Greater Heretaunga and Ahuriri Land and Water Management Collaborative Stakeholder (TANK) Group

Meeting 36: 30 January 2018
Karakia
Karakia

Ko te tumanako
Kia pai tenei rā
Kia tutuki i ngā wawata
Kia tau te rangimarie
I runga i a tatou katoa
Mauriora kia tatou katoa
Āmine

Water is a taonga
Introductions
Apologies
Housekeeping
Notices
Engagement etiquette

• Be an active and respectful participant / listener

• Share air time – have your say and allow others to have theirs

• One conversation at a time

• Ensure your important points are captured

• Please let us know if you need to leave the meeting early
Ground rules for observers

• RPC members are active observers by right (as per ToR)

• Pre-approval for other observers to attend should be sought from Robyn Wynne-Lewis (prior to the day of the meeting)

• TANK members are responsible for introducing observers and should remain together at break out sessions

• Observer’s speaking rights are at the discretion of the facilitator and the observer should defer to the TANK member whenever possible.
<table>
<thead>
<tr>
<th>Time</th>
<th>Agenda Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30am</td>
<td>Welcome and notices (Robyn)</td>
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<tr>
<td>9:45am</td>
<td>Objectives for today (Mary-Anne)</td>
</tr>
<tr>
<td>10:00am</td>
<td>Updates – TANK programme/WCO (James Palmer/Tom Skerman)</td>
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<tr>
<td>10:35am</td>
<td>Food Security (Lesley Wilson)</td>
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<tr>
<td>10:45am</td>
<td>Mapping and water permit details - Zone 1 (Jeff)</td>
</tr>
<tr>
<td>11:30am</td>
<td>Managing stream depleting groundwater takes (Pawel)</td>
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<tr>
<td>12:30pm</td>
<td><strong>LUNCH</strong></td>
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<td>1:00pm</td>
<td>Water allocation (Malcolm and Mary-Anne)</td>
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<td>3:00pm</td>
<td><strong>COFFEE BREAK</strong></td>
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<td>3:15pm</td>
<td>Tutaekuri Values (Te Kaha)</td>
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<tr>
<td>3:45pm</td>
<td>Confirm Meeting records (Mtgs 33-35)</td>
</tr>
<tr>
<td>4.20pm</td>
<td>Meeting 37 Agenda (22 February)</td>
</tr>
<tr>
<td>4:30pm</td>
<td><strong>CLOSE MEETING</strong></td>
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</tbody>
</table>
### Action points - Meetings 33, 34, 35

<table>
<thead>
<tr>
<th>ID</th>
<th>Action item</th>
<th>Person responsible</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>35. 1</td>
<td>To agree whether minutes could/could not be circulated in draft to respective organisational bodies.</td>
<td>Robyn</td>
<td>This meeting</td>
</tr>
<tr>
<td>35. 2</td>
<td>LWWG to work through a number of examples</td>
<td>Gavin</td>
<td>In prep</td>
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<tr>
<td>35. 3</td>
<td>Include climate change mitigation measures in HBRC wider policy review</td>
<td>Ceri/MAB</td>
<td>In prep</td>
</tr>
<tr>
<td>35. 3</td>
<td>Prepare a map of Zone 1 including irrigation consents within that zone</td>
<td>Jeff</td>
<td>This meeting</td>
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<tr>
<td>35. 4</td>
<td>Schedule another meeting after 20 January 2018</td>
<td>Desiree</td>
<td>This meeting</td>
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<tr>
<td>35. 5</td>
<td>Send Malcolm’s presentation out again before the next meeting</td>
<td>Malcolm/Mary-Anne</td>
<td>This meeting</td>
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<tr>
<td>35. 6</td>
<td>Email out Leander’s presentation to everyone so that they can read and digest the detail.</td>
<td>Mary-Anne</td>
<td>This meeting</td>
</tr>
<tr>
<td>34. 1</td>
<td>Bring back the Zone 1 map overlaid with existing consents (presented by hydrologists previously)</td>
<td>Jeff</td>
<td>This meeting</td>
</tr>
<tr>
<td>34. 2</td>
<td>HBRC to consider how to action TANK’s concern about vehicles on braided river systems</td>
<td>Mary-Anne</td>
<td>In prep</td>
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<tr>
<td>33. 1</td>
<td>Further modelling required – Anna’s recommendation +/- 20%</td>
<td>EAWG</td>
<td>In prep</td>
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<tr>
<td>33. 2</td>
<td>EAWG and industry bodies be asked to consider the menu of management options for reducing nutrient losses to the estuary.</td>
<td>EAWG/MAB</td>
<td>In prep</td>
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</tbody>
</table>
Meeting objectives

