Agenda

Canterbury Water Management Strategy
Waimakariri Zone Committee meeting

at 3.30pm
on Monday 2 May 2016

to be held in the

Function Room
Rangiora Town Hall
303 High Street
Rangiora

Members

Claire McKay (Chairperson)
David Ashby
Grant Edge
WDC Councillor Kevin Felstead
Judith Roper-Lindsay
Gary Walton
Carolyne Latham
Clare Williams (Te Ngai Tūāhuriri Rūnanga)
Cherie Williams (Te Ngai Tūāhuriri Rūnanga)
Rex Williams (Environment Canterbury Commissioner)

Chairman and Members
WAIMAKARIRI ZONE COMMITTEE

A Meeting of the **CANTERBURY WATER MANAGEMENT STRATEGY: WAIMAKARIRI ZONE COMMITTEE** will be held in the **FUNCTION ROOM, RANGIORA TOWN HALL, 303 HIGH STREET, RANGIORA** on **MONDAY 2 MAY 2016** to commence at **3.30PM.**

Adrienne Smith
COMMITTEE ADVISOR

Page No.

Recommendations in reports are not to be construed as Council policy until adopted by the Council

BUSINESS

1 KARAKIA

APOLOGIES

REGISTER OF INTEREST

5-6

Conflicts of interest (if any) to be reported for minuting.

2 CONFIRMATION OF MINUTES

Minutes of a meeting of the Canterbury Water Management Strategy - Waimakariri Zone Committee held on Monday 4 April 2016

7-15

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee

(a) **Confirms** as a true and correct record the minutes of a meeting of the Canterbury Water Management Strategy – Waimakariri Zone Committee held on Monday 4 April 2016.

MATTERS ARISING

3 OPPORTUNITY FOR PUBLIC TO SPEAK

4 **<u>WORKING GROUP AND REGIONAL COMMITTEE – UPDATES</u>** – C McKay (Chair) / Zone Committee members / A Veltman

16-17

RECOMMENDATION

THAT the CWMS *Waimakariri* Zone Committee:

(a) **Receives** these updates for its information and with regard to the committee's 5 Year Outcomes and 2016 work programme.

4.1 **<u>Regional Committee Report – 12 April 2016 –</u>** C McKay (Regional Committee representative)

18-20

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee:

(a) **Receives** the report for its information.

5 **<u>KAIAPOI RIVER, KAIAPOI WASTEWATER TREATMENT PLANT AND OCEAN OUTFALL – BRIEFING</u>** – G Cleary (Manager Utilities and Roading, WDC) and R Barber (Wastewater Asset Manager, WDC

21-35

RECOMMENDATION

THAT the CWMS *Waimakariri* Zone Committee:

(a) **Receives** these updates for its information and with regard to the committee's 5 Year Outcomes and 2016 community engagement priorities.

6 **<u>SUB-REGIONAL PLANNING PROCESS - BRIEFING</u>** – D Brand (ECan)

36

RECOMMENDATION

THAT the CWMS *Waimakariri* Zone Committee:

(a) **Receives** this briefing for its information.

(b) **Confirms** the preferred process for the Waimakariri sub-regional planning process scheduled to commence in July 2016.

7 **<u>TUTAEPATU LAGOON - UPDATE</u>** – G McKenzie / G Byrnes

37

RECOMMENDATION

THAT the CWMS Waimakariri Zone Committee:

(a) **Receives** these updates for its information and with regard to the committee's 5 Year Outcomes and 2016 community engagement priorities.

8 **<u>GENERAL BUSINESS</u>** – C McKay and Zone Committee Members

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BRIEFING

9 **OUTCOMES AND INDICATORS - WORKSHOP** – M Dodson / D Brand (ECan)

38-43

WAIMAKARIRI ZONE COMMITTEE

Register of Interests – April 2016

Name	Committee Member Interests
David Ashby	- Director/shareholder: Pineleigh Farm Limited - Director/shareholder: Dave Ashby Rural Consultants Limited - Shareholder: Waimakariri Irrigation Limited - Member: Cust Main Drain Water User Group
Grant Edge	- Director: Edge Landscape Projects Ltd, Edge Plants Ltd, and Edge Products Ltd - Member: NZ Institute of Landscape Architects - Member: Urban Design Forum - Member: QEII National Trust - Member: NZ Forest & Bird - Member: Heritage NZ - 1ha property Fernside (shallow bore user)
Kevin Felstead	- Deputy Mayor, Waimakariri District - Utilities and Roading Committee, Waimakariri District Council - Audit Committee, Waimakariri District Council - Sole Trader: Resource Consent Services
Carolyne Latham	- Farmer: Sheep, beef and racehorse agistment - Project Manager/Pastoral Consultant for Rural Value/LINZ - Shareholder: Silver Fern Farms, Farmlands - Registered Member: New Zealand Institute of Primary Industry Management - Member: Canterbury Ice Hockey Association
Claire McKay	- Dairy Farmer - Irrigator and shareholder: Waimakariri Irrigation Ltd - Holder of Groundwater take and use consents in Cust groundwater allocation zone - Holder of Effluent discharge consents - Member: Federated Farmers - Member: DairyNZ Dairy Environmental Leaders forum - Member: P21 Canterbury Industry Advisory Group
Judith Roper-Lindsay	- Director/ecologist: JR-L Consulting Ltd. - Land-owner/small-scale sheep farmer, Ashley downs - Member and local committee member: Environment Institute of Australia and New Zealand (EIANZ)
Gary Walton	- Director, Walton Farm Consulting Ltd - Director and Shareholder, Loburn Irrigation Co - Trustee, Rugby World Heritage Trust - Ashley Rugby Football Club (Inc.) - Farmer, sheep & cattle, Loburn
Cherie Williams	- Member: Mana Whenua Working Party - Tangatiaki / Kaitiaki - NZTA Northern and Southern Bypass Rūnanga Representative

Clare Williams	- Chair, Te Ngāi Tūāhuriri Rūnanga Inc. - Selwyn/Waihora Zone Committee – Te Ngāi Tūāhuriri Rūnanga representative - Member: Mana Whenua Working Party - Trustee: Central Plains Water Trust
Rex Williams	- Commissioner: Environment Canterbury - Director: HWRichardson Group Ltd., Invercargill

MINUTES OF A MEETING OF THE CANTERBURY WATER MANAGEMENT STRATEGY; WAIMAKARIRI ZONE COMMITTEE HELD IN THE FUNCTION ROOM, RANGIORA TOWN HALL, 303 HIGH STREET, RANGIORA AT 3.30PM ON MONDAY 4 APRIL 2016

PRESENT

Claire McKay (Chairperson), David Ashby, Grant Edge, WDC Councillor Kevin Felstead, J Roper-Lindsay, Carolyne Latham, Gary Walton, C Williams (Te Ngāi Tūāhuriri Rūnanga) and Cherie Williams (Te Ngāi Tūāhuriri Rūnanga)

IN ATTENDANCE

Murray Griffin (Zone Facilitator, ECan), Stephen Bragg (Mana Whenua Facilitator, ECan), Owen Davies (Drainage Asset Manager, WDC), Gerard Cleary (Manager Utilities and Roading, WDC), Andrew Arps, Zone (Delivery Manager, ECan), Anna Veltman (Land Management Advisor, ECan), Christina Robb (Acting Director, ECan), Mary Sparrow (Independent Consultant), Michael Bate, James Ensor (Woodend-Ashley Community Board), Sandra Stewart (Kaiapoi Community Board and Kaiapoi Advocate), Craig Fagan, Scott Pearson (Fish & Game), Danny Kimber (DOC), Dirk Brand (Planning Team Leader, ECan), Gina McKenzie (Communications, ECan), Ian Whitehouse (Facilitator, ECan), Richard Stalker, Craig McIntosh, and Emma Stubbs (Minute Secretary, WDC)

1 KARAKIA

C Williams conducted the karakia.

APOLOGIES

Moved J Roper-Lindsay Seconded K Felstead

An apology was received and sustained from Rex Williams for absence.

CARRIED

REGISTER OF INTEREST

- Clare Williams advised she was no longer a member of the Te Waihora Management Board.
- G Walton advised he was a Director and Shareholder of Loburn Irrigation Co.

2 CONFIRMATION OF MINUTES

Minutes of a meeting of the Canterbury Water Management Strategy - Waimakariri Zone Committee held on Monday 7 March 2016

Moved Clare Williams Seconded G Walton

THAT the CWMS Waimakariri Zone Committee

a) **Amends** the minutes of the Canterbury Water Management Strategy – Waimakariri Zone Committee held on Monday 7 March 2016. The second paragraph of item 4.2, page 3, change to '…commented that the Christchurch Recovery District Plan hearings were ongoing and a suggested option is that sites of ecological significance…'

b) **Confirms** as a true and correct record the minutes of a meeting of the Canterbury Water Management Strategy – Waimakariri Zone Committee held on Monday 7 March 2016.

CARRIED

MATTERS ARISING

Clare Williams requested an update with respect to 4WDs in the Ashley and Waimakariri Rivers. A Arps advised that he had spoken with the Parks team and during the breeding season road blocks were set up to prevent vehicles accessing bird nesting sites. Clare Williams advised that the birds were currently migrating, and that there were sedimentation issues which were having a negative effect on the longfin tuna. She noted that there were convoys of up to 50 vehicles at the estuary, and they did continue right up the river at times. Andrew advised that the conversation had started and that the issue would remain on the action list.

D Ashby advised that the Ashburton workshop with the Canterbury Primary Sector Industry Group had moved from the 26 April 2016 to the 31 May 2016.

J Roper-Lindsay noted the Carex Research Group had meet with a local water management group recently, and asked if it would be beneficial to update WWZC on the information they were providing to local groups. A Veltman replied that having attended those local meetings she could advise it was still general information they were passing on, not yet specific research from within the zone. C McKay advised that she received regular newsletter by email from the group and could ask that they be circulated to the committee also.

3 OPPORTUNITY FOR PUBLIC TO SPEAK

M Bate spoke to the committee and tabled an update regarding the Kaiapoi River, Kaiapoi Wastewater Treatment Plant and Ocean Outfall. He tabled photographs from these areas. Recently he had completed a walk from New Brighton Pier to Waikuku Beach, noting the appearance of "scum" on the beach was worst near Kaiapoi and Woodend.

