meet this demand was undertaken and presented to the TANK Group in March 2018[4]. The volume of water available during the winter and spring period June to September was calculated for each year of the SOURCE simulation from 2015 to 2032. The assumption being that if 17.5 Mm^3 of water was available for harvest during each winter, there would be sufficient to fill the storage required to meet demand for irrigating 3,500 ha.

19. Of the options identified it was determined that an additional high flow allocation of 2 m^3/s would not be sufficient to satisfy this storage capacity. An additional allocation of 4 m^3/s may be sufficient to fill the simulated reservoir's capacity during most, but not all, years of the simulation. An additional allocation of 6 m^3/s (a total of 8,000 l/s) is predicted to be satisfactory for filling 17.5 Mm^3 of storage during all years (2015-2032) of the simulation.

Issues and uncertainties

20. The TANK Group agreed in principle to incorporate policy within the draft plan change which provided the flexibility to permit high flow allocations for water storage (see policy 51, page 37 of the Draft Plan v7.1.0 August 2018). However, the TANK Group did not reach consensus with regards to what the high flow allocation should be limited to.

21. The modelled results presented to the TANK Group for the high flow allocation limits were 6 m^3/s and 8 m^3/s. 4 m^3/s was not considered an option because this would not be sufficient to satisfy storage capacity. As noted above both the 6 m^3/s and 8 m^3/s levels of abstraction would not impact the FRE_3 value of the river by more than 10% (the percentage change from zero high flow allocation was 4.8% and 6.3% respectively). There was not agreement within the TANK Group which of these two options was best, and some TANK members advocated that the full 10% (12 m^3/s) should be made available for storage as this provides for future water demand and remains consistent with the appropriate threshold for protection of the river ecosystem.

22. To be clear, nothing in PC9 assumes any specific capital works for high flow storage reservoirs. References to reservoirs relates to model simulations only – not real or specific scheme designs.

Summary of Options

[3] Pickens A. (2010) *Ngaruroro water augmentation scheme prefeasibility study – Stage 1 report*. Prepared by Tonkin & Taylor Ltd for HBRC, June 201

[4] Hawkes Bay Regional Council Te Tua Storage Scheme HAWKES BAY REGIONAL COUNCIL WWA0018 | Rev. 4 (available online)

23. The following three options are considered appropriate to meet the potential future water demands whilst still protecting instream ecological values. It is recommended that one of the following options be adopted and be incorporated within Draft Policy 51:

    Option A: A high flow allocation limit of 6 m3/s at 4.8%

    Option B: A high flow allocation limit of 8 m^3/s at 6.3%

    Option C: A high flow allocation limit of 12 m^3/s at 10%

24. The staff recommendation is that the RPC adopt Option B – 8 m^3/s high flow allocation. The analysis shows that 8 m^3/s can be taken for storage in the Ngaruroro catchment while also meeting an environmental threshold for minimising impacts on the range of river flows needed for efficient and effective functioning of the Ngaruroro River related to high flow flushing effects. This level of allocation results in substantially less change to the FRE_3 than the 10% threshold (a 6.3% change).

25. It is considered that a similar approach should also be adopted for the Tutaekuri River in order to provide a high flow limit.

26. While planning staff consider that Option A is also an acceptable option, it does not however offer the same level of security for future demand as Options B or C. Whereas Option C offers the most opportunity for water storage, this is well in excess of the projected demand and has not been considered fully by the TANK Group. While some members felt that the sustainable amount could be provided for now, others either preferred to work in stages or to adopt a risk averse approach to limit new storage.

Reporting Officers' Recommendation

27. Staff recommend Option B so that the proposed policy would read as follows:

> **Policy 51 Takes to Storage**
> *…and will limit the amount of flow alteration so that the taking of surface water does not cumulatively affect the frequency of flows above three times the median flow in the Ngaruroro and Tutaekuri Rivers by more than **6.3%** and provided that*
>
> *The high flow take ceases when the river is at or below the median flow;*
> *a) Such high flow takes do not cumulatively exceed the specified allocation limits;*
>
> *b) Any takes to storage existing as at <date of notification> will continue to be provided for within new allocation limits and subject to existing trigger flows.*
>
> *Schedule 7 specifies the limits associated with the damming and take to storage rules (TANK 11-14) and enables the policy to be implemented.*

ISSUE 2 STREAM DEPLETION MANAGEMENT

***Table 2**; Outline of non-consensus issue 2 - management of lowland stream-depletion effects from groundwater abstraction*

Issue	How flows in lowland streams should be managed as a result of the stream depletion effects of groundwater takes.
Options	A – Reduction in total groundwater allocations B – Restrictions on some/all groundwater takes at low flow times C – flow enhancement at low flows
What Group has agreed	▪ That an interim allocation limit for groundwater be adopted ▪ that re-allocation is only on the basis of actual and reasonable use ▪ that new water use is prevented ▪ that riparian land management be improved to provide shading, reduce macrophyte growth, reduce temperature and increase oxygen ▪ that a storage and release solution be further investigated and developed

Reporting officers' recommendation	Adopt Policy 35 in version 7 of PC9.

Background

28. The new Heretaunga Plains groundwater model shows that groundwater and surface water are highly connected across the Heretaunga Plains, with nearly all groundwater takes connected in varying degrees to surface water systems.

29. These findings along with full details of the model development, simulations and scenario modelling are described in technical reports. Some of the more pertinent findings are provided in more detail in the overview document (attachment 2) with the technical reports[5] describing the modelling and supporting these findings separately available.

30. The TANK Group supported the development of policies that are aimed at managing the Heretaunga Plains aquifers through a range of mechanisms. While they generally supported this range of measures, the flow enhancement mitigation measure was supported by the vast majority of members, but not fully supported (i.e. not consensus). Nonetheless, the draft Plan Change does contain policies agreed by the TANK Group that;

    30.1. Establish limits for managing water takes

    30.2. Ensure any reallocation is based on existing use (up to 2017) to reduce the level of over-allocation (actual and reasonable water use is defined)

    30.3. Remedy the stream depletion effects of groundwater takes by flow enhancement,

    30.4. Take into account the high level of uncertainty around the allocation limit and the actual level of water use.

    30.5. Ensure the development of other measures, technology and management responses to meeting the needs of the lowland streams affected by groundwater takes.

    30.6. Enable a staged management approach that allows better information to be collected. This includes further reduction of the allocation limit should over-allocation and adverse effects still be an issue.

31. The flow enhancement management regime and the background to its development is described in more detail in Attachment 2. The attachment also describes the management options that were considered and modelled.

32. The stream flow enhancement measure has been developed for the lowland spring fed streams that are tributaries of the Karamu River. This was not found to be an appropriate mechanism for managing the Ngaruroro River flows and so an alternative storage and flow release option has been developed separately to address groundwater flow depletion effects on that river.

33. The significant findings of the modelling exercise are that;

    33.1. Surface water is in a strong hydraulic connection with the Heretaunga Plains aquifer

    33.2. The effects of groundwater pumping on stream depletion are distributed throughout the Heretaunga aquifer, rather than being confined to small zones

    33.3. The stream depletion is a consequence of a cumulative impact of pumping throughout the Heretaunga Plains

    33.4. Groundwater pumping has been increasing during last 30 years

    33.5. Groundwater levels and spring flow in Heretaunga Aquifer have declined over several decades due to increased pumping

[5] Available online; https://www.hbrc.govt.nz/assets/Document-Library/Publications-Database/5018-Heretaunga-Aquifer-Groundwater-Model-Scenarios-Report-final.pdf

33.6. Decline over last 20 years has been generally small (less than 0.5 metres). Larger declines in limited area are most likely due to impact of abandoned artificial recharge scheme

33.7. Water balance of the aquifer indicates that current pumping does not exceed recharge and groundwater mining is not occurring

34. Lowland streams (including the Awanui, Irongate, Louisa Streams) do not meet targets for water quality, especially for oxygen, temperature and MCI. This means that the needs of the aquatic ecosystem, mauri and other instream values held for the lowland streams are not being met by current management.

35. The stream flows are affected by stream depletion from groundwater during summer. They are also adversely affected by the high rates of macrophyte growth. Macropyhte growth, which is a key stressor for the rivers as it results in extreme oxygen fluctuations as a result of the plant growth and respiration. Low flows in low gravity streams will also result in low levels of dissolved oxygen

36. The model was used to predict effects of changes to the water management regime for ground and surface water abstraction. The significant findings were;

36.1. If groundwater pumping remains at current levels, there will be no further decline of water levels and spring flows.

36.2. If groundwater pumping continues to increase, there will be significant effects on water levels, spring flows (including dry streams and rivers) and possibly saline intrusion issues.

36.3. If frequency of dry years increases, water levels and spring flows are likely to remain at low, but stable, levels

Stream flow depletion

37. Stream flow effects from groundwater takes are not localised and combined abstraction effects over the wider Heretaunga Plains add to declining water levels and flows. Every water user has some effect and the effect is cumulative across the Plains. This represents a big difference in the way the Council and wider community have understood and managed abstraction to date.

38. The groundwater and surface water models have been used to explore options for mitigating the stream depletion effects of groundwater pumping on surface water bodies. These options are summarised as;

38.1. the status quo approach to restrictions

38.2. no irrigation across the modelled area

38.3. using the same groundwater depletion categories used for the Tukituki Plan change (PC6).

39. Management measures that included bans or take restrictions linked to a minimum flow were not found to be effective measures to restore stream flows in a timely manner. The restriction would have to be substantial across all takes and the length of time before a flow improvement was evident was also significant.

40. An overall reduction in pumping was also modelled. Again this management measure was not found to be effective or efficient as substantial reductions in allocation would be needed across all of the existing takes, flow improvements would be variable and even at a 15% reduction, flow improvements would still not be significant for some streams.

41. A further complication was the uncertainty about the actual allocations for each permit and how a reduction in pumping could be calculated for each consent. Note that water allocation for the Heretaunga Plains aquifer exceeds approximately 140Mm^3per year and the actual use in the 2012/2013 drought has been modelled as 90 Mm^3per year. The total water use as the actual and reasonable level of pumping remains uncertain until each water permit is reviewed. That is in part why the allocation limit is an interim limit.

Flow Enhancement

42. Dissolved oxygen is vital for safeguarding the life-supporting capacity of streams, and reduced flow can reduce oxygen in low-gradient streams that support high abundances of aquatic plants. Additionally, high temperatures and low oxygen were correlated with degraded Macroinvertebrate Community Index scores in streams of the Heretaunga Plains (Haidekker 2016)[6].

43. Flow is not the sole determinant of oxygen concentrations. The same flow will produce less oxygen in streams with a flatter gradient and a larger channel (Wilding 2016)[7].

44. Decreased water temperatures also reduce the amount of oxygen that fish need to survive. Riparian shading can maintain cooler temperatures, especially for smaller channels. Hence, both flow management and riparian management can be applied to ensure oxygen supply from the water exceeds oxygen demand for fish survival.

45. More oxygen is required to sustain more sensitive fish and invertebrates. Predictions from the oxygen-flow modelling indicate that flow management alone could not achieve the oxygen requirements of the most sensitive species. The intention of a flow enhancement scheme is that it provides a way to manage the stream depletion effects of water abstraction and that other riparian land management initiatives are also important in relation to macrophyte growth management and shading.

Feasibility of flow enhancement

46. Modelling was carried out to determine effects of pumping groundwater to maintain stream flows. A key objective was to ensure the combined effect of groundwater abstraction for augmentation would not generate unmanageable stream depletion effects that would negate the benefits of the augmentation. Other assessments were carried out to ascertain the economic feasibility for permit holders.

47. Results showed that stream depletion could be effectively and economically remedied by augmentation from groundwater for the modelled streams, except for the stream depletion effect on the Ngaruroro and Karewarewa Rivers.

48. Flow enhancement of the Karewarewa is not likely to be effective. The modelling showed that complete flow restoration of the Karewarewa Stream is not likely to be possible via augmentation alone. Because of high streambed conductance (where surface water moves through the stream bed into the groundwater) in losing reaches, flow enhancement of the Karewarewa Stream is likely to result in adverse stream depletion effects as a consequence of groundwater pumping to provide augmentation water. Additional targeted policy to manage this stream has been included in the draft plan.

49. The management of the stream depletion effect on the Ngaruroro River flows was considered in more detail. The groundwater depletion effect is in the section of the river from Fernhill down to just above confluence with Tutaekuri/Waimate. This is the section that has variable flow (it is losing or gaining). Below that there is in-flow from Tutaekuri-Waimate River which is quite high so the river is no longer so sensitive to abstraction. High flows would be required to augment the river and they would have had adverse effect on groundwater levels.

50. The options considered included;

    50.1. Continue to “live with” stream depletion impact on Ngaruroro River

    50.2. Include the stream depletion effect within the surface water allocation.

    50.3. Reduce total allocations below current pumping levels

    50.4. Ban/restrict all/some takes in all zones at specified flow

[6] https://www.hbrc.govt.nz/assets/Document-Library/Publications-Database/4782-Life-Supporting-Capacity-in-Lowland-Streams-with-a-Focus-on-the-Karamu-Catchment-2016.pdf#search=%22mci%22

[7] https://www.hbrc.govt.nz/assets/Document-Library/Publications-Database/Spatial-oxygen-flow-models-for-streams-of-the-Heretaunga-Plains.pdf

50.5. Develop alternative mitigation option (i.e. water storage and release)

51. The water harvesting and release mitigation method for managing the river depletion effects of the Heretaunga Plains groundwater abstractions was found to be a feasible option and it would depend on the trigger flow used for initiating flow releases.

52. The draft Plan Change has therefore included policy direction for further feasibility assessment of this mitigation measure, including further understanding environmental, technical and economic effects, and options for funding, construction and management. The aim of such a scheme is to manage the stream depletion effects of Heretaunga Plains groundwater abstraction. If it is found to be not feasible, then the alternative options described above would need to be revisited. This approach was agreed by the TANK Group.

Issues and uncertainties

53. A number of issues have been raised by the TANK Group about the flow enhancement measures. These are described more fully in attachment 2 and include;

53.1. uncertainty about the nature and scale of the environmental benefits

In addition to the feasibility modelling, there are other flow enhancement schemes in operation or under development that illustrate the potential benefits.

53.2. that such a measure should be considered as short term only

The flow enhancement could become a longer term solution provided that upon review it is found to be effective and efficient. This determination is still subject to further work including implementation and assessment

53.3. that reduction in pumping should be a preferred option

This was modelled and found to be less directly effective and with likely very significant adverse effects on the socio-economic wellbeing of communities.

53.4. that flow enhancement does not address the cause of the problem

Not all adverse effects are required to be avoided. The flow enhancement along with the riparian land management improvements will both remedy and mitigate adverse effects and still protect the aquatic ecosystems and provide for community well-being.

53.5. that further groundwater abstraction will have adverse effects

Modelling shows that a limited amount of flow enhancement can be sustained without creating additional significant adverse effects.

53.6. the need for community and water permit holders to be involved in successful management

This was identified as both an opportunity and a risk.

Summary of Options

54. A number of management scenarios were assessed or modelled. They included:

54.1. status quo management

54.2. groundwater take management on similar basis to that adopted for the Tukituki

54.3. bans and restrictions when low flows were reached

54.4. reductions in allocations

54.5. storage and release for managing the Ngaruroro stream depletion effect

54.6. flow enhancement for lowland streams

54.7. a combination of water allocation and other measures (an interim allocation limit, reduce allocations to actual and reasonable, improve riparian land management and review success of these measures)

55. The non-consensus has principally been in relation to item 54.6.

Reporting Officers' Recommendation

56. *That the Committee adopt the TANK plan provisions for flow enhancement (in existing Policy 35 pg29 of V7), plus associated rules) for recommendation to the Council.*

ISSUE 3: MINIMUM FLOWS AND ALLOCATION LIMITS FOR THE TUTAEKURI AND NGARURORO RIVERS

Table 3 – Outline of non-consensus issue 3 – minimum flows and allocation limits for Ngaruroro and Tutaekuri Rivers

Issue	What low flow management regime(s) are the most appropriate to manage the effects of surface water abstraction from the Ngaruroro and Tutaekuri Rivers. Are changes required to the RRMP's existing minimum flows and allocation limits that manage abstraction from the Ngaruroro and Tutaekuri Rivers and impose restrictions on abstraction at times of low flows?
Options	**Ngaruroro River** A – Retain existing flow of 2400l/sec, decrease allocation limit to 1300l/sec B – Staged increase in minimum flow to 3600l/sec by 2035. Either decrease allocation limit or allocate existing use with lower security of supply **Tutaekuri River** A – Retain minimum flow of 2000l/sec and reduce allocation to 1140l/sec B - Increase minimum flow to 2500l/sec and reduce allocation to 1140l/sec C - Staged increase in minimum flow to 3200l/sec by 2030. Either decrease allocation limit or allocate existing use with lower security of supply
What Group has agreed	▪ Establish interim allocation limits for the Heretaunga aquifer based on existing levels of water use. ▪ Establish allocation limits for surface takes, including zone 1 groundwater. ▪ policies to manage over-allocation ▪ policies and rules to improve aquatic ecosystem health
Reporting officers' recommendation	Ngaruroro River – Option A. Tutaekuri River – Option B.

57. The TANK Group supported the establishment of interim allocation limits for the Heretaunga aquifer based on existing levels of water use. This will limit the potential for further reductions of flow in the Ngaruroro River. The Group also agreed on a range of measures designed to improve aquatic ecosystem habitat and water quality in the Ngaruroro and its tributaries.

58. However, there was non-consensus about the flow management regimes required to manage the effects of surface water abstraction for both the Tutaekuri and Ngaruroro Rivers.

59. One of the more significant non-consensus issues was around whether changes were needed to the minimum flow regime for the Ngaruroro and Tūtaekurī Rivers. This report summarises the key information that was considered by the TANK Group. The information is provided in more detail in attachment 3 to this report and in the technical reports[8] supporting this work.

60. The Regional Resource Management Plan (RRMP) contains minimum flows and allocation limits that manage the abstraction of water from the Ngaruroro and Tūtaekurī Rivers and impose restrictions on abstraction at times of low flows. These were introduced in the RRMP in 2000.

61. TANK Group did not specifically review the effectiveness of those provisions in meeting desired outcomes, but instead looked at the range of values that those water bodies

[8] The relevant documents are online; https://www.hbrc.govt.nz/hawkes-bay/projects/tank/resources/

have and considered the appropriateness of minimum flows in light of all of the identified values in a 'from new' approach.

62. The National Policy Statement for Freshwater Management (NPSFM) requires that the life-sustaining capacity, ecosystem processes and indigenous species of freshwater is safeguarded. It also requires that communities are enabled to provide for their economic well-being, including productive economic opportunities, in sustainably managing freshwater quantity, within limits.

63. The TANK Group supported capping water allocation from the Heretaunga aquifer at existing levels, and this will limit the potential for further reductions of flow in the Ngaruroro River as a result of stream depleting groundwater takes. The Group was unable to agree on whether changes were necessary to the minimum flow regimes or the associated allocation limits and in particular whether the minimum flows should be increased.

64. However, a range of provisions have been developed by the TANK Group to improve the management of land and freshwater within the TANK catchments that are relevant to the maintenance or improvement of mauri and aquatic ecosystem health of the two rivers. Those measures serve to illustrate that river and aquatic ecosystem health, especially in such a diverse landscape, does not depend solely on trigger flows for rationing abstraction.

65. The TANK Group has included measures in relation to ;

    65.1. damming prohibition on the mainstems, and a small number of named tributaries.

    65.2. targets for the reduction in a number of key contaminants including dissolved nutrient and sediment in the mainstem and the tributaries. This will have the flow on effect of improving MCI scores for the rivers and contributing to the health of the connected Waitangi Estuary.

    65.3. widespread improvement of riparian land management across the catchment and including stock exclusion.

    65.4. acknowledgement of the stream depletion effects of groundwater takes on the Ngaruroro River and new policy direction to explore measures to reduce this impact.

    65.5. reduced allowance for permitted activities to reflect the full and some cases over-allocation of the groundwater surface resources linked to the main rivers.

    65.6. reducing allocation of water to prevent further depletion of river flows.

    65.7. flow enhancement measures to remedy the effects of stream depletion.

66. In deciding when to limit water use, the TANK group considered the effect of reduced water flow on critical (instream) values. Critical values are those values that are most sensitive to reduced flows.

67. For both the Ngaruroro and the Tutaekuri Rivers, the TANK Group have identified a range of instream values for the rivers that include;

    67.1. tikanga Māori values including those for cultural practices

    67.2. habitat for native fish and birds

    67.3. recreational activities including trout fishing, swimming and boating

    67.4. trout habitat.

68. The TANK plan objectives include improvement in the lower reaches and tributaries, where necessary, to support healthy ecosystems including native fish (among other things). Areas where improvement in freshwater quality is necessary are identified through the attribute states specified in the draft Plan Change.

69. Of all of the identified values, the most flow demanding values for each river are torrent fish and trout for the Ngaruroro and Tutaekuri rivers respectively. If these fish are provided for, then other less flow demanding species will consequently also be

protected as their flow requirements are less. It is assumed that mana whenua, cultural and recreational values will also be accommodated within this ecological flow (although there are no guidelines that enable a quantitative assessment). Jet boating is less concerned with the minimum flow regime than it is with ensuring the braided reaches continue to be maintained, including as a result of any water damming or storage activities.

70. Minimum flow does not dictate river flows or halt flow recession. Also critical is how much water is being abstracted and how these two management levers interact and influence river health. It is the combination of the allocation limit as well as a minimum flow that triggers restrictions in water abstraction that are used to manage adverse effects of abstraction on river flows. The recovery of river flows, as a consequence of triggering restrictions in existing takes, is most effective at the lowest river flows. Raising the trigger flow substantially offers diminishing benefit for river flows because the flow depletion effect of those linked takes is relatively small at higher flows.

71. There are several reports and assessments relevant to the decision making for trigger flows for managing the effect of surface abstraction on river flows.

    71.1. economic, social and cultural impacts of imposing take restrictions on the ecosystem attributes for flow

    71.2. the assessment of the appropriate flow requirements for the identified river values of the Ngaruroro River and the conclusions of the WCO applicants.

    71.3. other management decisions made to improve aquatic ecosystems and meet objectives for freshwater (and the estuaries) including new abstraction limits where none existed previously.

    71.4. the comprehensive implementation plan demonstrating stakeholder commitments.

Fish Communities

72. There are existing highly valued native fish in both the Ngaruroro and Tutaekuri Rivers that indicate the suitability of the flow management regime for instream values. There is limited data available about the state and trends of the native fishery, except that there is general agreement that an important native fishery is present. The Council has recently undertaken additional fish surveys to gather more information.

73. In the Tūtaekurī River, trout are the most flow demanding species. In addition to native fish, the Tūtaekurī River and some of its tributaries are valued for recreational trout fishing. Habitat surveys focused on the mid-reaches of the Tutaekuri River where trout are plentiful, with earlier habitat surveys indicating similar habitat levels downstream of the Mangaone Stream confluence where notable populations of native fish can be found (e.g. freshwater flounder).

Existing water allocation and use

74. There are some shortcomings with the current allocation regime that require addressing. The RRMP currently has a minimum flow for the Ngaruroro River at Fernhill of 2400 litres per second (l/sec) and an allocation limit of 956,189 cubic meters per week (m3/week). This equates to (1581 l/sec). Changes to how groundwater takes with a direct effect on surface flow (referred to as the Zone 1 groundwater takes) are managed has also resulted in the amount of water allocated from the river now being calculated as 3033 l/sec. This means that even with no changes to the minimum flow the river is already being managed as an over-allocated river and water allocation will need to be significantly reduced to phase out this over-allocation.

75. The new modelling has also shown a significant stream depletion effect on the river from the cumulative impact of Heretaunga plains groundwater abstraction. The amount of stream depletion in Ngaruroro River (including variable loss section below Fernhill) can be up to about 1200 l/sec in a dry year (2012-2013 summer) and is on average about 750 l/sec during the summer. The mitigation of this stream depletion effect is proposed to be by a water storage and release scheme, possibly based on extending the storage provided by a water storage lake at Te Tua (refer policy 38).

76. The large over-allocation implies the river would dry up completely in dry years. The reason we do not see drying in practice (except 1983) is people rarely use their full consented allocation. In addition, people use water at different times, depending on the timing of peak demand by different land uses (e.g. onions, apples, grapes). One of the first steps in managing over-allocation will be in narrowing the gap between consented allocation and actual use.

Using Models

77. The RHYHABSIM model was used to provide information about the flow and habitat requirements of fish. Historical data was also used to help understand potential level of effect on water bodies and flows. RHYHABSIM and historical flow data is provided for both rivers in attachment 3. The ground and surface water models were used to predict what happens to river flows, changes to the number of days at or below minimum flows and the consequential impacts on security of supply for abstraction.

78. The impact of allowing for ongoing abstraction of 10% of the amount authorised by a water permit has also been modelled. This may be a management response

79. This information is summarised in attachment 3 and is also more fully reported in supporting science reports[9].

80. The social, cultural and economic impacts of changes to the existing water allocation have been modelled or assessed. The results of these assessments are separately reported[10] and summarised in attachment 3.

Impacts of Change;

81. The social and cultural impact assessment (SCIA) included the following strands of work.

    81.1. An assessment of TANK community perceptions, questions and feedback about the current TANK draft plan

    81.2. A statistical assessment of TANK community, social and cultural effects that can likely be anticipated as a natural consequence of implementing a future TANK plan

    81.3. An assessment of TANK Māori community, social and cultural effects that can likely be anticipated as a natural consequence of implementing a future TANK plan

82. The assessment described the inter-generational inequities associated with land alienation and the intra-generational inequities that have developed through the allocation and distribution of financial resources, jobs, homes and well-being needs of the whānau Kahungunu ki te Heretaunga.

83. The assessment concluded that the draft Plan Change would result in flows of ecological, social and cultural benefits to the TANK communities. However, there is a high likelihood of cultural, social and financial harm to some communities with the adoption of the changes to the minimum flow regimes evaluated by Agfirst, Nimmo-Bell and MEL.

84. In particular TANK catchment communities characterised by high levels of welfare dependency or by high levels of Māori will be at risk.

85. Timeframes for implementation and any effects on regional GDP should be specifically addressed within any plan change.

Economic Assessment

[9] Surface water quantity scenario modelling in the Tūtaekurī, Ngaruroro and Karamū catchments Greater Heretaunga and Ahuriri Plan Change (PC9) August 2018 HBRC Report No. RM18-28 – 5013 https://www.hbrc.govt.nz/assets/Document-Library/Publications-Database/5013-RM-18-28-TANK-Surface-Water-Quantity-Scenario-Modelling-Report3.pdf

[10] reports by ME, Nimmo-Bell and Agfirst

86. The assessment carried out by Agfirst, Nimmo-Bell and Market Economics found that changes to security of supply for irrigation of horticultural crops through increases to minimum flows or decreases in allocations would have a significant impact on the regional economy.

Flow Management Options

87. The outcomes being sought by various stakeholders have been moderated as a consequence of the TANK Group member discussions. However, there is still a considerable gap in the outcomes sought by the various stakeholder groups. There is no clear majority preference for either of the two options which are explained in more detail in the attachment 3

88. The extent of non-consensus at the conclusion of the TANK Group meetings is illustrated in the following table;

	Option A	**Option B**
Minimum Flow for Ngaruroro R. at Fernhill	Remains at 2400l/sec	**Step 1**. As at PC9 Notification; 2400l/sec **Step 2** 2025 increase to 2800l/sec **Step 3** 2030 increase to 3200l/sec **Step 4** 2035 increase to 3600l/sec
		Note that new minimum applies at time a water permit is applied for or, if as a result of a requirement to review an existing water permit, at the specified date provided the plan is operative by then.
Water storage	Council is committed to investigation/ development of storage options to provide for low flow enhancement as the resolution of the river depletion effect from the g/w takes in the HPGMZ	Council is committed to investigation/ development of storage options to provide for low flow enhancement as the resolution of the river depletion effect from the g/w takes in the HPGMZ
	Refer policy 53	

	Option A	Option B	
Allocation Limit	Target allocation limit of 1300 l/sec (down from 1580 l/sec) (existing allocation is now over 3000 l/s because of new accounting for Zone 1 groundwater takes)	*Either* Allocation limit[11] decreases at each step on a pro rata basis across all consents so that the following allocation limits can be met: **Step 1** As at PC9 Notification; actual and reasonable Step 2 2025 reduce to 1181 l/sec (25% reduction) Step 3 2030 reduce to 781 l/sec (50% reduction) Step 4 2035 reduce to 381 l/sec (75% reduction)	*Or* Water is allocated on actual and reasonable use basis and permit holder subject to a lower security of supply with the higher minimum flow
	To be reflected in policy 40 and schedule 6		
		Note in order to carry out pro rata reduction, all water permits would need to be called in and reallocated before required pro-rata reduction amount is calculated.	
Water Permit Allocation Management	Re-allocation of surface water will be on the basis of historic actual and reasonable water use. A sinking lid approach will be adopted to ensure ongoing reductions in allocation	As above	
	To be reflected in policy 40 and schedule 6		
Emergency water takes	Not provided for	10% of the allocation limit can continue to be abstracted after the minimum flow is reached	

89. There are costs and benefits associated with both these options which are summarised as follows.

The reasons supporting Option A;	The costs or risks with Option A;
The existing flow regime means reduced adverse impacts on social and economic well-being. There is little evidence that the existing flow regime is causing adverse effects on native fish.	Uncertainty that any storage flow enhancement solution to address stream depletion effects from Heretaunga Plains groundwater abstraction will be developed in a timely manner – despite the stated phase in dates and policy commitment.
The associated measures adopted to improving ecosystem habitat are less disruptive to communities and can be introduced in a staged cost effective manner,	A reduction in abstraction limit and potential adverse impacts on economic well-being of existing permit holders.
This approach complements measures being developed to manage the stream depletion effects of the groundwater takes in the Heretaunga Plains Water Management Unit (HPWMU)	A relatively high level of over-allocation needs to be phased out. (Actual use is likely to be significantly less than allocated use)

[11] calculated by Q95 – minimum flow where Q95 is the 7 day avg summer flow exceeded 95% of time and for the Ngaruroro is 3981 L/s

Social equity and impacts on Māori cultural values and uses are also able to be addressed by high flow water reservation measures	Lack of information about current state and trends of indigenous species
The allocation limit (compared to MALF) is reduced to more environmentally conservative levels.	
Reasons for supporting option B	**The costs and risks with Option B**
Provides higher level of habitat protection for aquatic species, especially indigenous species	Potential for very significant adverse effects on social cultural, and economic well-being including for Māori.
The timeframe for introducing new minimum flows is long and enables solutions and adaptation	Actual improvements to the environment as a result of the change may be difficult to measure, especially given other habitat improvements
Provides for the community ambitions to establish higher levels of protection for cultural and social well-being, including for Māori kaitiaki reasons	A very high level of over-allocation needs to be phased out
	Uncertainty that any storage flow enhancement solution to address stream depletion effects from Heretaunga Plains groundwater abstraction will be developed in a timely manner – despite the stated phase in dates and policy commitment.
	Uncertainty about land use change as a result of decreasing allocations and how that might affect water storage options

Reporting Officers' Recommendation

90. That the committee adopt Option A for Ngaruroro River flow management and allocation for recommendation to the Council.

Tūtaekurī River

91. The Tūtaekurī River is not fully allocated according to the existing flow regime and allocation limit for abstraction from this river. In response to the desire by some of the TANK Group to raise the level of protection being provided to the river by the current flow regime, the impact a number of higher flow triggers was modelled.

92. Detailed investigation of trout habitat use in the Tutaekuri River revealed that the existing minimum flow of 2000 l/s (at Puketapu) does not provide a high level of protection for the habitat of rainbow trout. Increasing the minimum flow from 2000 l/s to 2500 l/s would increase the level of habitat protection from 65% to 75%, without making any appreciable difference to the security of supply for existing water users.

93. The range of non-consensus about management options preferred for the Tūtaekurī River is illustrated in the following table.

	Option A	**Option B**	**Option C**	
Minimum Flow for Tutaekuri River at Puketapu	Remains at 2000 l/sec	Increase to 2500 l/sec	**Step 1**. As at PC9 Notification; 2500l/sec **Step 2** 2025 increase to 2800l/sec **Step 3** 2030 increase to 3200l/sec	
			Note that new minimum flows apply at time a water permit is applied for or, if as a result of a requirement to review an existing water permit, at the specified date provided the plan is operative by then	

Allocation Limit	Target allocation limit of 1140 l/sec (down from current limit at 1536l/sec) (a 25% reduction)	Target allocation limit of 1140 l/sec (down from current limit at 1536l/sec) (a 25% reduction)	*Either* Allocation limit[12] decreases at each step on a pro rata basis across all water permits so that the following allocation limits can be met: **Step 1** As at PC9 Notification; actual and reasonable **Step 2** 2025 reduce to 736 l/sec (52% reduction) **Step 3** 2030 reduce to 336 l/sec (78% reduction)	*Or* Water is allocated on actual and reasonable use basis and permit holder subject to a lower security of supply with the higher minimum flow

Reasons for supporting option A	**The costs and risks with Option A**
Retaining the existing flow regime means reduced adverse impacts on social and economic well-being. There is little evidence that the existing flow regime is causing adverse effects on native fish.	The level of habitat protection for aquatic species is not improved
There are associated measures adopted to improving ecosystem habitat	Actual improvements to the environment as a result of the change may be difficult to measure, especially given other habitat improvements
The allocation limit (compared to MALF) is reduced to more environmentally conservative levels.	Does not reflect kaitiakitanga aspirations of mana whenua
Reasons for supporting option B	**The costs and risks with Option B**
Provides higher level of habitat protection for aquatic species, especially indigenous species	A relatively high level of over-allocation needs to be phased out. (Actual use is likely to be significantly less than allocated use)
The higher minimum flow has minor impact on security of supply for existing users	Actual improvements to the environment as a result of the change may be difficult to measure, especially given other habitat improvements
There are associated measures adopted to improving ecosystem habitat	A reduction in abstraction limit has potential adverse impacts on well-being of existing permit holders

Reasons for supporting option C	**The costs and risks with Option C**
Provides higher level of habitat protection for aquatic species, especially indigenous species	Potential for high adverse effects on social cultural, and economic well-being including for Māori.
The timeframe for introducing new minimum flows is quite long and enables solutions and adaptation	Actual improvements to the environment as a result of the change may be difficult to measure, especially given other habitat improvements
Provides for the community ambitions to establish higher levels of protection for cultural and social well-being, including for Māori kaitiaki reasons	A very high level of over-allocation needs to be phased out
There are associated measures adopted to improving ecosystem habitat	A reduction in abstraction limit and potential adverse impacts on economic well-being of existing permit holders.
	Uncertainty about land use change as a result of decreasing allocations and how that might affect water storage options

[12] calculated by Q95 – minimum flow where Q95 is the 7 day avg summer flow exceeded 95% of time and for the Ngaruroro is 3981 L/s

Reporting Officers' Recommendation

94. *That the committee adopt Option B for Tūtaekurī River flow management and allocation for recommendation to the Council.*

Decision Making Process

95. Council is required to make every decision in accordance with the requirements of the Local Government Act 2002 (the Act). Staff have assessed the requirements in relation to this item and have concluded that if the Committee were indeed to make a decision similar to those being recommended by the authors, then:

    95.1. The decision does not significantly alter the service provision or affect a strategic asset.

    95.2. The use of the special consultative procedure is not prescribed by legislation.

    95.3. The decision does not fall within the definition of Council's policy on significance.

    95.4. The persons affected by this decision all persons with an interest in the region's management of natural and physical resources under the RMA, particularly land and freshwater resources in the TANK catchment area.