1. Agree the TANK programme

2. Agree to proposed mapping of Zone 1

3. Agree to application of calculator in rules for managing stream depleting groundwater (provisional)

4. Agree drafting instructions for water allocation and priority
TANK Programme review and update

James Palmer
Tom Skerman
TANK Programme – Key Topics

1. Water values
2. Balancing costs and timeframes
3. Climate change
4. Wetlands and lakes
5. Water quality
6. Water quantity
7. Water conservation and future supply
8. Information and knowledge
Significant decisions still to make

1. **Timeframes for meeting objectives**
   - Ongoing – linked to modelling results

2. **Management programme for Lakes**
   - Plan drafting

3. **Allocation regime for allocatable water**
   - Meeting 36

4. **Management framework for meeting water quality related objectives**
   - Meeting 37 – stormwater management
   - Meeting 38 – nutrients (linked also to modelling results)
Significant decisions still to make

5. Managing stream depletion effects of groundwater takes

   Confirmation of allocation limit for groundwater takes
   
   • Meeting 38 - Linked to WAG modelling for mitigation options

6. Flow management regimes – Ngaruroro and Tutaekuri Rivers
   
   • Meeting 39 – linked to modelling results

7. High flow allocation regime
   
   • Meeting 39
The TANK Programme – 2018

Tom Skerman
<table>
<thead>
<tr>
<th>Decision</th>
<th>Meeting 36</th>
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<tbody>
<tr>
<td>Minimum Flows</td>
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<td><strong>Jeff Smith: Zone 1 &amp; Water permits – drafting instructions</strong> Pawel Calculator</td>
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<td><strong>Malcolm/Mary-Anne: Decision on sinking lid &amp; Re-jig of recommendation groupings</strong></td>
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<td>Rina – Stormwater Draft Policy</td>
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<td>Rina/TLA’s – Drinking Water recommendations – Task Force (info item)</td>
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**DRAFT PLAN**
Food Security

Lesley Wilson
President Hawke’s Bay Fruitgrowers’ Association
Food Security

- What is food security (four pillars)
- Where does NZ fit – (policies, future growth etc)
- Where does access to water for irrigation fit (water is for food production)
- What are the potential implications of limiting access to water for food production
Stream Depleting Groundwater Takes Within Zone 1

Jeff Smith and Pawel Rakowski
Overview

• Introduction – context, recap of previous work and implications for water users
• Modelling – groundwater takes with direct connection to surface water
• Direct takes in locations with modelling uncertainty
• Zone 1 map
• Proposal for consideration
Introduction

- RRMP policy for managing stream depleting groundwater takes:

<table>
<thead>
<tr>
<th>POL 33</th>
<th>TECHNICAL PROCEDURES - GROUNDWATER TAKES WITHIN THE VICINITY OF SURFACE WATER BODIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.9.33</td>
<td>To manage the effects of groundwater takes from unconfined or semi-confined aquifers on nearby surface water bodies in the following manner:</td>
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(a) \(< 400m = \text{direct take (unless proven otherwise)}\)

(b) \(> 400m \text{ may require assessment if SW interaction is likely}\)

**Purpose** = to avoid adverse effects on SW bodies. Directly connected takes may be cut off during low flows.
Introduction

• Modelling identified 4 zones of surface water connection

• Zone 1 = directly connected – treated as surface water abstractions (cut off during low flows)

• Other abstractions may be more effectively managed with alternative mitigation (e.g. augmentation)

• Some areas of uncertainty = lower confidence in modelling
Recalibrated model – Zone 1