M Bate had heard that saltwater intrusion was being claimed as responsible for killing the weed in the Kaiapoi River but noted he had observed weed dying off where salt was not reaching. He held the view that the Waimakariri River minimum flow was too low, and made the suggestion for restricting irrigation during large tides to help prevent inflow of salt water.

D Ashby noted that a lot of the concerns M Bates raised were WDC issues and asked if he had taken up his concerns with them. M Bate advised that on Wednesday 6 April he was attending a meeting with WDC to discuss his concerns.

C McKay commented that the WWZC had requested a report from WDC on the issues and once that was received the committee would be better informed. Some of the comments M Bate raised were related to agenda item 6 – Kaiapoi River Rehabilitation.

4 WORKING GROUP AND REGIONAL COMMITTEE – UPDATES – C McKay / Zone Committee / A Veltman

Regional Committee Meeting – 12 April 2016
C McKay noted that there had not been a Regional Committee meeting since the last WWZC meeting.

Nutrient Management and Water Efficiency Working Group
D Ashby tabled a report.

D Ashby noted that a workshop had been held on Monday 7 March at which there had been good robust discussion, brainstorming and planning for the ZIP addendum. He asked the question 'how much wriggle room is there under the relevant policies – RMA and LWRP and requested that someone speak to the committee on that. M Griffin noted that it was a step in the process and around May or June there would be a workshop looking at that.

Lowlands Waterways, Braided Rivers and Biodiversity Working Group
G Edge tabled a report outlining various meetings he had attended.

G Edge noted that proposed outcomes and interagency coordination was discussed at the Regional Biodiversity Working Group

It was also noted the Kaiapoi River Rehabilitation Working Group was proceeding with the trial planting and an arborist would be consulted to ensure as few willows as possible would be removed. Some terrestrial planting may take place this autumn.

G Edge advised that the next meeting of the Biodiversity Stakeholders Working Group was scheduled for 18th of May.

It was noted that C McKay, as the committee chair, should provide a list of relevant meetings she had attended during the month.

Waimakariri Zone Committee Annual Report – Update

M Griffin advised that he had received feedback from the first draft and was looking to have an updated draft out this week. The Annual Report would be presented to the ECan Council 21 April 2016 and WDC 3 May 2016. C McKay would be attending and other committee members were invited. It was an opportunity for each committee to take the councils through their achievements and issues.

Clare Williams expressed concern regarding some of the content in the Annual Report. She believed that while Kaitiakitanga was a target they were not seeing progress on it. In general she believed there was not enough focus on Kaitiakitanga outcomes. She did not believe the water supply of the Tuahiwi Marae should be included as an achievement. M Griffin explained that the reference to the Tuahiwi community water connection related to the ZIP where it was a recommendation. It was of note the connection of the Tuahiwi community water supply had been achieved. The reference to the Marae water supply would, however, be removed. M Griffin noted that Clare Williams's concerns around kaitiakitanga were relevant to the workshop on Priority Outcomes and Narratives and that they should be discussed further there.

Waimakariri Zone Team Delivery – Update

A Arps commented that they were in the process of appointing a biodiversity officer to the team on a 3 month contract, after which there would be a permanent appointment. He noted the Zone Team focus was to make things happen and they had a focus on the field rather than internally.

- Stream Survey in Cam River

The stream survey off the Cam River and its tributaries took 20 man days. The survey was conducted by walking up the streams with a tablet recording different characteristics. The survey had been requested by the Cam River Enhancement Committee.

A Arps commented that being in the field provides the opportunity to work with people to improve environmental outcomes. He outlined two recent opportunities.

1. The first related to a site purchased by MainPower. Discussion with the landowner brought attention to the location of a spring head and MainPower was willing to move the proposed location of the substation to protect the spring head.
2. A Synlait customer wished to invest in an environmental project in Canterbury. The Cam stream survey had identified a location in Fernside with the potential to complete riparian planting associated with a spring head. The proposal was related to stream enhancement and did not involve changes in terms of the farm.

C Latham queried whether MainPower would have built the substation close to the spring head if it had not been identified during the stream survey. It was advised that the planning was still in draft form and that it would have been identified during the planning process. Clare Williams advised that MainPower had consulted early with the Rūnanga and K Felstead advised that there was a 10m setback requirement. A Arps commented that it showed the importance of being in the field and noted that not all information needed to come through official channels.

- Nutrient Management

The Team approach is very customer focused with one on one or small group discussions with farmers to deliver the message around nutrient management. It was not just for industry to deliver the message.

- Staff Training

It was important that staff engaged with the community in the right way and had ability to present information clearly. It was noted there had been confusion amongst some farmers around what they needed to be doing.

- Communication

A Arps noted that as the Zone Delivery Team was relatively small it was important to work closely with subcommittees.

A Veltman advised minutes from the water management group meetings had been sent to the committee members.

D Ashby enquired if there had been much consultation at the top of the catchment for example Woodstock and View Hill. A Veltman advised they had been invited to the Oxford meetings, but if there was a specific location the committee wanted to target that could be arranged. In response to a question from D Ashby, A Veltman advised that the largest dairy farmers in the district had been engaged with individually.

Action Points

M Griffin tabled an updated list of the Action Points from previous meetings.

1. With regard to Shellfish testing in Saltwater Creek estuary – this was incorporated with work that Gail Tipa was completing and the results would come through to the committee.
2. Investigation and monitoring of the Kaiapoi River – Adrian Meredith to provide an update later in the agenda.
3. Publication addressing waterway care – to remain on the action list.
4. Waterway typology review – to remain on the action list.
5. Avian Botulism risk and,
6. Kaiapoi Water Treatment Plant – both of these action points had been covered in a WDC report to Kaiapoi Community Board (KCB). G Cleary advised that the report had gone to the KCB and would also go to WDC Utilities and Roading. It addressed a number of issues that had been raised. The report would be presented to the committee at the May meeting with assistance of R Barber (WDC Wastewater Asset Manager).
7. 4WD Vehicles – as discussed in matters arising the initial follow up was underway with further follow up required.
8. TRoNT Planning Representatives – Matt Ross and Ryan Hepburn had been included in the Science Stakeholder Advisory Group.

4.1 **OVERVIEW OF NEXT STEPS FOR FRESHWATER CONSULTATION DOCUMENT** – E McNae

M Griffin outlined that E McNae had provided an overview of the 'Next Steps for Freshwater Consultation' document released by MfE and MPI in February. In the document were initiatives that could result in amendments to the RMA and NPS for Freshwater Management. E McNae provided a summary of the proposals that may be of most interest to the CWMS Committees. Submissions were due by 22 April 2016.

Clare Williams noted that there was no reference to Mahinga Kai which was a target beneficial to everyone in the summary of proposals provided. G Edge commented that the Next Steps document was large and included a section addressing the need for greater collaboration with Iwi. M Griffin suggested that Clare William's concerns could be discussed further at the outcomes workshop. He would also assist in getting those concerns through to E McNae for the submission process.

4.2 **WAIMAKARIRI WATER MANAGEMENT ZONE COMPLIANCE MONITORING ANNUAL REPORT AND PLAN (WAIMAKARIRI)**

M Griffin advised that the Monitoring Annual Report for Waimakariri and Canterbury Region had been included for the committee's information and there was not a specific briefing.

J Roper-Lindsay referred to the zone having the highest number of gravel extraction resource consents in Canterbury and queried whether actions on both sides of the Waimakariri River had been included in the zone. M Griffin would request clarification.

G Edge made the observation that complaints related to water usage were down 9% and queried what had led to the change? M Griffin would request clarification.

4.3 **WAIMAKARIRI WATER MANAGEMENT ZONE COMPLIANCE MONITORING ANNUAL REPORT AND PLAN (REGIONAL)**

C McKay commented that she was disappointed in the way the 'compliance indicators had been set out. She commented that there needed to be consistency in the way it was displayed and requested the reasoning from the communications team as to why it had been displayed as it had.

J Roper-Lindsay commented on the case study of 'Arthurs Pass Roading', noting that there was a lot of discussion regarding water, however ECan was also responsible for the aquatic and terrestrial environment. She would have liked to have seen more on the process and assessment of risk and how compliance was carried out across all consents in a complex project.

Moved C McKay Seconded G Edge

THAT the CWMS Waimakariri Zone Committee:

(a) **Receives** these updates for its information and with regard to the committee's 5 Year Outcomes and 2016 work programme.

CARRIED

5 HISTORY AND RATIONALE FOR THE CURRENT ENVIRONMENTAL FLOW AND ALLOCATION REGIME – ASHLEY/RAKAHURI RIVER – Matt Dodson (ECan Hydrogeologist) and John Glennie (Environmental Planning Consultant)

J Glennie gave a PowerPoint presentation to the committee providing an overview of the rationale for the Ashley/Rakahuri mainstem minimum flows.

He started by explaining the geology of the Ashley/Rakahuri River which was important to help understand how the Ashley behaved. The geological map presented showed the location of the permeable recent gravels.

A cross-section of the river showed permeable recent gravels inside the 'bath' shaped less permeable older outwash gravels. Water flowed preferentially through the more permeable recent gravels. The river flows are always greatest at the Ashley/Okuku confluence to the No.10 groyne area. From that point water was lost into the permeable gravels. The map showed the 'zone of drying' where historically the Ashley ran dry.

A table of comparison of flow at the Ashley Gorge and flow at downstream sites highlighted that a flow of 3-4 cumecs at the Ashley Gorge meant there was water in the river downstream.

John Glennie gave an overview of history for setting minimum flow. In 1989 following years of low flows a statutory minimum flow was set of 1.5m^3/s for February-March. This was the first time restrictions had been placed on irrigators. In 2001 a public advisory group was established to assist with work on Ashley flow regime review and a draft NRRP was released. This had a

minimum flow of 2.5m^3/s for Jan-July. This figure is current and has been retained throughout a number of appeals and processes.

An outline of the objectives and policies relating to minimum flow from the RMA and NRRP was provided as well as an outline of the process of setting the Ashley/Rakahuri minimum flow.

Some matters influencing decision making in 2001:

- The minimum flow is lower than the 7DMALF – this is indicative of a very low reliability of supply for irrigation.
- Surface flow is lost to groundwater.
- At most times flow of 2.5m^3/s at the gorge means continuous flow in the river.

New information in 2003 showed that a flow of 2.5m^3/s at the gorge did not satisfy connectivity and a continuous flow in the river.