    95.5. Staff have considered a number of different approaches to the three non-consensus issues discussed in this report.

    95.6. The decision is not inconsistent with an existing policy or plan.

    95.7. Given the nature and significance of the issue to be considered and decided, and also the persons likely to be affected by, or have an interest in the decisions made, Council can exercise its discretion and make a decision without consulting directly with the community or others having an interest in the decision. Once a plan change is publicly notified, any person may make a submission on that plan change.

96. Note that the Committee will be provided with further briefing reports about options and timeframes for further steps in this Plan Change process. This will include options for further consultation on a draft and notification of the Proposed Plan Change.

Recommendations

1. That the Regional Planning Committee receives and notes the ***"TANK Plan Change Further Information"*** staff report.

2. That the Regional Planning Committee adopts the following provisions to be included into the draft TANK Plan Change (PC9) Version 8.

    2.1 Include a high flow allocation limit of 8 m^3/s for the Ngaruroro River, and an equivalent high flow allocation for the Tutaekuri River as in Policy 51 and schedule 7 and associated rules.

    2.2 Provide for stream flow enhancement of lowland streams as in Policy 35 and associated rules.

    2.3 Maintain the RRMP's existing minimum flow trigger for the Ngaruroro River at Fernhill of 2400 l/sec and reduce the allocation limit to 1300 l/sec for surface and zone 1 groundwater abstraction in Policy 39 and associated rules.

    2.4 Increase the existing minimum flow for the Tutaekuri River at Puketapu to 2500 l/sec and reduce the allocation limit to 1140 l/sec for surface and zone 1 groundwater abstraction from in Policy 39 and associated rules.

Authored by:

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Attachment/s

⇩**1** High flow allocation limits for Ngaruroro and Tutaekuri Rivers

⇩**2** Managing stream depletion effects by groundwater abstraction

⇩**3** Minimum flow limits for Ngaruroro and Tutaekuri rivers

⇩**4** Minimum Flows Report Appendix 2

MEMO

To:	HBRC Regional Planning Committee
From:	Mary-Anne Baker, Senior Planner
Date:	5 September 2018
Subject:	**FURTHER INFORMATION ON NON-CONSENSUS MATTERS IN TANK PLAN CHANGE ('PC9')** - ***HIGH FLOW ALLOCATION LIMITS FROM NGARURORO AND TUTAEKURI***
Cc:	James Palmer

1.0 Background

1.1 The high flow allocation was initially presented to the Water Augmentation Working Group[1] on 12 February by Dr Jeff Smith and further elaborated on at WAWG meetings on 19 February and then 12 March 2018 (with input from Rob Waldron and Mary-Anne Baker).

1.2 The High Flow Allocation was then presented at TANK meeting 38 on the 22 March 2018 by Dr Jeff Smith. The principle of a high flow allocation for harvesting was generally accepted by the TANK Group, however the TANK group was not in unanimous agreement about how much the allocation limit should be less than the 10% of FRE_3. Modelling results were provided for allocation limits at 6 m^3/sec and 8 m^3/sec and these levels of abstraction impacted the FRE_3 by 4.8% for a 6m^3/sec limit and 6.3% for the 8 m^3/sec limit.

1.3 Some TANK Group members advocated that the full amount represented by the 10% FRE_3 (12 m3/sec) should be made available as it provides for future water demand and is consistent with an appropriate threshold for protection of the river ecosystem, however this was not modelled.

2.0 The science – an overview of the modelling

2.1 Due to the Ngaruroro run-of-river[2] allocation for surface water abstraction being exhausted, there is demand for high flow allocation that provides for harvest of water for storage. A high flow allocation has a cease-take trigger flow that ensures low flows in the river are not affected, but this also results in the reliability of supply being much less than a run-of-river allocation. Thus, the purpose of a high flow allocation is to provide water for a storage reservoir, so that water may be released or used later when there is demand or need.

High Flow Allocation – what it is.

2.2 MWH were appointed to undertake an assessment of the Ngaruroro River High Flow Allocation for the June to November period, the results of which can be found in the report (Harkness,

[1] The members of the WAWG are as follows: Monique Benson – Convenor, HBRC; Jenny Mauger; Xan Harding; Bruce Mackay; Mike Glazebrook; Emma Taylor; Jerf van Beek; Ivan Knauf; Ngaio Tiuka; Matt Brady; Tim Herman; Nathan Burkepile; Joella Brown.

[2] Run-of-river means the river flow operating without modification by upstream storage

2010)[3] . Historically there has been limited demand for high flow allocation in the TANK catchments, and subsequently HBRC had adopted a conservative 2 m^3/s high flow allocation for the Ngaruroro River, with a 20 m^3/s cease-take trigger flow. Approximately 1 m^3/s of the high flow allocation is currently consented. The Regional Planning Committee should note that high flow allocation is not a new concept to HBRC, there is existing policy within the RRMP for the Tukituki and Waipawa Rivers (PC6) which allows for, and identifies high flow allocation limits.

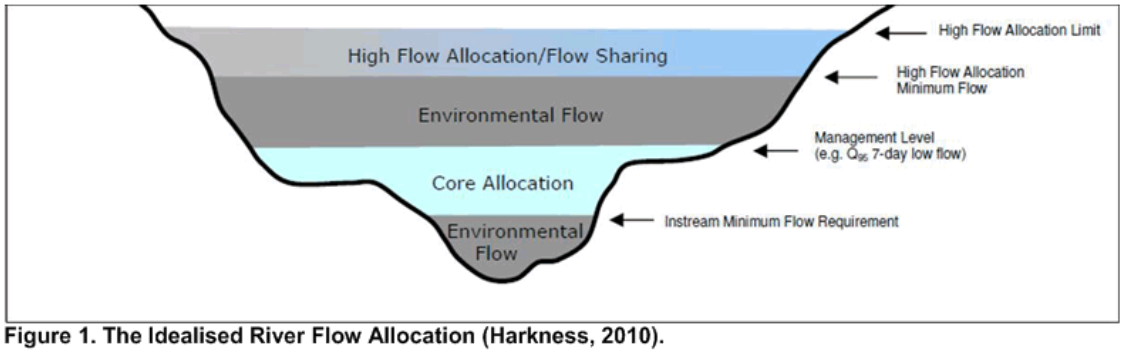


Figure 1. The Idealised River Flow Allocation (Harkness, 2010).

2.3 The MWH report (Harkness, 2010) provides the above picture which is a representation of how high flow allocation could be managed within existing water allocation practices. Harkness explains that the minimum flow is generally set to protect instream values such as habitat. The current minimum flow for the Ngaruroro is 2400l/s (2.4m^3/s). The core allocation depicted above is also termed the 'allocable volume' and is the prescribed management level and the minimum flow combined. Currently the Ngaruroro River management level is set at the 95 percentile flow (Q95) of the summer flow period (November to April). Q95 is the flow that is exceeded 95 percent of the time. As it currently stands under the RRMP the core allocation for the Ngaruroro River is 956,189 m^3/week (1.581m^3/s). The existing allocation regime for the Ngaruroro allows for the remainder of the flow which is in excess of the core allocation to remain within the river.

2.4 A high flow allocation should occur above a high flow minimum flow, to ensure that water harvesting only takes place above this threshold. As noted in paragraph 2.2 HBRC has adopted a 20 m^3/s cease-take trigger flow.

The FRE_3 Statistic – what it is.

2.5 The FRE_3 statistic is a measure of flow variability, being the number of times per year the flow exceeds three times the median flow. The FRE_3 statistic is a measure of a river's ability to maintain ecological (benthic) values by flushing periphyton and turn cobbles. The FRE_3 statistic incorporates both a frequency and intensity component and its application in New Zealand Rivers has shown close correlation with instream biological variables, such as periphyton and macroinvertebrate community structure. FRE_3 has been used throughout New Zealand for determining high flow allocations since Clausen & Biggs (1997)[4] identified its close correlation with instream biological values including periphyton flushing.

2.6 The FRE_3 statistic is important to high flow allocation in that it provides a level of flow which is considered acceptable for the instream values. Harkness (2010) considered that, in terms of

[3] Harkness M. (2010) Ngaruroro River high flow allocation: June to November period. Prepared by MWH for HBRC, 25 May 2010. Available at https://www.hbrc.govt.nz/assets/Document-Library/Projects/TANK/TANK-Key-Reports/Ngaruroro-River-High-Flow-Allocation-2010.pdf

[4] Clausen B. and Biggs J. B. (1997) *Relationships between benthic biota and hydrological indices in New Zealand streams.* Freshwater Biology, v38, pg 327 – 342.

limiting impact to the aquatic environment, a high flow allocation is acceptable if FRE_3 under the altered flow regime would be changed by less than 10% when compared to FRE_3 for naturalised flows. The same criterion was used for the TANK analysis.

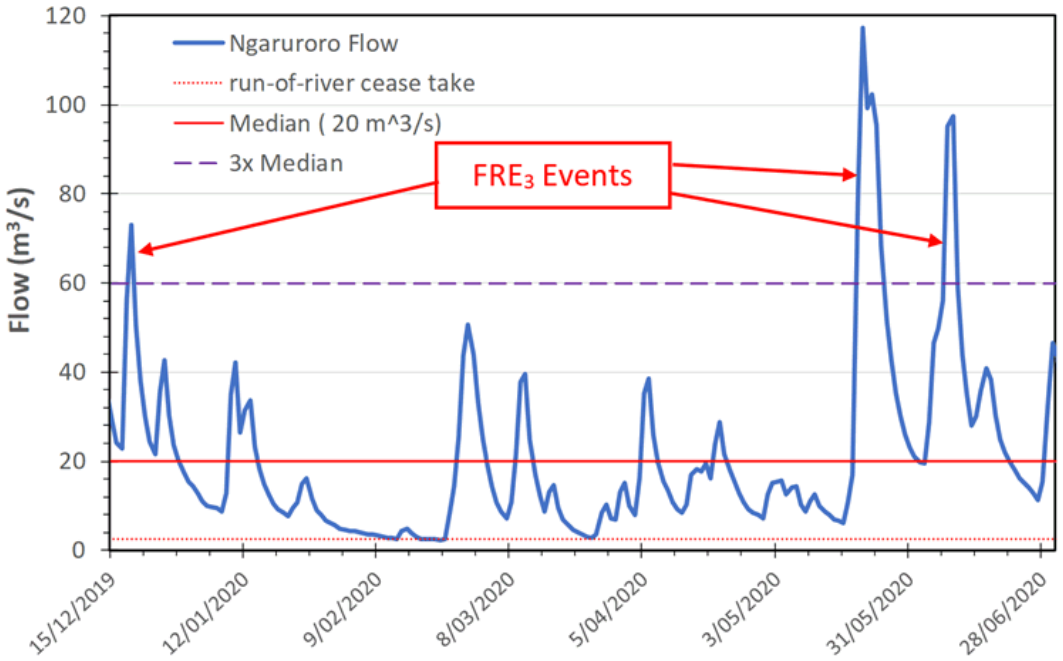
2.7 As noted above the purpose of a high flow allocation is to provide water for a storage reservoir, so that water may be released or used later when there is demand or need. In determining what the future demand for water might be Pickens (2010)[5] reported that the potential new irrigation of the Heretaunga Plains and Ngaruroro river flats may be up to 3,500 ha and this demand could be met with 17.5 million cubic metres (Mm^3) of storage.

2.8 The high flow allocation scenarios were considered in terms of this potential storage capacity, however it should be noted that this was not intended to predetermine the end use of the stored water but provided context for what a comparable water demand would equate to in real terms. There was some discussion around this from the TANK Group, and concerns raised with regards to increasing intensification of uses requiring water within the Heretaunga Plains. This assessment of the irrigable area was a high level screening exercise to provide understanding about the possible scale of future demand and potential storage options. Other reasons for advancing storage proposals could include for creation of aquatic habitat, flow enhancement, increasing a reliability of water supply or meeting other potential water demand such as for urban development.

2.9 An idealised river high flow allocation would occur in times of relatively higher flows such as winter and spring so that harvesting of flow has only a small proportionate effect on reducing river flows. The modelling assumed harvesting would occur when the Ngaruroro flow is between 20 m^3/s and 60 m^3/s, as flows greater than 60 m^3/s would be unsuitable for storage due to high sediment load.

2.10 Figure 2 shows simulated flows for December 2019 to June 2020, along with median and 3 times median flows for the Ngaruroro River at Fernhill. During this period, there were three FRE_3 events. The cease-take trigger for high flow abstractions (20 m^3/s) is also shown (to protect low flows and reliability of run-of-river takes). High flow abstraction does not occur when river flow is less than 20 m^3/s. For comparison, the current cease-take trigger for run-of-river takes (2.4 m^3/s) is also shown.

[5] Pickens A. (2010) *Ngaruroro water augmentation scheme prefeasibility study – Stage 1 report*. Prepared by Tonkin & Taylor Ltd for HBRC, June 2010.



2.11 **Figure 2**. Daily mean flows for the Ngaruroro River at Fernhill simulated using the HBRC SOURCE model for December 2019 to June 2020. The cease-take trigger flow for current high flow allocation (20 m3/s) is also shown, along with 3x median flow (60 m3/s) which is used to calculate FRE_3.

2.12 The modelling by Harkness (2010) assumed flow sharing regimes (where a specified proportion of the flow above the trigger is taken for storage) for all scenarios and that high flow abstraction would be limited to the months June to November. While Harkness (2010) demonstrated that high flow allocations of 2 m^3/s and 5 m^3/s would not cause significant effects on the Ngaruroro River ecology or water quality, HBRC at the time chose to adopt the former allocation option (2 m^3/s) with a trigger flow equal to the median (20 m^3/s).

2.13 The evaluation undertaken for the TANK Plan Change explored high flow allocations without a flow sharing regime and also assumed that abstraction occurs whenever flow in the Ngaruroro River at Fernhill is greater than the 20 m^3/s trigger flow (i.e. it is not limited only to the months June to November).

2.14 The aim of the analysis presented to TANK was as follows:

- To identify high flow allocation options with less than 10% change in FRE_3 when compared to FRE_3 for naturalised flows.; and
- To identify a high flow allocation that may be sufficient to meet the potential future irrigation demand for 3,500 ha with 17.5 Mm^3 storage as reported by Pickens (2010).

2.15 Along with the 2 m^3/s current high flow allocation, additional allocations of 2 m^3/s, 4 m^3/s and 6 m^3/s were assessed. Thus, FRE_3 statistics were calculated for total high flow allocation scenarios of 4 m^3/s, 6 m^3/s and 8 m^3/s.

3.0 FRE_3 Analysis

3.1 Naturalised daily mean flows for the Ngaruroro River at Fernhill were produced using the TANK SOURCE model for the years simulated between 2015 and 2032. The FRE_3 statistics were calculated for the naturalised flows, along with FRE_3 for the three high flow allocation scenarios (4 m^3/s, 6 m^3/s and 8 m^3/s).

3.2 Figure 3. is a snapshot of the impact that high flow allocation is predicted to have on the Ngaruroro River flows for the four-week period shown. In this case, the largest allocation

scenario (8 m^3/s) is plotted for illustration purposes. While flows greater than 20 m^3/s are reduced by the high flow allocation, the flushing flow event that peaked 9 June is not reduced below 3x median flow, so the FRE_3 flow threshold is not compromised in this case. The effect of the current 2 m^3/s high flow allocation is also shown in Figure 3.

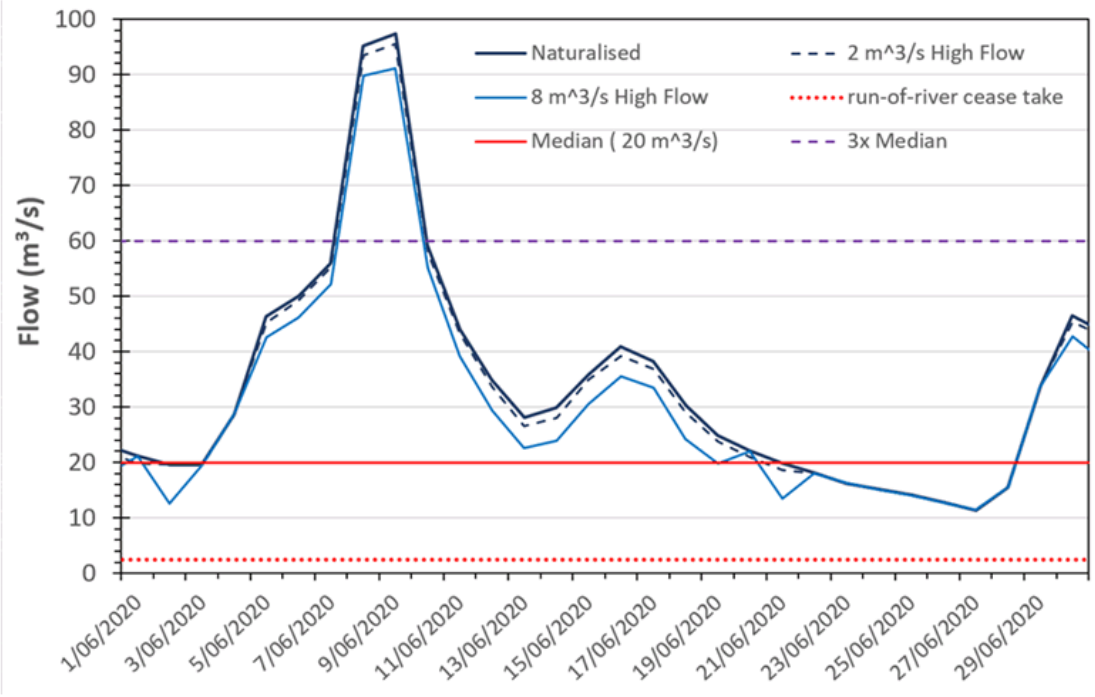


Figure 3. Daily mean flows for the Ngaruroro River at Fernhill during one month of the simulation period. Naturalised flows are shown, along with flows simulated for the current high flow allocation (2m^3/s) and the 8 m^3/s high flow allocation scenario. The trigger flow 20 m^3/s is also shown, along with 3x median flow (60 m^3/s) which is used to calculate FRE_3.

3.3 Figure 3 is helpful for demonstrating that:

1. low flows are not affected by high flow allocation; and
2. There are less than minor effects on flushing flow effectiveness during this four-week period.

3.4 However, to assess the long term effect of high flow allocation on flushing flows, the data in Figure 4 has been assessed against the criterion described above (i.e. less than 10% change in FRE_3 as a consequence of high flow allocation).

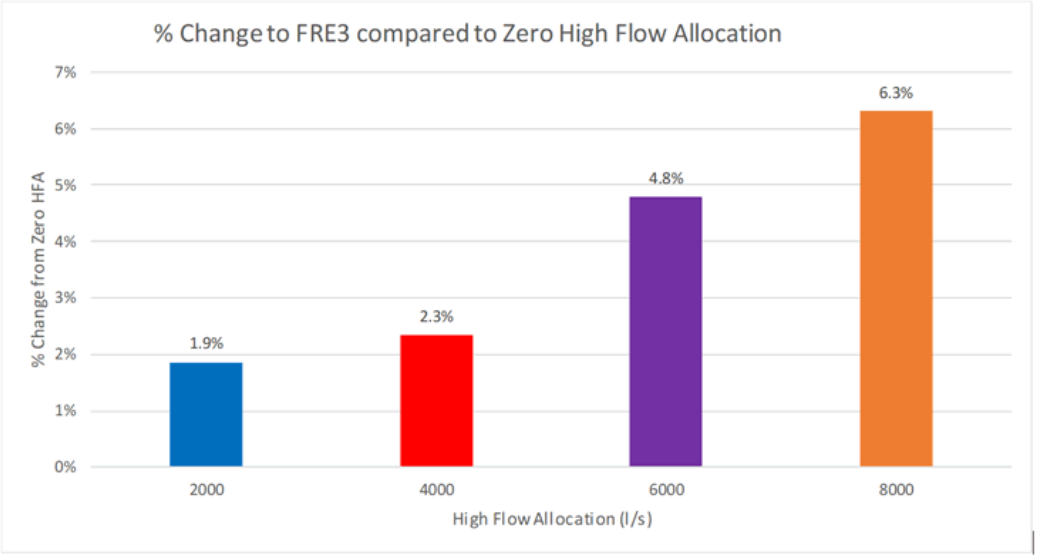


Figure 4. Percentage change of average annual FRE3 under high flow allocation scenarios, compared with FRE3 for naturalised flows.

3.5 Figure 4 shows that there is less than 10% change in FRE_3 for all high flow allocation scenarios up to 8 m^3/s. Based on the criterion established by Harkness (2010), a high flow allocation up to 8 m^3/s is supported for maintaining ecological instream values of the Ngaruroro River.

4.0 Capacity of High Flow Allocation to Meet Demand

4.1 The second aim of the analysis was to identify a high flow allocation that could be sufficient to meet the irrigation demand for 3,500 ha with 17.5 Mm^3 storage as reported by Pickens (2010). It is very difficult to achieve this via storage and demand modelling, because this is a hypothetical exercise and the location(s) and geometry of future storage are unknown. Furthermore, the location of land that may be irrigated from the storage is unknown and variables including soil properties and climate have a major influence on demand modelling and, consequently, predictions of water released from storage during the irrigation season. Note also that other reasons for developing water storage are not considered in this analysis, such as returning water to the river.

4.2 Because of the magnitude of required assumptions, a different approach was exercised. For each high flow allocation scenario, the volume of water available during the winter and spring period June to September was calculated for each year of the SOURCE simulation from 2015 to 2032. The assumption is that if 17.5 Mm^3 of water was available for harvest during each winter, there would be sufficient to fill the storage required to meet demand for irrigating 3,500 ha.

4.3 Based on advice from the TANK Water Augmentation Working Group, flows greater than 60 m^3/s are unsuitable for harvesting from the Ngaruroro River due to technical challenges including high sediment load in the river. Therefore, abstraction was assumed to be available only when flow in the Ngaruroro River was less than 60 m^3/s and greater than the 20 m^3/s cease-take trigger.

4.4 Assumptions made in the analysis are:

- A full 17.5 Mm3 reservoir capacity at the start of an irrigation season would be sufficient to meet demand for 3,500 ha of land;

- The entire allocation (i.e. up to 8 m^3/s) is capable of being transported to the storage reservoir(s). In practise, this may present technical challenges but may be achieved if a

suitable tributary was available for storage, or if several smaller storage facilities were developed with a combined capacity of 17.5 Mm^3;

- Evaporation losses from storage reservoir(s) have not been accounted for, because storage geometry is unknown. Based on potential storage sites identified by Pickens (2010), net evaporation losses may be in the order of 500,000 m^3 during irrigation seasons;

- Leakage losses from the storage and distribution infrastructure have not been included. In practise these losses are non-trivial and this uncertainty should be considered when interpreting results.

4.5 This analysis ignores the existing 2 m^3/s high flow allocation because, if the Ngaruroro River augmentation proposal described in paragraph 2 is adopted, there would be little remaining in the current high flow allocation. Therefore, winter/spring volumes were calculated for additional high flow allocation scenarios of 2 m^3/s, 4 m^3/s and 6 m^3/s that may be used for future demand. Results are plotted in Figure 5.

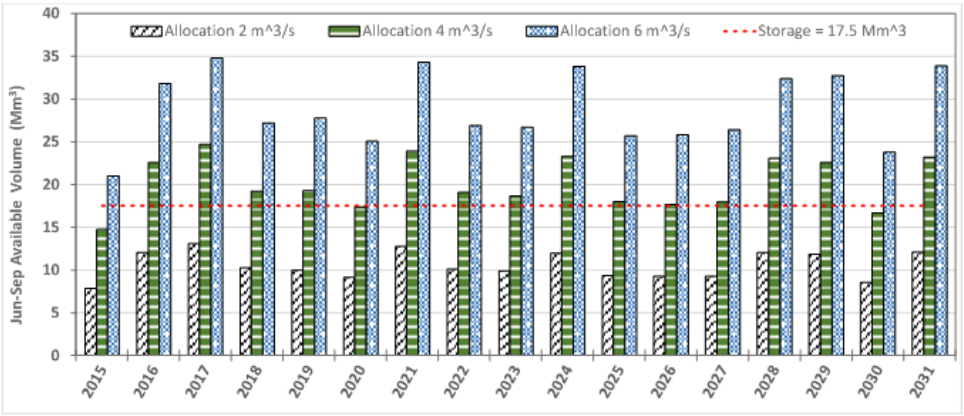


Figure 5. Annual volumes of water available for harvesting between June and September for SOURCE model simulations to 2032, for additional high flow allocations 2 m^3/s, 4 m^3/s and 6 m^3/s. The current 2 m^3/s high flow allocation is excluded. The dotted red line indicates the storage capacity reported by Pickens (2010) as sufficient to meet demand for 3,500 ha of irrigation

4.6 Figure 5 shows that an additional high flow allocation of 2 m^3/s would not be sufficient to satisfy storage capacity. An additional allocation of 4 m^3/s may be sufficient to fill the reservoir capacity during most, but not all, years of the simulation. An additional allocation of 6 m^3/s is predicted to be satisfactory for filling 17.5 Mm^3 of storage during all years of the simulation.

4.7 In summary, a total high flow allocation of 6 m^3/s (including 4 m^3/s for future demand) may be sufficient to provide new irrigation to 3,500 ha in most years. However, there is greater certainty (given the assumptions listed above) of a total high flow allocation of 8 m^3/s (including 6 m^3/s for future demand) providing for future demand to irrigate 3,500 ha. Moreover, a total high flow allocation of 8 m^3/s is the most likely scenario to provide additional volume to store water for environmental purposes, such as augmentation during low flow periods.

5.0 Other important considerations

5.1 It is important to note that one of the primary reasons for providing a high flow allocation and (cease take) trigger flow in the TANK plan change is to make provision for water harvesting in the future if storage is considered to be a sustainable means to meet additional demand or improving reliability of supply. If the TANK plan fails to make this provision, it will be far more onerous to implement a storage scheme in future. Assessing an application in the absence of any supporting policy or rules is a tougher, more costly and likely much more contentious proposition, than where there are plan provisions that provide scope and guidance to consider such an application. Plan provisions can provide direction in relation to both positive and

negative aspects of water harvesting. It also enables the plan to address the need to set limits to protect water body values as required by the NPSFM.

5.2 Along with demand for irrigation, there may be environmental benefits from harvesting high flows to storage. For example, offline (i.e. non-mainstem) storage may be considered for augmenting the Ngaruroro River in addition to the currently considered augmentation proposal for offsetting the impact of groundwater abstraction. Additional augmentation may be valuable for environmental benefits or to offset the effects of run-of-river abstractions during low flow periods. In addition, harvesting and storage may be required in the future for lowland stream augmentation: particularly for streams with technical challenges to augmentation from groundwater such as the Paritua and Karewarewa.

5.3 The purpose of this analysis was to identify high flow allocation options that may be sufficient to meet future demand for storage, without the potential for adverse effects from the abstraction itself. Depending on the intended purpose of any future storage scheme, there is also likely to be a need to consider environmental effects from the use of stored water. For example, there may be potential for water quality effects caused by land use change. These other potential environmental effects would require full assessment as part of the resource consent process.

5.4 It is not necessary to speculate on the use of water harvested to storage, or the potential environmental effects of that use, because those issues would be fully assessed when an application is made for resource consent. There will be a need to ensure land use change only occurs within the environmental limits established for the relevant water bodies.

5.5 Similarly, it is important to note that the provision of a high flow allocation does not allow for the development of any dam or storage facility. Construction of a storage reservoir is a separate activity to the abstraction of harvesting flow and requires a resource consent in its own right.

5.6 This analysis has shown that high flow allocations of 6 m^3/s or 8 m^3/s, accompanied with storage capacity of 17.5 Mm^3, may be sufficient to meet demand for 3,500 ha of new irrigation. There are assumptions and unknown variables in this analysis, particularly regarding locations of storage and irrigation demand, and an allocation of 8 m^3/s would provide greatest certainty for meeting future demand.

5.7 Because there is less than 10% change in FRE_3 for all high flow allocation scenarios, a high flow allocation up to 8 m^3/s could be supported for maintaining ecological instream values of the Ngaruroro River.

6.0 Options for managing high flow allocation

6.1 The above analysis shows that up to 8 m^3/s can be taken for storage in the Ngaruroro catchment and still meet an environmental threshold for minimising impacts on the range of river flows needed for efficient and effective functioning of the Ngaruroro River related to high flow flushing effects. This level of allocation results in a change to the FRE_3 of much less than the 10% threshold (a 6.3% change).

6.2 There are still some uncertainties that are not addressed by this analysis.

6.3 The TANK Group was not unanimous on this issue with some favouring the upper modelled limit ($8m^3/s$) based on the agreed threshold. Others felt a more staged approach was appropriate, that reflected a more likely rate of uptake of $6m^3/s$ that could be reviewed later. They considered that the rate of uptake of this amount was uncertain and would probably depend on other decisions about minimum flow triggers and allocation limits.

6.4 Some TANK Group members advocated that the full amount represented by the 10% FRE_3 (12 m^3/s) should be made available as it provides for future water demand and is consistent with an appropriate threshold for protection of the river ecosystem, however this was not modelled.

6.5 In debating the relative merits of the options, the TANK Group also considered the possibility that water augmentation proposals be subject to a requirement to release stored water during low flow periods. There wasn't unanimous agreement that this be made a requirement. The consequences of such a requirements could not easily be predicted as the options were likely to be very site specific and depend on things like the size, location and purpose for the water storage.

7.0 Instream Dams and Out of Stream Storage

7.1 Note that the analysis above addresses abstraction for out-of-stream storage and does not directly or specifically address limits for in-stream dams. However, both means of water storage will need to be guided by the findings of this analysis. The cumulative effect on river hydrology and flow regimes caused through water storage by any means should be covered by water storage policy.

8.0 Damming Prohibitions

8.1 The TANK group has also considered the high significance of the instream values of both the Ngaruroro and Tutaekuri rivers, including for native fisheries, birds, recreation and in respect of Māori tikanga. They agreed to include a prohibition on instream dams on the mainstem of both the Ngaruroro and the Tutaekuri River, and also the following tributaries; Taruarau, Omahaki, Mangaone and Mangatutu Rivers. This did not prohibit high flow storage on the mainstems, the 10% provides guidance for decision making.

ENDS

MEMO

To:	HBRC Regional Planning Committee
From:	Mary-Anne Baker, Senior Planner
Date:	5 September 2018
Subject:	**FURTHER INFORMATION ON NON-CONSENSUS MATTERS IN TANK PLAN CHANGE ('PC9')** - ***MANAGING STREAM DEPLETION EFFECTS BY GROUNDWATER ABSTRACTION***
Cc:	James Palmer

Reason for memo

1. This memorandum to the RPC sets out information in relation to the non-consensus item surrounding the management of the stream depletion effects of groundwater abstraction in the Heretaunga Plains. It summarises the Heretaunga plains groundwater model findings and management scenarios that were explored by the TANK group

BACKGROUND

STREAM DEPLETION AND FLOW ENHANCEMENT

2. The new Heretaunga Plains groundwater model shows that groundwater and surface water are highly connected across the Heretaunga Plains, with nearly all groundwater takes connected in varying degrees to surface water systems.

3. These findings along with full details of the model development, simulations and scenario modelling are described in technical reports[1]. Some of the more pertinent findings are summarised in this overview report.

4. The TANK group supported the development of policies that are aimed at managing the Heretaunga Plains aquifers through a range of mechanisms. While they generally supported a range of measures, the flow enhancement mitigation measure was not fully supported. The plan change contains policies that;

   4.1 establish limits for managing water takes

   4.2 remedy the stream depletion effects of groundwater takes by flow enhancement,

   4.3 take into account the high level of uncertainty around the allocation limit and the actual level of water use.

   4.4 ensure the development of other measures, technology and management responses to meeting the needs of the lowland streams affected by groundwater takes.

   4.5 enable a staged management approach that allows better information to be collected. This includes further reduction of the allocation limit should over-allocation and adverse effects still be an issue.

[1] TANK resources; https://www.hbrc.govt.nz/hawkes-bay/projects/tank/resources/

5. This report describes the flow enhancement measure in more detail and describes other management options that were considered and modelled. The stream flow enhancement measure has been developed for the lowland spring fed streams that are tributaries of the Karamu River. This flow enhancement measure was not found to be appropriate for managing the Ngaruroro River flows and an alternative storage and flow release option has been developed separately to address groundwater flow depletion effects on that river.

THE SCIENCE - AN OVERVIEW OF THE MODELLING

6. MODFLOW-2005 was used to simulate groundwater flow under both steady-state and transient conditions, with a monthly stress period. The model area is shown in Figure 1. The model domain includes the Heretaunga Plains and surrounding river valleys that have significant alluvial deposits. Hill country was excluded from the model domain, and surface and groundwater flows from these areas are instead included in the SOURCE model.

7. The model area was discretised into a uniform grid of 100m x 100m. The grid consists of 302 rows and 501 columns, with a total active area of 506 km2 that includes 87,594 active cells. The total number of cells (including inactive cells) is 302,604.

8. The aquifer was discretised into 2 model layers:

   8.1 Layer 1 represents shallow deposits in the unconfined aquifer area, peripheral river valleys aquifers and the upper, most productive part of the confined aquifer

   8.2 Layer 2 represents deeper deposits of the Heretaunga aquifer system

9. Pumping tests were used to derive initial hydraulic parameter values for the model, including horizontal conductivity, specific storage (for confined aquifers) and specific yield (for the unconfined aquifers). Limited data were available for vertical hydraulic conductivity, which was used as a calibration parameter. Estimation of model parameters through calibration was performed using the industry-standard parameter estimation software PEST.