Low confidence

Zone 1

Low confidence
Recalibrated model – Zone 1

In ZONE 1:
- Current stream depleting (n = 81)
- Currently NOT stream depleting (n = 26)

400 metre buffer

Zone 1

400 metre buffer
Recalibrated model – Zone 1

In ZONE 1:
- Current stream depleting (n = 81)
- Currently NOT stream depleting (n = 26)

Outside ZONE 1:
- Current stream depleting (n = 122)
Recalibrated model – Zone 1

**In ZONE 1:**
- ▲ Current stream depleting (n = 81)
- ▼ Currently NOT stream depleting (n = 26)

**Outside ZONE 1:**
- ▶ Current stream depleting (n = 122)
Recommendation: Zone 1 groundwater takes

That Zone 1 is defined by:

1. areas identified by modelling, with >90% stream depletion after 7 days pumping

AND

2. a 400m buffer around Ngaruroro and Tutaekuri Rivers, where there is lower confidence in the model results.
Recommendation: Zone 1 groundwater takes

1. That each groundwater take in Zone 1 is managed as if it were a surface take from the adjacent river and is:
   - included in an allocation limit for the surface water zone
   - and
   - subject to the flow restrictions for that river

   OR

2. Applicant provides additional information to confirm if the take fails to meet the stream depletion definition for zone 1.
Recommendations: Zone 2 – 4 groundwater takes

1. That any groundwater take in modelled zone 2-4 is a groundwater take in the Heretaunga Plains Zone and:
   - subject to the allocation limit for that zone
   - subject to the requirements for stream flow mitigation (using Pawel’s calculator)
Recalibrated model – Zone 1

Breakout/discussion

In ZONE 1:
- Current stream depleting (n = 81)
- Currently NOT stream depleting (n = 26)

Outside ZONE 1:
- Current stream depleting (n = 122)
Agree with recommendations

Or

State why there is disagreement
Extra slide – if discussion takes us here

To manage the effects of groundwater takes from the Heretaunga aquifer system on nearby surface water bodies in the following manner:

(a) Any taking of groundwater within Zone 1 will be treated as if it were a direct take unless the extent to which the groundwater will deplete water in the surface water body has been assessed using an appropriate scientific procedure in which case the effects on surface water will be assessed on that basis.

(b) Any taking of groundwater outside Zone 1 may require an assessment of effects in the river, lake or wetland if the scale of the take, the groundwater flow direction, and the transmissivity and storativity characteristics of the aquifer indicate interaction is likely to occur; in which case it may be treated as if it were a direct take.

Purpose = to avoid adverse effects on SW bodies. Directly connected takes may be cut off during low flows.
Calculating Stream Depletion Effects

Pawel Rakowski
Stream Depletion calculator
by Pawel Rakowski

Outline:
• Background
• Calculator demonstration
• Possible uses and examples
Groundwater model

High resolution grid 100x100m
2 layers
MODFLOW 2005
Simulation time: 1980 – 2015, monthly timestep
Rivers and springs – river boundary condition
Over 800 parameters

Successful model calibration

Long term water level trends

Seasonal GWL change

Spring flow/river loss

Average GWL

- Good calibration to stream flows
- Model can estimate stream depletion from pumping
Stream depletion zones

- Calculation for a reference period (very dry summer 2012-2013)
- Calculation can be repeated in multiple locations
  - E.g. every 5th model grid cell
  - Calculation can be automated
- Result: map of stream depletion
  - E.g. calculate stream depletion for
    - Ngaruroro River,
    - after 7 days of pumping
    - Pumping rate of 50 L/s rate
- Over 3000 model runs
- Run management and processing:
  - R script
  - Bud2hyd
  - Parallelised calculation
Response functions

Stream depletion fraction established and mapped

\[
\text{Stream depletion fraction} = \frac{\text{Stream Depletion}}{\text{Pumping rate}} = \frac{90 \text{ l/s}}{100 \text{ l/s}} = 90\% \text{ of pumping}
\]