Some matters influencing decision making in 2004:

- 13-of years 1987-2003 had main stem dry period.
- It was recognised that the river had a rapid flow recession, which is where flow drops very rapidly. Consequently it is difficult to manage abstractions and difficult to identify tangible benefits of raising the minimum flow.

Since the 2001-2004 process, no new evidence has been presented to decision makers supporting a change to the mainstem minimum flows. It was highlighted that the setting of a minimum flow would not stop the Ashley/Rakahuri going dry naturally.

J Glennie outlined the theory behind abstraction restrictions which meant the abstractor should reduce water-take in a pro-rata way as flow reduced. It was difficult in practice as it meant abstractors required live information and needed to be able to run irrigation systems at different pressures. It worked best with a water user group.

C Williams commented that bores in the permeable area were effectively taking water from the river. J Glennie replied that they were taking from groundwater but not directly from the surface. The further away the bore the less direct effect, but it was lowering the 'bath water'. She commented on her experiences of flow in the Ashley/Rakahuri and how flow had changed over time.

C McKay asked if the willow weeds in the Ashley were having an effect of volume of flow and J Glennie replied the question was if they were having a significant contribution. The smaller the stream the bigger the effect of willows. He was unsure how material the effect would be on the Ashly/Rakahuri.

G Walton queried if all abstractions are telemetered then why couldn't abstractions be in real time. J Glennie replied that the pressure could not be changed on irrigators. G Walton commented that it was possible to control abstraction volume by changing irrigation time suggesting technology was now ahead of rules.

G Edge queried if raising the minimum flow would raise groundwater levels in the 'bath'. J Glennie referred to the geology map where permeable bands were leaving the river to supply lowland streams. Decision makers had weighed the pros and cons and in the process decided to leave the minimum flow at 2.5m^3/s.

J Roper-Lindsay asked how far below the surface the water flow was. J Glennie replied that was beyond his knowledge however if gravel built up in the river the water level was effectively deeper.

G Edge asked if the 7DMALF was changing due to climate change and if there was flexibility required in that number. J Glennie advised that the 7DMALF was relatively constant. It had been revised down in 2004 as there had been a dry period 1987-2003. It was likely to be updated however there should not be a significant shift in the number unless there was a major swing in the weather pattern.

Moved C Williams Seconded K Felstead

THAT the CWMS Waimakariri Zone Committee:

(a) **Receives** this briefing for its information and with regard to the committee's 5 Year Outcomes and pending sub-regional planning process.

6 **KAIAPOI RIVER REHABILITATION – INVESTIGATIONS UPDATE** – A Meredith (ECan) and M Griffin (ECan)

A Meredith spoke to the committee providing an update on investigations.

- History and Context

In thinking about the Kaiapoi River it had to be recognised it had been significantly modified from what it used to be. Prior to Human intervention the Waimakariri River used to flow through the Kaiapoi River channel. This resulted in a large channel for the amount of water now carried by the river. The other issue with the river was it was low-lying and, therefore, tidal up past the railway bridge. When the Waimakariri River was in flood, silt from the Waimakariri flowed up the Kaiapoi settling on the edges of the river.

Kaiapoi prided itself of being a 'River Town' and it is a great feature, however, there are management issues. There had been a lot of discussion recently on how to enhance the Kaiapoi River. A recent report by Dr Henry Hudson had promoted the enhancement of a two stage channel concept which had vegetated flat berm sides and a low flow channel in the centre where the water could flow swiftly and cleanly down the middle. IMS had approved funding for trial planting to see if the concept would work.

- Monitoring

A Meredith advised that his role in the project was to assist with monitoring. Current monitoring occurred on the tributaries including Silverstream, Ohoka Stream, Cust River, Cam River and Courtenay Stream.

A Meredith noted there was no prescribed method for monitoring tidal river environments which were high highly complex and gave different results depending on the state of flow. He believed it was a challenge to be addressed.

- Investigations

A Meredith advised that investigations were looking at the state and cause of riverbed aquatic die off since 2012 as identified by M Bate and colleagues, and also investigating considerations for success of the proposed rehabilitation.

A Meredith commented that a standardised survey of freshwater mussels had been carried showing there was a relatively healthy population present. Soon after the investigative work began, the weed beds started to grow back. Rather than spend a large amount of money on testing sediments for herbicides and heavy metals where the weed had died off, the approach was taken to follow the growth over a wide area and to try and answer the question of what had changed since the four previous years.

A Meredith described the use of a CTD profiler which measures salinity, temperature and depth vertically in the water column. In the Kaiapoi this was used to determine if water was moving up the river. In January with an $80m^3/s$ flow in the Waimakariri the river was exclusively fresh water. At $60m^3/s$ saline water was just reaching up to Kaiapoi town centre. In February with the river at $31m^3/s$ saline water moved passed Courtenay's confluence. A Meredith showed a number of slides highlighting the location and attributes of the salt wedge in the Kaiapoi noting that it was not a classic salt wedge profile.

Results of the CTD profiling showed that flows around $30m^3/s$ in the Waimakariri resulted in saline water in the Kaiapoi, which was enough to kill aquatic weeds. A Meredith highlighted a slide showing flow in the Waimakariri since 2012 and indicated that there had been long periods during that time when there were low flows in the Waimakariri.

Preliminary conclusions:

- Water quality attributes are complicated.
- Salinity is critical and one of the biggest issues. Investigations into the salt wedge were important in terms of rehabilitation as if there was too much salt the proposed planting would be affected and that would need to be considered in terms of funding.
- There had been an unusual Waimakariri River flow period for 3 to 4 years, the question was 'was there going to be a continuation of those flows or would the river return to a period of 'normal' flows'?

To help complete the story around the Kaiapoi River staff were currently taking water and soil samples for herbicide analysis. In addition at the lower end of the Kaiapoi River different areas had been raised and dropped by the earthquakes. There was an investigation underway to see if those changes had effected the salt wedge.

G Walton noted that he appreciated the work that had been completed.

J Roper-Lindsay commented that it was good to see the Kaiapoi River now receiving the attention it deserved.

M Bate agreed with salt being a problem up to Bramleys Bridge, however, he raised his observations on the effect to aquatic life further upstream where salt was not the issue. A Meredith replied that it was a complex environment and unusual river system that they were currently working to understand.

C McKay appreciated the work of M Bate to keep the Kaiapoi River's environmental issues to the forefront.

Moved J Roper-Lindsay Seconded G Walton

THAT the CWMS Waimakariri Zone Committee:

(a) **Receives** this briefing for its information and with regard to its 2016 community engagement priorities and 5 year outcomes.

CARRIED

7 <u>GENERAL BUSINESS</u> – C McKay and Zone Committee Members

C Latham queried if the WZC could have access to a summary from FEPs regarding the consistent issues identified across farms. It would be good to understand:

1. What were the consistent issues?
2. What were the actions proposed?
3. What was the cost to complete those actions?
4. Would those actions make a difference?

She enquired whether WIL could be approached for that information. It was noted that DairyNZ had access to similar information also, and had previously shared examples from another Zone

D Ashby supported the approach and noted that FEPs were a priority as a source of good information on what was required to meet GMP. The Waimakariri was in a fortunate position where orange and red zone dairy farmers would have their FEPs completed by the end of the year.

A Veltman advised that DairyNZ had completed the Sustainable Milk Plans in the Hurunui and had amalgamated the actions. Work in the Waimakariri was still being completed and that information may be available in about six months.

C Latham asked for an update from forestry industry on how they protected land and water from the impacts of their activities.

M Griffin advised these requests would be put into the Action Plan.

There being no further business, the meeting closed at 6.10pm.

CONFIRMED

_____
Chairman

_____
Date

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BRIEFING

8 **WAIMAKARIRI PRIORITY OUTCOMES AND NARRATIVES – WORKSHOP** – M Dodson (ECan Hydrogeologist & Science Team Lead for Waimakariri) and M Griffin (ECan)

AGENDA ITEM NO: 4	SUBJECT: Working Group and Committee – Updates
REPORT TO: Waimakariri Water Zone Committee	**MEETING DATE:** 2 May 2016
REPORT BY: Murray Griffin, Facilitator	

PROPOSAL
This agenda item provides the committee with an overview of updates as tabled.

ACTION POINTS
An updated list of action points from previous meeting will be tabled with the committee.

COMMITTEE UPDATES
The following updates are tabled for the committee:

- **Regional Committee Meeting – 12 April 2016**

Claire McKay has provided a report on the 12 April Regional Committee meeting which is provided in meeting papers as agenda item 4-1.

Link to the 12 April meeting papers: http://ecan.govt.nz/publications/Council/regional-cttee-agenda-20160412.pdf

- **Nutrient Management & Water Efficiency Working Group**

David Ashby will provide an update at this meeting on this Working Group's priorities.

- **Lowlands Waterways, Braided Rivers and Biodiversity Working Group**

Grant Edge will provide an update at this meeting on the Biodiversity Working Group and other lowland waterway projects.

- **Waimakariri Zone Committee Annual Report – Update**

The inaugural annual report was tabled to the ECan Council on 21 April and will be tabled at Waimakariri District Council meeting on 3 May.

- **Waimakariri Zone Delivery Team – Update**

Waimakariri Zone Delivery Team Manager, Andrew Arps, will provide an update on current Zone Team priorities and achievements over April and May.

- **Zone Committee Engagement & Communications**

Engagements
- Science Stakeholder Advisory Group – 13 April, next meeting 11 May

Communications
- Committee's Monthly E Newsletter – Sent on 18 April.

Chair's Diary
- 21/4 Annual Report presentation to ECan Commissioners.
- 22/4 Ground-truthing Land Use maps with Matt Dodson
- 28/4 Farmers Panel meeting
- 29/4 Met with ECan CWMS Communications Team.

RECOMMENDATION

The Zone Committee are asked to receive these updates for its information and with regard to the committee's 5 Year Outcomes and 2016 work programme.