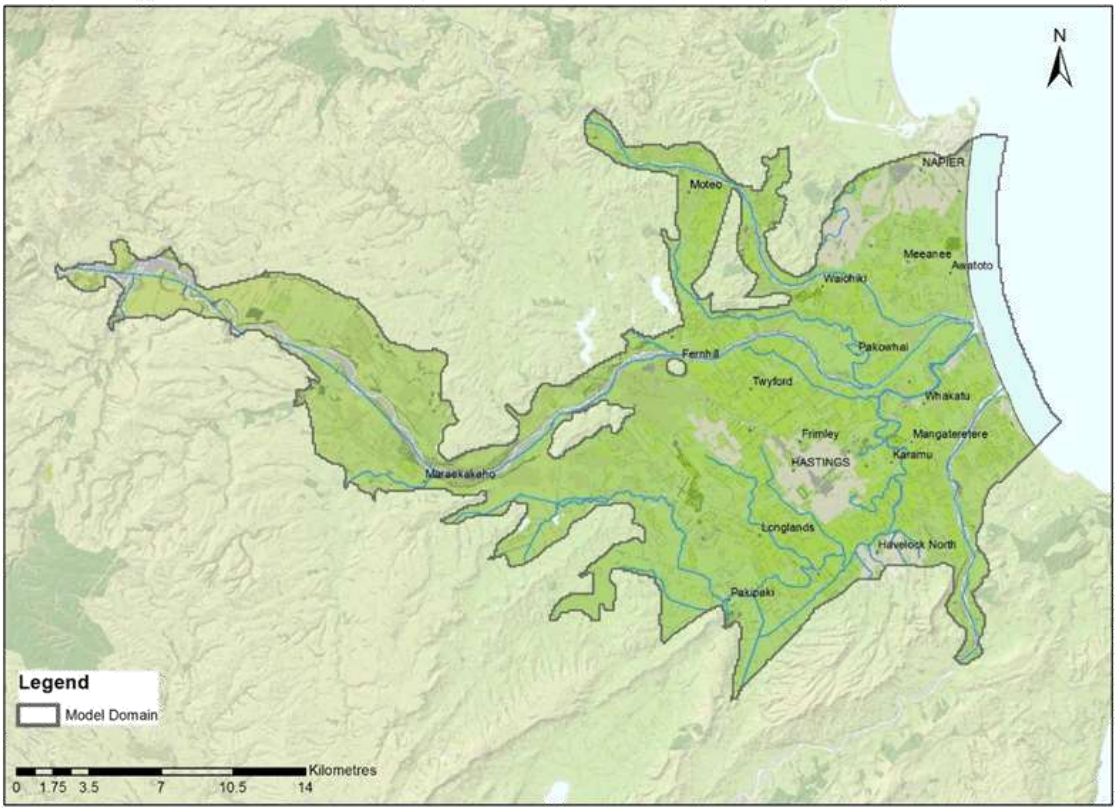


Figure 1;The groundwater model domain that includes the Heretaunga Plains

10. Model parameters estimated during the calibration process included:

    10.1 horizontal hydraulic conductivity (K);

    10.2 vertical K anisotropy factor (Kxy/Kz);

    10.3 specific yield (Sy);

    10.4 specific storage (Ss);

    10.5 land surface recharge rate multiplier (RM);

    10.6 irrigation-well extraction rate multiplier (QMirr);

    10.7 river-bed conductance (Criv);

    10.8 coastal-boundary conductance (Csea); and

    10.9 drain conductance (Cdrain).

11. The model was calibrated to field observations including:

    11.1 Groundwater levels, level changes, vertical level differences, long-term trends

    11.2 River gains and losses.

12. Comprehensive model calibration resulted in a match of modelled and observed groundwater levels, spring flows and river losses. This gives us confidence that the model provides a reasonable representation of the groundwater flow dynamics and river–aquifer connectivity, and can be used to predict how surface water flows respond to different levels of groundwater pumping.

13. Model simulations have demonstrated that:

    13.1 Surface water is in a strong hydraulic connection with the Heretaunga Plains aquifer

    13.2 The effects of groundwater pumping on stream depletion are distributed throughout the Heretaunga aquifer, rather than being confined to small zones

    13.3 The stream depletion is a consequence of a cumulative impact of pumping throughout the Heretaunga Plains.

14. The level of stream depletion caused by groundwater abstraction varies across the Plains and the model was used to classify level of effect as follows;

Heretaunga Plains Potential Stream Depletion Zones

Layer 1 Stream Depletion Zone

- Zone 1 (>90% - 7 days)
- Zone 2 (>60% - 30 days)
- Zone 3 (>60% - 150 days)
- Zone 4 (<60% - 150 days)

15. Changes to water use in these zones were modelled to assess effects of different management scenarios.

Lowland Stream Health

16. Lowland streams (including the Awanui, Irongate, Louisa Streams) do not meet targets for water quality, especially for oxygen, temperature and MCI. This means that the needs of the aquatic ecosystem, mauri and other instream values held for the lowland streams are not being met by current management.

17. The streams are affected by stream depletion from groundwater during summer, and they are also adversely affected by the high rates of macrophyte growth. Macropyhte growth is a key stressor for the rivers as it results in extreme oxygen fluctuations as a result of the plant growth and respiration. Low flows in low gravity streams will also result in low levels of dissolved oxygen. The Council has carried out detailed oxygen modelling for rivers in the Karamu catchment to help predict oxygen levels at different flows.

18. The focus on key stressors to improve ecosystem health has meant the plan change contains milestones for improved riparian land management that will provide more shade to reduce macrophyte growth.

19. However, water abstraction must also be managed in order to meet objectives for lowland stream health. For example, oxygen is predicted to decline below minimum levels for healthy ecosystem functioning in the Raupare Stream if water use increases. These findings are illustrated in Figure 2 and Figure 3.

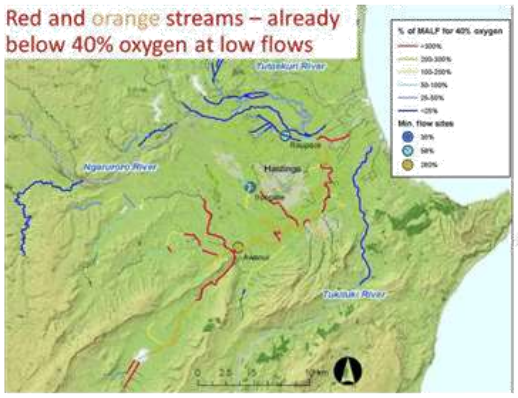


Figure 3; Modelled oxygen levels in lowland streams

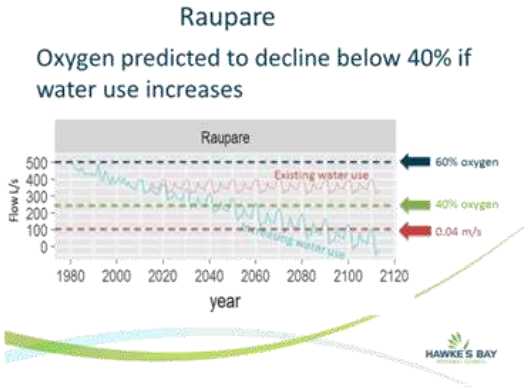


Figure 2; Change in oxygen levels with changes in water use

LONG TERM EFFECTS OF GROUNDWATER ABSTRACTION

20. The groundwater model was used to predict the current and long term effects on the aquifer levels of groundwater abstraction from the Heretaunga Plains. This is reported fully in the technical reports[2]. In summary, the modellers reached the following conclusions;

    20.1 Groundwater levels and spring flow in Heretaunga Aquifer have declined over several decades due to increased pumping.

    20.2 Decline over last 20 years has been generally small (less than 0.5 metres).

    20.3 Larger declines in limited area are most likely due to impact of abandoned artificial recharge scheme.

    20.4 Water balance of the aquifer indicates that current pumping does not exceed recharge and groundwater mining is not occurring.

    20.5 Groundwater pumping has been increasing during last 30 years

21. The model was used to test the consequences of changes to water use and the following findings were reported;

    21.1 If groundwater pumping remains at stable levels, there will be no further decline of water levels and spring flows.

    21.2 If groundwater pumping continues with current trends, there will be significant effects on water levels, spring flows (including dry streams and rivers) and possibly saline intrusion issues.

    21.3 If frequency of dry years increases, water levels and spring flows are likely to remain at low, but stable, levels.

MANAGING THE EFFECTS OF GROUNDWATER ABSTRACTION

Modelling Management Solutions

22. Stream flow effects from groundwater takes are not localised and combined abstraction effects over the wider Heretaunga Plains add to declining water levels and flows. Every water user has some effect and the effect is cumulative across the plains. This represents a big difference in the way the Council and wider community have understood and managed abstraction to date.

[2] https://www.hbrc.govt.nz/assets/Document-Library/Publications-Database/5018-Heretaunga-Aquifer-Groundwater-Model-Scenarios-Report-final.pdf

23. The groundwater and surface water models have been used to explore options for mitigating the stream depletion effects of groundwater pumping on surface water bodies. These options are described below.

24. The effects of pumping restrictions across the Heretaunga Plains has been modelled to show;

    24.1 the status quo approach to restrictions

    24.2 no irrigation across the modelled area

    24.3 using the same groundwater depletion categories used for the Tukituki Plan

Status Quo Management

25. The traditional approach of restricting or banning ground water takes to manage depletion of flow in surface water bodies based on the current minimum flow regimes was found not to significantly change river and spring flows. The response to banning at existing minimum flows relative to total flow was small for Ngaruroro although may be more significant at extremely low flows (e.g. < 1000L/s in Ngaruroro). Any difference in flows would take 30 to 150 days to become evident and banning all water takes (including the municipal supplies) during low flow periods would be required to achieve meaningful mitigation of stream depletion effects.

Banning Abstraction at Minimum Flows

26. The impact of banning water takes when flows in connected streams reach specified minimum flows is summarised in Figure 4. This shows the effect on stream flows as increasingly stringent bans are imposed across all groundwater users. The area covered by each of the Zones 1 – 3 encompass nearly all groundwater users in the Heretaunga Plains including the effect on the stream flow is given as a percentage of the low flow.

27. The increase in flow as a result of the ban was different for the different streams, but the required ban on pumping to achieve the stream flow recovery would apply to all groundwater users in Zones 1-3. This is a substantial adverse effect on all water users including for including municipal and industrial takes.

Using the Tukituki Framework

28. Application of Tukituki (PC6) framework for managing stream depleting takes would result in almost all groundwater takes subject to river flow restrictions. It was also found that restriction zones alone are not likely to be a very effective way to protect connected surface waterways. This was further explored by modelling different ban scenarios.

Managing Stream Depletion by Zones of Effect

29. The modelling also showed that stream depletion zones for spring fed streams (such as the Karamu and Raupare) cannot be established because individual effects are small but the cumulative pumping effects are significant.

30. The impact of reducing allocations was also investigated. This is illustrated in the following figure that shows how much stream flow improvement there is for 15% reduction in water use (based on the 2012 modelled use) for different rivers. Table 2 also gives information about the impact on stream flows from various percentage reduction options

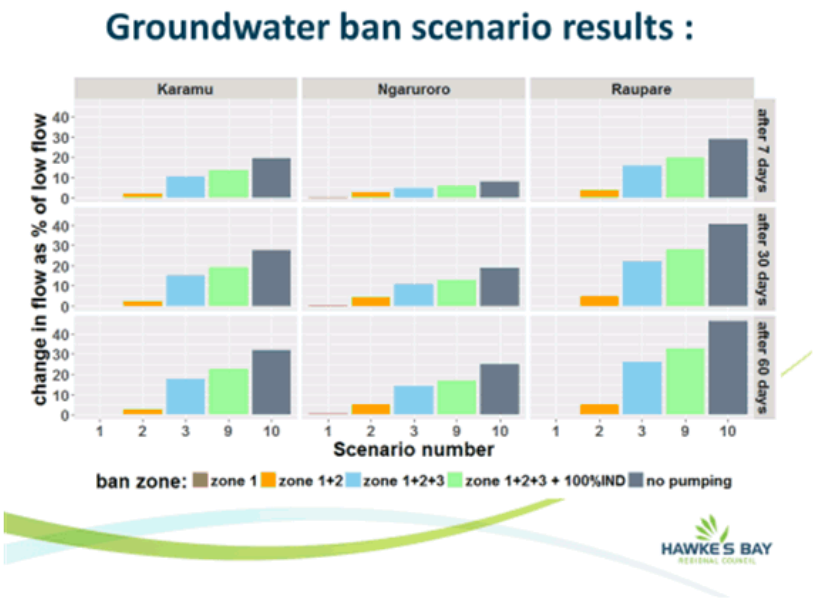


Figure 4; Groundwater ban scenario results;

Reductions in Pumping

31. Figure 5 outlines the effects of a modelled reduction in pumping. Appendix 1 also provides data showing the effect of incremental changes in pumping on stream flows. The impacts are very variable and not always very significant, particularly in terms of changes to the modelled flows (note the small percentage flow increase for the Raupare, Karamu and Ngaruroro Rivers).

Effect on flows from 15% decrease in pumping (2012)

STREAM	a) Flow Increase (%)	b) Observed Flow (L/s)	c) Flow Increase (L/s)	d) Minimum Flow (L/s)	e) Flow to Augment (L/s)
Raupare	10%	280	28	300	0
Irongate	23%	19	4	100	77
Mangateretere	46%	27	12	100	61
Karamu (gains in main stem)	7.5%	720	54	1,100	326
Karewarewa	52%	4	2	75	69
Ngaruroro	12%	1,300	156	2,400	944

Figure 5; Stream flow changes for 15% decrease in pumping throughout the Heretaunga Plains. Modelling was based on stream flows observed during the dry period 2012-2013

32. It was found that while reductions of groundwater abstraction may provide some benefit to lowland stream flows, this approach would not be an effective solution on its own. In figure 5, Column e) shows augmentation that would be required in addition to 15% reduction of pumping throughout the entire Heretaunga Plains. Apart from the Raupare Stream, substantial augmentation as well as the pumping reduction would still be necessary in all streams to achieve the minimum flow.

33. This demonstrates that regulation to decrease actual groundwater abstraction by 15% would be entirely inadequate by itself to achieve minimum flows in lowland streams and the Ngaruroro River during prolonged dry periods, such as during the dry 2012-2013 summer.

MANAGING STREAM DEPLETION BY FLOW ENHANCEMENT

34. The modelling was then used to assess alternative management approaches of augmenting stream flows from groundwater and the feasibility of using stored water to mitigate stream depletion effects on the Ngaruroro.

35. Flow enhancement options considered minimum flows that were shown to be necessary (by modelling) to maintain oxygen and temperature requirements for aquatic ecosystem health. The group also modelled the water requirements if the existing minimum flows were used as the flow enhancement trigger. (The surface water takes would have ceased at that flow.)

36. The Group considered the feasibility of flow enhancement in relation to the stream characteristics and location in the Plains. If flow mitigation occurs in upper tributaries, the increased flow effect would be seen in those lower reaches as well.

37. Aquifer recharge and flow enhancement solutions are also being developed by other NZ councils and elsewhere around the world. Canterbury[3] and Gisborne[4] are dealing with very similar problems.

What The Flow Enhancement Might Mean For Aquatic Ecosystem Health –

38. For many Heretaunga streams, dissolved oxygen will be exhausted before the streams run dry. Dissolved oxygen is vital for safeguarding the life-supporting capacity of streams, and reduced flow can reduce oxygen in low-gradient streams that support high abundances of aquatic plants, like the Karamu. This means oxygen is an important consideration when setting in-stream flows for the Karamu catchment.

39. Oxygen is a critical issue for many streams on the Heretaunga Plains. For example, the Awanui Stream experienced seventy-seven days of overnight anoxia during summer and autumn 2013 (Wilding 2015). A less diverse fish community was recorded in the Awanui Stream, compared to Raupare Stream which experienced higher oxygen levels.

40. Inanga is a native fish that survives in the Awanui. But the inanga sampled were found to be in poorer condition after a period of low flow and low oxygen. Additionally, high temperatures and low oxygen were correlated with degraded Macroinvertebrate Community Index scores in streams of the Heretaunga Plains (Haidekker 2016)[5].

41. Flow is not the sole determinant of oxygen concentrations. The same flow will produce less oxygen in streams with a flatter gradient and a larger channel (Wilding 2016)[6]. Therefore, it is the low-gradient streams where setting trigger flows needs to consider the consequences for oxygen levels.

42. Decreased water temperatures reduce the amount of oxygen that fish need to survive. Riparian shading can maintain cooler temperatures, especially for smaller channels. Hence, both flow management and riparian management can be applied to ensure oxygen supply from the water exceeds oxygen demand for fish survival. The management options considered are illustrated in Figure 6.

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3 https://www.ecan.govt.nz/get-involved/news-and-events/zone-news/ashburton/managed-aquifer-recharge-pilot-achieves-two-out-of-three-goals/

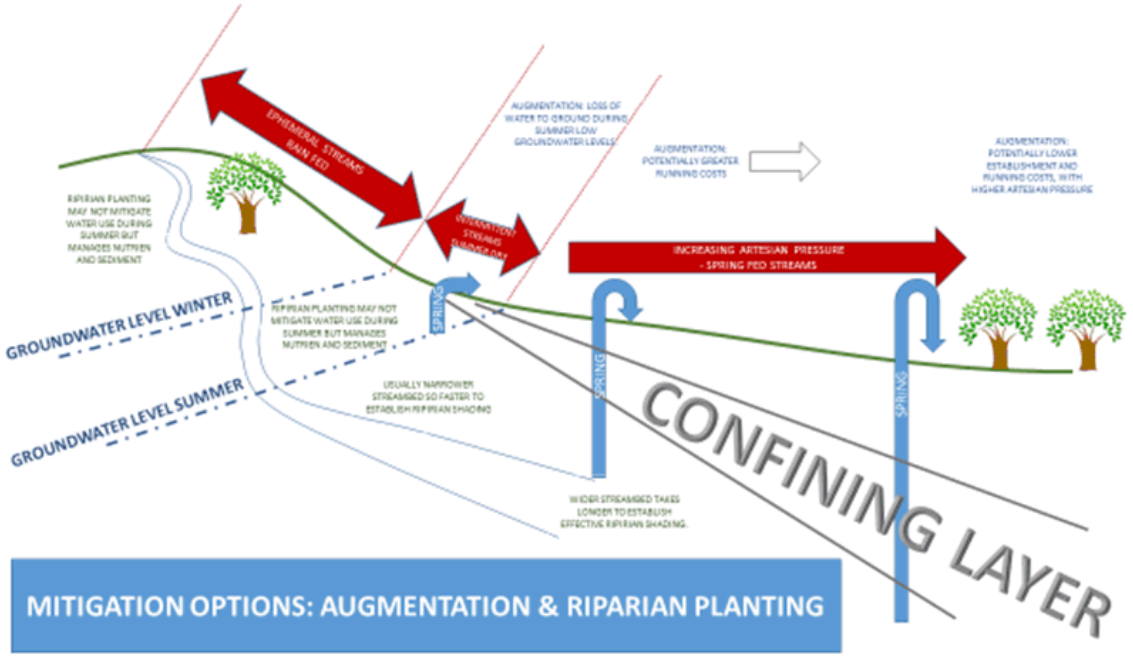
4 http://www.gdc.govt.nz/about-the-mar-project/

5 https://www.hbrc.govt.nz/assets/Document-Library/Publications-Database/4782-Life-Supporting-Capacity-in-Lowland-Streams-with-a-Focus-on-the-Karamu-Catchment-2016.pdf#search=%22mci%22

6 https://www.hbrc.govt.nz/assets/Document-Library/Publications-Database/Spatial-oxygen-flow-models-for-streams-of-the-Heretaunga-Plains.pdf

43. In the past, one trigger flow has been set to trigger one response – a cease take order for water takes that are linked to a stream. The TANK stakeholder group has considered a wider range of responses (e.g. day to day restrictions on water, limits on total allocation, enhancement of stream flows from groundwater). The various responses come with different consequences, and therefore adopting more than one trigger level may be justified, despite the added complexity that this incurs.

Figure 6; Illustration of Mitigation Measures Considered



44. The flow enhancement scheme brings some risk of its own impacts (e.g. drying of springs where fish are seeking refuge) and there is a degree of uncertainty in the amount of flow required to achieve a given oxygen level. For example, growth of aquatic plants in Karamu Stream reduces the oxygen reaeration at a given flow by increasing depth and slowing the water speed. The flow enhancement can be adaptive and be based on measured oxygen levels as well as considering flow triggers. This also means that any benefits of other mitigation measures (e.g. riparian shading, reduced nutrients) are being accounted for in the long-term operation of the flow enhancement scheme.

45. More oxygen is required to sustain more sensitive fish and invertebrates. Predictions from the oxygen-flow modelling indicate that flow management alone could not achieve the oxygen requirements of the most sensitive species (Wilding 2015, Wilding 2016)[7].

46. The intention of the flow enhancement scheme is that it provides a way to manage the stream depletion effects of water abstraction. It is also possible to manage the scheme to further enhance the ecosystem health with even higher flows than would have occurred naturally, however, this is not specifically provided for or modelled.

Feasibility Modelling - Lowland Stream Flow Mitigation Scheme

47. The groundwater and surface water models were used to explore options for mitigating the effects of groundwater pumping on lowland streams of the Heretaunga Plains. The modelling included simulation of combined augmentation of the Tutaekuri-Waimate, Raupare, Irongate, Karewarewa, Karamu and Mangateretere streams. A key objective was to ensure the combined

[7] https://www.hbrc.govt.nz/assets/Document-Library/Publications-Database/Spatial-oxygen-flow-models-for-streams-of-the-Heretaunga-Plains.pdf

effect of groundwater abstraction for augmentation would not generate unmanageable stream depletion effects that would negate the benefits of the augmentation.

48. Modelling results[8] showed that stream depletion could be effectively remedied by augmentation from groundwater for the Irongate, Raupare, Karamu and Mangatereteretere streams. Augmentation of these streams is not expected to cause problematic stream depletion effects in these streams or elsewhere. This is illustrated in Figure 7 below.

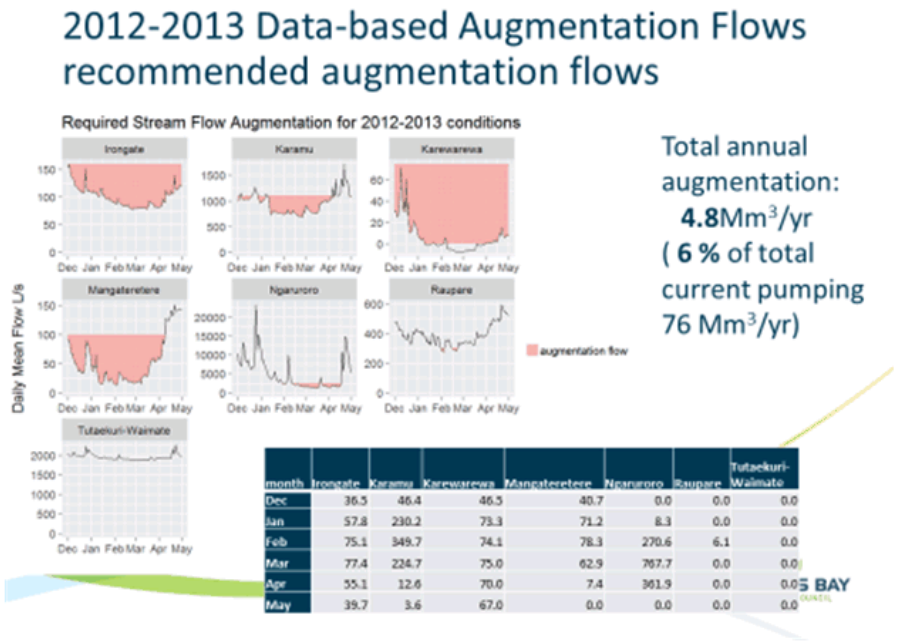


Figure 7; Augmentation flows to maintain minimum flows

49. The analysis also showed that the Tutaekuri-Waimate stream is unlikely to require augmentation to offset any effects of groundwater pumping.

50. The modelling showed that complete flow restoration of the Karewarewa Stream is not likely to be possible via augmentation alone. Because of high streambed conductance in losing reaches, the Karewarewa Stream in its current state is likely to result in adverse stream depletion effects as a consequence of groundwater pumping to provide augmentation water. The Paritua and Karewarewa streams are likely to require further investigation to identify the best mix of:

    - streambed restoration;
    - augmentation (from groundwater or storage); and/or
    - managed aquifer recharge.

    (Note that the localised challenges to improving the ecosystem health of the Paritua and Karewarewa rivers has led to separate management policy for those streams.)

51. The modelling also showed the use of groundwater to manage the stream depletion in the Ngaruroro River was not a sustainable solution. The volume of water that would be required to address the cumulative stream depletion effect in het Ngaruroro would cause further adverse groundwater effects.

52. The effects of combined groundwater pumping for lowland stream augmentation is predicted to generate some additional depletion of flow from the Ngaruroro River. However, the modelling indicates that this effect on the Ngaruroro River is relatively small and the TANK group mostly agreed that it could be considered to be acceptable. For example, during the 2012-2013 summer

[8] Reported to TANK Meeting 31.

the combined effect of augmentation pumping was predicted to be 35 to 70 L/s (depending on flow trigger levels for augmentation), which is less than 4% of Ngaruroro flow at the time and would be indiscernible by flow gauging.

Assessment of drawdown effects from pumping to augment lowland streams

53. An assessment was made of drawdown at hypothetical pumping sites as a consequence of pumping groundwater to augment stream flows. The drawdown estimates were also required to assist with estimating potential operational pumping expenses for an augmentation scheme.[9]

54. The assessment provided approximations of the groundwater levels and drawdown within hypothetically located production wells. The estimates indicate the likely magnitude of drawdown within the production wells and does not indicate an exact level of drawdown at each well. The method does not account for long-term trends in groundwater levels nor does it account for well losses influenced by well design.

55. One of the limitations of this analysis is that the locations of augmentation wells are likely to differ from the hypothetical sites chosen for feasibility modelling. Variation of aquifer properties is such that drawdown is likely to be different at other locations and operation costs may vary as a consequence.

56. Furthermore, the drawdown in each production well relies on the aquifer properties chosen from nearby pumping tests to reflect the aquifer characteristics at each hypothetical augmentation site. The more similar the well depths, and closer the well locations, the more likely this is met. In reality, the aquifer properties will differ, due to aquifer heterogeneity. This will lead to some error in the drawdown estimates. Results from nearby pumping tests show aquifer properties are variable. However, most tests indicate a highly transmissive and confined aquifer.

57. The accuracy of the groundwater levels at the augmentation sites (relative to land surface) assume groundwater levels from nearby State of the Environment wells reflect the water level positions at each augmentation site. The more similar the well depths, and the closer the well locations, the more likely this is met. Different land surface elevations between sites may result in large errors.

58. The drawdown estimates also rely on the assumption that the Theis solution remains valid over the duration of pumping. This assumption is likely to become increasing violated with time. As the cone of depression expands, it is increasingly likely that other influences will affect its response. For example, not all water will come from storage and drawdown may be influenced by boundaries such as rivers and streams. Over time, the effects of leakage from overlying and underlying source beds will provide additional water as will recharge from rainfall and returns from irrigation.

59. In all cases, after establishing a production well site, pumping tests are recommended to confirm and establish aquifer and well performance properties. This information is the most reliable approach for characterising local settings and predicting the production well drawdown for specific pumping rates, and for assessing the effects on other users and water bodies. Prior to designing an augmentation scheme, sensitivity analysis on these statistics is advised to help account for some of the error inherent in this assessment.

60. Notwithstanding the assumptions and limitations of the assessment, the work is considered appropriate for informing a ballpark economic assessment of costs associated with the proposed lowland stream augmentation scheme.

[9] Report by McFarlane Rural Business; Lowland streams augmentation pre-feasibility assessment of capital and operating expenditure for the Tutaekuri, Ahuriri, Ngaruroro, Karamu catchments 12 February 2018.

Managing Stream Depletion Effects on the Ngaruroro River

61. The management of the stream depletion effect on the Ngaruroro River flows was considered in more detail. The groundwater depletion effects is in the section of the river from Fernhill down to just above confluence with Tūtaekurī/Waimate. This is the section that has variable flow, so it is losing or gaining. Below that there is in-flow from Tūtaekurī-Waimate River which is quite high so the river is no longer so sensitive to abstraction

62. The options considered included;

- Continue to "live with impact" on Ngaruroro from GW abstraction in plains
- Include groundwater depletion in SW allocation
- Reduce total allocations below current levels
- Ban/restrict all/some takes in all zones at specified flow
- Develop mitigation option (i.e. water storage and release) and incentivise or require contribution.

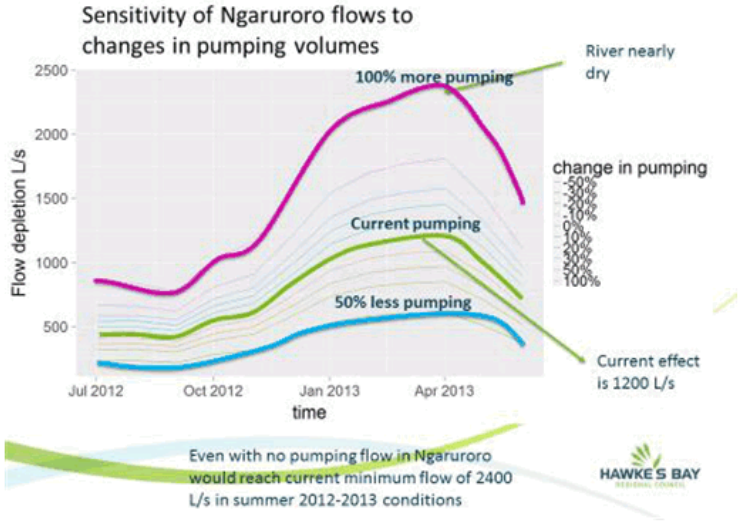


Figure 8; Sensitivity of Ngaruroro River to changes in pumping

63. The flow enhancement solution was not found to be feasible for the Ngaruroro River. The rate of groundwater pumping required would be significant and would cause adverse effects on groundwater levels. As noted above, other alternatives considered and not further developed included pumping reductions and abstraction bans at times of low flows.

64. The restrictions in pumping required to manage flows in the river would need to be substantial and occur over long durations in order to make a significant impact on river flows. The sensitivity of the Ngaruroro River flow to reductions in allocation was tested and the results summarised in Figure 8. The average groundwater pumping effect on the river is 720l/sec with this rising to 1200l/sec in a dry summer. Even with no pumping the flow in the Ngaruroro would have dropped below 2400l/sec in the summer of 2012-2013. Further groundwater pumping will increase the stream depletion effect.

65. An alternative solution was developed whereby water would be harvested at times of high flow and released when minimum flow triggers were reached.

66. A preliminary feasibility assessment into the volumes of water potentially available and required to address the stream depletion effect was carried out and reported[10]. Different scenarios were tested including a flow offset for just groundwater depletion (800l/sec) and groundwater plus

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surface water depletion (1600/sec) and at different minimum flows (2400l/sec and 4000l/sec). More water would be required for the higher flow offset and higher minimum flow. The modelling considered the feasibility of enlarging the existing Te Tua dam to provide the necessary water.

67. The water harvesting and release mitigation method for managing the river depletion effects of the Heretaunga Plains groundwater abstractions was found to be a feasible option and it would depend on the trigger flow used for initiating flow releases.

68. The draft Plan Change has therefore included policy direction for further feasibility assessment of this mitigation measure, including further understanding environmental, technical and economic effects, and options for funding, construction and management. The aim of such a scheme is to manage the stream depletion effects of Heretaunga Plains groundwater abstraction. If it is found to be not feasible, then the alternative options described above would need to be revisited.

ISSUES AND UNCERTAINTIES

69. Concerns were raised about the effectiveness or desirability of flow enhancement from groundwater to remedy or mitigate the effects of groundwater abstraction during periods of low flow. Further analysis was carried out to address those concerns.

Environmental benefits of a lowland stream augmentation scheme

70. The groundwater modelling has considered other options (e.g. Managed Aquifer Recharge) that may be adopted for remedying or mitigating stream depletion effects caused by groundwater pumping.

71. Apart from stream augmentation and widespread and significant total allocation reductions or bans during low flows, no other options have been identified as feasible solutions for maintaining adequate environmental flows in lowland streams. The modelling has demonstrated that it is technically feasible to maintain trigger flows in most Heretaunga lowland streams via augmentation from groundwater.

72. Furthermore, the Twyford augmentation scheme has demonstrated the environmental benefits of augmenting lowland streams to increase flows via the discharge of oxygen enriched groundwater (the resource consent held by Twyford Co-operative Company Limited (TCCL) requires augmentation water to have at least 80% oxygen saturation

73. While the oxygen content of groundwater remains relatively stable, the oxygen levels in the Raupare can vary considerably during the day. The Twyford group are experimenting with ways of increasing oxygen saturation in the groundwater to help the oxygen levels in the Raupare.

74. For streams struggling to maintain 40% oxygen overnight, this augmentation would improve dissolved oxygen directly and also as a consequence of improved flows. Therefore, the benefits would extend downstream during low flows when oxygen saturation is less than 40%.

75. Also, augmentation is regarded as a real solution for enhancing lowland stream flows and improving instream habitat.

76. Aquifer recharge and flow enhancement solutions are being developed by other NZ councils and elsewhere around the world. Canterbury[11] and Gisborne[12] are dealing with very similar problems.

77. Environment Canterbury is seeking solutions to very similar issues with lowland streams that are fed by groundwater. For example, significant habitat has been lost from springfed streams in the Selwyn/Waihora Zone as a consequence of declining groundwater discharge to the streams. Targeted Stream Augmentation (TSA) is being trialled in one of those waterways; which involves

[11] https://www.ecan.govt.nz/get-involved/news-and-events/zone-news/ashburton/managed-aquifer-recharge-pilot-achieves-two-out-of-three-goals/

[12] http://www.gdc.govt.nz/about-the-mar-project/

pumping groundwater, increasing the dissolved oxygen content and discharging the oxygen-enriched water into the stream. (See Figures 8 and 9 which show the stream enhancement scheme in operation and the flow improvements sustained in the receiving creek). The augmentation trial has shown considerable benefits to instream flows from augmentation.

78. While the Canterbury work is still in a trial phase, the Twyford project has provided the TANK Group with evidence of a working scheme that has improved flows and ecological habitat in the Heretaunga Plains. The groundwater modelling has also demonstrated how augmentation can provide environmental benefits in other lowland streams including the Irongate, Karamu and Mangateretere streams.

Figure 9; Discharge point of targeted stream augmentation trial in Boggy Creek, Canterbury. Water is supplied through multiple holes in the PVC pie and discharged on to cobbles to increase the dissolved oxygen content.

Augmentation is a short-term solution

79. There was feedback that this response to groundwater depletion should only be seen as a short term solution while a better management approach is developed to meet freshwater outcomes. It was felt by some stakeholders that flow enhancement solution should over time be replaced with better water use, riparian land management and newer technologies that would meet environmental outcomes on a more sustainable basis.

80. This concern is addressed by the review policy; the effectiveness of this flow enhancement solution is to be revisited and assessed. Effectiveness of other measures to be implemented (including reduced allocations and riparian land management) would also be assessed. Support for flow enhancement is not intended to be to the detriment of other solutions, nor given priority over them.