Unit: fraction of pumping rate

Actual effect can be calculated:

\[
\text{Actual effect [L/s]} = \text{Stream depletion fraction}[\text{ fraction of pumping rate}] \times \text{actual pumping rate [L/s]} = 90\% \times 50 \text{ l/s} = 5 \text{l/s depletion}
\]

Data input:
location and pumping rate

Combined effect from multiple pumping locations can be calculated
Without the use of the model
Web application

- Calculation can be automated
- Pre-calculated stream depletion distribution
- For multiple time intervals, streams
- Calculation for single well of group of wells
- stream depletion calculator
Stream depletion tool offline
Overview

Stream depletion calculator

- Total effect on selected stream from pumping for specified location, rate and duration: \(-12.12\) L/s
- Stream depletion as % of pumping: \(24.24\) %

Select stream options:
- allones
- Irongate
- Karamu
- Karamu gain
- Kerewarewa
- Mangaterere
- Ngaruroro
- Ngaruroro major
- Ngaruroro variable
- Raukape
- Taikitu
- Taekau
- Tumare Kainui

Select time (days):
- 7
- 30
- 60
- 90
- 150

Select Layer:
- 1
- 2
Select location (click on map or enter coordinates)

Stream depletion calculator

- Total effect on selected stream from pumping for specified location, rate and duration: -40.9 L/s
- Stream depletion as % of pumping: 81.8 %

Easting: 1925633.81663996
Northing: 5613096.85616821
Pumping rate L/s: 50

- select stream
  - alzones
  - Irongate
  - Karamu
  - Karamu gain
  - Kaearewa
  - Mangateretere
  - Ngakuru
  - Ngakuru major
  - Ngakuru variate
  - Raupare
  - Tukituki
  - Tuaekuri
  - Tuaekuri Waimate

- select time (days)
  - 7
  - 30
  - 60
  - 90
  - 150

- select Layer
  - 1
  - 2
Effect for different rivers

Stream depletion calculator

- Total effect on selected stream from pumping for specified location, rate and duration: **-3.23 L/s**
- Stream depletion as % of pumping: **6.45 %**

![Map showing effect vs stream and effect vs time](image_url)
Effect for different times

Stream depletion calculator

Total effect on selected stream from pumping for specified location, rate and duration: \(-17.33\) L/s

Stream depletion as % of pumping: \(34.66\) %

Map showing the effect vs stream (for selected time) and effect vs time (for selected stream).
Multiple bores at once
End of offline slides
Web application advantages

- Consistent methodology for estimating stream depletion
- Cheap to use, no skills required
- Could be made available to the public (e.g. consent applicants – generate automatic report)
- Consent officers - quick assessment of impact for new consents
- Could be a default tool (but could be followed with more detailed investigation when required)
- Model
  - Model results are made available to public
  - Extending life cycle of a model
Response functions – mitigation calculator

- Calculate how much users should contribute to mitigation schemes (e.g. augmentation) base on their proportional impact

**Example**

Total effect on a stream from all users: \( \text{Eff}_{\text{tot}} = 200 \text{ L/s} \)

Total cost of augmentation scheme: \( \text{cost}_{\text{tot}} = \$50,000 \)

Impact caused by specific user: \( \text{Eff}_{\text{user}} = 5 \text{ L/s} \)

Cost for the specific user \( \text{cost}_{\text{user}} \):

\[
\text{cost}_{\text{user}} = \frac{\text{cost}_{\text{tot}} \times \text{Eff}_{\text{user}}}{\text{Eff}_{\text{tot}}} = \frac{\$50,000 \times 5 \text{ L/s}}{200 \text{ L/s}} = \$1250
\]
<table>
<thead>
<tr>
<th>stream</th>
<th>user1</th>
<th>user2</th>
<th>user3</th>
<th>user4</th>
<th>user5</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>pumping per user (L/s)</td>
<td>20</td>
<td>10</td>
<td>100</td>
<td>50</td>
<td>30</td>
<td>210</td>
</tr>
</tbody>
</table>

**Stream depletion calculator**

**pumping input type**
- single point
- upload csv

**select stream**
- allzones
- Irongate
- Karamu
- Karamu.gain
- Karewarewa
- Mangateretere
- Ngaruroro
- Ngaruroro.major
- Ngaruroro.variable
- Raupare
- Tukituki