AGENDA ITEM NO: 4–1	SUBJECT: Regional Committee Report – 12 April 2016
REPORT TO: Waimakariri Water Zone Committee	**DATE OF MEETING:** 2 May 2016
REPORT BY: Claire McKay, Regional Committee representative	

Regional Committee Report

At April meeting the committee (RC) received updates from the working groups:

1) **Regional infrastructure working group (RIWG):**
   - Region wide challenge for Scheme funding contributions, due to low investment priority for hydro-generation, low dairy pay-out and economic effects of recent droughts.
   - Hurunui Water Project resource consent confirmed 18th December, as a result of High Court decision, following withdrawal of appeals to the Environment court.
   - Barrhill Chertsey Irrigation have commissioned a new lower Rakaia Barrhill scheme and are working with Ashburton District Council on the provision of stockwater through their infrastructure.
   - In the Ashburton Zone-The MAR project consenting processes now completed.
   - RIWG reviewed the Infrastructure Funding Working groups' advice on funding public benefit projects, as requested by the RC at the last meeting.
     After considerable discussion, RIWG agreed that it is not appropriate to include additional criteria but did propose some changes to the text of the recommendation which was discussed at the Regional Committee meeting, to clarify intent.
     The RC discussed the amended recommendation, and agreed the final wording:

"While public funding should be a last resort, there could be a case for Environment Canterbury to provide public funding (through a rate) to contribute to only the public benefit elements of an infrastructure project if the following criteria were satisfied. The project:

1. *Delivers significant, demonstrable ecological, social and cultural benefits over and above the alternatives (including doing nothing);*
2. *Requires only a one-off capital investment (i.e. other funding mechanisms are appropriate for ongoing activities);*
3. *Is a cost-effective way to achieve goals;*
4. *Benefits a group wider than the immediate users (i.e. clear identification of beneficiaries is required);*
5. *In principle, Environment Canterbury should not help underwrite private gain;*
6. *Contributes to the achievement of other public policies or strategies (if relevant); and*
7. *Has obtained resource use consents that may be required (including any obligation to avoid remedy or mitigate)*

Good investment principles should be followed when assessing the project (including a risk assessment and cost-benefit analysis). In addition, an assessment of the scale of the benefits and the affordability of the project, including the ability of a local community to meet the costs, would help to determine the mix of funding and how to rate (i.e. targeted or regional)."

The RC chair has conveyed this advice note to the Commissioners.

2) **Ecosystem Health and Biodiversity Working Group (BEWG)**

- Hosted a meeting of interested parties to discuss a joint approach to developing agreed priority five year outcomes for biodiversity across the region in March. Attendees included personal from DOC, LINZ, F & B, Landcare Research and Lincoln University, District Councils, ZC, and several Commissioners.
  Following discussion of the draft version of 5 year outcomes, a number of additional issues were identified for consideration by the working group before presenting to the RC.
- The working group made a number of recommendations about Immediate Steps funding that were accepted by the Regional Committee.
  - Funding for the Braided River project on the Upper Rangitata and Rakaia is to be rolled over for 5 years, subject to annual review on the basis of risk to the gains that have been made.
  - Funding for the Wainono and Te Waihora projects will be rolled over for 2016/17, and then retained to the level necessary to maintain the investment already made.
- The RC also accepted the proposed 5 year Regional Biodiversity outcomes as a basis for the development of a joint work programme with partner agencies and others, with an additional emphasis on biodiversity to be woven into Farm Environment Plans.

3) **Land Use and Water Quality Working Group (LUWQ)**

- As a strand of the 2016 work programme, the LUWQ held a field trip to Rangiora in March, where they were joined by some members from each of the Christchurch-West Melton and Waimakariri zone committees, with a focus on urban water quality issues. The field trip was hosted by the Waimakariri District Council, and provided the opportunity to see a range of stormwater management options:
  - including soakage to ground in new developments,
  - drainage design where groundwater is high,
  - the use of older infrastructure for new purposes,
  - management of impacts on spring fed streams (e.g. the Southbrook and Middlebrook)
  - management of the interface of rural and urban flows.
- The working group also received an initial briefing on planning frameworks for urban water quality.

Briefings to the RC

1) Attention was drawn to the proposed Freshwater Improvement Fund in the Government's Next Steps for Fresh Water consultation document, with the committee noting this has parallels with their advice to Commissioners (see above).

2) In response to a presentation from Scott Pearson from North Canterbury Fish & Game, the RC has re-convened the recreational working group to progress a project to better assess and apply the values associated with freshwater recreation in Canterbury, in association with Fish & Game and other recreational groups

3) Update on Drinking Water and note the work programmes underway.

- Access to safe drinking water is a first order priority of the CWMS. To qualify as 'safe', drinking water must comply with the Drinking Water Standards, set by the Ministry of Health. The National Environmental Standard for Sources of Human Drinking Water also sets requirements for protecting sources of human drinking water from becoming contaminated. This is the role of Regional council in planning

and policy. The majority of Canterbury's drinking water supplies are sourced form groundwater. Those coming from surface water supplies or shallow groundwater, are highly vulnerable to contamination by human or animal faeces, while those supplies coming from a secure, often deeper, groundwater source are safe to drink without any treatment.

- In the 2015 CWMS Targets report, progress was noted under the target for protecting source water quality, although eight water supplies in Canterbury, had lost compliance with the Drinking Water Standards (DWSNZ) since 2011/2012. Progress in the target areas of 'emerging contaminant risk' and 'catchment nutrient load' were both assessed as 'achieving'.
- ECan and the Canterbury District Health Board have a joint work programme with key work streams being drinking and recreational water targets. Aim is for a proactive approach to identifying, mitigating and managing issues to improve these targets. (e.g. developed communications & awareness around Nitrate N levels in wells, and risk maps)
- Zone Implementation Teams are now establishing programmes and targets to advance the more than 140 recommendations made in the ZIPs to set catchment load limits and improve nutrient management to protect drinking water quality.

4) Advised of the draft Navigation Safety Bylaw, currently out for consultation with the primary focus of the bylaw being for recreational boating.

5) An annual report on the activities CWMS zone and regional committees is a requirement in the Regional Council's Long Term Plan. The RC final report was approved by the full committee and will be submitted to the Regional Council at its meeting on 21 April.

6) Each zone committee had an opportunity to update the regional committee in writing or verbally.

Claire McKay

AGENDA ITEM NO: 5	SUBJECT: Kaiapoi River, Kaiapoi Wastewater Treatment Plant and Ocean Outfall – Update
REPORT TO: Waimakariri Water Zone Committee	**DATE OF MEETING:** 2 May 2016
REPORT BY: Murray Griffin	

PURPOSE

The purpose of this report is to provide the Waimakariri Water Zone Committee with the report provided to the Kaiapoi Community Board information requested in response to public enquiries about the condition of the Kaiapoi River and tributaries, the Eastern District Sewerage Scheme treatment performance and the occurrence of Avian Botulism in the region.

The report is included in the committee meeting papers as **agenda item 5-1**.

WHO

This report is provided by: Gerard Cleary – WDC Manager Utilities and Roading,
Owen Davies – WDC Drainage Asset Manager, and
Ric Barber – WDC Wastewater Asset Manager

RECOMMENDATION

That the committee receive this briefing for its information and with regard to its 2016 community engagement priorities and 5 year outcomes.

WAIMAKARIRI DISTRICT COUNCIL

REPORT

FILE NO and TRIM NO:	GOV-26-01-07 / 160302017635
REPORT TO:	Kaiapoi Community Board
DATE OF MEETING:	21st March 2016
FROM:	Gerard Cleary – Manager Utilities and Roading Owen Davies – Drainage Asset Manager Ric Barber – Wastewater Asset Manager
SUBJECT:	Update on Kaiapoi River, Kaiapoi Wastewater Treatment Plant and Ocean Outfall

SIGNED BY:
(for Reports to Council or Committees)

Department Manager

pp Chief Executive

1. SUMMARY

1.1. The purpose of this report is to provide the Kaiapoi Community Board information requested in response to public enquiries about the condition of the Kaiapoi River and tributaries, the Eastern District Sewerage Scheme treatment performance and the occurrence of Avian Botulism in the region.

1.2. The issues covered in this report include confirmation from staff that:

1.2.1. The Kaiapoi River Rehabilitation Working Party is working toward providing long term improvements to the Kaiapoi River environment and water quality.

1.2.2. There is no evidence that weed spraying in the upstream catchments is having any impact on the Kaiapoi River.

1.2.3. The Eastern District Sewerage scheme including the Kaiapoi Wastewater Treatment Plant and the Ocean Outfall meets all of its consent conditions other than some minor non compliances.

1.2.4. The incidence of Avian Botulism within the Waimakariri District is part of a national and international issue. Staff undertake best practice steps to help manage this issue.

Attachments:

i. Summary of 2015 Annual Compliance Report for Ocean Outfall consent.
ii. Summary beach monitoring test results for Ocean Outfall consent.

2. RECOMMENDATION

THAT the Kaiapoi Community Board:

(a) **Receives** report No.160302017635.

(b) **Notes** that the Kaiapoi River Rehabilitation Working Party is working toward providing long term improvements to the Kaiapoi River environment and water quality.

(c) **Notes** that there is no evidence that weed spraying in the upstream catchments is having any impact on the Kaiapoi River.

(d) **Notes** that the cost of using solely mechanical means rather than spraying where appropriate, to control weeds in Council Drains upstream of the Kaiapoi River is estimated to be $80,000 per year. Staff will take this matter to the Utilities and Roading committee for consideration.

(e) **Notes** that the Eastern District Sewerage scheme including the Kaiapoi Wastewater Treatment Plant and the Ocean Outfall meets all of its consent conditions other than some minor non compliances.

(f) **Notes** that the incidence of Avian Botulism within the Waimakariri District is part of a national and international issue. Staff undertake best practice steps to help manage this issue.

(g) **Notes** that testing of the sea foam and Kaiapoi River water quality and river bed sediment will be carried out if possible and the results will be reported to the Kaiapoi Community Board when they are available. The Kaiapoi River water and sediment test results will be available for the 18 April KCB meeting.

(h) **Circulates** this report to the Utilities and Roading Committee for its information.

(i) **Circulates** this report to the Waimakariri Water Zone Committee for its information.

(j) **Circulates** this report to the Drainage Advisory Groups for their information.

(k) **Circulates** this report to the Rangiora, Woodened Ashley and Community Boards and the Oxford Eyre Ward Advisory Board for their information.

3. ISSUES AND OPTIONS

3.1. KAIAPOI RIVER

3.1.1. The concern in the community about the condition of the Kaiapoi River and lower tributaries, including the health or viability of aquatic plants, freshwater mussels and fish are acknowledged by the Waimakariri District Council (WDC) and Environment Canterbury (ECan). The Councils are undertaking a series of investigations and trial programmes to verify the causes of the “die back” of aquatic plant and animal life that has occurred in the previous 3 years.