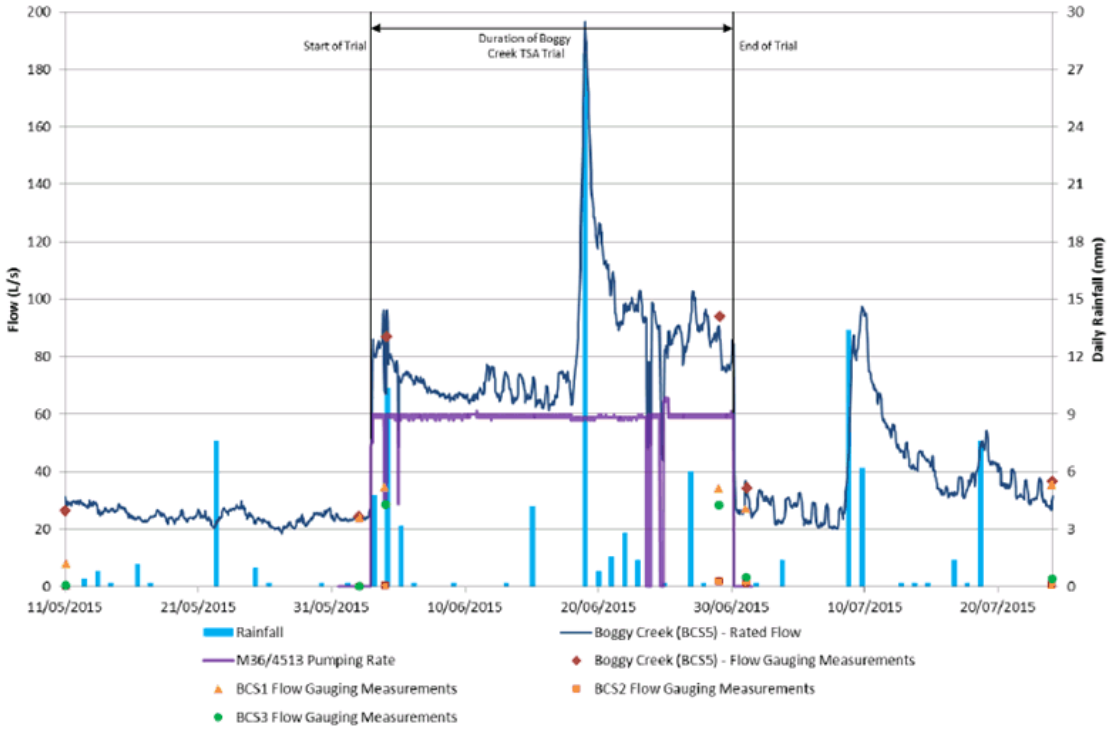

Figure 10; Stream flow, rainfall and augmentation flow for the Boggy Creek augmentation trial: before, during and after the experiment. The data show that 60 L/s augmentation made a significant difference to flow in the tributary

Reduction of pumping would be more effective than augmentation

81. The RMA does not require that all adverse effects be avoided. For some activities, adverse effects cannot be avoided but can be remedied or mitigated. It is a matter of both the evidence provided by the models and data, and of judgement as to where the balance between avoid (e.g. reduce allocations) remedy (e.g. flow enhancement solutions) or mitigate (e.g riparian planting etc.) will be made.

82. The model reporting[13] identified that while reductions of groundwater abstraction may provide variable benefit to lowland stream flows, this approach would not be an effective solution on its own, and reductions would need to be significant to make a significant difference for most streams.

Augmentation does not treat the cause of the problem

83. Some stakeholders and mana whenua considered this approach to be more of a band-aid solution that does not address the actual cause of the problem. While a substantial reduction in total allocations would avoid the problem, this does not address the high value groundwater has for communities and the substantial adverse impact this remedy would have. As noted above, all adverse effects need not always be avoided – for some activities and their effects, remedy and mitigate may be more appropriate responses.

84. The effect can be remedied through additional pumping to enhance flows. The RMA allows for actions to be taken that can remedy or mitigate an effect of an activity, if the adverse effects cannot otherwise be avoided.

85. The Twyford Co-operative Company Limited (TCCL) have shown us that augmentation does remedy the effects of groundwater pumping on lowland stream flows. This has provided instream ecological benefits and modelling has demonstrated that it is technically feasible to augment

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most other Heretaunga lowland streams from groundwater. Furthermore, the Twyford group has developed a sense of responsibility for managing flows in the Raupare Stream. In this way, the Twyford group have been incentivised to implement careful management of the groundwater resource, including reduced abstraction and more efficient water use which is "treating the cause".

86. This approach also provides for incentives for behaviour change as it is more outcomes based.

87. Development of an augmentation scheme across the Heretaunga Plains might be implemented via similar co-operative groups that are responsible for managing flows in discrete lowland streams. Each co-operative group may then be incentivised to implement careful management of their groundwater resources with the shared objective of ensuring adequate flows in the lowland stream they are responsible for.

88. The involvement of the water users in the design and management also enables more cost effective solutions as they are likely to be more incentivised to contribute to the infrastructure and its operation and in some cases, existing infrastructure may be available for use.

89. If water permit holders are not willing or able to be part of a collective response, they would still be required to contribute to a flow enhancement scheme.

Further allocation of groundwater for stream augmentation

90. There is concern that additional water is intended to be pumped for the stream enhancement schemes.

91. Augmentation requirements for lowland streams represent a maximum of 2% to 6% of current groundwater utilisation. The modelling was done on the assumption that additional water could be pumped from groundwater sources. If augmentation is achieved from an additional groundwater allocation, it is important to consider that:

    - The requirement for augmentation is driven by the environmental effects caused by widespread pumping of groundwater. Any allocation for augmentation would be for the purpose of remedying those adverse environmental effects.
    - Augmentation requirements are relatively brief and are not usually sustained for long periods of time

92. Moreover, it is entirely possible that augmentation requirements from groundwater may be met from within the groundwater allocation – not in addition to the allocation. The Twyford scheme has demonstrated that additional allocation is not a requirement for successful flow enhancement schemes.

93. For the Twyford scheme, the irrigators managed collectively with less water to meet the flow needs when the Raupare flow reduced. There was water available either within consented totals as there was at times a gap between what was allocated and what was being used or because of water use efficiency.

94. In order to address the concerns expressed by TANK group members, a solution that stream enhancement flow could be included within the proposed allocation limit and not provided for as an additional water take was developed by the TANK stakeholders. The Draft Plan Change reflects this in the policies and rules. That is, water is allocated as per the current proposals; a proportion of this take will be subject to use for stream flow enhancement if and when this becomes necessary during summer when minimum flows are reached. The amount that needs to be kept aside for the enhancement (when flow enhancement is necessary) will be informed by a new calculator developed as part of the modelling development. It remains an incentive for efficient use as the less water abstracted for irrigation and other uses means lower costs associated with enhancement flow requirements.

95. The TANK stakeholders were concerned about the priority needs of water for human health needs. The portion of the municipal supply used for industrial and commercial use that causes stream depletion effect will there be subject to this requirement, while the amount of water used for essential human health needs will be exempt.

Community involvement and management

96. The irrigators and other TANK stakeholders acknowledge the success of the community approach to water management demonstrated by the Twyford group. The Draft Plan provides for development of a management structure that builds on the learning provided by the Twyford group and that encourages and supports collective management to meet environmental outcomes. As part of this users with higher stream depletion effects for certain streams can be identified and management systems can be established that enable their active involvement.

FLOW ENHANCEMENT SCHEME – COST ESTIMATES AND ALLOCATIONS

97. A high level economic assessment was undertaken that estimated the costs associated with the construction and operation of a flow enhancement scheme. This analysis was directed at answering two key questions:

- What are the costs of the proposed flow enhancement scheme?
- How will these costs be allocated amongst consent holders?

Flow Enhancement Scheme Costs

98. The proposed flow enhancement scheme consists of two distinctive infrastructure components:

- The augmentation of lowland streams by means of a numbers of wells (and associated infrastructure) located at strategic locations. The targeted rivers were the Irongate, Karamu, Karewarewa, Mangateretere and Raupare streams (the "lowland streams").
- The augmentation of the Ngaruroro River by means of an off river dam with a capacity of 4.5million cubic meters. This augmentation facility would be directed at off-setting the pumping impacts of groundwater takes at the Fernhill monitoring site.

Lowland Stream Augmentation

99. MacFarlane Rural Business ("MRB")[14] were engaged to assess the potential capital and operating costs required to augment the lowland streams. Their analysis concluded that a scheme capable of providing the required peak flow of 654 l/s and annual average[15] augmentation volumes of 1.9 million cubic meters per annum would likely require the construction of 18 bores with an associated infrastructure cost of $1.7 m. Ongoing operating costs were estimated to range between $92,000 and $224, 000.[16]

Off River Dam (for Ngaruroro flow enhancement) Cost Estimates

100. Desk top analysis of the Ngaruroro River flow enhancement option was also carried out. This would involve construction of a water storage structure and release of water at times of low flow to mitigate the effects of the groundwater abstraction on Ngaruroro River flows.

101. During the period 2010/11 Tonkin Taylor ("TT") estimated the costs of constructing 12 dams that varied in size between 3Mm3 and 50Mm3. HBRC used this analysis to produce a construction cost estimate of $5[17] per cubic metre for the proposed off river dam. This translates into a dam capital cost of $24.5m (and includes a 10% provision for land acquisition

[14] A desk top exercise undertaken by McFarlane Rural Business; Mark Everest (report dated 12 February 2018)
[15] Based on a 17 year analysis undertaken by HBRC Science.
[16] Variable depending on the level of augmentation required.
[17] Inflation adjusted the original TT estimate of $4.30.

and consulting/consenting costs). Pumping costs to operate the dam were estimated to average $30,000 per annum[18] with total operating costs being $90,000.

102. The above outcomes were intended to be high level indicative estimates of what a storage facility of 4.5Million cubic metres could cost to build and operate. No attempt was made to estimate the specific costs associated with extending the size of the existing Te Tua Storage facility (0.5Mm^3) to 4.5Mm^3.

Annualised Total Costs

103. The capital costs of the lowland19 and dam20 flow enhancement schemes were annualised to facilitate the anticipated ongoing year on year allocation of these charges to groundwater consent holders. These annual costs (both opex and capex) are shown in the Table 1 below.

	Ngaruroro	Irongate	Karamu	Karewarewa	Mangateretere	Raupare	Total
Capex	$1,972,574	$27,137	$119,901	$32,206	$35,734	$27,349	$2,2m
Opex	$90,000	$11,333	$60,029	$25,875	$28,516	$28,516	$226,307
Total	$2,062,574	$38,470	$179,930	$58,081	$64,250	$64,250	$2.4m

***Table 1**; Expenditure Estimates for flow enhancement schemes*

Allocation of Flow Enhancement Scheme Costs

104. The objective of this part of the analysis is to develop an allocation methodology that will result in a fair and equitable distribution of annual costs to groundwater consent holders[21] .

105. A range of allocation methodologies have been developed and tested[22] and reported to the TANK Group[23].

Stream Depletion Management Proposal

106. As the stream depletion calculator is refined and more data about actual abstraction and river flows is gathered the allocation and mitigation calculations can be reviewed. However, assuming a policy direction that seeks to impose costs equitably and according to the extent to which stream depletion is being caused, the calculator itself is sufficiently developed to ascertain relative impact and therefore relative costs.

107. Irrespective of how costs might be assigned, the total costs associated with constructing and operating the scheme appear at this stage to be able to be absorbed by existing water users. There were particular challenges in ensuring the cost calculation is done to meet the equitable outcomes for all water permit holders as sought by the TANK group.

108. There are a number of operational and practical challenges to designing, setting up and operating a network of flow enhancement schemes. These include;

- Lack of detail about the precise design and location of the flow mitigation bore network.
- Uncertainty about exact costs including in relation to bore location and ownership
- Lack of detail about exact water use /allocation on which to base allocation of costs
- Water permit renewals occurring over a number of years might mean maintaining consistency between permit holders is challenging.

[18] $0.03c per cubic metre.
[19] 10 year loan of $1.7m with a fixed interest rate of 7% requiring annual repayments of $242k.
[20] 30 year loan of $24.5m with a fixed interest rate of 7% requiring annual repayments of $1.97m.
[21] 1471 current consents were included in this analysis. Frost takes and GW takes located in Zone 1 were excluded from this analysis.
[22] These methods generally utilise the capabilities of the Stream Depletion Calculator developed by Pawel Rakowski.
[23] 22 Feb TANK meeting 37

109. The issue of total costs and how this impacts on water permit holders is potentially significant in relation to clarity and certainty for permit applicants and impacts on their businesses. Conditions can be imposed on resource consents that require provision of services or works, including planting or the restoration or enhancement of any natural or physical resource. Permit holders will however, still want to have further input into scheme design and costs imposed.

110. This further input is intended to be provided for through further consultation on the scheme design and costs. The annual charges can then be calculated and imposed through the Schedule of Fees and Charges. These are consent related charges that are confirmed annually and subject to public submission.

111. Other issues arising related to what individual water permit holders might want to do in relation to their own calculated stream depletion effect. They might already be part of a flow enhancement scheme (the Twyford) or have on-site opportunities for storage/release.

112. The Draft plan proposes that the following pathway addresses the challenges, and still provides sufficient certainty for water permit holders;

    A. The policy direction is confirmed as follows;

        i. A stream flow enhancement scheme to maintain minimum flows in affected rivers will be developed to mitigate stream depletion effects of groundwater takes in the Heretaunga Plains.

        ii. Scheme design and management will be;

            1. Informed by the site specific characteristics of each affected lowland stream and installed only where flows will be significantly improved (and not lost to groundwater)

            2. Account for drawdown effects on other water users

            3. Linked to other environmental outcomes being sought including dissolved oxygen levels and temperature.

            4. Aligned with alternative mitigation measures including wetlands and improved riparian land management.

        iii. Costs are equitably distributed across all consent holders and based on consented take over the 'period of influence' on stream flows Oct - May with only one exception;

            1. An exception is provided for the water required for essential human health (supplied in any municipal or community water supply or papakāinga and calculated at 200 l/person)

        iv. Costs of constructing and operating the enhancement network are assigned to water permit holders based on the calculated size of the stream depletion effect (using the Stream Depletion Calculator)

        v. Any consent to take groundwater in the Heretaunga Plains water management zone will be subject to a requirement for mitigation (although an alternative to be subject to a pumping ban will be provided). A consent will not otherwise be issued.

        vi. Management of the flow enhancement scheme (through water permits to take and discharge groundwater) by Council but also management by landowners and affected water permit holders will be enabled to ensure operation of the scheme is efficient and takes advantage where possible of water use regimes that reduce stream depletion effects

    B. It is being recommended by most of the TANK group through this plan change that Council fund the investigation and design of the bore network, in association with adjacent landowners and bore owners. Local landowner assistance will be sought to enable the scheme to be designed and operated as efficiently and cost effectively as

possible. (This work can commence at any time. This design cost could also be recovered from permit holders but it is being recommended that council cover this work in recognition of its management responsibilities)

C. Further public and affected water permit holder input into the design and cost of the scheme.

D. Council can commence construction and can progressively recover costs from permit holders as existing consents expire and new consents are issued.

E. The Council's annual schedule of charges will provide the detail about the annual costs for all affected consent holders (reflecting the capital and operational costs over the term of all the consents) that will be imposed via consent conditions.

F. For streams which are not suited to flow enhancement, the charges imposed (under c and d) for mitigation flows will be used to fund riparian land management enhancements or wetland construction.

Costs of allocation reductions and bans

113. The costs of groundwater reductions or ban options that might be imposed to manage lowland stream flows were not directly modelled. However, information generated as part of the social, cultural and economic impact assessment[24] for changes to the minimum flows and security of supply for water abstraction did show the high level of dependency community well-being had on the TANK catchments primary production. A 15% reduction in water use will have a significant adverse effect on community well-being is indicated by that study.

114. Should the mitigation measures for improving aquatic ecosystem health and managing the stream depletion effects of groundwater be found to be ineffective the alternative options of restrictions and pumping bans will be revisited. Further analysis of the costs and benefits of these schemes will need to be carried out at that time.

[24] Agfirst, Nimmo-Bell, Market Economics and iPansophy assessments.

Table 2; Changes in river flow with changes in pumping

% change in flow comparing to no change in pumping

stream	-100%	-50%	-30%	-20%	-10%	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Raupare	66%	33%	20%	13%	7%	0%	-7%	-13%	-20%	-27%	-34%	-40%	-47%	-54%	-60%	-67%
Irongate	152%	76%	46%	31%	15%	0%	-15%	-31%	-45%	-58%	-71%	-80%	-89%	-97%	-106%	-115%
Mangateretere	310%	155%	93%	62%	31%	0%	-31%	-61%	-90%	-115%	-139%	-148%	-157%	-167%	-176%	-185%
Karamu(gains in main stem)	49%	24%	15%	10%	5%	0%	-5%	-10%	-15%	-20%	-25%	-30%	-35%	-40%	-45%	-50%
Karewarewa	423%	211%	113%	71%	33%	0%	-31%	-57%	-82%	-100%	-119%	-124%	-130%	-135%	-140%	-145%
Ngaruroro *	82%	41%	24%	16%	8%	0%	-8%	-16%	-25%	-33%	-41%	-49%	-57%	-65%	-73%	-81%
* % base on 1000 L/s river flow																

>25% flow lost	*25 % flow added*
>50% flow lost	*50 % flow added*
dry	*100 % flow added*

ENDS

Item 7

Attachment 2

HAWKE'S BAY REGIONAL COUNCIL

MEMO

To:	HBRC Regional Planning Committee
From:	Mary-Anne Baker, Senior Planner
Date:	5 September 2018
Subject:	**FURTHER INFORMATION ON NON-CONSENSUS MATTERS IN TANK PLAN CHANGE ('PC9')** - ***MINIMUM FLOW LIMITS FOR NGARURORO AND TUTAEKURI RIVERS***
Cc:	James Palmer

INTRODUCTION

1. This memorandum provides some background to the decision making so far and information considered by the TANK group in relation to the review of the minimum flows for the Ngaruroro and Tūtaekurī Rivers. There was no consensus around the management of the minimum flows and associated allocation limits. This report describes the issue and provides information used by the TANK about the options and consequences of different management options. It sets out the range of the non-consensus in relation to the possible flow and allocation regimes and makes recommendations for consideration by the Regional Planning Committee.

BACKGROUND

2. The Regional Resource Management Plan (RRMP) contains minimum flows and allocation limits that manage the abstraction of water from the Ngaruroro and Tūtaekurī Rivers and impose restrictions on abstraction at times of low flows. These were introduced in the RRMP in 2000.

3. TANK Group did not specifically review the effectiveness of those provisions in meeting desired outcomes, but instead looked at the range of values that those water bodies have and considered the appropriateness of minimum flows in light of the identified values. Their decision making was informed by new information about connectivity between water bodies, especially in relation to the stream depletion effects of groundwater takes in the Heretaunga Plains.

4. The TANK group recognised a wide range of instream values dependent on the maintenance of flows in the river as well as the significant contribution that abstraction of water makes to the human health, economic, social and cultural well-being of its community.

5. The National Policy Statement for Freshwater Management (NPSFM) requires that the life-sustaining capacity, ecosystem processes and indigenous species of freshwater is safeguarded. It also contains an objective that communities are enabled to provide for their economic well-being, including productive economic opportunities, in sustainably managing freshwater quantity, within limits.

6. The NPSFM also specifically requires consideration of;

   6.1 any choices between the values that the formulation of freshwater objectives and associated limits would require;

6.2 any implications for resource users, people and communities arising from the freshwater objectives and associated limits including implications for actions, investments, ongoing management changes and any social, cultural or economic implications;

7. The TANK Group supported capping water allocation from the Heretaunga aquifer at existing levels, and this will limit the potential for further reductions of flow in the Ngaruroro River. The Group was unable to agree on whether changes were necessary to the minimum flow regimes or the associated allocation limits and in particular whether the minimum flows should be increased to a higher flow.

8. This paper summarises the environmental information that has been used to understand the potential impact of different flow management regimes on the instream values of the river. It also provides information on the economic, social and cultural impacts of changes to the flow management regime.

Previous TANK Decisions

9. There is a wide range of management measures being introduced in the plan change. They particularly address water quality concerns, especially in relation to deposited sediment, macrophyte growth, stock access, risk of algal blooms and improved MCI in the Karamu catchment and in both the Tutaekuri and Ngaruroro rivers and consequently the Waitangi estuary. A number of new provisions will address these land use and contamination issues.

10. In addition to decisions about values and management objectives, The TANK Group has made decisions about priorities for management and has made the following decisions;

10.1 Firstly, provided for the rivers' mauri, and the health of their aquatic ecosystems. The Group has used measures or attributes relating to water quality and flow in order to make decisions for these values. It has used a critical values approach and has made decisions about water quality state around what value is the most sensitive.

10.2 Recognised the higher natural character and state values of the upper rivers in relation to the objective to maintain these rivers and to prohibit damming.

10.3 Provided priority for water use for human health and well-being. It has done this in a number of places including in relation to municipal supplies and exemptions for the human health component in management requirements, reservation for future community use and priority during low flow periods.

10.4 Provided water as a priority for the irrigation of land and the processing of primary production, particularly through restricting transfer of water away from these uses.

11. A range of decisions have also been made to improve the management of land and freshwater within the TANK catchments that are relevant to the maintenance or improvement of mauri and aquatic ecosystem health of the two rivers. They serve to illustrate that river and aquatic ecosystem health, especially in such a diverse landscape, does not depend solely on trigger flows for rationing abstraction.

12. The TANK members have shown great willingness to acknowledge the wide range of values and uses of the rivers and have agreed that appropriate limits that provide for this range of values are necessary. They have considered a wide range of measures that enable the values to be met in a sustainable manner and in a way that also provides for the needs of future generations

13. The TANK Group sought to achieve this by adopting an integrated, mountains to sea, ki uta ki tai approach that also focuses on the impacts of land use on the health of aquatic ecosystems in tributaries as well as in the mainstems of the rivers. The TANK Group has addressed not only the flow management regime, but also the following:

13.1 damming prohibition on the mainstems, and possibly on a small number of named tributaries.

13.2 targets for the reduction in a number of key contaminants including dissolved nutrient and sediment in the mainstem and the tributaries. This will have the flow on effect of improving MCI scores for the rivers and contributing to the health of the Waitangi Estuary

13.3 widespread improvement of riparian land management across the catchment and including stock exclusion.

13.4 acknowledgement of the stream depletion effects of groundwater takes on the Ngaruroro River and new policy direction to explore measures to reduce this impact.

13.5 reduced allowance for permitted activities to reflect the full and some cases over-allocation of the groundwater surface resources linked to the main rivers.

13.6 reducing allocation of water to prevent further depletion of river flows

13.7 flow enhancement measures to remedy the effects of stream depletion.

14. These management provisions illustrate that improved ecosystem health is not just a function of river flow, it is also a function of the way land, including riparian margins is managed. They also recognise that community well-being is provided by access to water for abstraction and that adverse effects of human interactions do not necessarily always have to be avoided – sometimes they must be remedied or mitigated.

15. The work being done by the TANK Group is also demonstrating that good relationships between stakeholders can be extremely influential in changing behaviours and increasing understanding about values and agreeing visions for the future. The fostering of these relationships including through the plan implementation provisions that provide for on-going input into implementation can continue to be powerful in affecting positive change within our river environments.

SUMMARY OF INFORMATION CONSIDERED FOR ESTABLISHING MINIMUM FLOWS

Values and Critical Values

16. The TANK Group identified a range of instream and out of stream or abstractive values for the Ngaruroro River. The RPS (via Change 5) also provides further information about the values to be provided for. The TANK Plan Change draft objectives acknowledge the wide range of values and aim to provide for all of them – the decision making in respect of the quality and quantity limits and targets is expected to provide for all of the values in an appropriately balanced and considered way. The RMA and NPSFM specify that the life supporting capacity and ecosystem processes are to be safeguarded - the decision making entailed in flow management is about understanding what this minimum standard needs to be for the Ngaruroro and Tūtaekurī Rivers and to manage water use above this, in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being.

17. The draft Plan Change currently distinguishes the Upper Ngaruroro (provisionally defined as being upstream of Whanawhana) from the lower reaches and seeks the maintenance of the upper river water quality and quantity.

18. In deciding when to limit water use, the TANK group considered the effect of reduced water flow on critical (instream) values. Critical values are those values that are most sensitive to reduced flows. The decision on when to limit water use requires a judgement as to what is needed to safeguard the life-supporting capacity and how much risk to the desired values is acceptable as a result of water abstraction.

19. For both the Ngaruroro and the Tutaekuri, the TANK group have identified a range of instream values for the rivers that include;

19.1 tikanga Māori values including those for cultural practices

19.2 habitat for native fish and birds

19.3 recreational activities including trout fishing, swimming and boating

19.4 trout habitat.

20. The input of the mana whenua throughout the process has also demonstrated a high level of commitment to improving ecosystem health for a range of values particularly important to them including for mahinga kai and the habitat of native fish, plants and birds. The rivers are valued by local marae and hapū who generally consider their rivers require a higher level of protection in order to support cultural uses, their historical connections with the awa and to enable them to carry out their role as kaitiaki.

21. The TANK group has particularly identified the habitat and biodiversity values for indigenous species including torrent fish, inanga and indigenous birds in the Ngaruroro River. The TANK members understand torrentfish to be the most flow-demanding of New Zealand's indigenous fish fauna. In the Tūtaekurī, trout are the most flow demanding species there.

22. A number of native fish species that have been identified by the Department of Conservation threat classification as "at risk- declining' are present in the Ngaruroro and Tūtaekurī Rivers. They include the high flow demanding torrent fish as well as those like dwarf galaxias, lamprey, and redfin bully which seek out shallow, slow moving water as their preferred habitat. (The summary of the threat classification and the native fish present in the rivers is in appendix 1)

23. The TANK plan change's draft objectives for the Ngaruroro River (and Tutaekuri) Rivers also specifically acknowledge the abstractive demand for water by people and communities for their health, social, economic and cultural well-being. While the Objectives 6 and 7 for these rivers list all the values, Objective 13 states that the amount of allocatable water is subject to the limits and flow regimes established to meet the needs of the water body and the allocation objectives for allocatable water is specified.

24. The objectives include improvement in the lower reaches and tributaries, where necessary, to support healthy ecosystems including native fish (among other things). Areas where improvement in quality is necessary are identified through the attribute states specified in the draft Plan Change.

25. Of all of the identified values, the most flow demanding values for each river are torrent fish and trout for the Ngaruroro and Tutaekuri respectively. If these fish are provided for, then other less flow demanding species will consequently also be protected as their flow requirements are less. It is assumed that mana whenua, cultural and recreational values will also be accommodated within this ecological flow (although there are no guidelines that enable a quantitative assessment). Jet boating is less concerned with the minimum flow regime than it is with ensuring the braided reaches continue to be maintained, including as a result of any water damming or storage activities.

26. It should be noted that minimum flow is not a measure of protection on its own. The minimum flow does not dictate river flows or halt flow recession. Also critical is how much water is being abstracted and how these two management levers interact and influence river health. It is the combination of the allocation limit as well as a minimum flow that triggers restrictions in water abstraction that are used to manage adverse effects of abstraction on river flows. The recovery of river flows, as a consequence of triggering restrictions in existing takes, is most effective at the lowest river flows. Raising the trigger flow substantially offers diminishing benefit for river flows because the flow depletion effect of those linked takes is relatively small at higher flows. In addition, more information is now available through more sophisticated modelling based on the SOURCE Flow model and groundwater models.

27. There are several items of information relevant to the decision making for the Ngaruroro River trigger flows for managing the effect of surface abstraction on river flows.

27.1 economic, social and cultural impacts of imposing take restrictions on the ecosystem attributes for flow (this will be reported on separately by Dr Anthony Cole (iPansophy) and Garry McDonald (Market Economics)

27.2 the assessment of the appropriate flow requirements for the identified river values of the Ngaruroro River and the conclusions of the WCO applicants.

27.3 other management decisions made to improve aquatic ecosystems and meet objectives for freshwater (and the estuaries) including new abstraction limits where none existed previously.

27.4 the robust and comprehensive implementation plan and community commitments to the implementation and to ecosystem health improvements

Significance of Values, Outstanding Waterbodies and the WCO process

28. The determination of this level of significance is still subject to two separate processes – the Water Conservation Order application and hearing process and the Regional Planning Committee's own outstanding freshwater body identification process as required by the RPS to give effect to the NPSFM.

29. The TANK Group explored the option of assessing the significance of values[1]. This would be in relation to deciding whether a value was outstanding or locally or regionally significant or some other scale that ranks the values in relation to each other.

30. Despite referring to significance criteria and information (like that provided by the RiVAS assessment or through the WCO process) about the relative importance of different rivers for a specific value, the Group did not seek to further develop this sort of analysis or develop criteria to help decide significance or to assign levels of significance to values.

31. Other elements of the RMA and the NPSFM are however, obliged to consider this aspect. There are two other processes – a Plan Change to implement RPS Policy LW1A about identification of outstanding freshwater bodies and the WCO application to determine the values of the Ngaruroro and Clive are outstanding and warrant protection under a WCO.

32. Should either of those processes result in some values of the Ngaruroro or Tutaekuri Rivers being considered outstanding under either the NPSFM or the WCO , subsequent changes to the TANK plan change may be necessary to ensure consistency and to ensure the relevant provisions can be given effect to. The outstanding waterbodies work is programmed for notification in advance of the TANK Plan Change.

Existing state of instream fisheries

33. The Lower Ngaruroro River is not in its natural state. There has been modification of the lower reaches of the river, particularly in relation to protection of communities from flooding through gravel management and stop-banking.

34. However, despite this, the lower river is understood to contain a number of significant values and also contributes to the highly valued upper river values. In particular, the lower river contains some braided reaches that are very highly valued for a range of aquatic habitats they support, including as habitat for native bird species. It is also the part of the river subject to a very wide range of use values including abstraction and use for a range of recreation activities.

35. The protection of the braided reaches is less by the minimum flow regime and more through ensuring the high (flushing) flows continue to be enabled and not adversely impacted by damming and water storage. The Draft Plan Change contains policies and rules that limit the amount of change to flushing flows.

[1] Meeting 34

36. A particular consideration in reviewing the minimum flow regime is the state of the river as a result of water abstraction and the extent to which current abstraction is causing a decline in the health of the native fisheries or whether the state of the fishery is being maintained by the current flow regime.

37. There are existing highly valued native fish communities that indicate the suitability of the flow management regime for instream values. There are some failings with the current allocation regime that require addressing (see next section). Despite this, the native fish community in the Ngaruroro River is considered by some to be 'outstanding' (determination of how significance is to be assigned is part of the two other and separate processes).

38. In the draft WCO, maintenance[2] of the current water quality, flows and channel in the lower river is being sought. This includes in relation to the current pattern of water abstraction and the low flow trigger currently in the RRMP and provides also for the current pattern of land use. This conclusion is noteworthy as it acknowledges the existing health and diversity of native fisheries and establishes (in the opinion of the applicants) the existing management regime as adequately providing for them.

39. There is limited data available about the state and trends of the native fish community. There is general agreement that an important native fish community is present. The Council has recently undertaken additional fish surveys to gather more information about the state of the fish community. Understanding where and when fish populations are stressed by insufficient flow will require ongoing investigation. With high temperature, sediment and flood disturbance imposing constraints at different times and places, isolating the effects of flow extremes requires intensive investigation.

40. Supporting information for the WCO application shows all of the Ngaruroro River sites had IBI (Fish Index of Biotic Integrity) scores in the top score range for the Hawkes Bay Region. All site IBI scores were also classed as 'excellent' in terms of their biotic integrity. The attributes of the 'excellent' class show that sites with these scores are comparable to sites without human impact, or in other words a 'natural state' when the presence or diversity of species is considered.

41. In addition to native fish, the Tūtaekurī and some of its tributaries are valued for recreational trout fishing. Habitat surveys focussed on the mid-reaches of the Tutaekuri where trout are plentiful and there was a perceived increase in pressure on water resources. However, most of the water use remains concentrated downstream the Mangaone confluence. Native fishes are less diverse than the Ngaruroro River. However, populations of freshwater flounder and other notable species can be found in the lower river.

Existing Water Allocation
Ngaruroro River

42. The RRMP currently has a minimum flow of 2400 litres per second (l/sec) and an allocation limit of 956,189 cubic meters per week (m3/week). This equates to (1581 l/sec). Historic variations in how allocations were calculated for each water permit and a lack of long term water metering data means that the actual water use is currently uncertain. The Plan now contains a new approach to surface water allocation that is aimed at specifying allocation limits in terms of the impact on the river – i.e. in litres per second (this is on the basis of the average rate of take derived from a maximum weekly volume averaged over one month). Allocations are set within rules – not as part of guiding policy which resulted in cumulative effects not being well addressed. Additional policy to phase out over-allocation is also included.

43. Changes to how groundwater takes with a direct effect on surface flow are managed has also resulted in the amount of water allocated from the river now being calculated as 3033l/sec. This

[2] https://www.epa.govt.nz/assets/FileAPI/proposal/NSP000041/Board-minutes-directions-and-correspondence-Correspondence-to-decision-maker/Applicants-Memorandum-of-Counsel-Second-Draft-Order-8-Dec-2017.pdf

means that even with no changes to the minimum flow the river is already being considered as over-allocated and water allocation will need to be significantly reduced to phase out the over-allocation.

44. The new modelling has also shown a significant stream depletion effect on the river from the cumulative impact of Heretaunga plains groundwater abstraction. The amount of stream depletion can be up to 1200l/sec in a dry year (2012-2013 summer) and is on average about 750l/sec. The mitigation of this stream depletion effect is to be by a water storage and release scheme, possibly based on extending the storage provided by a water storage lake at Te Tua.

45. The large over-allocation implies the river would dry up completely in dry years. The reason we do not see drying in practice (except 1983) is people rarely use their full allocation. In addition, people use water at different times, depending on the timing of peak demand by different land uses (e.g. onions, apples, grapes). One of the first steps in managing over-allocation will be in narrowing the gap between consented allocation and actual use.

Tūtaekurī river

46. The Tūtaekurī River is not fully allocated according to the existing flow regime and allocation limit for abstraction from this river.

47. Existing water allocation for the Tūtaekurī at 1140 l/sec is less than the allocation limit is 1536 l/sec.

RHYHABSIM and Assessing effects of changes

48. There are tools that assist in making decisions about flow requirements of fish, including modelling approaches such as RHYHABSIM[2] and SOURCE modelling[3]. The levels of habitat protection provided for the different flow regimes are based on calculated relationships between flow and habitat provided by models – and for the two rivers, the RHYHABSIM model has been used. RHYHABSIM provides an understanding of the effect of water use on the capacity of the river to support life. The RHYHABSIM method therefore achieves good alignment with Council's obligations under the National Policy Statement to safeguard the life-supporting capacity of rivers. This is especially true when integrated with management of other stressors (e.g. nutrients, sediment, riparian shade).

49. There are other assessment tools and methodologies in addition to RHYHABSIM models that the TANK Group also considered and these included comparisons with changes to flow statistic like MALF and calculations based on historic flows developed using a SOURCE model. The relationship between temperature and flow was also investigated. Water temperature is a potentially critical issue for fish and invertebrates in the Ngaruroro and Tutaekuri rivers. However, the effect of water use on temperature was less pronounced compared to the habitat reductions predicted using RHYHABSIM.

50. The RHYHABSIM model predicts how depth and water speed changes in response to less flow. For example, torrentfish like fast and shallow riffles, and RHYHABSIM is used to predict how fast-shallow water areas decrease with flow. RHYHABSIM can also predict changes to deep water, at moderate speeds, and this is where common smelt are often found or the flow requirements of fish that prefer slow moving water such as some bullies.

51. The models provide information about the extent to which different flow regimes constrain the capacity of the river to support fish and invertebrate life, focussing on flow-sensitive habitat features like water depth and the speed of the water. A range of factors other than flow also impact on the health of fishes, including temperature, flood disturbances and water quality. When it comes to the point of introducing more restrictive rules that impact on existing water users, it is

[2] Johnson, 2011 Web Link. Johnson, 2012 Web Link. Wilding, 2018 Web Link.
[3] Waldron, 2018 Web Link.

reasonable to want information beyond the life-supporting capacity as measured using RHYHABSIM. For example, investigating the observed constraints that prevent fish communities from utilising available habitat.