Total effect on selected stream from pumping for specified location, rate and duration:
Stream Depletion calculator
by Pawel Rakowski

Outline:
• Background
• Calculator demonstration
• Possible uses and examples
Using the Stream Depletion Calculator in the Plan
Managing effects of stream depleting g/w takes – review of options

1. The combined effect of g/w takes in the Heretaunga plains has a cumulative adverse effect on river flows

2. Management options considered
   - Zones cannot be developed to manage specific takes effects on nearby streams*
   - Restricting groundwater use during lower flows very has delayed effects and needs to be significant cutback across all users to make a difference

3. Other management tools being developed;
   - allocation limits,
   - reduction in allocations to reflect actual/reasonable
   - water allocation subject to annual limits
   - water use efficiency requirements
Management option being assessed;
• directly mitigate stream depletion effects
• WAG carrying out feasibility study

Other management options being considered;
• Other riparian land management where augmentation not effective
• Wetland construction
• Possibility of mitigation of Ngaruroro flows by storage also being assessed
• Reduction in total allocation
Proposal; Further develop use of Stream Depletion Calculator to manage stream depletion effects

If the flow augmentation option is feasible and cost effective;

1. Costs of scheme estimated for all stream depletion in plains (WAG).

2. Each consent subject to contribution to costs of scheme development through consent conditions.
   • Costs for each permit are assessed on basis of stream depletion calculator

3. Flow mitigation installed over time as consents are renewed and subject to the new conditions.

4. Council to co-ordinate funding, but allow for collective management of schemes (as demonstrated by Twyford)
Agree with proposal?

State why there is disagreement
Water Allocation – Priority Allocations

Mary-Anne Baker
Water Allocation and Priority End Uses

1. Discussion papers with policy options pre-circulated
   • Questions and clarification

2. Recommendations
   • Discussion and debate

3. Agree with recommendations
   or

4. Agree any amendments/solutions
<table>
<thead>
<tr>
<th><strong>Summary of Recommendations</strong></th>
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<tbody>
<tr>
<td>1. That development of a “high value” allocation policy based on economic returns is not pursued.</td>
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<tr>
<td>2. That development of an “added value” allocation policy is not pursued.</td>
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<td>3. Agree that recognition for food/drink production is already provided for in the RPS, both in relation to water use and the protection of land for primary production.</td>
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<tr>
<td>4. That the importance of water use for existing and planned future community health and well-being is recognised and granted priority within the allocation limit for the Heretaunga Plains groundwater.</td>
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<tr>
<td>5. That development of an allocation policy for specific water use activities (sectors) is not pursued (except as in recommendation 4).</td>
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<tr>
<td>6. That granting of permits for the taking and use of water be made conditional on the preparation of a farm environment plan or membership of an applicable industry good practice programme.</td>
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<tr>
<td>7. Remove the 20m$^3$/day provision for new uses in TANK catchment. No new permitted use of water except continue to allow domestic and stock drinking water takes only. <strong>Existing</strong> users depending on the 20m$^3$/day permitted quantity continue as existing permitted use.</td>
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<tr>
<td>8. That policy direction be provided to guide consent conditions and decision making during droughts or when making water shortage directions.</td>
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</table>
1. Questions and Clarification

2. Discussion of Recommendations
Agree with recommendations or State why there is disagreement
Water Allocation – Existing Use

Malcolm Miller
Water Allocation

1. Discussion papers with policy options pre-circulated
   - Questions and clarification

2. Recommendations
   - Discussion and debate

3. Agree with recommendations
   or

4. State why there is disagreement
Surface water allocation
## Summary – Surface Water Allocation

### 1
Allocate surface water to reflect the historical amounts allocated. Once the TANK Plan Change is operative replace/review all surface water take resource consents to ensure that they are efficient in their take and use of water and reduce the amounts allocated where it is appropriate to reflect this.