3.1.2 Adrian Meredith at Environment Canterbury has reported that, during the last six months, aquatic macrophytes are growing and expanding their distributions above and below the Cam confluence. The reappearance of dominant plants such as Potamogeton sp. (trout weed) and Elodea and Lagarosiphon (oxygen weeds) is evident, together with secondary growths of Starwort and water buttercup. These observations indicate successful reestablishment of some biodiversity on the river bed.

3.1.3 A survey by Environment Canterbury around the Cam confluence shows an abundant population of healthy freshwater mussels of several class sizes and other native fish life. At present the river is showing good recovery from a recent algal bloom observed in early 2016.

3.1.4 ECan, in conjunction with WDC, is undertaking investigations into the Kaiapoi River water quality and river bed sediment. These are being led by Adrian Meredith, the ECan Principal Surface Water Quality Scientist.

3.1.5 Testing and monitoring undertaken by ECan confirmed that a salt water wedge is present throughout the upper Kaiapoi River as far upstream as the SH1 motorway bridge. During investigations in mid-February, this salt water wedge was tested through the river system and observed at the SH1 bridge. This occurred during a period of high tides and low catchment flows in both the Waimakariri River and Kaiapoi River catchments.

3.1.6 The impact of the salt wedge is determined by the extent the salinity strength decreases as the wedge moves upstream. The seawater sits within the lower parts of the water column on the river bed and is overlaid by a freshwater layer of varying depths. The salinity decreases as a percentage of the total water column as the wedge moves upstream. The recent evidence of a salt water wedge as a percentage of the water column at the SH1 bridge is thought to represent an extreme or unusual case requiring further investigation.

3.1.7 ECan has advised that it is possible a salt wedge may have contributed to the previous "die back" of aquatic vegetation, freshwater mussels and some fish species in the river. It is also noted that the earthquakes lowered some areas of the river bed and ejected quantities of sediment that may have temporarily impacted on the viability of some of these species. The algal blooms occurring during the summer over recent years may also have been a factor. None of the possible causes of the "die back" are however confirmed, meaning further investigation is required.

3.1.8 ECan hydrologists are now extracting low flow frequency records for the last few years to determine whether the extreme conditions that caused the recent salt water wedge in the upper river occurred more frequently over the summers of 2012 to 2014, compared with earlier years. This should help ECan determine whether the circumstances that led to the occurrence of the salt wedge in the upper parts of the river were present, and in what durations, during previous summer months. This will assist to determine whether or not saline intrusion could have been a cause of the "die back" in the river over previous summers.

3.1.9 The recent observation of the salt water wedge in the upper river reaches challenges the usual understanding among river users that the wedge is found only from the river mouth to the area around the Courtenay confluence. The effects of the wedge will be most obvious on the deeper riverbed ecology (on submerged macrophytes well below low tide level and in the deep channel) and least on the mudbanks at higher tide levels, where both Councils are seeking to establish plants as a part of the Kaiapoi River planting trial.

3.1.10 It is noted that WDC suspended spraying its drains within the Kaiapoi River tributaries and tributary catchments since late 2015. This was a trial to see if it is feasible and cost-effective to manage the drains using only mechanical methods. The trial was not undertaken to test the environmental impact of herbicides as private drain spraying continued throughout the trial period. It is understood ECan has also reduced its spraying within the Kaiapoi River catchment.

3.1.11 The WDC and ECan staff that are involved in the Kaiapoi River investigations do not believe that the weed spraying caused the "die back" observed in recent years. Nonetheless, council staff have trialled suspending the spraying programme in the rural stormwater drains to test the need for spraying, and to determine cost implications.

3.1.12 The trial has indicated that the use of manual weed control methods alone is not cost effective. Staff estimate that the total cost of drain cleaning in the Ohoka,

Clarkville and Central Rural Drainage Schemes would increase by up to $80,000 per year if maintenance was solely undertaken using mechanical methods. There is not adequate budget to cover these costs. This approach would have a significant impact on drainage rates for these schemes.

3.1.13 There is a need to verify the exact causes of the “die back” in previous years. The WDC intends to commence testing to determine whether any herbicide chemicals are present in the river and tributaries surface water and sediment, if such testing is feasible. The Council will report the results of this testing to the 18 April board meeting.

3.1.14 Staff will continue to monitor for presence of herbicides in the river system downstream of the drain spraying activities.

3.1.15 The Kaiapoi River Rehabilitation Project is identifying a long term strategy for the river that is not yet funded. It may take several generations to achieve the full vision that is being identified through the investigations. The causes of “die back” of aquatic macrophytes and other species need to be understood to be sure the strategy considers all environmental factors in its future waterway improvement programme.

EASTERN DISTRICT SEWER

3.2. Kaiapoi Wastewater Treatment Plant

3.2.1. This section of the report aims to provide details about the operation of the Kaiapoi wastewater treatment plant and any current issues.

3.2.2. Since the Ocean Outfall was completed in 2006, the Woodend and Kaiapoi wastewater treatment plants (WWTP’s) have discharged to the Ocean Outfall and have met the resource consent conditions other than some minor non compliances.

3.2.3. The Kaiapoi WWTP has a treatment process consisting of an aeration basin, two settling ponds, a large wetland and then planted wetland followed by UV disinfection prior to being pumped to the ocean outfall. Figure 1 shows an aerial view of the Kaiapoi WWTP.

Figure 1: Aerial view of Kaiapoi wastewater treatment plant.

3.2.4. The Kaiapoi WWTP treats and discharges wastewater from the Kaiapoi, Rangiora and Mandeville communities and has an average flow out of the treatment plant of approximately 7,000 m^3 per day.

3.2.5. In 2011 a capacity assessment of all the treatment plants was undertaken, with recommended upgrades and expansion to the Rangiora and Woodend WWTP's. These capacity upgrades are to cater for growth in population and are not required to improve performance. There are no significant planned upgrades to the Kaiapoi WWTP over the next 50 years. The Kaiapoi WWTP was determined as having sufficient treatment capacity for the projected population over the next 50 years.

3.2.6. There are a couple of small scale upgrade and maintenance projects such as adding a second screen for the raw sewage and desludging work that are planned.

3.2.7. Four new aerators were installed in 2015 to replace the four existing aerators that were at the end of their useful lives and were starting to fail. These new aerators will provide sufficient aeration to cope with all the incoming wastewater for the next 15 years.

3.2.8. Weekly testing is carried out at a number of places at the treatment plant so that we can monitor the treatment process and to ensure resource consent compliance is met. Consent compliance is covered in section 3.5 of this report.

3.2.9. Overall the Kaiapoi WWTP is operating well, meeting its resource consent conditions and has no planned expansion in the next 50 years apart from small operational improvements.

3.3. Wetland Planting

3.3.1. Both the treatment plants at Kaiapoi and Woodend have a planted wetland that the wastewater passes through before UV disinfection and pumping out to the ocean outfall.

3.3.2. The planted wetlands at both the Kaiapoi and Woodend WWTP's had some plant die-off approximately 2 years after they were initially planted in 2006. They were replanted in 2009 with locally sourced wetland plants.

3.3.3. Over the last 7 years since they were re-planted, the wetlands had an initial die off of one of the species of plants again between 18 to 24 months, but the second plant species has continued to grow in the wetlands.

Figure 2: Woodend WWTP Wetlands – April 2015

3.3.4. Figure 2 shows a photo of the four wetland cells at the Woodend WWTP taken in April 2015. The wetland cell on the right was re-shaped and replanted in April 2014 by experts in wetland planting. The three other wetland cells are still the original 2009 plants. These were fully planted originally.

3.3.5. The remaining plants in the three original cells appear to be in good health, but are only providing partial cover of the planted wetland area. The replanted cell was undertaken as a trial for how to address the planted wetlands in the future.

3.3.6. The replanted cell has mainly been a success, with the majority of the plants having grown well for over two years now, although the methodology of planting will need to be changed to minimise the effect of Pukekos eating the newly planted shoots. This is the reason there are gaps within the newly planted cell, as despite being covered by netting, the Pukekos still managed to get to some of the plants.

3.3.7. There is a project in the existing Long Term Plan budget for replanting the wetlands at Kaiapoi in 2017/18 and 2019/20 and at Woodend WWTP in 2018/19. It is yet to be determined the optimal way to replant these.

3.4. Avian Botulism

3.4.1. Since the summer of 2011/12, there have been avian botulism outbreaks in the Bromley Wastewater ponds in Christchurch. In summer 2012 there were 6,300 birds collected that died attributed to avian botulism within the Bromley Oxidation ponds, with the estimated number over 7,000 due to a number unable to be recovered. Since then there have been outbreaks at the Christchurch City Council ponds every summer. The general noted pattern is that there is a reduction in dead birds after approximately 3 to 4 years.

3.4.2. In January 2014 the Kaiapoi WWTP had significant bird life die off. The government's veterinary epidemiologist carried out autopsies on birds at the Kaiapoi WWTP and confirmed that the cause was avian botulism.

3.4.3. Over the last three years there have also been bird deaths due to avian botulism at the Rangiora and Woodend WWTP's, Kaiapoi Lakes, Pegasus wetlands and Tutaepatu lagoon. The total numbers of bird deaths by year are shown on the chart below.

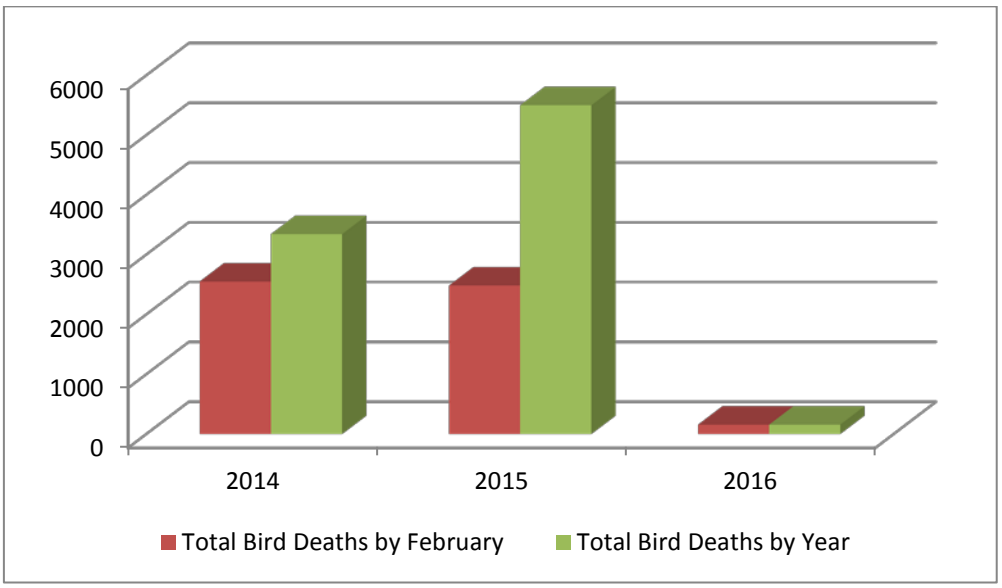


Figure 3: Chart showing the numbers of bird deaths due to Avian Botulism by Year

3.4.4. It can be seen in Figure 3 that there have been very few bird deaths this summer relative to the previous two years. To date there have been 158 birds collected in 2016 compared to 2,481 this time last year.