52. Tables 1 and 2 summarise the RHYHABSIM data for the two rivers.

Table 1; Flow and habitat protection levels for the Ngaruroro River

Ngaruroro River - downstream of Fernhill nat. MALF 4700 L/s *(was 4500)* exist. MALF 3800 L/s	Flow for 90% habitat	Flow for 80% habitat	Flow for 70% habitat	Habitat protection at 2400 L/s
Fast-water fish i.e. torrentfish	4400 L/s	4000 L/s	3600 L/s	44%
Moderate-water fish i.e. smelt	2700 L/s	2200 L/s	1800 L/s	86%
Slow-water fish i.e. common bully	1200 L/s	<1000 L/s	<1000 L/s	100%
Invertebrates (food producing)	4200 L/s	3700 L/s	3200 L/s	47%

Table 2; Flow and habitat protection levels for the Tutaekuri River

Tutaekuri River - Puketapu nat. MALF 3900 L/s *(was 3800)* exist. MALF 3500 L/s	Flow for 90% habitat	Flow for 80% habitat	Flow for 70% habitat	Habitat protection at 2000 L/s (existing trigger flow)
Fast-water fish i.e. adult trout	3300 L/s (3200)	2800 L/s (2600)	2300 L/s (2100)	65% (68%)
Moderate-water fish i.e. koaro	1600 L/s	1100 L/s	700 L/s	100%
Slow-water fish i.e. common bully	<500 L/s	<500 L/s	<500 L/s	100%
Invertebrates (food producing)	2700 L/s	2100 L/s	1600 L/s	79%

53. Advice from Cawthron[4] emphasised the importance of both the allocation limit, together with minimum flows, in managing the effects of water use on fish communities. They re-iterated the importance of flows greater than the mean annual low flow in providing food for trout populations. However, the estimated actual reduction in invertebrate habitat at median flows from existing water use was minor in these rivers (e.g. 2.13 to 2.12 m2/m of habitat for Tutaekuri). In addition to water use representing a smaller proportion of higher river flows, there is currently less water demand for irrigation and other uses at times when moisture levels are sufficient to sustain median river flows. The decline in habitat during low-flow periods was greater, with invertebrate habitat reduced from 5.2 to 4.3 m2/m (habitat at naturalized versus measured MALF, respectively). Given the low-flow period is more critical, both in terms of fish habitat and

[4] Meeting 34. Considerations for Setting Low Flows and Allocation Limits, Joe Hay, Cawthron Institute

invertebrate habitat, basing minimum flows on low-flow statistics is appropriate for the Ngaruroro and Tutaekuri.

54. Hydrological analysis also demonstrated that the improvements to the habitat with increases to the minimum flow are not straightforward. An increase in the minimum flow from 2400l/sec to 3600l/sec does not increase the actual flow in the river from 2400l/s to 3600l/s. Natural flow recession is climate driven, and continues regardless of plan limits. The magnitude of recovery to natural flows that is achieved by restricting water use is limited by the magnitude of actual use at the time of the restriction coming into force.

55. Impacts of changes to the minimum flow were summarised for TANK members following their meeting 38 and is attached (appendix 2) for reference. This summarises the effect on river flows provided by changes to the minimum flow. The overall finding is that increasing the minimum flow has limited benefit, usually for short periods.

Other assessment methods

56. Understanding possible level of impact can use comparisons between levels of abstraction with MALF to assess how much change a river ecosystem might be facing under different allocation regimes. The interaction between how much water is being abstracted above different minimum flows and how these two management levers interact and influence river health is also important.

57. Variations to the allocation limit and the minimum flow will have consequential impacts on water reliability and primary production and other abstractive uses. Section 64 below describes impact of different flows on security of supply for abstraction.

58. Other Councils are using various percentages of MALF to guide allocation limits along with different combinations of habitat protection. Some recent approaches are summarised in Table 3[5].

Table 3; Summary of recent allocation approaches

	High degree of flow alteration % of MALF	Reasonably Environmentally Conservative	Low Impact/conservative
Beca 2008	Abstraction >40% MALF	Total abstraction 20-30% MALF depending on instream values and base flow	
Horizons One Plan		<30% of MALF allocation	
Richter et al 2012		<20% of MALF (some changes to structure and minimal changes to ecosystem function.	Altering natural flows by <10% is environmentally conservative and natural structure and function maintained.
TDC and NCC	>30% higher risk	If instream values lower priority accept more risk Allocation of 20-30% of MALF Minimum flow at 70-80% habitat retention	If instream values high priority allocation at 10-20% MALF 90-100% habitat retention

[5] From the Cawthron advice to meeting 34

Effect on Number of Days Below the Trigger Flow

59. Flows will vary naturally from year to year in response to climate variability, dropping to lower flows in dryer years. Water abstraction will change the frequency at which flows might drop to low flows.

60. In the past, flow thresholds for the Ngaruroro and Tutaekuri were referred to as "minimum flows". The problem with this term is it implies the river flow will always remain above this minimum value, which is not the case. For example, flow in the Ngaruroro River dropped to less than 2,400 L/s, which is the existing "minimum flow" at Fernhill, in 7 years during the 1998 to 2015 period. And flow would have dropped below this level in the absence of water use (estimated 2 years below 2,400 L/s using naturalised flow series 1998-2015).

Table 4 *The number of water years in which the annual low flow dropped below each flow threshold (7-day mean minimum for the July to June water year). Both measured and naturalised flows are presented for the Ngaruroro at Fernhill (period 1998-2015) and the Tūtaekurī at Puketapu (1981-2015). The naturalised flows are the flows estimated to have occurred if there was no water use (based on estimated actual use, rather than allocation). Water year July to June.*

Flow L/s	**Ngaruroro** measured	/18 years naturalised	**Tutaekuri** measured	/33 years naturalised
1000	0	0	0	0
2000	2	0	**0**	**0**
2400	**7**	**2**	2	2
3000	7	4	10	4
3500	10	7	17	14
4000	12	7	23	18
4500	13	9	28	25
5000	16	13	30	28

61. The minimum flow therefore acts as a "trigger flow" as it triggers a management response that is intended to slow the rate of flow recession, but not necessarily halt it. For the higher trigger flows under consideration, the rivers would drop below the trigger more often, both under existing water use and in the absence of water use. The difference is how often the flow drops below the trigger.

62. The duration of low flows also increases with water use, with the Ngaruroro estimated to have spent 7 more days per year below 2,400 L/s as a result of water use (average days/year for 1998-2015). During most years, flow did not fall below 2,400 L/s (11 out of 18 measured years; 16 out of 18 naturalised years). Dry years saw the biggest increase in the duration of low flows, with 64 days below 2,400 L/s in 2013, compared to 8 days below from the naturalised flows (using daily mean flow).

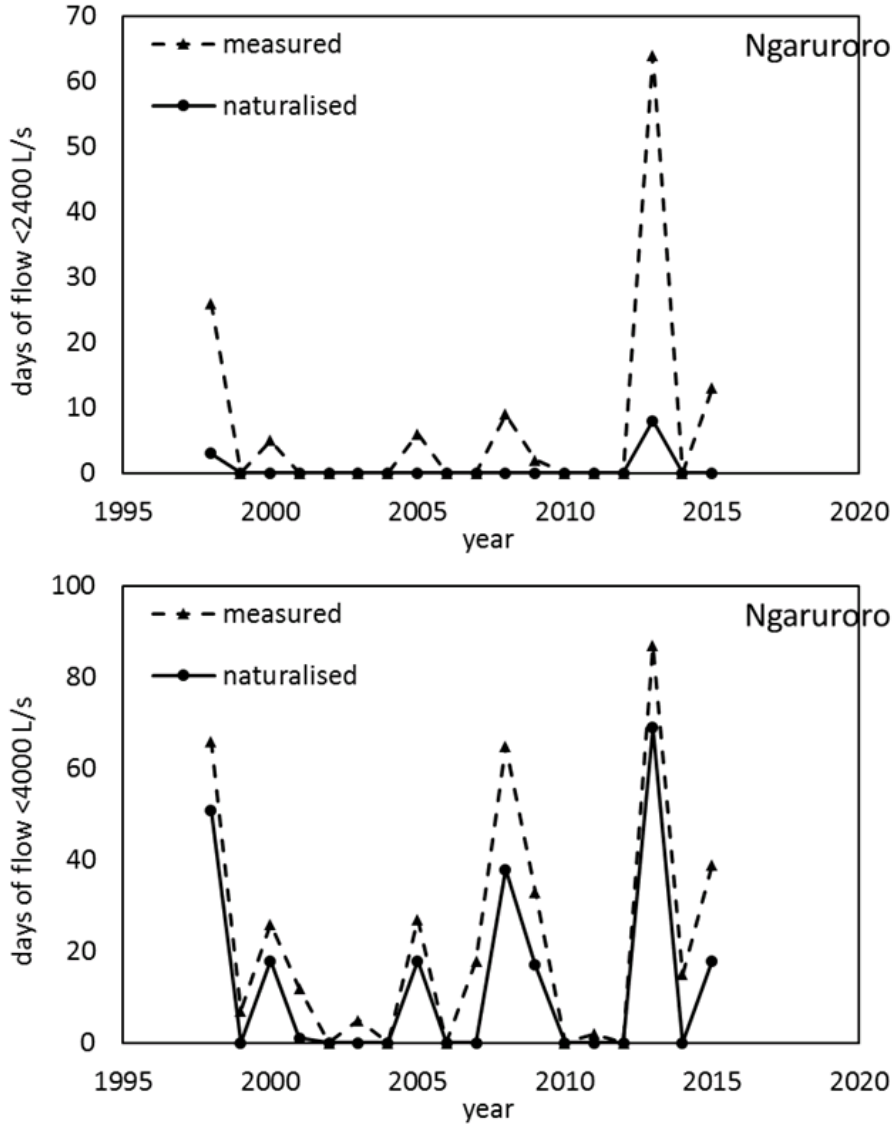

***Figure 1**;Water use increases the number of days when flow is below a given threshold. The upper plot shows the number of days when the measured flow dropped below the existing trigger flow (2,400 L/s) for Ngaruroro at Fernhill. The lower plot uses a different t threshold of 4,000 L/s (80% protection level for torrentfish)*

63. Trigger flows can be used in a variety of ways including to direct when abstractions must reduce or cease or when flow enhancement is required. They are also be used to calculate the amount of allocatable water so that both security of supply for abstraction is adequate and impact on fish habitat is addressed. The specified trigger flow indicates a flow at which there is a calculated habitat reduction for fish.

Effect of Flow Triggers on Reliability of Supply

64. This section considers the effect of different flows that trigger day-to-day restrictions on surface takes. This will now include groundwater takes in zone 1 but does not apply to groundwater takes outside of zone 1, where the delayed effect on flows diminishes the value of day-to-day restrictions.

65. Different flow management regimes have varying impacts on the security of supply for water abstraction. That is, as a flow trigger is reached, water abstraction is required to stop (or in some

circumstances, the amount of water abstraction is reduced) and if the flow trigger is high, restrictions are imposed sooner and water use is stopped or restricted more often.

66. Table 5 below provides some information about allocation limits for different minimum flow triggers for the Ngaruroro River that would allow security of supply standards to continue to be met.

Table 5; Allocation limit to meet security of supply standard at different minimum flows

	Allocation limit (l/sec) for each flow (based on Q95 of 3981l/sec)				
	For 2400l/sec	For 2600l/sec	For 2800l/sec	For 3200l/sec	For 3600/sec
Allocation limit (l/sec)	1581	1381	1181	781	381
Reduction %	0	17%	25%	50%	76%
Allocation limit as % of MALF	33.6	27	25%	16%	8%

Impacts on water users

67. Agfirst calculated the impact of reduced security of supply on irrigated horticultural crops associated with an increase in minimum flow for 20% of the reference irrigated area to represent the impact from changes to a minimum flow of 2400l/sec at Fernhill (and 6% of the irrigated areas connected to 2000l/sec at Puketapu). The location of the surface takes for both the Tūtaekurī and Ngaruroro is shown generally as the yellow areas in Figure 2:

68. The impact of different flow management regimes on reliability statistics is an important indicator for understanding impact on abstractive water use, particularly for irrigation[6]. These statistics include, for example, the number of times in all the years being modelled there would be restrictions lasting longer than 3 or 10 days, or the number of days in any year there would be restrictions.

69. The impact on farm production and income from the different levels of water reliability that are a consequence of the different flow management scenarios were assessed by AgFirst Consultants[7]. In this economic modelling, AgFirst took the flow and restriction data and applied it to actual farm production on a model farm that represented a specific crop and management regime.

70. This analysis showed the economic impacts of changing water reliability of supply at a farm scale.

71. The area subject to the Ngaruroro River minimum flow is estimated to be somewhere between 3400ha and 4400ha[8].

6 Described at Meeting 34
7 AgFirst Report For the Hawkes Bay Regional Council on Part 2 of the TANK catchment Economic, Social and Ecological Impact Assessment: Water Management & Land Management Policy Options
8 From the AgFirst report and the Heretaunga Plains modelling report

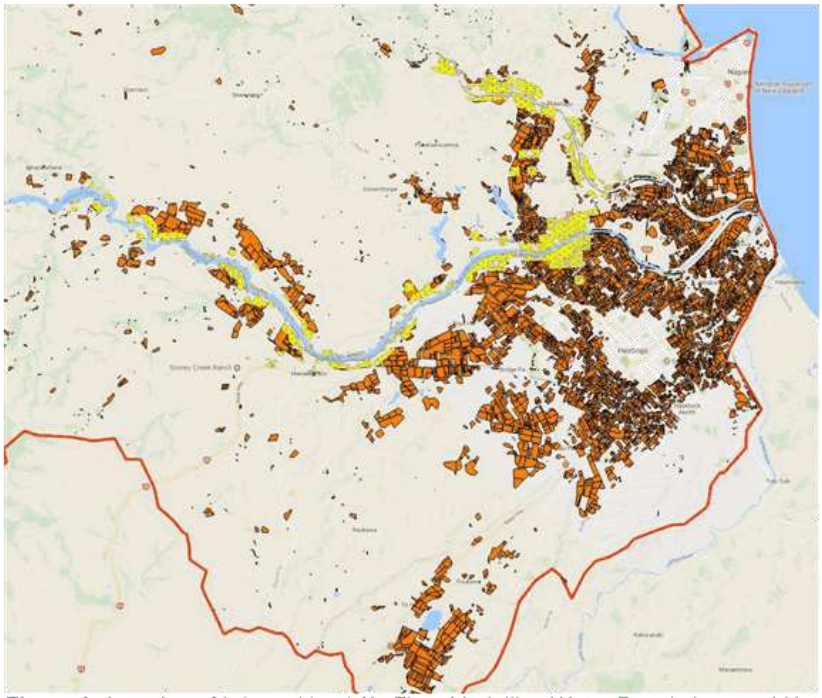

Figure 2; *Location of irrigated land (AgFirst: Modelling Water Restrictions and Nutrient Loss for horticulture in the TANK Catchment*

72. The consequence of an increased minimum flow may result in either;

- existing water permit holders coping with a reduced security of supply (land use will change, see next section)
- allocations to permit holders being reduced (for example by pro rata reductions in allocation)

73. In either case, the investment into high value crops will reduce and the total areas irrigated will reduce. A land use change scenario was not modelled because of the difficulties in predicting the likely changes. However, the most likely scenario is change to "summer dry" area with the consequential impact on farm EBIT[9] (Earnings Before Interest and Tax) and flow on effects.

74. As a result of new flow and allocation rules, there will be an increased interest in water storage. Timing and pathways become very important considerations as without adequate planning and time provided, primary producers will not be in a strong position to fund storage. With any significant change to minimum flows and allocation limits, the costs of the new water management regime should ideally be directed to new infrastructure and not into loss of production in the interim. Either way, the costs of the new water allocation regime are real and will be borne by landowners.

75. Further work was then undertaken to assess the flow on effects of this change to the wider Hawkes Bay economy, employment and the community. This analysis was carried out by Nimmo-Bell[10] and Market Economics[11].

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9 TANK members are referred to the Agfirst reports for farm income data for further detail about the differences between income for the summer dry farm and the remaining farm types. Part 2 of the Agfirst report assessed farm earnings (expressed as EBIT Earnings Before Income and Tax) for the unirrigated land as $141 with Part 1 of the report for the irrigated land in the TANK catchments finding EBIT varied from $200 (grapes) to $3,592 (vegetables) to $33389 for kiwifruit from the base case)

10 Nimmo-Bell; Direct Economic Impact of the TANK A report prepared for Hawke's Bay Regional Council FINAL 20 June 2018

11 Dr Garry McDonald and Dr Nicola McDonald Economy-wide Impacts of Proposed Policy Options for the TANK Catchments Prepared for Hawke's Bay Regional Council HBRC 001.16/final report; 20 August 2018

76. Other analysis has also been done to assess impacts of the management scenarios on the social and cultural well-being of the affected communities. This analysis included a specific focus on the cultural health and well-being of tangata whenua.

Land Use Change

77. As water reliability decreases, and farm income is affected for the different crops grown, land managers could reasonably be expected to begin to change water use behaviour and what is grown and irrigated.

78. Depending on the severity of changes proposed by new policy and the management regime adopted for the allocatable water, the following responses are possible by land managers;

    78.1 More efficient water use and adoption of new technology, more targeted water use

    78.2 Irrigators and land managers will look for opportunities to access allocated but unused water (through site to site transfers or by permit sharing)

    78.3 Different land use mixes would be adopted to manage risk to higher value crops (low value crops could be sacrificed in dry years)

    78.4 The higher value crops at most risk from reductions in water reliability will most likely be replaced by lower value crops and the amount of irrigation would reduce (either the irrigated area would reduce or lower water use crops would be grown on the same areas).

    78.5 Opportunities for improving security of supply would be advanced

79. The possible development of a threshold to indicate when a crop/land use system will no longer be economic was considered. It could have assisted with assessing the regional impacts of land use changes as a result of changes to water supply reliability. In reality, a decision to change land use based on security of water supply is difficult to predict as decisions to change can be gradual, especially if the following summers are not particularly dry, or if the change to security of supply is subtle and there are adaptations that can be adopted to reduce severity of impacts. Land use change will also be dependent on the land manager's own situation, their levels of indebtedness and the individual or farm ability to manage this risk.

80. In any case, the outcome of significant changes to reliability of supply is that the area irrigated is likely to decrease overall, and/or the area of low value crop that is irrigated might increase. Both scenarios will have a flow on impact to the regional economy. Anecdotally, there are reports that this is already occurring in Tukituki for surface water users as new minimum flows take effect there.

WHAT HAPPENS TO FLOWS IF THERE IS A 10% EMERGENCY WATER TAKE

81. One of the flow regime management options is to allow water abstraction to continue once the minimum flow is reached – but only for emergency end uses. This could include water needed to sustain tree crops to avoid long term economic impacts if tree crops were to be lost to drought. It could also include water needed to maintain water supply for stock drinking water, where use was in excess of permitted quantities.

82. This management response could be a means of reducing impact of changes to minimum flows.

83. The amount of water for emergency use could be limited to a relatively small amount such as 10% of the allocated total. It is an arbitrary amount, but would reflect the amount needed to keep mature tree crops alive[12].

[12] Allocation for root stock survival in Tukituki is approx. 10% of the allocation limit for surface water.

84. The potential impact of a 10% emergency water take has been modelled on the Ngaruroro and Tutaekuri Rivers[13] For the purposes of estimating the potential impact, the 10% emergency water take has been modelled to apply to all groundwater abstractions located within the proposed Stream Depletion Zone 1, and all surface water abstractions located upstream of the Ngaruroro at Fernhill and Tutaekuri at Puketapu flow management sites.

85. For each flow management site a 10% emergency water take has been calculated based on combining 10% of the maximum modelled stream depletion effect from groundwater abstractions within the Stream Depletion Zone 1, with 10% of the maximum daily allocation for all upstream surface water abstractions.

86. The 10% emergency water take that has been calculated and modelled at each flow management site is shown in the following table. The breakdown of the groundwater and surface water components that are combined to calculate the 10% emergency water take are also included. The groundwater component is very small when compared to the surface water component.

Flow Management Site	10% of Max SD Effect from GW Abstractions in SD Zone 1 (l/s)	10% of Max Daily Upstream SW Allocation (l/s)	Total 10% Emergency Water Take (ls)
Ngaruroro River at Fernhill	2	161	163
Tutaekuri River at Puketapu	0.01	83	83

NB: SD = Stream Depletion, GW = Groundwater, SW = Surface Water

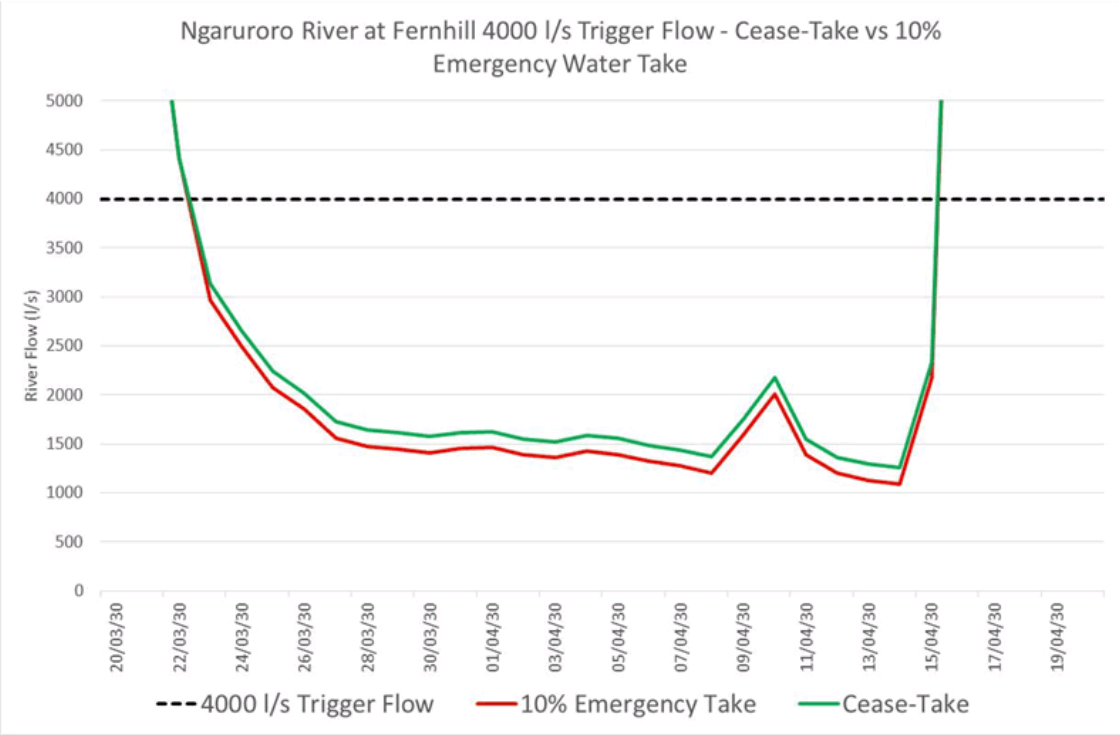
87. The modelled potential impact on river flows resulting from the calculated 10% emergency take is shown in the following table for the different scenario trigger flows at each flow management site. The minimum and maximum percentage change to river flow below each minimum flow is given.

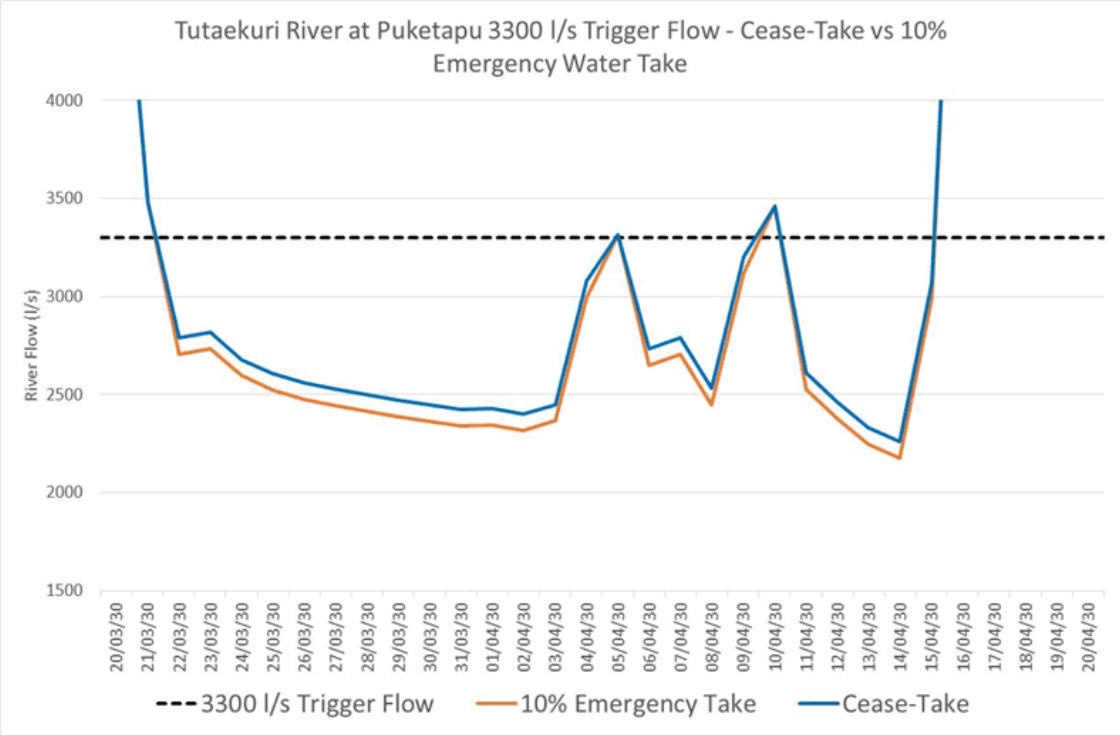
Flow Management Site	Minimum Flow (l/s)	% Change to River Flow Below Minimum Flow	
		Min % Change	Max % Change
Ngaruroro River at Fernhill	2400	-7%	-15%
	3600	-5%	-15%
	4000	-4%	-15%
Tutaekuri River at Puketapu	2000	0%	0%
	2500	-3%	-4%
	3300	-3%	-4%

88. For the Ngaruroro River, the maximum modelled impact from a 10% emergency water take is a 15% change to river flows. This 15% change is the same for all modelled trigger flows. For the Tutaekuri River, modelled river flows never go below a 2000 l/s trigger flow, so a 10% emergency water take is never abstracted. River flows are modelled to go below the higher trigger flows of 2500 l/s and 3300 l/s, and a 10% emergency water take would potentially reduce river flow by up to 4%.

[13] https://www.hbrc.govt.nz/assets/Document-Library/Publications-Database/5013-RM-18-28-TANK-Surface-Water-Quantity-Scenario-Modelling-Report3.pdf

89. The following two graphs compare the effect on river flows with a cease-take trigger flow versus a 10% emergency water take occurring when the river at or below the trigger flow. The two graphs show each flow management site separately, using the highest trigger flow and showing a short period of record to highlight the potential effects on river flow.





Timeframes

90. If changes to the trigger flows are to be made, timeframes for how these will be imposed will need to be considered. The economic analysis did not take this into account directly. The Group

considered the option of imposing new flow and allocation provisions as existing consents expire as would usually happen in the normal course of events. They also considered advancing review of some longer term consents so that all permits would have been reviewed within 10 years (from the operative date of the Plan). Not all Group members entirely agreed with this approach and some were seeking an alternative regime. As discussion about alternative minimum flow regimes progressed, suggestions for staged approaches were also made.

91. Should a significant change to the flow triggers be made, some stakeholders proposed that lead-in time could be provided to support the change and enable adaptation to occur.

92. If changes to minimum flows are to be made, not only the rate of progress towards better environmental outcomes is relevant but there are a range of other considerations that should also be accounted for including;

    92.1 The administrative and cost burdens on both consent holders and the council

    92.2 The time needed by land managers and water permit holders to plan for different land uses if a significant change to water reliability was made

    92.3 The impact on employment and resulting social changes for individuals and their families and communities as land and water use changes (refer especially to findings of the iPansophy Social and Cultural Impact Assessment).

SOCIAL, CULTURAL AND ECONOMIC IMPACT ASSESSMENT

93. The potential economic, social and cultural consequences of the management scenarios being considered for the TANK Plan Change[14] have been assessed. Economic modelling was carried out by Agfirst, Nimmo-Bell and Market Economics and social and cultural impact assessment carried out by iPansophy to assess the impacts of a range of management scenarios on the Hawkes Bay community including in particular impacts on mana whenua.

Cultural and Social Impact Assessment

94. This project set out to consider how current land and water use (the baseline or status quo) relate to social wellbeing, and what the effects of changes might be.

95. A report was produced covering the outputs from engagement with community reference groups. It was one of three strands of work that were part of the creation of a comprehensive social and cultural impact assessment of the TANK plan which included:

    95.1 An assessment of TANK community perceptions, questions and feedback about the current TANK draft plan

    95.2 A statistical assessment of TANK community, social and cultural effects that can likely be anticipated as a natural consequence of implementing a future TANK plan

    95.3 An assessment of TANK Māori community, social and cultural effects that can likely be anticipated as a natural consequence of implementing a future TANK plan.

96. The Community Reference Group interviews covered a wide range of topics and issues important to the respondents that were relevant to decision making for water management. The reference group interviews included people from a wide range of community members and sectors including Māori and non-Māori people from schools, religious groups, catchment groups, family focused groups, environmental representatives, health professionals.

97. The assessment looked at a range of social and demographic indicators for community wellbeing and concluded that some TANK sub-catchment communities were at risk with increases to the minimum flow regime and associated water use changes. The TANK Plan Change and this cultural assessment also provided a means for making a commentary in specific and general

[14] TANK Meeting 41

terms about matters of social fairness and cultural survival that are of concern to the local mana whenua.

98. The assessment took an evidential approach (not discursive) being informed by the community reference group and also by key data from Statistics NZ. The presentation as a result of this work provided key insights only. These included;

98.1 Population changes and risks associated with net population outflow, and short population residency times. This contributes to loss of 'cultural memory, especially for Māori. ((60-70% population turnover 0-9 years)

98.2 Changing age range of the population which has implications for the labour market, and infrastructure

98.3 The dispersed locations of Whanau Kahungunu around NZ caused by demand for jobs, homes and social services and the impact this has on cultural survival

98.4 The changes to the Māori economy and the critical diminishing of mana/mauri of whānau Māori.

98.5 Changes to income characterisation; high levels of income inequality, high dependence on low income jobs (30-40% of sub-catchment populations earn <$50000 per year) and need for more than one income to support families in Hawkes Bay, and high dependency on welfare income (40% of urban families and 25-30% rural families and this is partly because of aging populations)

98.6 Wider national and international issues including accounting for community well-being and limitations of the GDP measure, which measures economic growth but does not account for ecological, social or cultural impacts.

98.7 The cultural and social changes associated with Increasingly longer working hours, women in the workforce, credit card use, changes to the housing market, increasing adverse social behaviours (crime addiction, violence suicide), with Māori populations being disproportionately represented in adverse statistics.

98.8 The effect of a high dependence on the primary industries of manufacturing (including food processing), agriculture, forestry and other manufacturing in Hawkes Bay.

99. The researchers developed the following diagram to illustrate the complexities between historic events and how these changes have impacted on Māori over time. Only part of the issue is addressed within the TANK process and there are indications provided within the diagram about how the Plan Change can be used to address some of them.

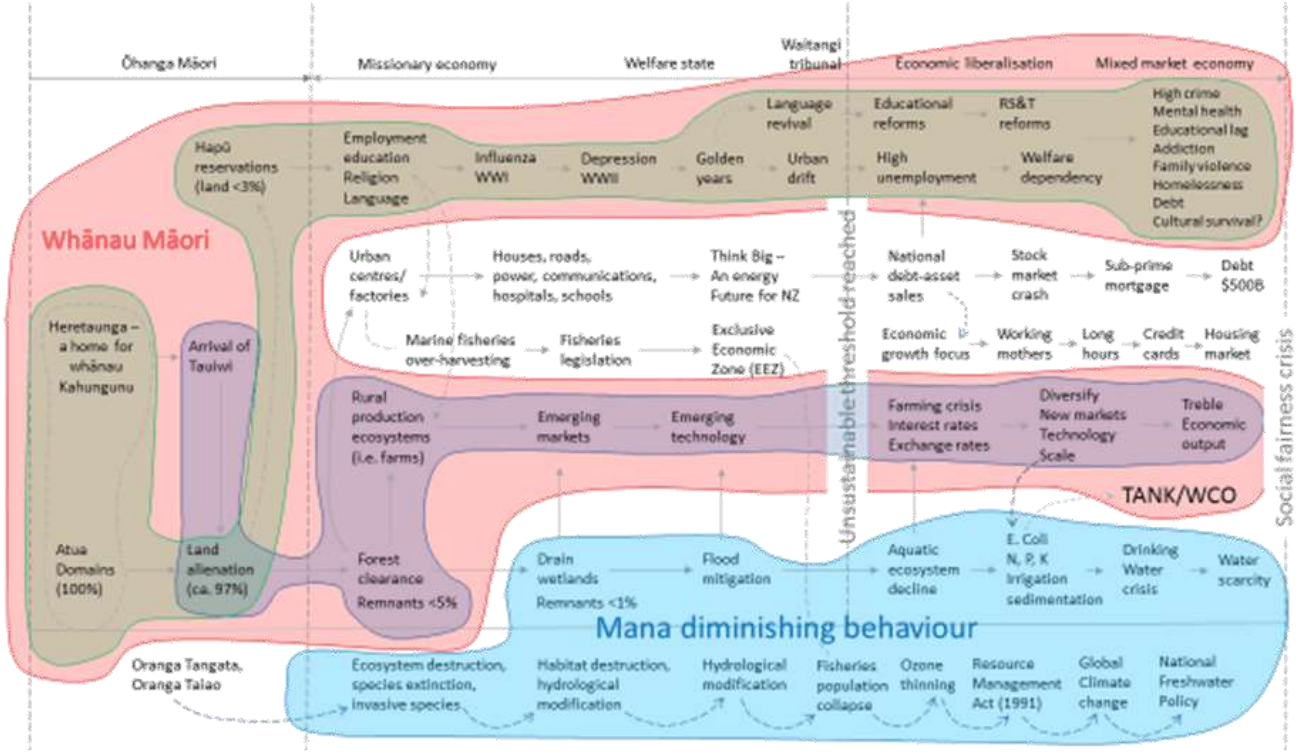


Figure 3; Illustrating the Hawke's Bay Economy, Income Inequality and Social Fairness

Summary of Social and Cultural Impact Assessment Findings

100. The assessment conclusions noted the inter-generation inequities associated with land alienation and the intra-generational inequities that have developed through the allocation and distribution of financial resources, jobs, homes and well-being needs of the whānau Kahungunu ki te Heretaunga.

101. The assessment concluded that the draft Plan Change would result in flows of ecological, social and cultural benefits to the TANK communities. However, there is a high likelihood of cultural, social and financial harm to some communities with the adoption of the changes to the minimum flow regimes evaluated by Agfirst, Nimmo-Bell and MEL.

102. In particular TANK catchment communities characterised by high levels of welfare dependency or by high levels of Māori will be at risk.

103. Timeframes for implementation and any effects on regional GDP should be specifically addressed within any plan change.