### 2
Remove groundwater takes from the surface water allocation count except for Zone 1 groundwater takes.

### 3
Set each surface water allocation limit as a rate of take (L/s)

### 4
For each water permit measure the amount of surface water allocated as the average rate of take (L/s) derived from the maximum weekly volume

### 5
Sum these amounts to determine the total amount allocated for all surface water and zone 1 groundwater take water permits for each surface water resource

### 6
Provide for water sharing / rostering / augmentation of water at times of low flow (when the full allocated amount is not available in the river or stream)

### 7
Provide additional allocation blocks to allow for takes at higher flows (WAG)
Water Allocation – Surface water

1. Discussion and debate

2. Agree with recommendations
   or

3. State why there is disagreement
Groundwater allocation
# Summary – Groundwater Allocation

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<tbody>
<tr>
<td><strong>1</strong></td>
<td>Set a groundwater allocation limit for the Heretaunga Plains based on existing peak use (provisionally 90 million m³ per year).</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>For each groundwater permit, count the annual volume that is assigned as the amount that is allocated.</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Sum the annual volume of each consent to determine the total amount allocated across all groundwater water permits in the Heretaunga Plains.</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Once the plan is operative replace or review all groundwater take water permits to assess actual and reasonable use and to ensure that they are efficient in their take and use of water. Reduce the amount allocated where it is not demonstrated that water is needed and/or used efficiently.</td>
</tr>
</tbody>
</table>
Water Allocation - Groundwater

1. Discussion and debate

2. Agree with recommendations
   or

3. State why there is disagreement
Efficient water use
<table>
<thead>
<tr>
<th></th>
<th>Summary – Efficient Allocation and Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To require all water use activities to be efficient in their use of water and therefore to avoid wasteful use.</td>
</tr>
<tr>
<td>2</td>
<td>To update and use the Irricalc water demand model to determine efficient water allocations</td>
</tr>
<tr>
<td>3</td>
<td>To allocate water on the basis of activities being 80% efficient or better in their use of water.</td>
</tr>
<tr>
<td>4</td>
<td>To require all non-irrigation water takes to show how water use efficiency of &gt; 80% is being met (and in line with industry best practice).</td>
</tr>
<tr>
<td>5</td>
<td>Provide for each water permit to be issued for a 20 year duration providing it has been demonstrated that the take is an actual and reasonable amount for the purpose which the water is taken and that the cumulative allocation is within the allocation limits that have been set for the water body</td>
</tr>
</tbody>
</table>
Water Allocation Efficient Use

1. Discussion and debate

2. Agree with recommendations
   or

3. State why there is disagreement
Consent Management
## Summary – Consent Management

<table>
<thead>
<tr>
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<tr>
<td>1</td>
<td>Provide for each water permit to be issued for a 20 year duration providing it has been demonstrated that the take is an actual and reasonable amount for the purpose which the water is taken and that the cumulative allocation is within the allocation limits that have been set for the water body.</td>
</tr>
<tr>
<td>2</td>
<td>Implement the provisions of the TANK Plan Change as water permits expire up until 2026 and by reviewing all other water permits that haven’t expired by that date. If TANK introduces changes to minimum flows in rivers and streams review consents sooner if necessary to align them with the provisions of TANK.</td>
</tr>
<tr>
<td>3</td>
<td>No removal of minimum flow conditions from groundwater takes until augmentation schemes are implemented.</td>
</tr>
</tbody>
</table>
Water Allocation – Consent management

1. Discussion and debate

2. Agree with recommendations or

3. State why there is disagreement
Next meeting – 22 February 2018

• Stormwater management draft policy for decision making (Rina, SWWG)

• Report back on outputs from flow modelling (Jeff and Rob) and economic analysis reporting (AgFirst/NimmoBell)

• Report and recommendations from Joint Drinking Water Group (Nick Jones, Craig Thew)

• Updates;
  • nutrient and sediment management (EAWG and farmer ref group)
  • mana whenua group and plan drafting
  • WAG and g/w depletion modelling
Closing Karakia

Nau mai rā
Te mutu ngā o tatou hui
Kei te tumanako
I runga te rangimarie
I a tatou katoa
Kia pai to koutou haere
Mauriora kia tatou katoa
Āmine