3.4.5. Avian botulism is a paralytic disease of waterbirds caused when toxin is released by a bacteria commonly found in the substrates of lake and pond beds, including wastewater oxidation ponds. This toxin is accumulated in aquatic invertebrates which are then consumed by healthy birds.

3.4.6. Botulism is an intoxication similar to food poisoning rather than an infectious disease. The affected birds show a number of consistent symptoms including weakness, lethargy and a progressive paralysis which initially affects the legs and neck. Walking becomes difficult and paralysis of the neck means birds cannot hold their heads erect. For birds sitting on the water this inevitably leads to death by drowning.

3.4.7. Carcasses of dead birds are subsequently fed on by flies and their larvae, which then concentrates the botulinum toxin within the larvae and the bird-toxic maggot cycle commences which leads to the deaths of subsequent waves of birds as they feed on the maggots in and around the dead bird carcasses.

3.4.8. For the two previous years, Council staff have managed the outbreak of avian botulism as advised by international best practice and have used an experienced ecologist that Christchurch City Council also use for the same processes. We have put out a media release regarding the avian botulism outbreaks for each year so far to advise the public of best practice. In previous years the practice has been to collect carcasses every 3 days. This year the carcasses have been collected daily.

3.4.9. It is thought that a combination of better management, weather conditions and the natural botulinum cycle have all contributed to significantly lower numbers of bird deaths this summer shown in Figure 3.

3.4.10. Council staff and contractors have worked with Christchurch City Council, Pegasus Town and Te Kohaka o Tuhaitara Trust to ensure a collaborative and best practice approach is taken with regards to avian botulism management.

3.4.11. The potential for bird scaring to reduce the bird population at the wastewater treatment plants has been proposed to attempt to reduce the numbers of bird deaths at the treatment plants. Council staff have spoken to manufacturers of acoustic bird deterrent devices and there is no specific bird scarers made for water birds that they could guarantee would work on ducks, geese and swans. There is already have an acoustic deterrent device installed in the wetlands which has been of very limited success.

3.4.12. At Te Kuiti WWTP in the Waitomo District they trialed bird scaring using a gas powered booming machine on weekdays between November and March in 2013. The wastewater manager at this plant commented that there had been very little success with birds soon becoming accustomed to the noise and even sitting on top of the machine when it went off after a couple of weeks. The suggestion of having people with shotguns on site to scare the birds off is not feasible from a health and safety perspective as a number of contractors are required to access to the ponds during the day, whilst we could get round this, staff would also question the efficacy of this approach based on the trial by Waitomo District Council.

3.4.13. The ecologist we have contracted to manage the identification, counting and retrieval of bird carcasses, Niall Mugan, has also recommended against the approach of trying to scare birds from the ponds. Internationally significant flocks of Paradise Shelduck, Grey Teal, New Zealand Scaup and Australasian Shoveler use the Districts Wastewater Oxidation Ponds, particularly Kaiapoi, as a moulting and post-breeding flocking site with approximately 10% of the New Zealand population of Paradise Shelducks passing through the Kaiapoi WWTP during the year. Attempting to reduce the numbers of these could potentially lead to a spread of avian botulism to other areas that are not as easy to collect the carcasses.

3.4.14. There has been some concern expressed in the community that the botulism is being caused by a perceived deficiency in the treatment plant. There is no basis for this concern and the bacteria that forms the botulism toxin is a widespread, naturally occurring bacteria throughout New Zealand and globally. By their nature, wastewater pond systems provide an ideal environment for this bacteria.

3.5. Ocean Outfall

3.5.1. Since the Ocean Outfall has been in service since 2006, it has met all the resource consent conditions other than some minor non compliances.

3.5.2. As part of the resource consent, a compliance report for the Ocean Outfall is produced to Environment Canterbury in August each year. This annual

compliance report also covers consents for the Kaiapoi, Woodend and Rangiora WWTP's.

3.5.3. The summary August 2015 compliance report is included as attachment i. This summary shows good overall compliance with two areas of non-compliance. These were due to two factors; two missed samples in the weekly sampling regime and high enterococci levels at the outfall sampling point.

3.5.4. The missed samples were down to human error and this has been addressed with a more stringent testing programme and results analysis. These sampling errors had not been an issue in previous consent compliance reports.

3.5.5. Enterococci is an indicator bacteria used to determine whether there are human pathogens in the wastewater. There are a number of studies carried out recently that prove that Enterococci is not an accurate indicator bacteria for human pathogens and that faecal coliforms or E.coli should be used.

3.5.6. Christchurch City Council and a number of other Councils in New Zealand have had the requirement for Enterococci testing removed from their consent conditions for wastewater disposal.

3.5.7. Over the past three years, the ocean outfall testing has shown elevated Enterococci levels on fifteen separate occasions out of a total of 156 tests. All of these have been in the summer time around February and none of them have had a corresponding rise in faecal coliforms or E.coli levels, both of which are also tested.

3.5.8. The consent limit for faecal coliforms has not been exceeded since the operation of the ocean outfall started, and whilst there is no consent limit for E.coli (this is still tested for operational management of the plants), the values have shown a similar trend.

3.5.9. There is on-going testing to determine the cause of the high Enterococci levels at the ocean outfall samples, although no definite conclusions have yet been drawn from this testing.

3.5.10. There may be potential to change the consent conditions for the WDC ocean outfall depending on the outcome of the current Enterococci testing. This will be determined later this year.

3.5.11. The other issue that has been raised is of a scum or sea foam on the beaches being attributed to the ocean outfall discharge. Whilst Council staff do not believe this is attributed to the ocean outfall discharge, a series of tests on this will be carried out this to determine its make-up. Determining the source of this may not be possible.

3.5.12. Environment Canterbury have also requested to see the results of this testing after being made aware of the build-up on the beach.

3.5.13. Environment Canterbury staff, as part of the Waimakariri Water Zone Committee, have seen photos of the scum on the beach and Lesley Bolton-Ritchie, the Senior Water Quality Scientist – Coastal at Environment Canterbury described it as "a common bloom of marine diatoms coming onto the beach".

3.5.14. Council staff have attempted to test the scum on the beach but been unable to find any since the start of March. If it is found again, the testing will be undertaken.

3.5.15. The testing carried out on this scum will determine whether it is a marine diatom. If that is the case, then no further testing is proposed. If it is not, then further testing of any faecal indicator bacteria presence will be carried out, and if any is found, then tracing work to determine the source of this can then be undertaken.

3.5.16. There has been concern expressed that the Council is discharging 'sludge' through the ocean outfall. This is definitely not the case. The total suspended solids in the discharge must be less than 200g/m^3 to meet the consent conditions and on average is actually less than 100g/m^3. This is 1 gram per litre. It is not possible that this could be 'sludge'. The ocean outfall pipeline and diffusers are not physically capable of conveying and discharging sludge.

Figure 4: Testing locations on the beach

3.5.17. As part of the resource consent, weekly testing is carried out on the water at three locations along the beach shown by the blue squares on Figure 4.

3.5.18. The two along the beach are at set points approximately one kilometre either side of the ocean outfall pipeline and are required for the resource consent, there is also one taken at the mouth of the Waimakariri River for our own information.

3.5.19. There are a number of parameters that are required to be tested for at these locations and the results of these over the last 6 months for all three sites are shown in graphs in attachment ii.

3.5.20. The two beach samples show very low background levels of both faecal coliforms and Enterococci. The highest level shown is one occurrence in November 2015 which was below 350 per 100 ml. This is well below the lowest level of compliance of 500 per 100ml for our wastewater discharge and we would also acknowledge that Council do not have control over any other factors of sea quality.

3.5.21. The Waimakariri river mouth sample shows two instances of higher levels, with the highest being 12,000 per 100 ml. This corresponded with the highest peak at the two beach sites which was due to an unknown event on the Waimakariri River.

3.6. In conclusion for wastewater, Council staff believe that the Kaiapoi WWTP is currently operating well and within consent limits, the wetlands at both Woodend and Kaiapoi treatment plants are due to have some work in the next few years. The avian botulism outbreak has had significantly less impact on the bird population in the District than in the previous two years. Staff intend to carry on with the management practices for this through the end of this summer and again next year. Also that the ocean outfall

generally complies with all consent conditions, and those conditions that are not met have minimal to no effect on the quality of the wastewater discharge. Staff are currently undertaking testing of the scum on the beach and will report back on any conclusions from this.

OTHER INVESTIGATIONS

3.7. Associated Upstream Investigations – Cam River and Tuahiwi Stream

3.7.1. ECan, with support from WDC, has just completed a full "stream walk" of the Cam River system, including the Cam River mainstem, 3 Brooks in Rangiora (mainly the rural reaches), and Tuahiwi Stream (also known as Maori Drain). These stream walks have a focus on identifying opportunities to improve habitat in the river systems. The results of that investigation are being analysed and results will be reported to the Cam River Enhancement Sub-Committee to determine appropriate actions going forward.

3.7.2. A number of other projects are underway in the Cam River and tributaries. These include the Canterbury Waterways Rehabilitation Experiment (CAREX) project which is a project undertaken by the University of Canterbury to trial effectiveness of waterway improvements. The project includes creation and monitoring of a series of sediment traps in the Middle Brook. It also includes a sand wand trial and bed raking for removal of legacy sediment. It includes habitat creation experiments and an area of bank reshaping undertaken by the WDC.