Economic Assessment

104. The economic analysis reports (separately available) addressed;

104.1 the costs of mitigation measures to meet targets for sediment loss reduction,

104.2 stock exclusions and improved riparian land management,

104.3 nutrient management,

104.4 reduced allocations for groundwater takes,

104.5 increased minimum flows for surface water abstractions from the Ngaruroro and Tūtaekurī Rivers.

105. There were impacts on farm income as a result of the sediment and other mitigation scenarios. The modelling was done on the basis of 'average' or reference farms. This assessment does not account for the fact that sediment loss risk is not distributed evenly across all properties and not all properties have the same gross revenue to support the investment necessary. The costs and consequent impact on land owners of meeting the sediment control targets varied considerably. These impacts also had flow-on effect to other parts of the agricultural supply chain which indicated a need for caution about timeframes for achieving water quality outcomes.

106. The assessment modelling found that the greatest impact on social, cultural and economic well-being was as a result of changes to groundwater allocations, and changes to reliability of supply through changes to minimum flows for surface water and allocation methodology. While more detail for the various scenarios was supplied by the Agfirst modelling for the farm scale impacts, the wider economic model scenarios by Market Economics provided the comparisons between the base case (Scenario A) and the following changes;

- contaminant mitigation measures on pastoral land
- increasing the minimum flow flows for the Tūtaekurī and Ngaruroro Rivers.

107. Scenario B considered the costs when 20% of irrigators are subject to water restrictions related to Ngaruroro 3,600 l/s and 6% related to the Tūtaekuri 2,500 l/s restrictions. G/w was based on 2013 levels of use.

- decreasing the security of supply for groundwater takes.

108. Scenario C considers g/w use when allocations are reduced to a 9 in 10 year reliability (the minimum flows remained the same as for scenario B).

109. While scenario B and C both contain the contaminant mitigation costs for the irrigated land, it is clear however, and confirmed by the modellers, that the significance of the economic impact is in relation to the water management scenarios.

Summary of Economic Assessment Findings

The Market Economics Study[15]

Introduction

110. The Market Economics ('ME') study estimates the flow on economic impacts associated with changes in farm systems that result from the implementation of the policy options outlined in Nimmo-Bell analysis. ME utilises an Input-Output framework and reports impacts for both Hawke's Bay and New Zealand over a 30-year period. The analysis demonstrates how these impacts are distributed among 106 economic industries, both within the Hawke's Bay and New Zealand. All results are presented in net economic terms i.e., net of horticultural and pastoral base case sub-scenarios.

111. To better understand the scale of the impacts two sensitivity tests were undertaken by ME. First, the results were analysed with not only the standard 8% Treasury discount rate shown above, but also with lower 6% and 2% discount rates. Second, the speed of implementation of the policies were also analysed. This included the medium (Year 5 onwards) and slow (Year 8 onwards) start options in addition to the fast option (Year 3 onwards). Changing the discount rate considerably affects the magnitude of the Present Values and changing the speed of

[15] summarised by G Pechey

implementation also has a major influence on outcomes. The summary results presented below are calculated by applying the fast option and 8% discount rate.

Key Summary Results

112. Results vary across the 30 years considered. For example, while the horticultural sub-scenarios produce losses in value of economic output, these losses are not experienced over the entire 30 years of analysis, and the sub-scenarios vary in terms of when the losses commence.

113. Some of the complexities relating to the variation in impacts over time are reduced by presenting the national economic impacts as the average annual impacts experienced over the entire 30 years considered. These results are shown in Table 6 below. The pastoral sub-scenarios (MS1 and MS2) produce economic impacts that are much less than those calculated for the horticulture sub scenarios (Future B and Future C).

Table 6; Average Net New Zealand Value Added and Employment Impacts by Horticulture (2021-2051)

Table 1: Average Net New Zealand Value Added[16] and Employment Impacts[17] by Horticulture (2021-2051)

	Value Added $m (Avg. Net)	Employment (Avg. Net)
Horticulture (Fast Start – Year 3)		
Future B	-97	-675
Future C	-208	-1,487
Pastoral (Start Year 1, 10-year spread)		
MS1	-2	-29
MS2	-17	-175

114. Table 7 shows the value added results across time by using the Net Present Value metric (NPV) and demonstrates how impacts initially experienced by farm systems (direct impacts) can magnify into significantly larger impacts when all direct and effects of changes are taken into consideration. For example, with Combined Scenario 3 (Future C+ MS2) the value added change over 30 years is estimated as a loss of $403 million, but increases to a loss of $2,331 million when indirect and induced effects are taken into consideration.

Table 7; NZ Net Present Value of Value Added Impacts by Sub-Scenario, 2021-2051 (8% Discount Rate)

Table 2: NZ Net Present Value[18] of Value Added Impacts by Sub-Scenario, 2021-2051 (8% Discount Rate)

	Direct Impacts ($m)	Direct, Indirect & Induced Impacts ($m)
Horticulture (Fast Start – Year 3)		
Future B	-181	-982
Future C	-370	-2,116
Pastoral (Start Year 1, 10-year spread)		
MS1	-19	-77
MS2	-33	-215

115. Not surprisingly, in the Hawke's Bay, the largest value added impacts are experienced by the agricultural industry directly impacted under the sub-scenarios, and the key processing industries that are reliant on the outputs of those directly impacted agricultural industries. For

[16] Value added impacts are measured in $2016 million.
[17] Employment impacts include working proprietors.
[18] A key point to note about the NPV measure is that impacts occurring in the more distant future are given less weight than those that occur sooner through the application of a discount rate.

example, in the Future B Horticulture sub-scenario, a loss of value added of $184 million is estimated for the horticulture and fruit growing industry, and a further loss of $260 million is estimated for the other food manufacturing. Other industries are also impacted in the Hawke's Bay, particularly through losses in income, which have flow-on effects of reduced household spending. Overall, for Combined (Future B+MS1) Scenario 2, the value added impacts in the Hawke's Bay are equivalent to a loss of 2% of the entire primary sector and 2.7% of the secondary sector. The regional level losses are even more significant under Scenario 3 (Future C+MS2), equivalent to 4.4% of the primary sector and just under 6% of the secondary sector.

116. The direct employment impacts felt by the horticulture and fruit growing sector are relatively low. This reflects the information provided to Nimmo-Bell and, in turn, to ME from AgFirst. Under the Future B and C horticultural sub-scenarios, AgFirst's modelling identified no substantive changes in farm expenditure (including labour) costs. The brunt of the impact is instead felt in terms of lost farm surplus, which in the ME analysis, is captured in changes to value added. The value added impact in the horticulture and fruit growing industry is thus considerable, while the loss of employment is not. Employment impacts are mostly felt indirectly through impacts to processing and services, and, in turn, less spending (through reduced revenues in other industries) by households.

117. Importantly, if horticultural growers were faced with consecutive year-on-year bans of sufficient severity, then it is possible that they may simply fail. This possibility was not modelled but would likely result in significant direct employment impacts.

PLANNING AREAS AND MAPS

118. A Ngaruroro Freshwater Quantity Management Unit (NFQMU) is being mapped and intended to feature as part of the TANK plan change content. An earlier version of that map was presented to the TANK Group in July at meeting #42 (see Figure 4). Allocation limits are established for abstraction from the river as well as additional policies providing default allocation limits for any unlisted rivers and for groundwater takes outside Zone 1 and the Heretaunga Plains.

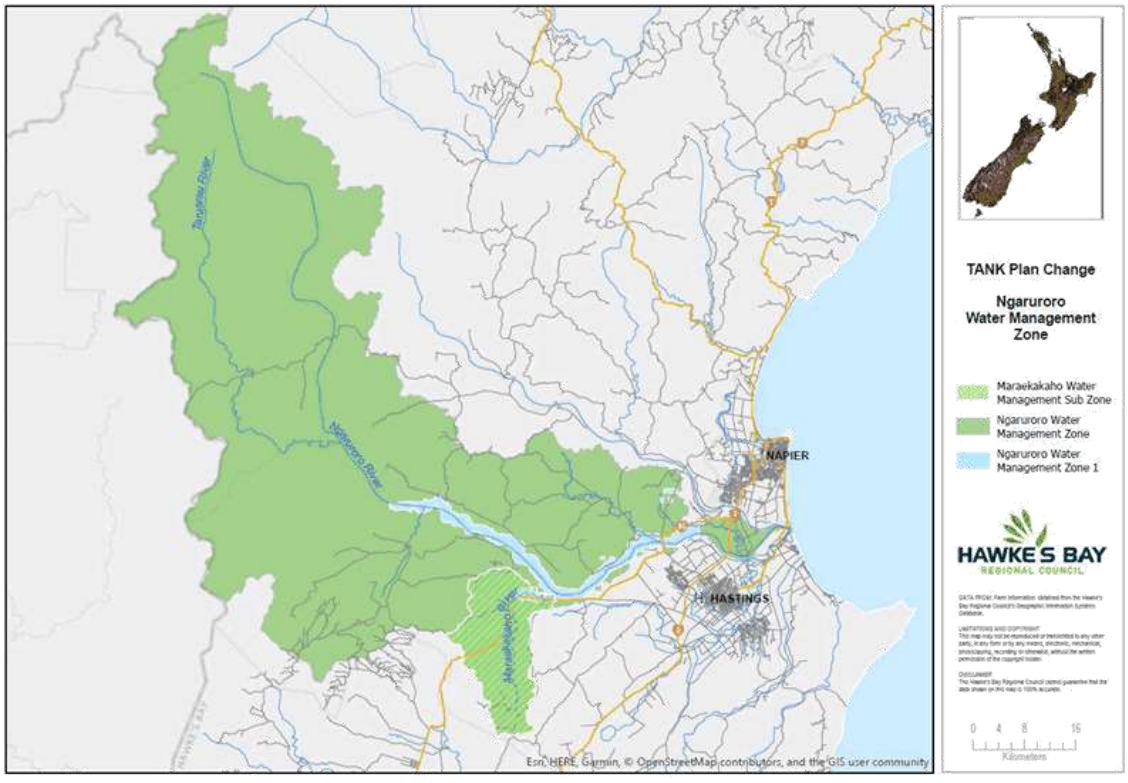


***Figure 4** - preliminary map to illustrate location and extent of a Ngaruroro Freshwater Quantity Management Unit.*

119. The surface water allocation limit for the NFQMU includes abstraction from Zone 1. Also provided is a groundwater allocation limit for groundwater takes that are not Zone 1. The limit for this groundwater abstraction is set at existing level of use and it is suggested that this be considered a provisional limit until more information is available about the nature and extent of the groundwaters including recharge mechanisms, level of connection with other rivers and water bodies including the Heretaunga Plains.

120. However, not all groundwater consents have been incorporated into the surface flow allocation limit. This is because the new model has shown a different connection between Zone 1 groundwater takes and what was previously understood.

Ngaruroro River Flow Management

121. Modelling the effects of a range of new minimum flows was be carried out. This included;

121.1 hydrological modelling to predict changes to minimum flow triggers for abstraction on security of supply and on amount of time at or below the minimum flow

121.2 modelling production and income impacts of changes at the farm gate

121.3 the flow-on and overall economic effects of changes across the TANK catchment and Hawkes Bay region

121.4 cultural and social impacts that might occur as a result of changes

122. The findings of this modelling have been described above.

123. The TANK group initially explored flow management options that ranged from a change in minimum flow from 2400 to 4200 L/s. This range was reduced by the final TANK meeting to

123.1 staying with existing minimum flows (but changes made to allocation limit and addressing the over-allocation).

123.2 increase the minimum flow in a series of stages from plan notification until 2030 to result in a minimum flow of 3600l/sec.

124. It was also noted that the stream depletion from groundwater abstraction across the Heretaunga Plains also has a significant effect on low flows. The Group has already adopted policy (see Policy 29) which would commit the Council (along with stakeholders) to investigating the feasibility of a water storage and flow release option to mitigate those effects.

125. The following Table shows the two alternative approaches illustrating the range of non-consensus by TANK members.

	Option A	Option B
Minimum Flow	Remains at 2400l/sec	**Step 1**. Notification; 2400l/sec **Step 2** 2025 increase to 2800l/sec **Step 3** 2030 increase to 3200l/sec **Step 4** 2035 increase to 3600l/sec
		Note that new minimum applies at time permit is applied for or, if as a result of a review requirement, at the specified date provided the plan is operative by then.

	Option A	Option B	
Water storage	Council is committed to investigation/ development of storage options to provide for low flow enhancement as the resolution of the river depletion effect from the g/w takes in the HPGMZ	Council is committed to investigation/ development of storage options to provide for low flow enhancement as the resolution of the river depletion effect from the g/w takes in the HPGMZ	
	Refer policy 53		
Allocation Limit	Target allocation limit of 1300/sec (down from 1580l/sec) (existing allocation is now over 3000 l/s because of new accounting for Zone 1 groundwater takes)	*Either* Allocation limit[19] decreases at each step on a pro rata basis across all consents so that the following allocation limits can be met: **Step 1** Notification; actual and reasonable Step 2 2025 reduce to 1181 l/sec (25% reduction) Step 3 2030 reduce to 781 l/sec (50% reduction) Step 4 2035 reduce to 381 l/sec (75% reduction)	*Or* Water is allocated on actual and reasonable use basis and permit holder subject to a lower security of supply with the higher minimum flow
	To be reflected in policy 39 and schedule 6		
		Note in order to carry out pro rata reduction, all consents would need to be called in and reallocated before required pro-rata reduction amount is calculated.	
Water Permit Allocation Management	Re-allocation of surface water will be on the basis of historic actual and reasonable water use. A sinking lid approach will be adopted to ensure ongoing reductions in allocation	As above	
	To be reflected in policy 39 and schedule 6		
Emergency water takes	Not provided for	10% of the allocation limit can continue to be abstracted after the minimum flow is reached	

126. **Option A** looks to a longer term approach by reducing allocations and improving river flows by alternative means while Option B looks to a more targeted and direct approach to increasing the minimum flow triggers used to control water abstraction.

127. Both options are also dependant on the range of other ecosystem enhancement initiatives adopted so far by the TANK Group, including in relation to sediment loss management, nutrient

[19] calculated by Q95 – minimum flow where Q95 is the 7 day avg summer flow exceeded 95% of time and for the Ngaruroro is 3981 L/s

management, stock exclusion, riparian land management and wetland protection and development.

128. The main feature of option A is a focus on reducing the amount of water allocated over time with a new target allocation of 1300l/sec. This needs to be considered in light of the water consents data that shows current allocation is over 3000 L/s.

129. The allocation limit change is founded on re-allocation based on 'actual and reasonable' use; a likelihood that there is a significant gap between allocated and used water; potential water use efficiencies; and that the allocation reliability is raised to 90%. It is also to bring the allocation limit to below 30% of MALF (27.6%) which is generally recognised as a reasonably environmentally conservative allocation based on advice from the Cawthron Institute.

130. The reality between actual and reasonable water demand and allocated amounts needs to be more clearly ascertained before the level of over-allocation is better understood. Addressing the current level of over-allocation will be a necessary first step to managing allocations for the Ngaruroro River. Any new minimum flow at TANK Plan notification will only influence new water permits (plus existing consents that are to be renewed). In order for any new minimum flow to be otherwise applied to existing consents, a review requirement will need to be included so that existing consents are made subject to the new provisions and this will also require that there is an operative plan in place.

131. **Option B** is reliant on minimum flow increases, but this option aims spreading the impact over a longer timeframe. The main benefit is a higher river flow at which restrictions in water takes are initiated. It is expected that the cessation of abstraction would be evident in an increase to the river flows. This restriction also means the river flow can be maintained at a higher flow for longer as water takes cease at higher flows. Option B provides a higher level of protection for some indigenous fish (torrent fish potentially have more habitat available. Other threatened species such as redfin bully have 100% habitat availability at 2400l/sec).

132. As described above, an increase to this minimum flow will provide (some) limited environmental benefits. The costs of the allocation reductions are likely to be significant in terms of changes to primary production and the subsequent impact of this on the local economy, although the impact of the changes are gradual and could enable landowners to adopt alternative land uses, or develop storage solutions.

The reasons supporting Option A;	The costs or risks with Option A;
The existing flow regime means reduced adverse impacts on social and economic well-being. There is little evidence that the existing flow regime is causing adverse effects on native fish.	Uncertainty that any storage flow enhancement solution will be developed in a timely manner – despite policy commitment.
The associated measures adopted to improving ecosystem habitat are less disruptive to communities and can be introduced in a staged cost effective manner, This approach complements measures being developed to manage the stream depletion effects of the groundwater takes in the Heretaunga Plains Water Management Unit (HPWMU)	A reduction in abstraction limit and potential adverse impacts on economic well-being of existing permit holders.
Social equity and impacts on Māori cultural values and uses are also able to be addressed by high flow water reservation measures	A relatively high level of over-allocation needs to be phased out. (Actual use is likely to be significantly less than allocated use)

The allocation limit (compared to MALF) is reduced to more environmentally conservative levels.	Lack of information about state and trends of indigenous species
Reasons for supporting option B	**The costs and risks with Option B**
Provides higher level of habitat protection for aquatic species, especially indigenous species The timeframe for introducing new minimum flows is long and enables solutions and adaptation Provides for the community ambitions to establish higher levels of protection for cultural and social well-being, including for Māori kaitiaki reasons	Potential for high adverse effects on social cultural, and economic well-being including for Māori. Actual improvements to the environment as a result of the change may be difficult to measure, especially given other habitat improvements A very high level of over-allocation needs to be phased out Uncertainty that any storage flow enhancement solution will be developed in a timely manner – despite the stated phase in dates and policy commitment. Uncertainty about land use change as a result of decreasing allocations and how that might affect water storage options

TŪTAEKURĪ RIVER FLOW MANAGEMENT

133. The Tūtaekurī River is not fully allocated according to the existing flow regime and allocation limit for abstraction from this river. There is a desire amongst some of the TANK Group members to raise the level of protection being provided to the river by the current flow regime.

134. The establishment of flow triggers and allocation limits is informed by RHYHABSIM habitat models and habitat protection levels linked to river flow statistics. This provides an understanding of the effect of water use on the capacity of the river to support life.

135. The MALF (Minimum Annual Low Flow) for the Tūtaekurī is 3900l/sec and the Q95Flow is 3536l/sec. Additional analysis of flow data has also been carried out as the modelling reports have been finalised and the new modelling information is reviewed.

136. SOURCE model predictions for the Tūtaekurī have compared the modelled flow records. The results are summarised below in Table 8 below.

Table 8: *Tūtaekurī River days of restrictions at different minimum flows*

Cease-take minimum flow (l/s)	No. days restriction	No. periods of >=3 consec. days restriction	No. periods of >=10 consec. days restriction
2000	0	0	0
2300	0	0	0
2500	0	0	0
2800	11 Climate equivalent to: 2002-2003 = 2 days 2008-2009 = 5 days 2014-2015 = 4 days	0	0

137. The current allocation limit allows for 1536l/sec to be abstracted, which is some 39% of MALF. As noted above, according to advice from Cawthron, abstractions over 30% of MALF can be considered a high degree of flow alteration (on average across all rivers) and allocations of less than 30% are increasingly considered more conservative in terms of impact on the river.

138. Currently there is about 300 l/sec unallocated from within the existing allocation limit for the Tūtaekurī surface water limit. Some adjustments are required to ensure we properly account for the new calculation of surface water takes and zone 1 takes for the Tūtaekurī as explained above for the Ngaruroro.

139. Capping allocation at the current amount would both mean the low flow trigger is not reached as quickly and also offset the security of supply impact a higher trigger has on existing abstractors.

140. Because of this unallocated water, it means flow management options for the Tūtaekurī River are less constrained by adverse impacts on primary production and associated flow-on economic and social effects and potentially less contentious.

141. Council investigations using RHYHABSIM support the proposal from some stakeholders to raise the minimum flow for the Tutaekuri River. The existing minimum flow of 2000l/s was based on models that under-predicted the flow requirements of trout. In response to concerns raised by submitters though the previous planning process (RRMP), detailed investigation of trout habitat use were undertaken in the Tutaekuri River, in partnership with the Cawthron Institute and Fish and Game[18]. This demonstrated that a minimum flow greater than 2000l/s would be required to achieve a high level of protection for habitat of rainbow trout.

142. Further, the data in table 8 indicates that increasing the minimum flow from 2000l/s to 2500l/s will not make any appreciable difference to the security of supply for existing abstraction, while increasing the level of habitat protection from 65% to 75%. If security of supply does not change appreciably, economic activity would also not reduce appreciably. Any increase in minimum flow and associated decrease in allocation limit results in an opportunity cost that means any new or future demand for water will not be met.

143. However, this limit setting means that future demand would need to be met by high flow storage solutions rather than further abstraction.

144. The range of non-consensus about management options preferred for the Tūtaekurī River is illustrated in the following table.

	Option A	Option B	Option C	
Minimum Flow	Remains at 2000 l/sec	Increase to 2500 l/sec 1536-1140	**Step 1**. Notification; 2500l/sec **Step 2** 2025 increase to 2800l/sec **Step 3** 2030 increase to 3200l/sec	
			Note that new minimum flows apply at time permit is applied for or, if as a result of a review requirement, at the specified date provided the plan is operative by then	

	Option A	Option B	Option C	
Allocation Limit	Target allocation limit of 1140 l/sec (down from current limit at 1536l/sec) (a 25% reduction)	Target allocation limit of 1140 l/sec (down from current limit at 1536l/sec) (a 25% reduction)	*Either* Allocation limit[20] decreases at each step on a pro rata basis across all consents so that the following allocation limits can be met: **Step 1** Notification; actual and reasonable **Step 2** 2025 reduce to 736 l/sec (52% reduction) **Step 3** 2030 reduce to 336 l/sec (78% reduction)	*Or* Water is allocated on actual and reasonable use basis and permit holder subject to a lower security of supply with the higher minimum flow
			.	

145. **Option A** is for the allocation limit for the Tūtaekurī to be reduced by 395l/sec to 1140l/sec.

146. **Option B** is to reduce the allocation limit as in Option A and increase the minimum flow to 2500l/sec, this results in abstraction at 29% of MALF and provides a habitat protection level close to 80%. There was a high level of support for Option B (with concerns expressed by some about the impact of the new limits).

147. **Option C** reflects the Treaty Partners group position; they were seeking a higher minimum flow in the long term and this is illustrated by Option C in the following table.

The reasons supporting Option A;	**The costs or risks with Option A;**
Retaining the existing flow regime means reduced adverse impacts on social and economic well-being.	The level of habitat protection for aquatic species is not improved
There is little evidence that the existing flow regime is causing adverse effects on native fish.	
There are associated measures adopted to improving ecosystem habitat	Actual improvements to the environment as a result of the change may be difficult to measure, especially given other habitat improvements
The allocation limit (compared to MALF) is reduced to more environmentally conservative levels.	

[20] calculated by Q95 – minimum flow where Q95 is the 7 day avg summer flow exceeded 95% of time and for the Ngaruroro is 3981 L/s

[18] Wilding, 2018 Web Link

Reasons for supporting option B	The costs and risks with Option B
Provides higher level of habitat protection for aquatic species, especially indigenous species	A relatively high level of over-allocation needs to be phased out. (Actual use is likely to be significantly less than allocated use)
The higher minimum flow has minor impact on security of supply for existing users	Actual improvements to the environment as a result of the change may be difficult to measure, especially given other habitat improvements
There are associated measures adopted to improving ecosystem habitat	A reduction in abstraction limit has potential adverse impacts on well-being of existing permit holders

Reasons for supporting option C	The costs and risks with Option C
Provides higher level of habitat protection for aquatic species, especially indigenous species	Potential for high adverse effects on social cultural, and economic well-being including for Māori.
The timeframe for introducing new minimum flows is long and enables solutions and adaptation	Actual improvements to the environment as a result of the change may be difficult to measure, especially given other habitat improvements
Provides for the community ambitions to establish higher levels of protection for cultural and social well-being, including for Māori kaitiaki reasons	A very high level of over-allocation needs to be phased out
There are associated measures adopted to improving ecosystem habitat	A reduction in abstraction limit and potential adverse impacts on economic well-being of existing permit holders. Uncertainty about land use change as a result of decreasing allocations and how that might affect water storage options

148. The staff recommendation is that the Regional Planning Committee adopt Option B for Tūtaekurī River flow management and allocation for recommendation to the Council.

SUMMARY OF THE DEPARTMENT OF CONSERVATION THREAT CLASSIFICATION

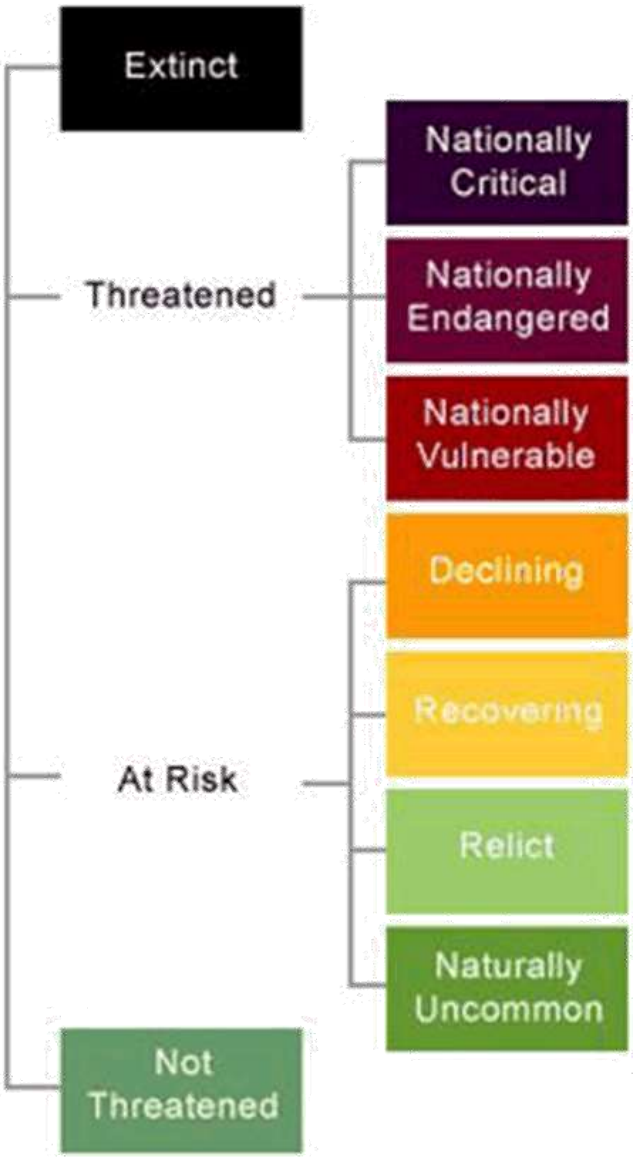


Table 1: Conservation threat status, migration behaviour, and location of fish and koura species recorded in the Ngaruroro River and its tributaries.

Common name	Conservation status[2]	Migratory	Upper River	Lower River		
				Braids	Flood control	Estuary
ENDEMIC SPECIES						
Black flounder	Not threatened	✓		✓		✓
Bluegill bully	At risk – declining	✓		✓	✓	
Common bully	Not threatened	✓		✓	✓	✓
Cran's bully	Not threatened			✓		
Dwarf galaxias (Northern)	At risk – declining			✓	✓	
Giant bully	Not threatened	✓				✓
Koura/freshwater crayfish	Gradual decline		✓	✓		
Longfin eel/tuna	At risk – declining	✓	✓	✓	✓	✓
Redfin bully	At risk – declining	✓		✓		✓
Smelt	Not threatened	✓		✓	✓	✓
Torrentfish	At risk – declining	✓	✓	✓	✓	✓
NATIVE SPECIES						
Cockabully/estuarine triplefin	Not threatened	marine				✓
Inanga	At risk – declining	✓		✓	✓	✓
Koaro	At risk – declining	✓	✓	✓		
Lamprey/piharau/kanakana	At risk – declining	✓				✓
Shortfin eel/tuna	Not threatened	✓		✓	✓	✓
Yelloweye mullet	Not threatened	marine				✓
Grey mullet	Not threatened	marine				✓
Kahawai	Not threatened	marine				✓

ENDS

Consideration of Trigger Flows for the Tutaekuri and Ngaruroro Rivers

Ppt explanation - Thomas Wilding, Jeff Smith and Rob Waldron presented to a subgroup 2/7/2018. Prompted by John Cheyne and organised by Tom Skerman. The meeting looked at where agreement might be reached on trigger flows for Ngaruroro and Tutaekuri.

Questions to consider:

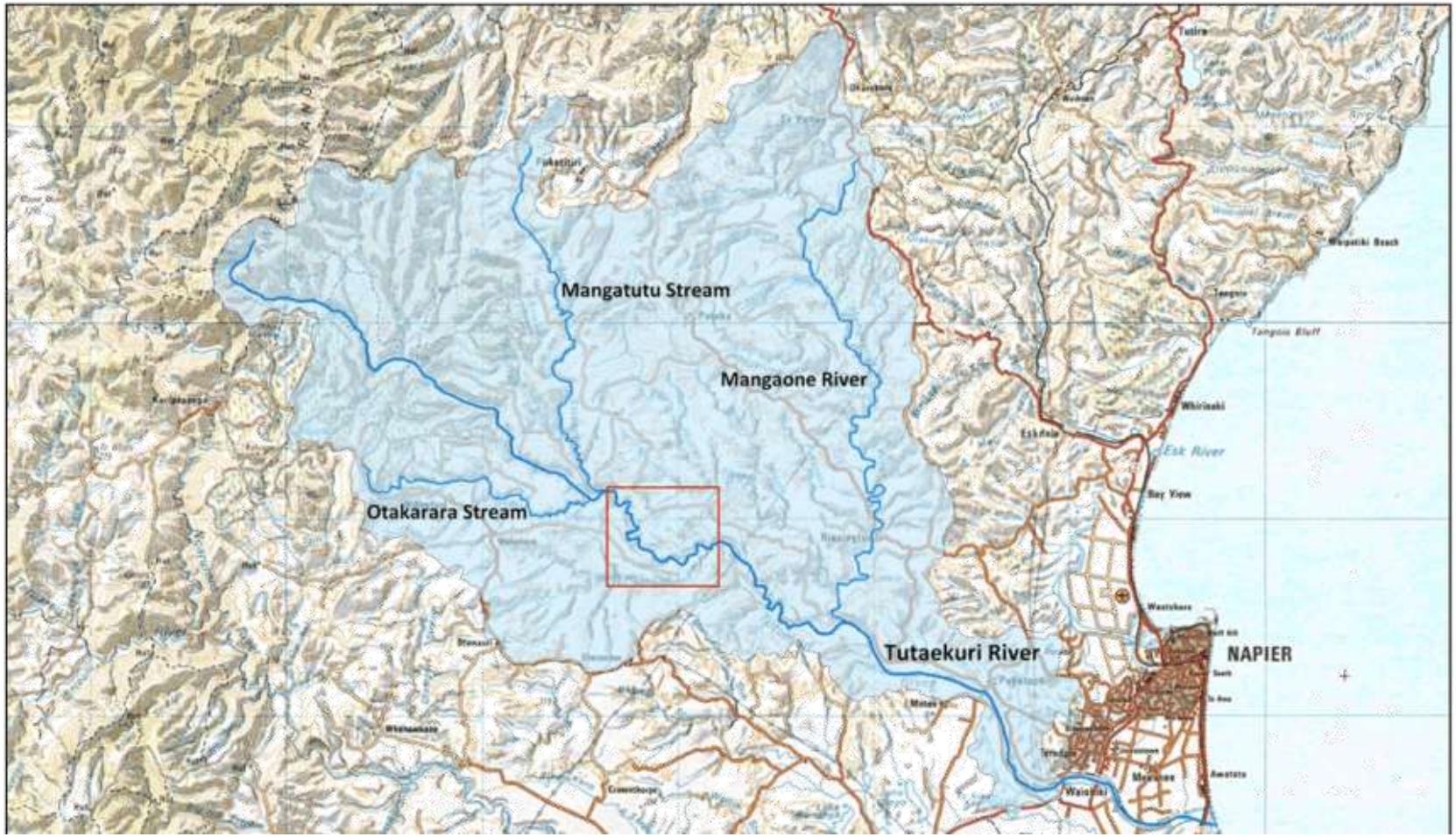
1. Trigger flow options for Ngaruroro and Tutaekuri – what benefits to expect from increasing trigger flows?
2. Mangatutu and Mangaone MALF and proposed allocation
3. MALF estimates vs. fish carrying capacity

1. Ngaruroro and Tutaekuri trigger flows

The science tells us:

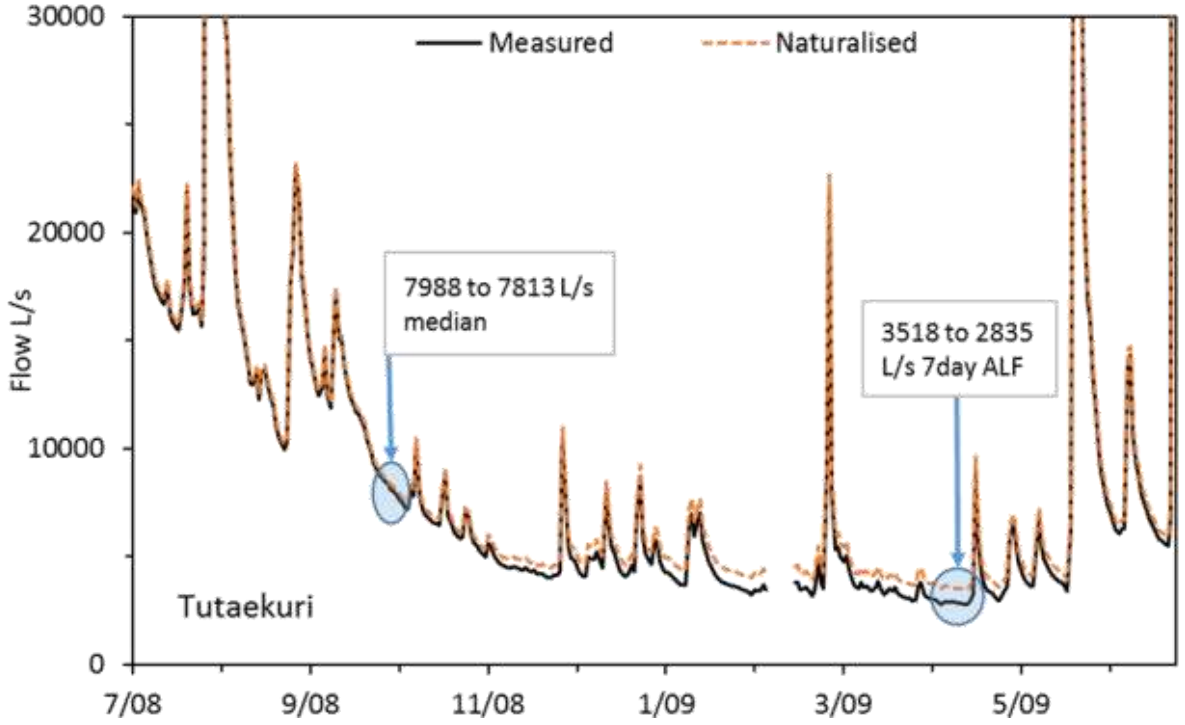
- Increasing trigger flows would have limited benefit … usually for short periods
- Greater benefit for the Ngaruroro River if effects of groundwater abstraction are remedied

Tutaekuri River



Tutaekuri

- Compare measured flow with naturalised
- Little or no effect at high to median flows
- Some flow alteration at low flows

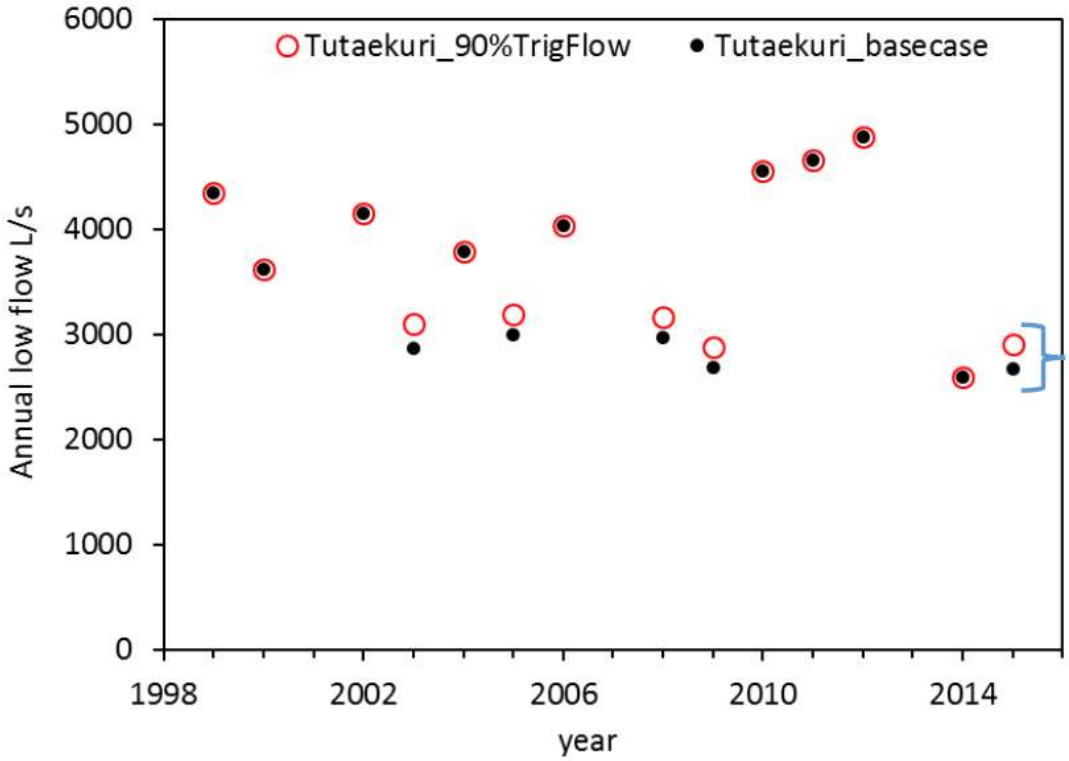


Focus on the low-flow period.