3.7.3. Some students are also involved in planning improvements within the 3 Brooks urban reaches throughout Rangiora. These include studying opportunities for habitat enhancement within the 3 Brooks and river bed surveys to enable reporting on habitat issues and objectives.

3.7.4. A scoping strategy of the 3 Brooks is now in preparation to identify future opportunities. This includes reviewing potential for a two stage ditch proposal and identifying potential improvement areas for creation of riffles, pools, sediment traps and other ideas for habitat enhancement. The strategy will draw from the results of the recently completed "stream walk" undertaken by ECan and the University student studies of the 3 Brooks in urban Rangiora.

3.8. The Management Team has reviewed this report and supports the recommendations.

4. COMMUNITY VIEWS

4.1. There has been concern expressed by a member of the community and in a local newspaper regarding the issues discussed in this report.

4.2. There is representation from Te Runanga O Ngai Tahu and Ngai Tuahuriri on the Kaiapoi River Rehabilitation Working Party. Feedback on proposals developed for the Working Party to date is that mahinga kai is being harvested from the Kaiapoi River and tributaries. The members of those communicates consuming the food have expressed their concerns to the Working Party about its safety.

5. FINANCIAL IMPLICATIONS AND RISKS

5.1. The proposed capacity upgrades to the Rangiora and Woodend Wastewater treatment plants are allowed for in the Council Long Term Plan.

5.2. Ongoing, maintenance, monitoring and testing to ensure compliance with the Councils discharge consents for the Eastern District sewerage schemes is allowed for within annual budgets.

5.3. The cost of carrying out mechanical cleaning of drains upstream of the Kaiapoi River is estimated to be $80,000 per year more than the cost of spraying herbicide. There is no evidence that the use of herbicide in upstream drains has any adverse effect on the Kaiapoi River. The budgets for the rural drainage schemes are not adequate to cover this cost.

6. CONTEXT

6.1. Policy

This is not a matter of significance in terms of the Council's Significance Policy.

6.2. Legislation

The investigation of water quality in streams and rivers, and effects of activities on the environment, addresses requirements in the following legislation:

Resource Management Act 1991

Section 31

(1) Every territorial authority shall have the following functions for the purpose of giving effect to this Act in its district:

(e) the control of any actual or potential effects of activities in relation to the surface of water in rivers and lakes:

Section 35

(1) Every local authority shall gather such information, and undertake or commission such research, as is necessary to carry out effectively its functions under this Act or regulations under this Act.

(2) Every local authority shall monitor (a) the state of the whole or any part of the environment in its region or district;

Local Government Act 2002

Section 10 Purpose of Local Government

(1) The purpose of local government is –

(a) To enable democratic local decision-making and action by, and on behalf of, communities;

6.3. Community Outcomes

Addressing water quality in the Kaiapoi and coastal areas gives effect to the following outcomes:

- There is sufficient clean water to meet the needs of communities and ecosystems.
- People enjoy clean water at our beaches and rivers.
- There are areas of significant indigenous vegetation and habitats for indigenous fauna.

Attachment i – Summary of 2015 Annual Compliance Report for Ocean Outfall consent.

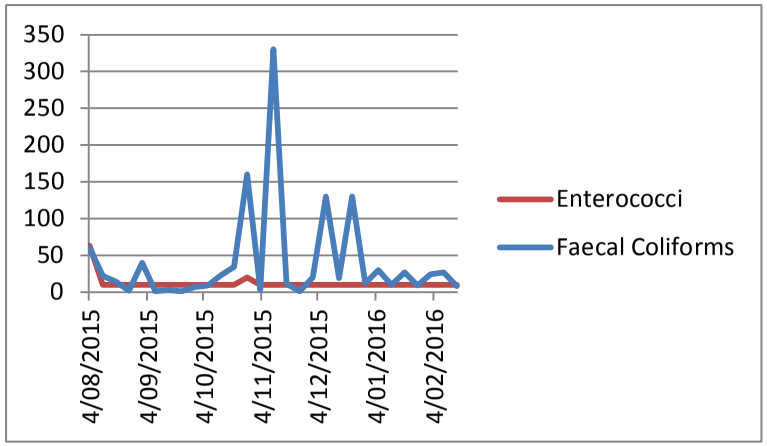
Consent condition	Description	Compliance
Condition 2	Discharge volume and rate	Full compliance
Condition 9	Ocean outfall discharge quality	9(a) Full compliance for 9 parameters; 98% compliance for 3 parameters 9(b) Full compliance 9(c) Full compliance 9(d) Full compliance 9(e) Full compliance
Condition 11	Discharge BOD_5, TSS, ammoniacal-N limits	Full compliance
Condition 12	Discharge microbiological limits	Minor non-compliance (enterococci)
Condition 13	Woodend Beach and The Pines Beach	Full compliance
Condition 14	Visual observations	Full compliance
Condition 15 – 26	Water quality, surface sediments and benthic infauna	Not applicable
Condition 30	Complaints	Full compliance

The key results for the 2014/15 outfall monitoring programme were:

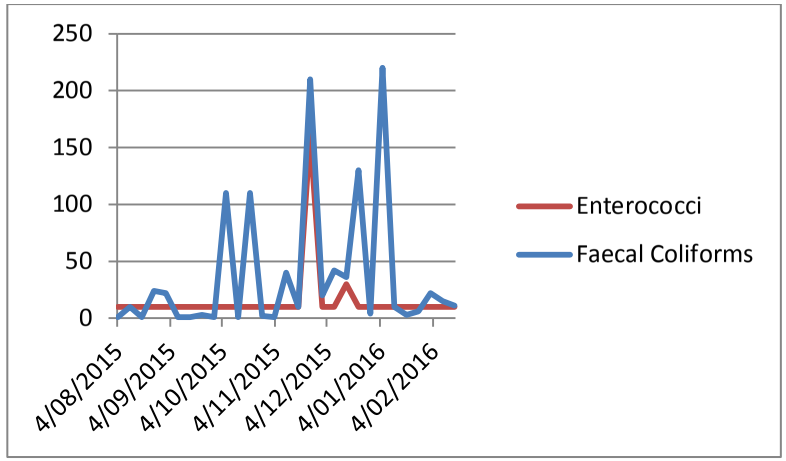
- Laboratory and field measured pH in 2014/15 displayed a lower median and range, and less seasonal variation in comparison with the 2013/14 data.
- Median concentrations of DO were lower in 2014/15, which is likely partially attributable to two of the four aerators at Kaiapoi WWTP simultaneously failed in November 2014.
- There were no exceedances detected of the consent limit for TSS (200 g/m^3) over the 2014/15 monitoring period.
- Ammoniacal-N concentrations exceeded the consent limit of 27 g/m^3 on two occasions during the 2014/15 monitoring period, but this is allowable under Condition 11.
- The median TN concentration in 2014/15 was comparable to the median in the 2013/14 monitoring period. Trends in DRP and TP show an increase since the previous monitoring period.
- Faecal coliform numbers detected exceeded the summer standard value of 1,000 cfu/100 mL on a single occasion, but this is allowable under Condition 12.
- Four samples (three of which occurred within eight consecutive samples) collected between December 2014 and February 2015 exceeded the high limit for enterococci. This exceedance constitutes a non-compliance with Condition 12.
- Apart from cadmium and mercury, all other metals and metalloids that were analysed were detected, although at levels which were below the detection limits of the previous sampling.
- All organochlorine, PCB and PAH results were below analytical detection limits.

Attachment ii – Summary Beach Monitoring Test Results for Ocean Outfall consent.

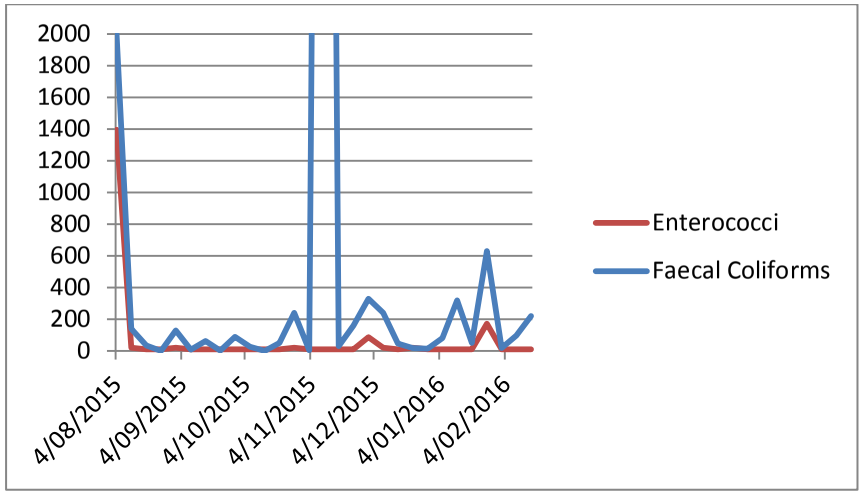
Pines Beach (South of Ocean Outfall)



Woodend Beach (North of Ocean Outfall)



Waimakariri River Mouth



AGENDA ITEM NO: 6	SUBJECT: Waimakariri Sub Regional Planning Process – Briefing
REPORT TO: Waimakariri Water Zone Committee	**DATE OF MEETING:** 2 May 2016
REPORT BY: Murray Griffin	

PURPOSE

To provide the Water Zone Committee with a briefing on the recommended process for advancing the sub regional planning process in the Waimakariri and to discuss the process between now and formulating recommendations

BACKGROUND

This update follows on from the committee's workshop earlier in April, which introduced some of the key learning from other zones that have gone through their sub regional planning process, as part of the Canterbury Land and Water Regional Plan.

The proposed schedule for advancing the Waimakariri sub regional planning process to be discussed with the committee is as follows:

May to mid-2016	**- Identify gaps, gather information and consolidate knowledge**
	- Zone committee to confirm community outcomes and indicators
Mid 2016	**- Current State**
Nov 2016-Feb 2017	**- Scenarios**
Mar 17-Sep17	**- Developing Solutions**
Oct 2017	**- ZIP Addendum**
Mid 2018	**- Plan Notification & on the ground actions**

WHO

This update will be provided by: Dirk Brand (Planning Team Leader, ECan) and Matt Dodson (Hydrogeologist and Science Technical

RECOMMENDATION

That the committee receive this briefing for its information and confirm the preferred process for the Waimakariri sub-regional planning process scheduled to commence in July 2016.

AGENDA ITEM NO: 7	SUBJECT: Tutaepatu Lagoon and Pines Beach Wetland – Update
REPORT TO: Waimakariri Water Zone Committee	**DATE OF MEETING:** 2 May 2016
REPORT BY: Murray Griffin	

PURPOSE

To provide the Water Zone Committee with an update on the Immediate Steps projects at Tutaepatu Lagoon and Pines Beach wetland.

BACKGROUND

This update follows on from the committee's field trip in December 2015 and will include two short videos profiling the progress made at Tutaepatu Lagoon and Pines Beach.

WHO

This update will be provided by: Greg Byrnes (General Manager, Te Kōhaka o Tūhaitara Trust) and Gina McKenzie (Communications Advisor, ECan)

RECOMMENDATION

That the committee receive this briefing for its information and with regard to its 2016 community engagement priorities and 5 year outcomes.

AGENDA ITEM: 9	SUBJECT: Community Outcomes & Indicators – Workshop
REPORT TO: Waimakariri Water Zone Committee	**MEETING DATE:** 2 May 2016
REPORT BY: Dirk Brand and Jason Holland, Planning Team, Environment Canterbury	

National Policy Statement for Freshwater Management 2014

Purpose of Workshop
To update the Zone Committee about the National Policy Statement for Freshwater Management (NPSFM) 2014, and discuss how it aligns locally with the Waimakariri Community Outcomes.

Background
The Waimakariri sub regional plan, a chapter of the Canterbury Land and Water Regional Plan, must give effect to the NPSFM, which came into effect on 1 August 2014.

The NPSFM is about recognising the national significance of fresh water and Te Mana o te Wai (the mana of the water).

The key features of the NPSFM are:

- maintaining or improving overall water quality within a region;
- safeguarding the life-supporting capacity of freshwater, and the health of people and communities;
- the efficient use and allocation of water;
- protecting significant values of wetlands and outstanding freshwater bodies;
- improving the integrated management of land and fresh water in catchments; and
- involving iwi and hapu in decision making and ensuring tangata whenua values and interests are reflected in freshwater management.

The NPSFM requires regional councils to:

- identify fresh water management units (FMU)[1];
- set freshwater quality and quantity objectives for the FMU that describe the desired state of the water bodies

[1] FMU are defined as "the water body, multiple water bodies or any part of a waterbody determined by the regional council as the appropriate spatial scale for setting freshwater objectives and limits and for freshwater accounting and management purposes" (NPSFM, 2014; 7)

- set water quality and quantity limits for the FMU (maximum amount of the resource available for use)

- implement methods to achieve the freshwater objectives and limits, including taking into account all freshwater takes and discharges.

Environment Canterbury must consider the 'Values[2]' set out in the NPSFM, and develop plans that recognise and protect these values. There are two compulsory values in the NPSFM that council must incorporate; ecosystem health and human heath for recreation. There are also other optional national values that Council must consider. The full list of values within the National Policy Statement for Freshwater Management are also provided as reference for the committee in Appendix 2.

The NPSFM also highlights a range of Attributes[3] that must be considered, to ensure the Compulsory Values are measurable and maintained within certain critical thresholds that ensure ecosystem health and human health for recreation.

Update

On Thursday 14 April, Environment Canterbury staff met to explore how the draft Community Outcomes and Indicators aligned with the NPSFM compulsory and optional national values. There was also discussion about FMUs, which can encompass a sub-catchment or a whole zone. The table below in Appendix 1 demonstrates how the draft Community Outcomes align with the values of the NPSFM14.

Recommendation

That the Zone Committee takes note of the results of the preliminary assessment and that the committee considers the NPSFM compulsory and national values at their next workshop when making any amendments to the Community Outcomes and Indicators.

[2] Value is defined as "a) any national value; and b) includes any value in relation to fresh water, that is not a national value, which a regional council identifies as appropriate for regional or local circumstances" (NPSFM, 2014; 8).

[3] Attribute is defined as "a measurable characteristic of fresh water, including physical, chemical and biological properties, which supports particular values" (NPSFM, 2014; 7).

Appendix 1: Waimakariri Community Outcomes and NPSFM Values

Waimakariri Outcomes	NPSFM Value
1. The zone has safe and reliable Drinking Water, preferably from secure sources.	Water supply – meet potable water needs
2. There is improved contribution to the Regional Economy from the Zone	Economic opportunities to people, business and industries
3. Protect and improve the indigenous biodiversity in the zone.	National Value – Ecosystem health
4. Highly Reliable Irrigation water, to a target of 95%, is available in the Zone	Irrigation and food production
5. The Ashley/Rakahuri River is safe for contact recreation, has improved river habitat, fish passage, customary use, and flows that support natural coastal processes	National Value – Ecosystem health (Ashley only) National value - human health for recreation (Ashley only) Mahinga Kai Wai tapu (Ashley only) Natural form and character
6. Lowland streams water quality and water quantity maintains mahinga kai gathering and a diversity of aquatic life	Mahinga Kai
7. The Waimakariri River is a healthy habitat for freshwater and coastal species, and is protected and managed as an outstanding recreation resource and outstanding natural landscape	National Value – Ecosystem health (Waimak only) Transport – water navigable (Waimak only) Natural form and character (Waimak only)
8. Optimal Water and Nutrient management is common practice	Irrigation and food production

Appendix 2: National values and uses for fresh water

COMPULSORY NATIONAL VALUES
Te Hauora o te Wai / the health and mauri of water
Ecosystem health – The freshwater management unit supports a healthy ecosystem appropriate to that freshwater body type (river, lake, wetland, or aquifer). In a healthy freshwater ecosystem ecological processes are maintained, there is a range and diversity of indigenous flora and fauna, and there is resilience to change. Matters to take into account for a healthy freshwater ecosystem include the management of adverse effects on flora and fauna of contaminants, changes in freshwater chemistry, excessive nutrients, algal blooms, high sediment levels, high temperatures, low oxygen, invasive species, and changes in flow regime. Other matters to take into account include the essential habitat needs of flora and fauna and the connections between water bodies. The health of flora and fauna may be indicated by measures of macroinvertebrates.
Te Hauora o te Tangata / the health and mauri of the people
Human health for recreation – As a minimum, the freshwater management unit will present no more than a moderate risk of infection to people when they are wading or boating or involved in similar activities that involve only occasional immersion in the water. Other contaminants or toxins, such as toxic algae, would not be present in such quantities that they would harm people's health. In freshwater management units where a community values more frequent immersion in the water such as swimming, white-water rafting, or water skiing, the risk of infection will be no more than moderate. In some freshwater management units, the risk of infection to people undertaking any activity would be no greater than what would exist there under natural conditions.
ADDITIONAL NATIONAL VALUES
Te Hauora o te Taiao / the health and mauri of the environment
Natural form and character – Where people value particular natural qualities of the freshwater management unit. Matters contributing to the natural form and character of a freshwater management unit are its visual and physical characteristics that are valued by the community, including its flow regime, colour, clarity, morphology or location. They may be freshwater management units with exceptional, natural, and iconic aesthetic features.
Mahinga kai / food gathering, places of food
Mahinga kai – Kai are safe to harvest and eat.

Mahinga kai generally refers to indigenous freshwater species that have traditionally been used as food, tools, or other resources. Mahinga kai provide food for the people of the rohe and these sites give an indication of the overall health of the catchment.

For this value, kai would be safe to harvest and eat and knowledge transfer is present (intergenerational harvest). In freshwater management units that are highly valued for providing mahinga kai, the desired species are plentiful enough for long-term harvest and the range of desired species is present across all life stages.

Mahinga kai – Kei te ora te mauri (the mauri of the place is intact).

For this value, freshwater resources would be available and able to be used for customary use at some places (but not everywhere). In freshwater management units that are highly valued for providing mahinga kai, resources would be available for use, customary practices able to be exercised to the extent desired, and tikanga and preferred methods are able to be practised.

Fishing – The freshwater management unit supports fisheries of species allowed to be caught and eaten.

For freshwater management units valued for fishing, the numbers of fish would be sufficient and suitable for human consumption. In some areas, fish abundance and diversity would provide a range in species and size of fish, and algal growth, water clarity and safety would be satisfactory for fishers. Attributes will need to be specific to fish species such as salmon, trout, eels, lamprey, or whitebait.

Mahi māra / cultivation

Irrigation and food production – The freshwater management unit meets irrigation needs for any purpose.

Water quality and quantity would be suitable for irrigation needs, including supporting the cultivation of food crops, the production of food from domesticated animals, non-food crops such as fibre and timber, pasture, sports fields and recreational areas. Attributes will need to be specific to irrigation and food production requirements.

Animal drinking water – The freshwater management unit meets the needs of stock.

Water quality and quantity would meet the needs of stock, including whether it is palatable and safe.

Wai Tapu / Sacred Waters

Wai tapu – Wai tapu represent the places where rituals and ceremonies are performed.

Rituals and ceremonies include, but are not limited to, tohi (baptism), karakia (prayer), waerea (protective incantation), whakatapu (placing of raahui), whakanoa (removal of raahui), and tuku iho (gifting of knowledge and resources for future generations).

In providing for this value, the wai tapu would be free from human and animal waste, contaminants and excess sediment, with valued features and unique properties of the wai protected to some extent. Other matters that may be important are that identified

catchments have integrity (there is no artificial mixing of the wai tapu) and identified taonga in the wai are protected.
Wai Māori / municipal and domestic water supply
Water supply – The freshwater management unit can meet people's potable water needs. Water quality and quantity would enable domestic water supply to be safe for drinking with, or in some areas without, treatment.
Āu Putea / economic or commercial development
Commercial and industrial use – The freshwater management unit provides economic opportunities to people, businesses and industries. Water quality and quantity can provide for commercial and industrial activities. Attributes will need to be specific to commercial or industrial requirements.
Hydro-electric power generation – The freshwater management unit is suitable for hydro electric power generation. Water quality and quantity and the physical qualities of the freshwater management unit, including hydraulic gradient and flow rate, can provide for hydro-electric power generation.
He ara haere / navigation
Transport and tauranga waka – The freshwater management unit is navigable for identified means of transport. Transport and tauranga waka generally refers to places to launch waka and water craft, and appropriate places for waka to land (tauranga waka). Water quality and quantity in the freshwater management unit would provide for navigation. The freshwater management unit may also connect places and people including for traditional trails and rites of passage, and allow the use of various craft.