- How much flow is gained by adopting a higher trigger flow?
- Compare flows at existing trigger flow to predicted flow if a higher trigger flow was enforced

Tutaekuri

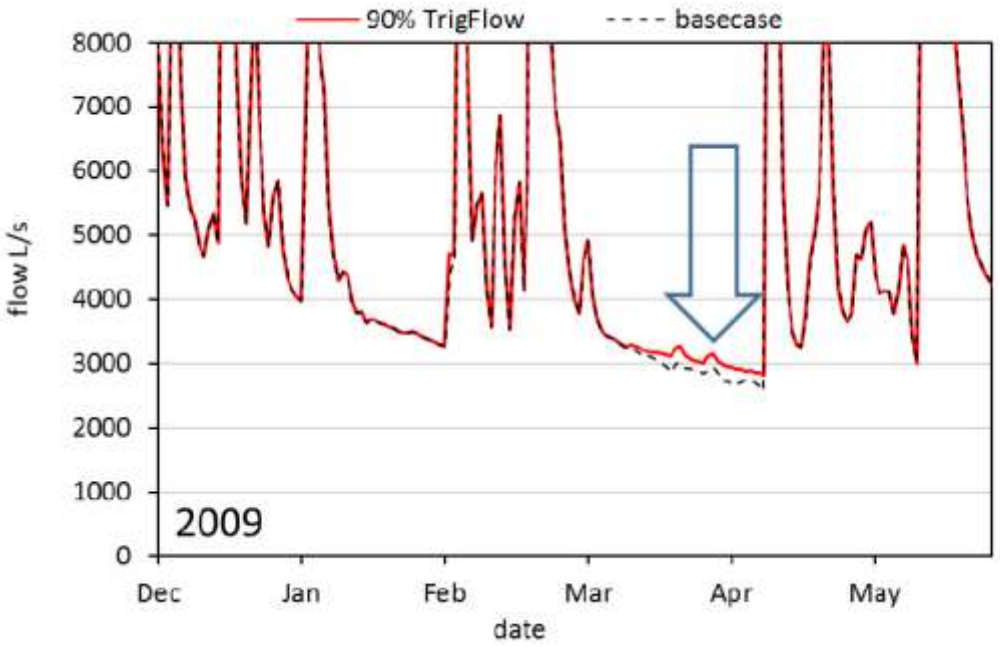
- Increasing trigger flow from 2,000 to 3,300 L/s would have increased annual-low-flow in some years

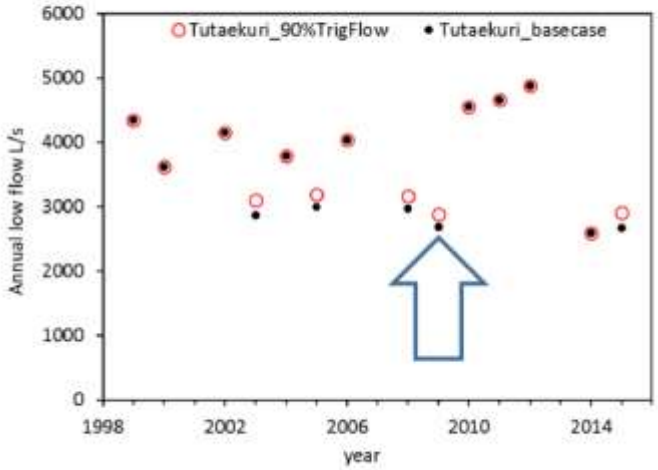


230 L/s more flow in driest week of 2015 (9% increase)

Tutaekuri – higher trigger flow

- Would have increased flow in 2009.

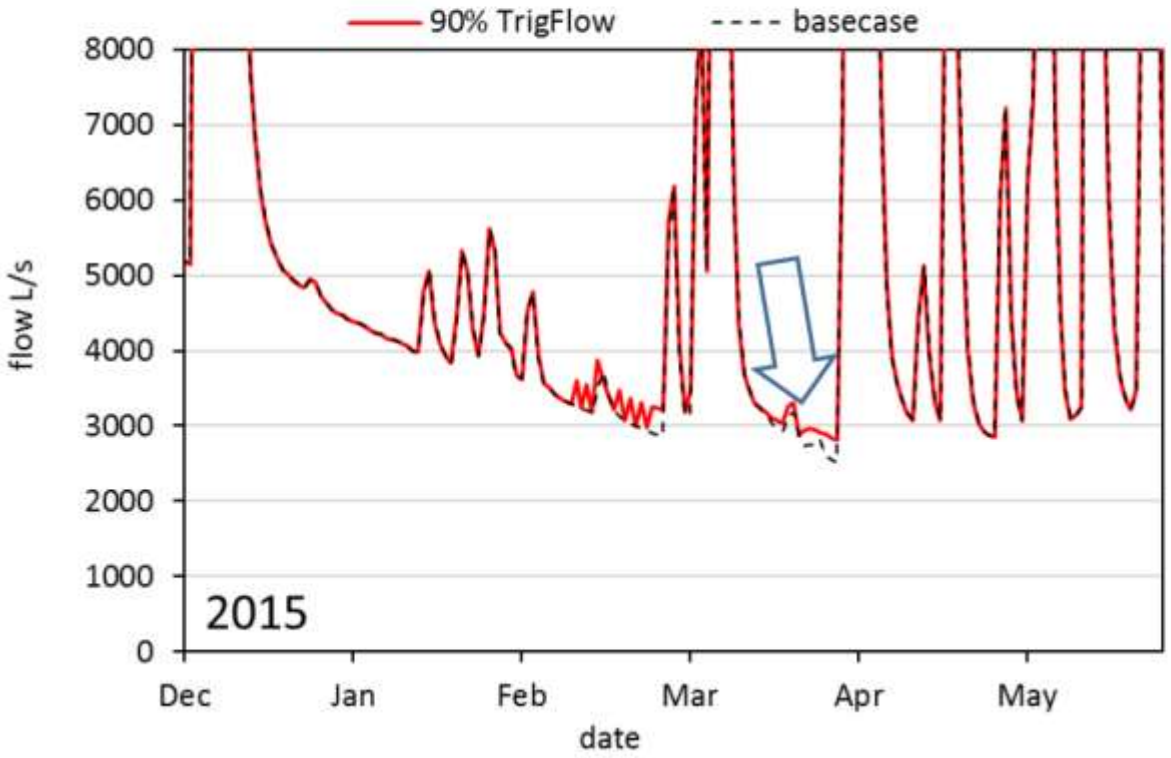


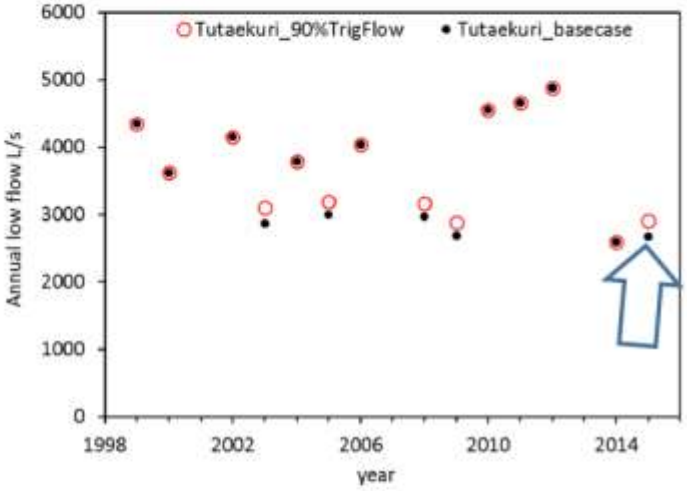


Maximum gain – 196 L/s

Tutaekuri – higher trigger flow

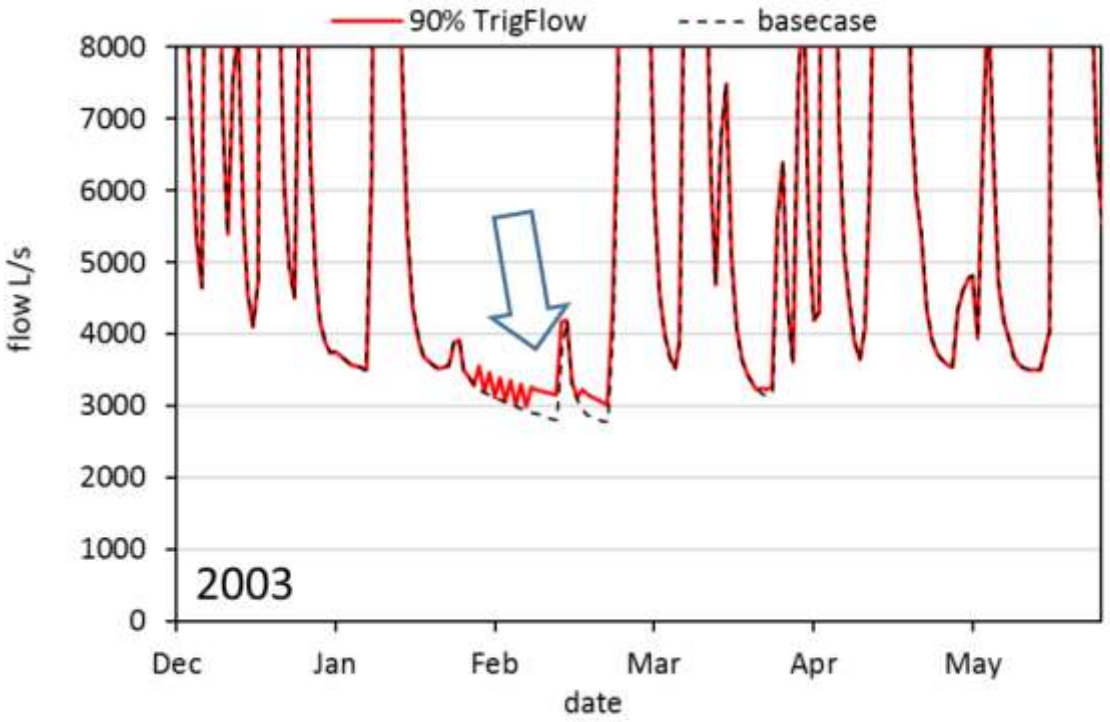
- Would have increased flow in 2015.

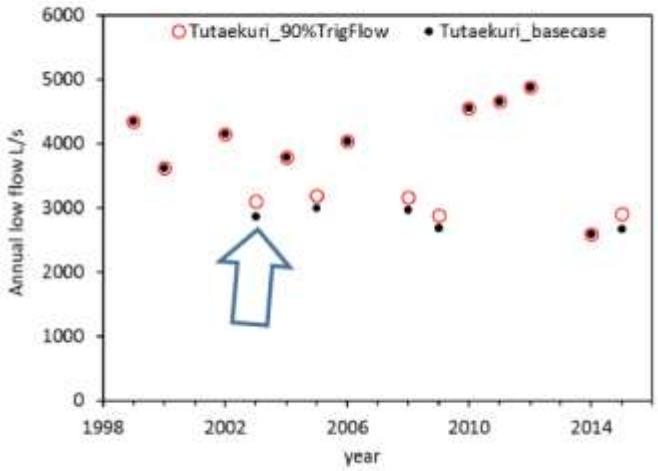




Tutaekuri – higher trigger flow

- Would have increased flow in 2003.

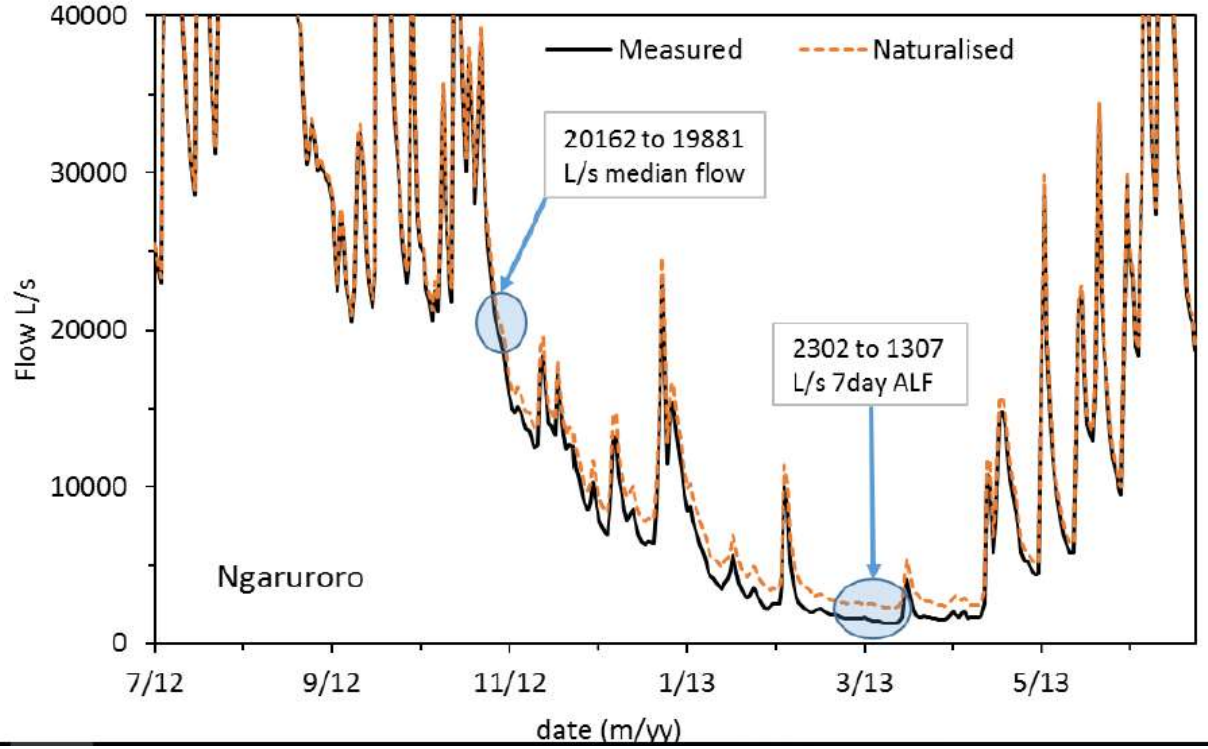




Ngaruroro River

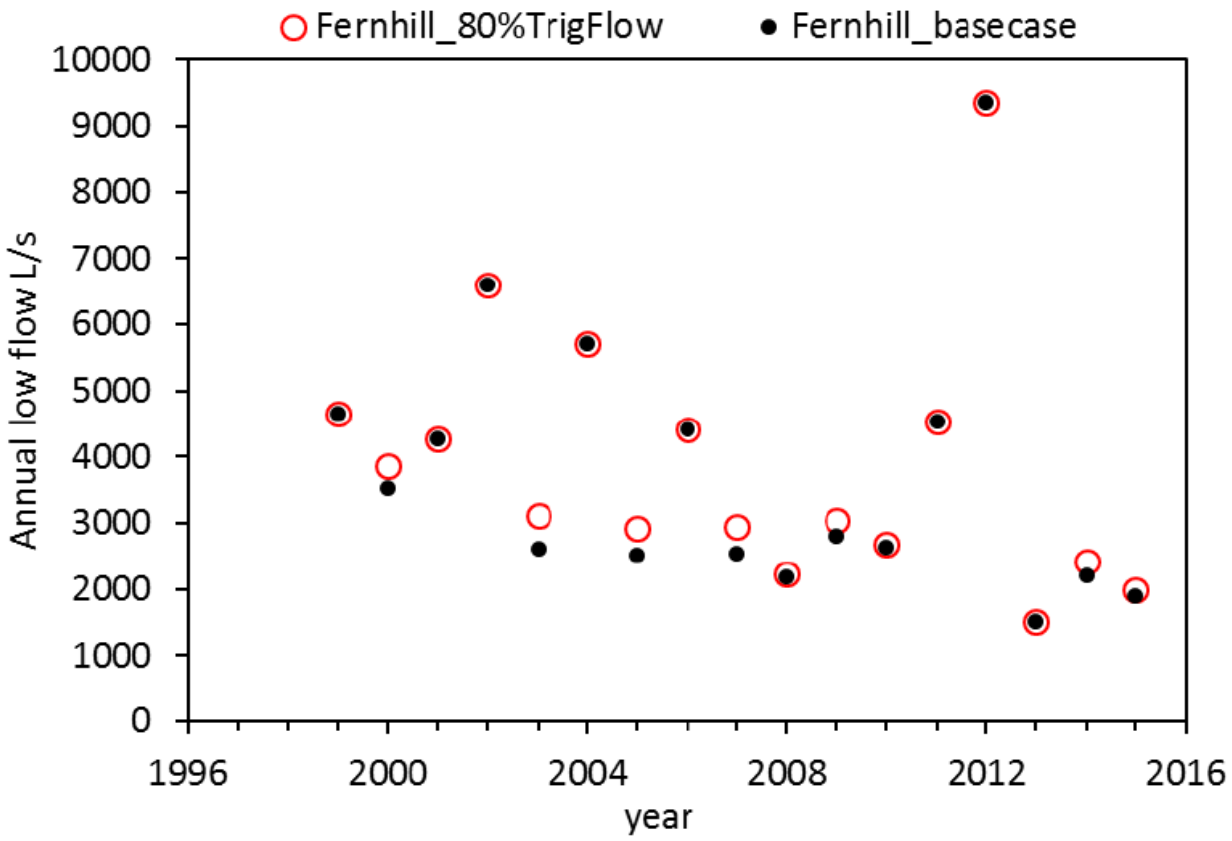
Ngaruroro

- Compare measured flow with naturalised
- Little or no effect at high to median flows
- Some flow alteration at low flows



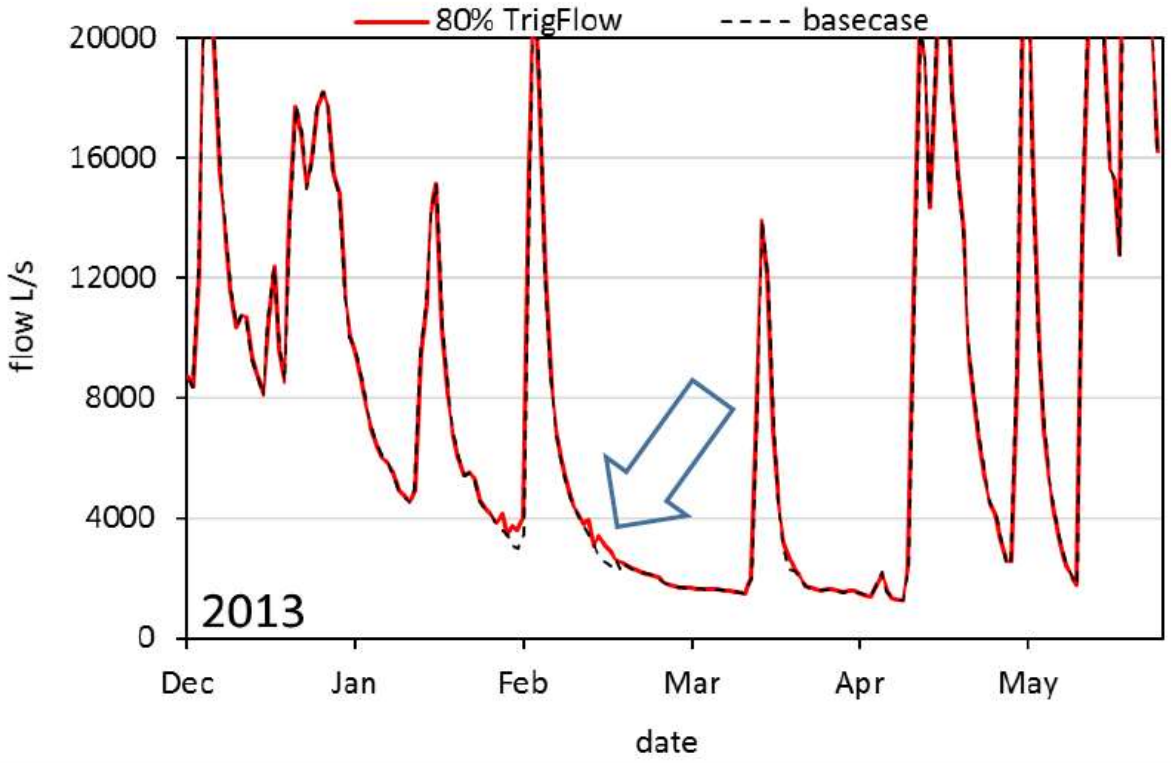
Ngaruroro

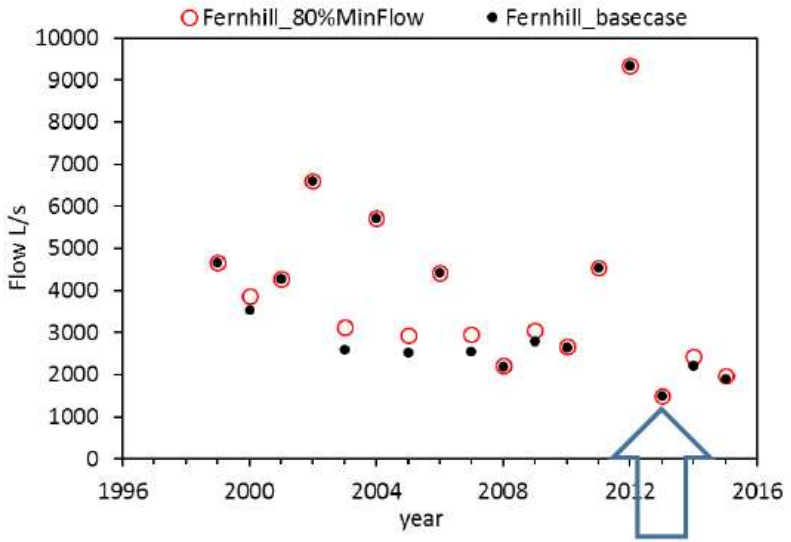
- Raising trigger flow from 2,400 to 4,000 L/s increases the annual-low-flow in some years



Ngaruroro - higher trigger flow

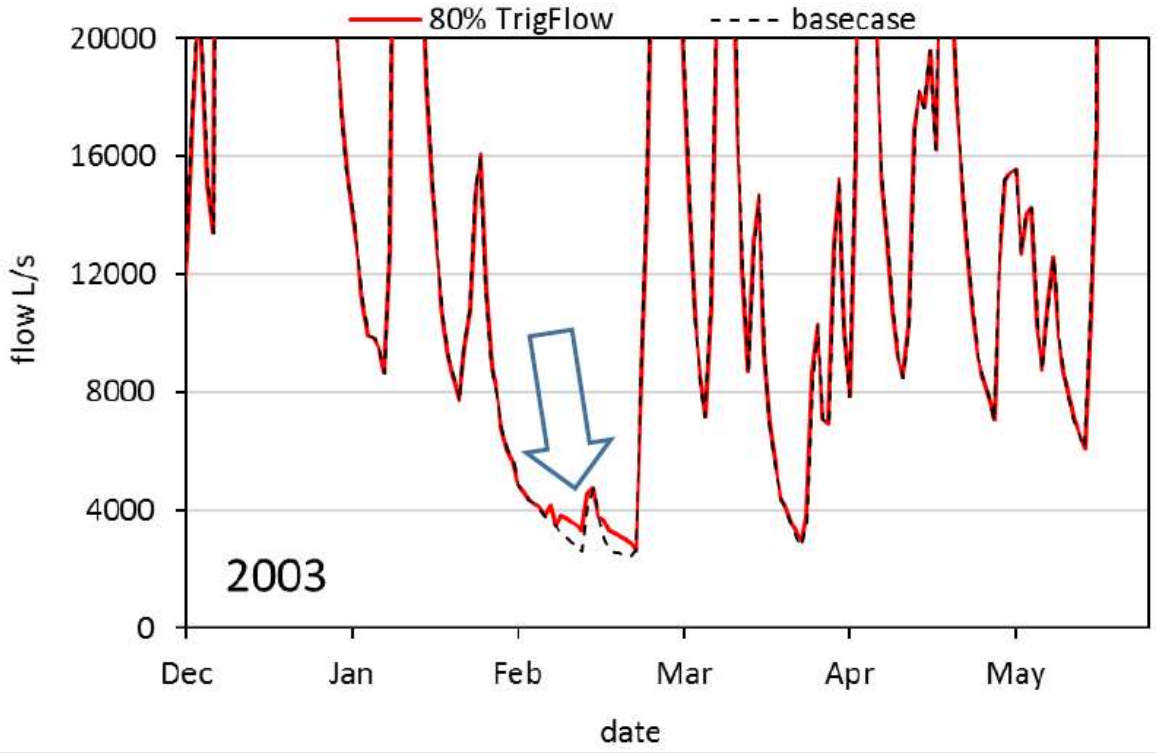
- Not much change in a drought year (2013) - already on ban

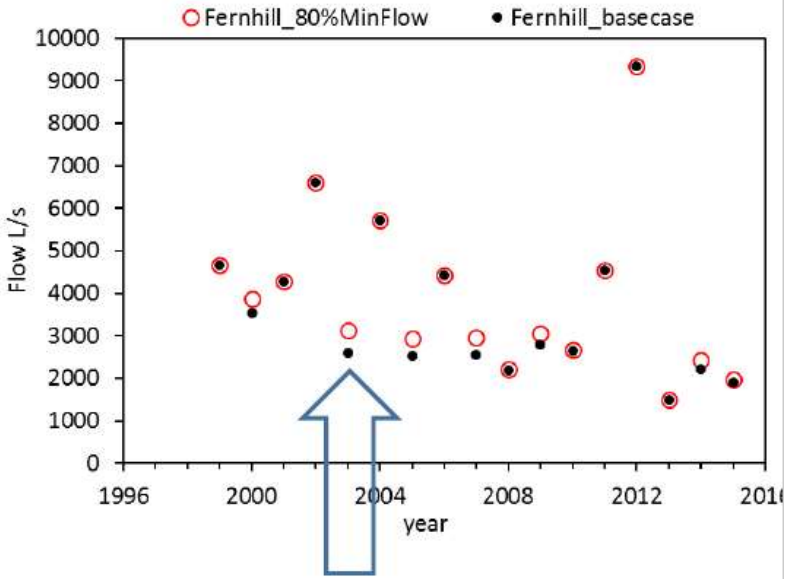




Ngaruroro - higher trigger flow

- more flow recovery in 2003





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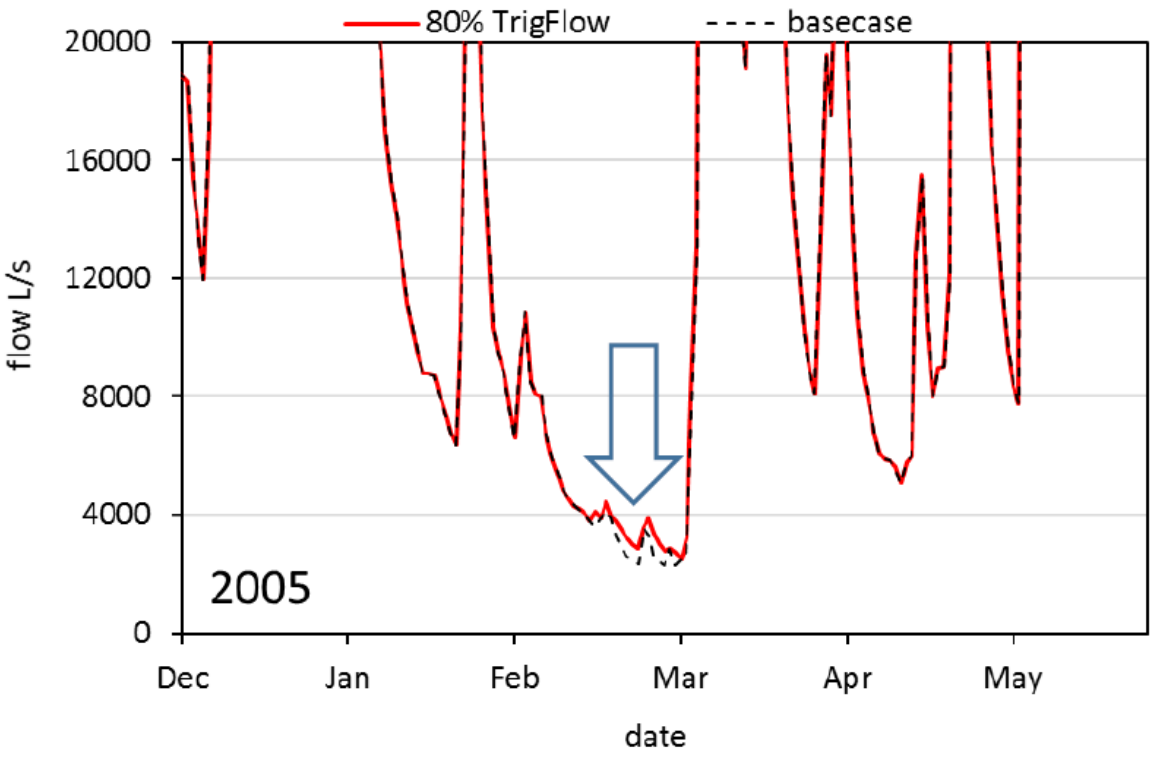
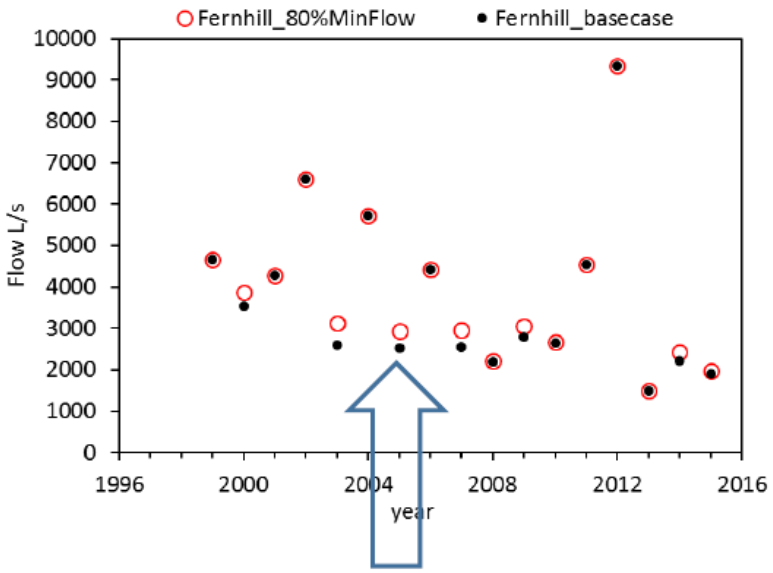
Attachment 4

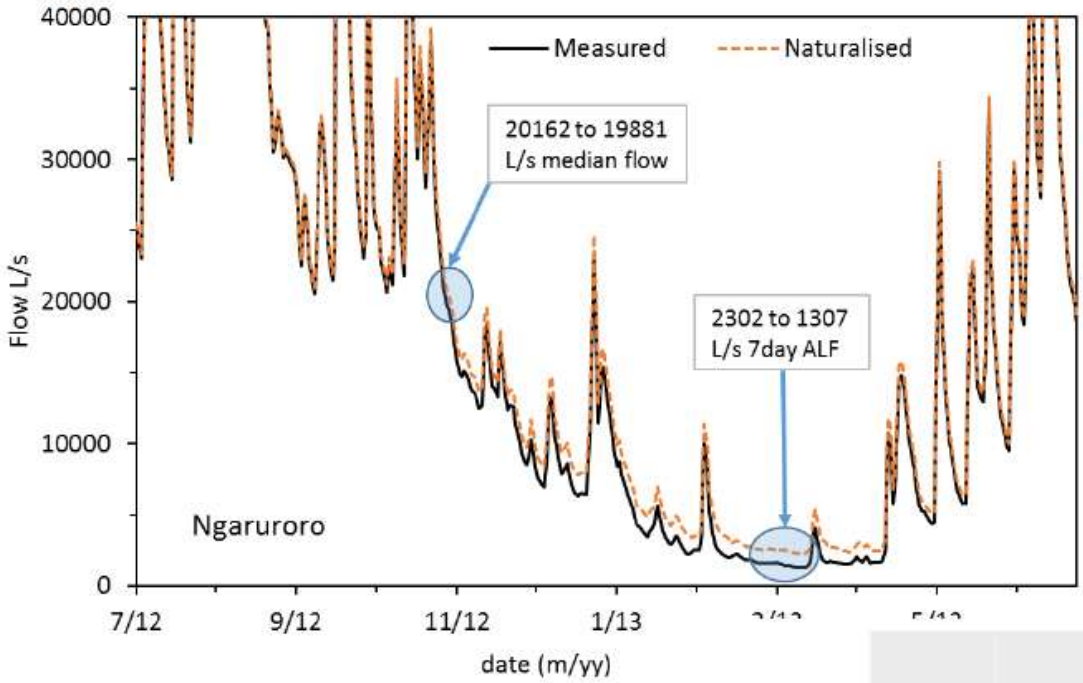
Ngaruroro - Higher trigger flow

- Longer benefit in 2005



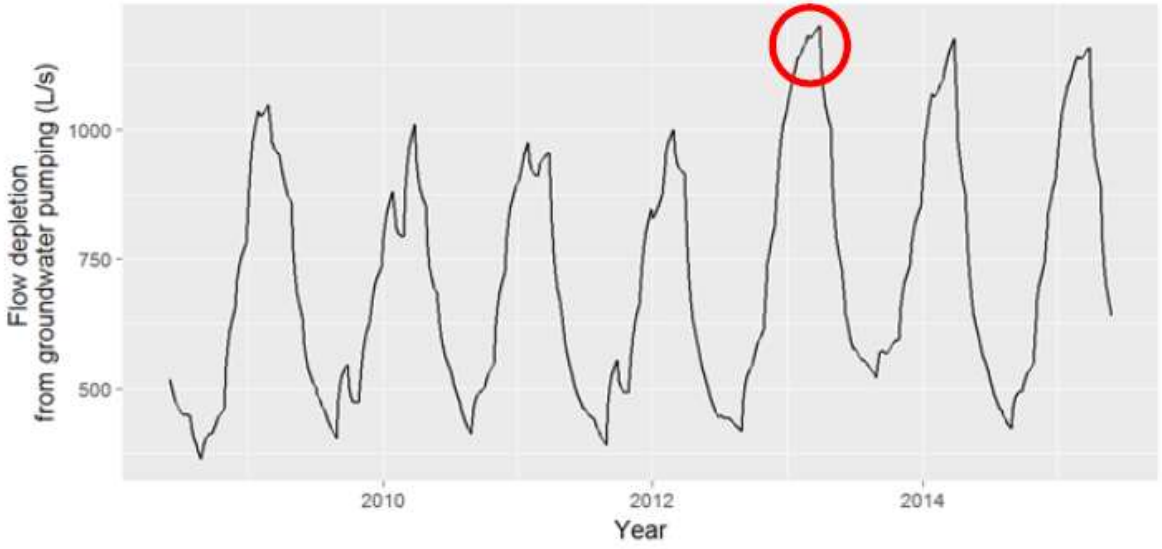


Ngaruroro River flow depletion



March 2013:
1,200 L/s flow loss caused by pumping

Groundwater modelling

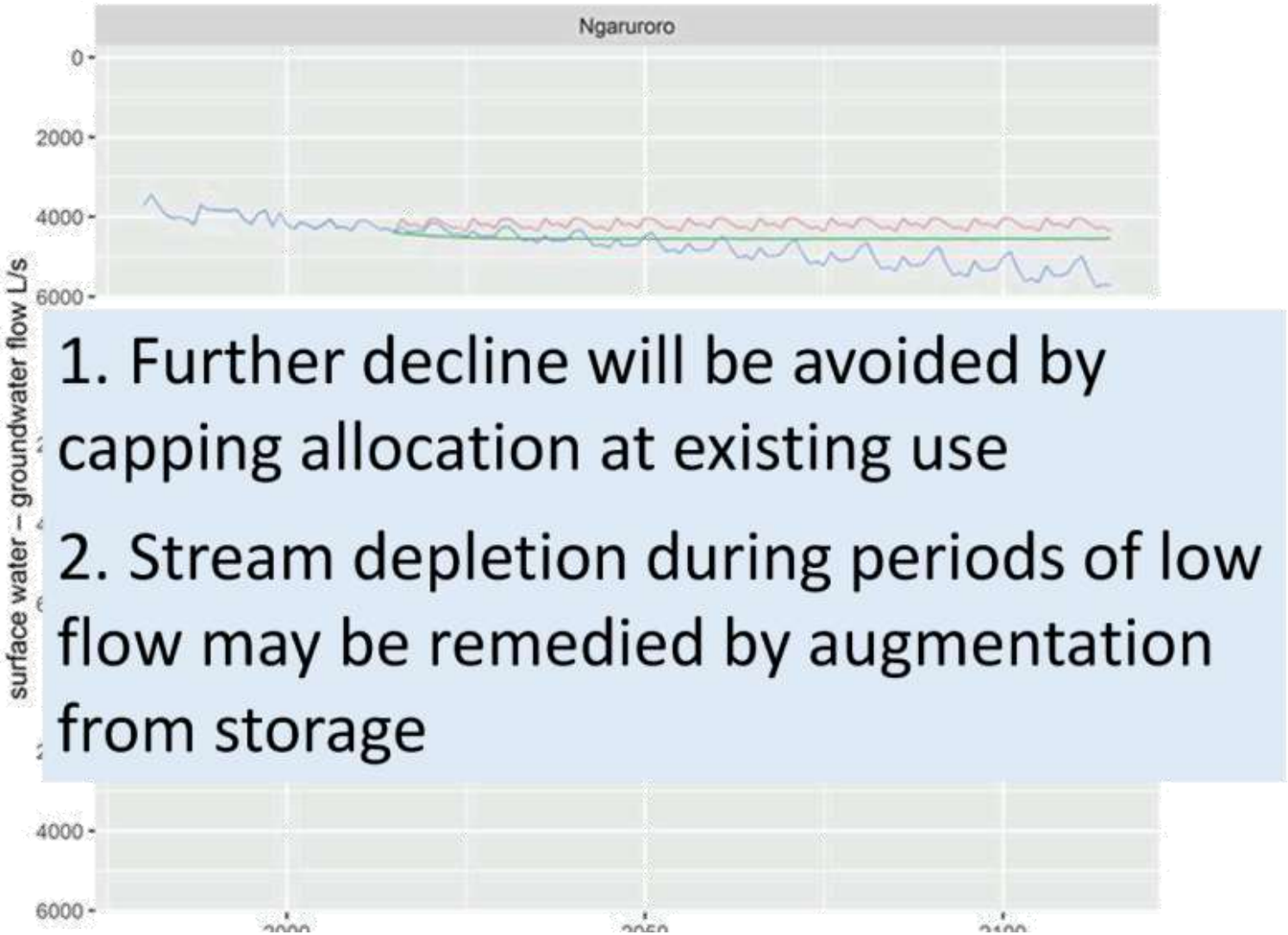


Item 7

Attachment 4

Attachment 4

Item 7



Question 1. Benefits from increased trigger flows for Ngaruroro and Tutaekuri

The science tells us:

- Increasing trigger flows would have limited benefit … usually for short periods
- Greater benefit for the Ngaruroro River if effects of groundwater abstraction are remedied

Questions to consider:

2. Mangatutu and Mangaone MALF and proposed allocation

Estimates from modelling

- Mangatutu MALF: 1200 L/s (10% = 120 L/s) (Station Br.)
- Mangaone MALF: 1500 L/s (10% = 150 L/s) (Rissington)

Questions to consider:

3. MALF estimates vs. fish carrying capacity

For Clarification and Discussion

HAWKE'S BAY REGIONAL COUNCIL

REGIONAL PLANNING COMMITTEE

Wednesday 12 September 2018

Subject: 2017-18 ANNUAL SUMMARY REPORT OF REGIONAL PLANNING COMMITTEE ACTIVITY

Reason for Report

1. This paper presents a summary of the Regional Planning Committee's activities during the 2017-18 financial year.

Discussion

2. The Council's Annual Plan identified within the *Community Representation & Regional Leadership* group of that at the end of each financial year, an Annual Report on Regional Planning Committee activities will be produced at the end of each financial year for inclusion in the Council's Annual Report.
3. The attached draft RPC annual activity report has been prepared to fulfil this requirement covering the 2017-18 financial year period and is included in the Council's 2017-18 Draft Annual Report. This summary of RPC activities is part of a broader section at the beginning of the Annual Report on 'Māori contributions to decision-making.'
4. The Council's 2017-18 Draft Annual Report also features a summary of the Council's activities to progressively implement the National Policy Statement for Freshwater Management. A copy of that summary is also attached to this paper. Annual reporting on NPSFM progressive implementation is required by the NPSFM.

Decision Making Process

5. 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 Regional Planning Committee receives and notes the ***'2017-18 Annual Summary Report of Regional Planning Committee Activity'*** staff report.

Authored by:

Gavin Ide
MANAGER POLICY AND PLANNING

Approved by:

Tom Skerman
GROUP MANAGER STRATEGIC PLANNING

Attachment/s

⇩**1** Extracts from Draft 2017-18 Annual Report re RPC activity and NPSFM Implementation

Report on Māori Contributions to Decision-Making Processes

Clause 35 to Schedule 10 of the Local Government Act 2002 requires Council to include in its annual report a report on the activities that Council has undertaken in the year to establish and maintain processes to provide for opportunities for Maori to contribute to Council's decision-making processes.

Regional Planning Committee

The Regional Planning Committee ('RPC') was first established by the Council in 2011. In August 2015, the Hawke's Bay Regional Planning Committee Act 2015 came into effect and formalised the arrangements for the RPC. The purpose of the Act is to improve tangata whenua involvement in the development and review of plans prepared by the Council under the Resource Management Act.

Having been permanently established, the RPC is not dissolved every three years while local body elections take place. This enables the RPC, and in particular the Treaty settlement claimant groups, to oversee development and review of regional plans and policy statement documents under the RMA – processes which often span multiple years for longer-term environmental outcomes.

The RPC operates under the principles of co-governance to ensure that tāngata whenua are active decision makers in managing their tāonga under the RMA. The RPC has two co-chairs: Mr Toro Waaka (appointed by tāngata whenua members) and Regional Council Chairperson, Mr Rex Graham.

Eleven RPC meetings were scheduled between 1 July 2017 and 30 June 2018.[1] In 2017, the RPC typically met every month, then in 2018, the RPC returned to six-weekly meeting intervals. A number of matters were considered by the RPC throughout the year – many of which were furthering workstreams from the previous year. Matters considered by the RPC during 2017-18 included:

a) deciding on tāngata whenua representative appointments to several of the Council's other committees (being the Strategic and Corporate Committee, the Hearings Committee, the Environment and Services Committee and also the Biosecurity Working Party).

b) considering suggestions and options for revising the RPC's own Terms of Reference to align with the Hawke's Bay Regional Planning Committee Act which came into effect in August 2015. The RPC considered revisions to the Terms of Reference on a number of occasions during the 2017/18 period, but no revised Terms of Reference have yet been agreed amongst committee members. The current operating Terms of Reference for the RPC date back to 2014.

c) remuneration of RPC tāngata whenua members is one of the matters covered in the Committee's Terms of Reference. A special report was commissioned to look at fair and reasonable remuneration for the RPC's tangata whenua members (and also members of HBRC's Māori Committee). The Council has since altered remuneration payments for RPC tāngata whenua members from a fixed daily meeting fee to an annual honorarium for each member. Members' travel expenses to/from meetings continue to be covered by the Council.

d) considering several options for improving water security within the Tukituki River catchment following the Council deciding to shelve plans for investing in the Ruataniwha Water Storage Scheme.

e) receiving advice from staff on potential content of a narrowly scoped plan change intended to address urgent implementation matters arising from Tukituki Plan Change 6. The RPC was unable to reach agreement on a process and potential scope of any such plan change. Consequently, there was no recommendation made from the RPC to the Council. In June 2018, the Council adopted its 2018-28 Long Term Plan without any specific resourcing provision being prioritised for a plan change to aid implementation of Tukituki Plan Change 6.

f) In August, the RPC considered a draft submission for potentially lodging on the Ngaruroro and Clive River Water Conservation Order application. The RPC was unable to agree on what it should recommend to Council about content of the submission. Subsequently, the Council decided to lodge a submission to the Special Tribunal in opposition to the WCO application.

g) maintaining its oversight of the TANK Collaborative Stakeholder Group's discussions and drafting of the draft TANK plan change ('PC9'). This occurred throughout 2017-18 as the TANK Group reached agreements

[1] *Eleven meetings were scheduled, but three of those meetings were not officially constituted or cancelled in advance due to a lack of a quorum of members in attendance. The Committee's tāngata whenua members typically convened their own hui a day prior to the full Committee meeting.*

on an increasing number of matters relating to land and freshwater management within the Greater Heretaunga / Ahuriri catchment area.

h) considering options and further revised options for researching and assessing outstanding recreational, ecological, cultural and landscape values of the region's exceptional freshwater bodies. In May 2018, the RPC had nominated 21 candidate waterbodies for further secondary assessment of those waterbodies' outstanding values. Identification of the region's outstanding freshwater bodies is one action required by the Government's National Policy Statement for Freshwater Management, but this has not been a straightforward exercise. In March, the RPC agreed that its Co-Chairs would write to the Minister for the Environment requesting reconsideration and clarification of the outstanding waterbodies cultural values provisions in the NPSFM.

i) continuing to oversee development of a stronger approach for regulating oil and gas exploration activities offshore and around the region's waterbodies. The RPC had progressed the project up to a point ready for targeted iwi and stakeholder input. However, in April 2018, the Prime Minister announced that the Government would be banning any further new offshore oil exploration. In light of the Prime Minister's announcement, the RPC supported pausing the Council's own plan change project and the targeted iwi and stakeholder input phase did not proceed.

j) receiving a consultant's report summarising the effectiveness of some specific parts of the Hawke's Bay Regional Resource Management Plan (RRMP). The RMA requires councils to report on the effectiveness of their regional plans at least every five years.

k) continuing to receive regular update reports from staff about consent applications and proposed district plan changes that the Council had previously submitted to other councils on.

l) In early 2018, a review of the RPC's performance was initiated. The Hawke's Bay Regional Planning Committee Act requires the review to be done by September 2018 (i.e. three years after the Act came into force).

m) presentations from several individuals and organisations covering:

- the Resource Management Amendment Act 2017 and in particular implications of the amendments for the RPC's work overseeing HBRC's RMA planning documents.
- an introduction by officials from Ministry for the Environment about the RMA's new provisions for Mana Whakahono a Rohe arrangements between councils and iwi groups.
- Myrtle rust incursion into New Zealand.
- the experiences of Ngati Pahauwera in progressing application to the Crown for recognition of customary activities in the coastal marine area.
- the concerns of members of the Central Hawke's Bay community about the impact of Plan Change 6's new minimum flows and water allocation rules coming into effect from mid-2018, and what the RPC/Council could do to assist water users with timing and impact of that step-change.
- science of the Heretaunga Plains water resource and the system's complex interactions between rivers, stream, springs and groundwater.
- economic theory, accounting methods and the Māori economy (a presentation by Dr Antony Cole who is a kaupapa Māori transdisciplinary researcher).
- two presenters' perspectives on the degree of regulation of oil and gas activities in the Hawke's Bay region and in other jurisdictions.

Appendix A - Key activities for progressively implementing the 2014 National Policy Statement for Freshwater Management

ID	Description	Status
1	**Tukituki River catchment plan change (PC6).** During 2017-18, the Regional Planning Committee (RPC) considered several options for improving water security within the Tukituki River catchment following the Council deciding to shelve plans for investing in the Ruataniwha Water Storage Scheme. The RPC received advice from staff on potential content of a narrowly scoped plan change intended to address urgent implementation matters arising from Tukituki Plan Change 6. The RPC was unable to reach agreement on a process and potential scope of any such plan change. Consequently, there was no recommendation made from the RPC to the Council. In June 2018, the Council adopted its 2018-28 Long Term Plan without any specific resourcing provision being prioritised for a plan change that would aid implementation of Tukituki Plan Change 6.	Operative 1 Oct 2015
2	**Greater Heretaunga / Ahuriri Catchment Area (aka 'TANK' catchments[2]) plan change.** The RPC maintained its oversight of the TANK Collaborative Stakeholder Group's discussions and drafting of the draft TANK plan change ('PC9'). This occurred throughout 2017-18 as the TANK Group reached agreements on an increasing number of matters relating to land and freshwater management within the Greater Heretaunga / Ahuriri catchment area. During 2017-18, the TANK Group held meetings 30 to 41. In addition to the full TANK Group meetings, many additional meetings and discussions were held amongst smaller working groups and sub-groups looking at specific matters such as stormwater, wetlands, protection of human drinking water sources, water augmentation, and cultural values.	Plan Change in preparation. To be publicly notified in 2018-19.
3	**Outstanding waterbodies plan change** During 2017-18, the RPC considered options and further revised options for researching and assessing outstanding recreational, ecological, cultural and landscape values of the region's exceptional freshwater bodies. In May 2018, the RPC had nominated 21 candidate waterbodies for further secondary assessment of those waterbodies' outstanding values. Identification of the region's outstanding freshwater bodies is one action required by the Government's National Policy Statement for Freshwater Management, but this has not been a straightforward exercise. In March, the RPC agreed that its Co-Chairs would write to the Minister for the Environment requesting reconsideration and clarification of the outstanding waterbodies cultural values provisions in the NPSFM.	Plan change in preparation. To be publicly notified in 2018-19.
4	**Plan Change 5 to RRMP** (integrated land and freshwater management) Part of the last remaining appeal (by Fish and Game) relating to wetlands in the RRMP and Plan Change 5 is unresolved. An Environment Court hearing was held 11 -12 September 2017 and adjourned, awaiting closing legal submissions from parties and Court-facilitated caucusing of expert witness planners. ETA of Environment Court's decision is not known.	Subject to part of one remaining appeal in the Environment Court.

[2] 'TANK' catchments refers to the Tutaekuri, Ahuriri, Ngaruroro and Karamu surface water catchment areas, plus the Heretaunga Plains groundwater system.

ID	Description	Status
5	**Plan change for greater regulation of oil and gas exploration activities** The RPC continued its work overseeing development of a stronger approach for regulating oil and gas exploration activities offshore and around the region's waterbodies. The RPC had progressed the project up to a point ready for targeted iwi and stakeholder input. However, in mid-April 2018, the Prime Minister announced that the Government would be banning any further new offshore oil exploration. In light of the Prime Minister's announcement, the RPC supported pausing the Council's own plan change project and the targeted iwi and stakeholder input phase did not proceed. The oil and gas plan change project is on-hold awaiting further direction from the RPC and the Council about next steps given the Government's announcements earlier in 2018.	Plan change in preparation, but paused pending further direction from RPC and Council.
6	**Mohaka River catchment plan change** A Draft Mohaka plan change work programme had been prepared and was presented to the RPC in September 2016. Due to other planning staff commitments and priorities, further policy option evaluation and stakeholder engagement has been postponed. Further progress on policy options and stakeholder engagement is subject to recruitment of senior planning expertise in 2018-19. Meanwhile, environmental science data and information gathering in the catchment is ongoing, as is land management liaison with landholders in the upper Mohaka/Taharua catchment area.	Under preparation. Not yet publicly notified.
7	**Rest of Region plan change** (i.e. covering all other catchments in the Hawke's Bay region that are not within the Tukituki, TANK or Mohaka catchment areas)	Not scheduled for 2017-18. To commence in 2020-21.
8	**Ngaruroro Water Conservation Order application** The Council lodged a submission in opposition to an application for a Water Conservation Order for the Ngaruroro and Clive Rivers. The application and submissions are being considered by a Special Tribunal appointed by the Minister for the Environment.	Ongoing

NOTE 1: The Council's revised second edition of its progressive implementation programme ('PIP') was notified in November 2015. Following amendments to the NPSFM in 2017, that PIP must now be reviewed and revised if necessary. A further revised third edition of the PIP must be adopted notified by Council before 31 Dec 2018.

NOTE 2: In terms of involvement of tāngata whenua in (i.e. Objective D1 and Policy D1 of the NPSFM), further commentary on this is outlined in the Introductory section of this Annual Report.

NOTE 3: This Appendix does not outline the wide range of other activities (e.g. environmental monitoring, science information, land management services, open space activities etc that underpin, inform and implement changes to the RRMP. Refer to the separate activity reports elsewhere in this Annual Report.

HAWKE'S BAY REGIONAL COUNCIL

REGIONAL PLANNING COMMITTEE

Wednesday 12 September 2018

SUBJECT: RMA POLICY PLANNING PROJECTS UPDATE

Reason for Report

1. This report provides an outline and update of the Council's various resource management projects currently underway (i.e. the regular update reporting presented to every second meeting of the Regional Planning Committee).

Resource management policy project update

2. The projects covered in this report are those involving reviews and/or changes under the Resource Management Act to one or more of the following planning documents:
   - 2.1. the Hawke's Bay Regional Resource Management Plan (RRMP)
   - 2.2. the Hawke's Bay Regional Policy Statement (RPS) which is incorporated into the RRMP
   - 2.3. the Hawke's Bay Regional Coastal Environment Plan (RCEP).
3. From time to time, separate reports additional to this one may be presented to the Committee for fuller updates on specific plan change projects.
4. The newly adopted 2018-28 Long Term Plan specifies high level statements and measures for Levels of Service in the Strategic Planning Group of activities. The Long Term Plan no longer specifies required actions for each financial year. Consequently, the table in **Attachment 1** looks slightly different to update reporting previously presented to the Committee.
5. Similar periodical reporting is also presented to the Council as part of the quarterly reporting and end of year Annual Plan reporting requirements.

Decision Making Process

6. 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 Regional Planning Committee receives and takes note of the '***RMA Policy Planning Projects Update***' staff report.

Authored by:

Gavin Ide
MANAGER POLICY AND PLANNING

Approved by:

Tom Skerman
GROUP MANAGER STRATEGIC PLANNING

Attachment/s

⇩**1** HBRC RMA Plan Change Preparation & Review Projects

Status Report on HBRC Resource Management Plan Change Preparation & Review Projects (as at 31 August 2018)

Project	Narrative update	Next intended reporting to RPC
'PC5' Integrated land & freshwater management	Publicly notified, Decisions on submissions partly subject to appeal. Part of the last remaining appeal (by Fish and Game) relating to wetlands in the RRMP and Plan Change 5 is unresolved. Environment Court hearing was held 11-12 September 2017 and adjourned, awaiting closing legal submissions from parties and Court-facilitated caucusing of expert witness planners. ETA of Environment Court's decision is not known.	12 December 2018
'PC7' Outstanding waterbodies plan change	Under preparation. Not yet notified Refer separate report on RPC's 2 May 2018 meeting agenda. A fuller project recap and various options were featured in staff report presented to the RPC meeting on 21 March. The current phase of work involves planning staff meeting with iwi authorities, TLAs and the other stakeholders previously agreed by the Committee. The principal purpose of the meetings is to seek feedback on the secondary assessments prepared in relation to the 21 candidate waterbodies as agreed by the Committee earlier this year. Very few replies received to date from iwi authorities in response to staff's offer to meet and discuss this project. Further update reporting on feedback from targeted consultation with groups intended to be presented to the RPC's meeting in December.	12 December 2018
'PC8' Taharua & Mohaka Catchment plan change	Under preparation. Not yet notified. Project re-design occurring in 2018-19 period.	12 December 2018
'PC9' Greater Heretaunga/ Ahuriri catchment area plan change (a.k.a. TANK project)	Under preparation. Not yet notified. Refer separate item on 12 September 2018 RPC meeting agenda.	Meetings scheduled for 19th and 25th September.
'PC10' Oil and gas regulation	Refer separate item on 12 September RPC meeting agenda. This is the same report that was published for the RPC's meeting on 20th June 2018.	TBD. Subject to decisions made at RPC's 12 Sept 2018 meeting
Progressive Implementation of, and reporting on, NPS for Freshwater Management	Revised progressive implementation programme ('PIP') was notified in November 2015. This can be viewed on HBRC's website. Following amendments to the NPSFM in 2017, that PIP must be reviewed and revised if necessary. A further revised third edition of the PIP must be adopted notified by Council by 31 Dec 2018. The Council's recently adopted 2018-28 Long Term Plan will underpin the shape and speed of the PIP's 3rd edition. Annual progress reporting on implementation during 2017/18 period will feature as part of the Council's Annual Report due late 2018.	
Responsiveness to 'National Direction' (i.e. legislation incl NPSs, national Regulations, national standards, etc).	**NES for Plantation Forestry** – NES has been finalised and came into effect from 1 May 2018. NESPF will impact operational activities of HBRC Consent and Compliance teams. 'Plan alignment' amendments to RRMP and RCEP	

Project	Narrative update	Next intended reporting to RPC
	still to be completed when staff capacity allows later this year. **Review of NES on Air Quality** – New Environment Minister is determining next steps. Likely a proposal for a revised NESAQ will be released for public feedback in late2018 / early 2019. **Review of NES for Human Drinking Water Sources** – New Environment Minister is determining next steps. Likely a proposal for review will be circulated amongst local government and other stakeholders during late 2018. **NPS on Urban Development Capacity** – in effect Dec 2016. Will influence HBRC's role in ongoing implementation of the Heretaunga Plains Urban Development Strategy ('HPUDS') and also the RPS. NPSUDC will also have implications for all TLAs, irrespective of projected rates of residential and business land growth demands. **NPSFM Amendments** - Minister has announced an intention to make further amendments to the NPSFM, although details or specifics are not yet clear. **RMA Amendments** – Minister has announced an intention to amend the RMA and roll-back some of the amendments passed in 2017. Details and scope are not yet available. **Zero Carbon Bill** – Bill yet to be released but anticipated late 2018. Submissions closed on Government's Consultation Document on 19 July. HBRC's submission is on website. Much of the national direction remains uncertain as the Labour-led government and its Ministers adjust their respective Ministries work programme direction.	
Statutory Acknowledgements of Treaty settlements	**Heretaunga Tamatea Claims Settlement Act 2018** in effect from 28 June 2018. From 22 February 2019, Statutory Acknowledgements (text and maps) to be appended to HBRC's RRMP and RCEP (refer s27 of Act), and consent authorities to have regard to the Crown's statutory acknowledgements. *Refer to Pātaka online mapping tool for further information [website link] about current Statutory Acknowledgements in Hawke's Bay region that have been passed in various Treaty settlement statutes.*	

HAWKE'S BAY REGIONAL COUNCIL

REGIONAL PLANNING COMMITTEE

Wednesday 12 September 2018

SUBJECT: STATUTORY ADVOCACY UPDATE

Reason for Report

1. To report on proposals forwarded to the Regional Council and assessed by staff acting under delegated authority as part of the Council's Statutory Advocacy project since the last update in May 2018.
2. The Statutory Advocacy project (Project 196) centres on resource management-related proposals upon which the Regional Council has an opportunity to make comments or to lodge a submission. These include, but are not limited to:
    2.1. resource consent applications publicly notified by a territorial authority,
    2.2. district plan reviews or district plan changes released by a territorial authority,
    2.3. private plan change requests publicly notified by a territorial authority,
    2.4. notices of requirements for designations in district plans,
    2.5. non-statutory strategies, structure plans, registrations, etc prepared by territorial authorities, government ministries or other agencies involved in resource management.
3. In all cases, the Regional Council is **not** the decision-maker, applicant nor proponent. In the Statutory Advocacy project, the Regional Council is purely an agency with an opportunity to make comments or lodge submissions on others' proposals. The Council's position in relation to such proposals is informed by the Council's own Plans, Policies and Strategies, plus its land ownership or asset management interests.
4. The summary outlines those proposals that the Council's Statutory Advocacy project is currently actively engaged in. This period's update report excludes the numerous Marine and Coastal Area Act proceedings little has changed since the previous update.

Decision Making Process

5. 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 Regional Planning Committee receives and notes the ***Statutory Advocacy Update*** staff report.

Authored by:

Gavin Ide
MANAGER POLICY AND PLANNING

Approved by:

Tom Skerman
GROUP MANAGER STRATEGIC PLANNING

Attachment/s

⇩**1** Statutory Advocacy Update September 2018

Statutory Advocacy Update (as at 31 August 2018)

Received	TLA	Activity	Applicant/ Agency	Status	Current Situation
9 April 2018	HDC	**Public notification of Variation 4 'Iona Urban Development Area'** Proposed district plan amendment involves rezoning approx. 55ha of land on western fringes of Havelock North to residential zone. Variation 4 is being processed under a Streamlined Planning Direction issued by the Environment Minister on 28 Feb 2018.	Hastings District Council	Notified. Hearing complete. HDC Commissioners' recommendations being considered by the Minister	**Latest…** Hearing held in early June by three HDC-appointed Commissioners. As required by the Minister's Direction, on 31st July, HDC referred the Commissioners' recommendations to the Environment Minister for his consideration. The Minister's decision is pending. **Previously…** Submission lodged. A copy of HBRC's submission can be found at HBRC Submissions. Topics in submission were urban development (Heretaunga Plains Urban Development Strategy), natural hazard information, and collection, treatment and disposal of stormwater from the development area. A copy of the Minister's Direction and other information regarding Variation 4 can be viewed on HDC's website here: www.hastingsdc.govt.nz/iona
7 February 2018	NCC	**Public Notification of Plan Change 12** Mission Heights Special Character Zone proposed and various amendments to existing district plan provisions to accommodate the new zone.	Napier City Council	Notified. Submissions closed. NCC hearing scheduled for 10-11 September	**Previously…** Submission lodged. A copy of HBRC's submission can be found at HBRC Submissions. Submission highlighted several issues including natural hazards, stormwater collection, treatment and disposal, and the need for reserve areas adjacent to the Taipo Stream. Hearing by NCC Commissioner scheduled for 10-11 September.
13 December 2017	NCC	**Public Notification of Resource Consent** Application for Land Use Consent for a retirement village and care home at 25 and 35 Ulyatt Road, Napier. Comprising 99 retirement villas, 19 retirement apartments, 49 care home rooms, as assoc. care facilities	**Applicant** Bupa New Zealand **Agent** Wasley Knell Consultants Limited	Notified. NCC decision issued.	**Latest** Hearing held 21 August by NapierCC-appointed commissioner. Commissioner's decision was issued on August to grant resource consent, subject to conditions. Six conditions in particular addressed HBRC's concerns regarding stormwater management, reverse sensitivity and hazard evacuation planning. **Previously…** Submission lodged. A copy of HBRC's submission can be found at HBRC Submissions. Submission highlighted issues regarding consistency of proposal with the Regional Policy Statement and the Heretaunga Plains Urban Development Strategy (HPUDS); Aged care facility operator's planning for tsunami event, stormwater collection, treatment and disposal; and reverse sensitivity issues.

Received	TLA	Activity	Applicant/ Agency	Status	Current Situation
9 December 2017	n/a	**HB Fish and Game Council's Draft Sports Fish and Game Management Plan** A draft management plan under the Conservation Act to eventually replace the current 2005 Sports Fish and Game Management Plan for the HBFG region.	HB Fish and Game Council	Notified, Submissions closed. Hearing pending	**Previously…** Submission lodged. A copy of HBRC's submission can be found at HBRC Submissions.
13 July 2016	HDC	**Howard Street Rezoning Variation 3** Variation to rezone 21.2 hectares of land from its current Plains zone to General Residential zone in between Howard Street and Havelock Road.	Hastings District Council	HDC Decisions issued Subject to appeal, mediation pending.	**Latest…** • A further status report from appellant and respondent (HDC) was sent to Environment Court on 3 August and parties have indicated resolution is achievable regarding land for stormwater management. Final documentation is being drafted by HDC for Court's approval. **Previously…** • Parties to the appeal have been discussing recently completed stormwater engineering investigations and geotechnical assessments and how the District Plan rezoning appeal might now be resolved. HDC issued its decisions on 25th March.
24 July 2017	n/a	**Application for Water Conservation Order (WCO)** Application for a WCO for the Ngaruroro River & Clive River	Applicants NZ Fish & Game Council, HB Fish & Game Council; Whitewater NZ; Jet Boating NZ; Operation Patiki Ngāti Hori ki Kohupatiki; Royal Forest & Bird Protection Society	Notified, Submission period closed. Special Tribunal commenced Stage 1 (of 2) hearing	**Latest…** • Special Tribunal have renotified the WCO application and second submission phase closed on 22nd August. The EPA is summarising those submissions. HBRC did not make an extra submission on the renotified WCO application. • A further Memorandum of Counsel was submitted to the Special Tribunal on behalf of HBRC on the 30th August 2018 to provide the latest draft versions of both the TANK plan change and draft TANK plan change implementation plan. • WCO co-applicants will circulate a Version 3 of the draft Order by 14 September 2018, after they have completed consultation with other stakeholders and considered the TANK Group's report.

Received	TLA	Activity	Applicant/ Agency	Status	Current Situation
18 January 2016	WDC	**Resource Consent Application** Consent is sought to clear 248 hectares of Manuka and Kanuka on Part Umumanfo 2 Block on Kopuawhara Road, Mahia.	**Applicant** R & L Thompson **Agent** Insight Gisborne Ltd	**Limited Notified** **WDC hearing pending**	**Previously…** • HBRC has opposed the application based on concerns relating to the loss and degradation of soil (erosion) and water quality. A copy of the submission can be found at HBRC Submissions. • HBRC staff and applicants have held discussions about potential alternative clearance proposals.
9 June 2015	NCC	**Resource Consent Application** Consent is sought to create four additional lots (total 5) to subdivide Lots 7-10 Deeds Plan 96 (1.8919 ha) into five (5) lots.at 258 Meeanee Road.	**Applicant** A & F Partnership **Agent** OPUS	**Notified** **NCC decision pending**	**Latest…** Hearing was held on 7th August by NapierCC-appointed commissioner. The Commissioner's decision is pending. HBRC did not appear and present at the hearing as it had previously indicated the further information supplied by the applicant had addressed its biggest concerns. **Previously…** • HBRC's submission had opposed the application principally because the application site is in an area that has been determined as inappropriate for development in both the RPS and the 2010 Heretaunga Plains Urban Development Strategy and it is in an area with limiting physical characteristics and limited infrastructure and servicing. • A copy of the submission can be found at HBRC Submissions.
8 November 2013	HDC	**Proposed Hastings District Plan** Review of the Hastings District Plan in its entirety. Includes the harmonisation of district wide provisions between the Napier District Plan with the Hastings District Plan where relevant.	**Hastings District Council**	**Notified** **HDC decisions issued, subject to appeals**	**Previously…** • Over 40 separate appeals were lodged against HDC's decisions by other groups and individuals. HBRC joined as a section 274 interested party to proceedings on eleven (11) of those appeals. All but one of those appeals has been resolved. That last one will is awaiting the appellant to prepare a draft 'structure plan' for their development area in Havelock North. • HDC issued its decisions on 12 September 2015. Council staff reviewed the decisions and were satisfied that HBRC's submission has been appropriately reflected so did not need to lodge an appeal itself.

HAWKE'S BAY REGIONAL COUNCIL

REGIONAL PLANNING COMMITTEE

Wednesday 12 September 2018

Subject: DISCUSSION OF ITEMS OF BUSINESS NOT ON THE AGENDA

Reason for Report

1. This document has been prepared to assist Committee Members to note the Items of Business Not on the Agenda to be discussed as determined earlier in Agenda Item 5.

1.1. ***Urgent*** items of Business *(supported by report tabled by CE or Chair)*

	Item Name	Reason not on Agenda	Reason discussion cannot be delayed
1.			
2.			

1.2. ***Minor*** items *(for discussion only)*

Item	Topic	Councillor / Staff
1.		
2.		
3.		
4.		
5.		