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**Waitaki**  
DISTRICT COUNCIL  
TE KAUNIHERA Ā ROHE O WAITAKI

## To the members of the Upper Waitaki Zone Water Management Committee

### MEMBERSHIP

Barry Shepherd (Chairman)	Peter Skelton
Mathew Bayliss	John Wilkie
Jay Graybill	Murray Cox
Lisa Anderson	Gary Kircher
Simon Cameron	Richard Subtil
Sandra Hampstead Tipene	
Moeraki Representative (vacant)	

***Notice is given of the Meeting of the Upper Waitaki Water Zone Management Committee to be held on Friday 19 August, 2016, at 9.30am***

**VENUE:** Mackenzie Country Inn, Twizel

**BUSINESS:** As per agenda attached

**WAYNE BARNETT**  
**CHIEF EXECUTIVE OFFICER, MACKENZIE DISTRICT COUNCIL**

**MICHAEL ROSS**  
**CHIEF EXECUTIVE OFFICER, WAITAKI DISTRICT COUNCIL**

	<p align="center"><b>Upper Waitaki Zone Committee Meeting</b></p> <p align="center"><b>Friday 19 August 2016</b></p> <p align="center"><b>9:30am</b></p> <p align="center"><b>Mackenzie Country Inn, Twizel</b></p>	
<b>9:00 am</b>	Arrive / Cup of tea	
<b>9:30</b>	<b>Standing Items:</b> Karakia, Apologies, Confirmation of Minutes, Correspondence, Regional Committee update	<b>3</b> <b>8</b>
<b>10:00</b>	<b>Genesis Energy:</b> Update on works at Lake Tekapo	Elinor Watson, Genesis Energy
<b>10:20</b>	<b>Immediate Steps Biodiversity review:</b> feedback	Chris Keeling, Environment Canterbury <b>9</b>
<b>10:40</b>	<b>Plan Change 5 update</b>	Jason Holland, Environment Canterbury <b>13</b>
<b>11:00</b>	<i>Morning Tea</i>	
<b>11:15</b>	<b>Opportunities and Challenges of Measuring Nitrogen Leaching at the Farm Scale:</b> Presentation and Discussion	Sam Carrick, Landcare Research
<b>12:00</b>	<b>Lake Middleton Investigation</b>	Helen Shaw, Environment Canterbury <b>16</b>
<b>12:30</b>	<b>Mackenzie District Council:</b> Update on Freedom Camping and District Plan Review	Aaron Hakkaart, Mackenzie District Council
<b>12:45</b>	<b>General Business</b> <i>General Public</i>	
<b>1:00PM</b>	<i>Meeting Close and Lunch</i>	

**ENVIRONMENT CANTERBURY  
MACKENZIE AND WAITAKI DISTRICT COUNCILS**

**MINUTES OF THE MEETING OF THE UPPER WAITAKI ZONE WATER  
MANAGEMENT COMMITTEE, HELD AT THE MACKENZIE COUNTRY INN,  
TWIZEL, ON JULY 15, 2016 AT 9.37AM**

**PRESENT:**

Barry Shepherd (Chair)  
Simon Cameron  
Mathew Bayliss  
Sandra Hampstead-Tipene  
Peter Skelton  
John Wilkie  
Richard Subtil  
Murray Cox  
Jay Graybill

**IN ATTENDANCE:**

Nic Newman, Zone Committee Facilitator  
Keri-Ann Little, Committee Secretary, MDC  
Ian Lyttle, Environment Canterbury  
Michael Hide, Environment Canterbury  
John Benn, Department of Conservation  
Peter Ramsden, Environment Canterbury  
Shirley Hayward, Environment Canterbury  
Jason Holland, Environment Canterbury  
Peter Scott, ECan Representative  
Tania Butterfield, Environment Canterbury  
Charlotte O'Sullivan, Environment Canterbury

**APOLOGIES:**

Resolved that an apology be received from Lisa Anderson and Miriam Morton.

**Chair/ John Wilkie**

**KARAKIA:**

Peter Ramsden opened the meeting with a karakia.

**MINUTES AND MATTERS ARISING:**

Resolved that the minutes of the meeting held on 21 June 2016, be confirmed and adopted as a correct record.

**Richard Subtil/ Sandy Tipene- Hampstead**

*Changes to the previous minutes:*

Page 4 paragraph 7 amended read:

Mr Skelton responded stating the booklet represents agreed good management practices not just in Canterbury but around New Zealand and is quite an achievement.

*Matters arising from the previous minutes:*

Richard Subtil asked Mr Hide for an update on 7 properties not metered. Mr Hide replied the property owners had been contacted and given a timeframe before enforcement would be applied. The current timeline is 25 August 2016. Mr Subtil suggested a site visit would be preferred rather than communication due to the small number of outstanding properties. Mr Hide said there are a number of different scenarios and he would follow this up.

The Committee communicated interest in more lysimeter's being installed in the Zone including better use of Mr Subtil's which had already been installed, resulting in long-term quality data being available for the use in water improvements.

Mr Newman commented that secure funding would need to be sourced but developing an extension programme with ECan and land owners to gain useful information. He said he will follow up with Mr Subtil.

Mr Skelton suggested liaising with Ngai Tahu to gain information regarding the use of their lysimeter's.

**CORRESPONDENCE:**

Mr Newman distributed an invitation to the Committee from the new Water Force Store in Omarama opening to be held in their store on Thursday 28 July at 4pm.

The Chair noted an email he received from Bill Bayfield, Chief Executive Officer, ECan offering guidance for committee members wishing to stand in local body elections. He stated Members can stand down from the Committee on a temporary basis.

Resolved: that the Upper Waitaki Zone Committee receive and note all correspondence.

**Chair/ Simon Cameron**

**REGIONAL COMMITTEE UPDATE:**

The Chair distributed a copy of a report from Niwa on climate change. Next regional committee meeting is on the 9<sup>th</sup> of August 2016.

Mr Wilkie said that a submission regarding the Long Fin Eel was included in the TRONT submission.

At the invitation of the Chair, Peter Scott, Representative Regional Committee for Councils and Mayors informed the Committee he will be standing for election for ECan. He updated the Committee on the Regional Infrastructure Working Group meeting held on 13 July 2016.

The Committee discussed the Aoraki Water Trust's proposal to pipe water from Tekapo. Mr Bayliss noted his surprise that various parties would be resubmitting this idea after previous studies showed the proposal was not economically viable and raised several problems. The Chair added that Jeremy Boyce from Aoraki Water Trust had approached him regarding attending a Zone Committee meeting to inform the Committee of their proposal.

**WHAT'S HOT:**

Mr Hide updated the Committee on the following points:

*Consents:*

- Benmore Irrigation hearing had now been delayed.
- Genesis Energy are under taking work on the Tekapo intake surge tank for earthquake strengthening.
- Sensitive Lakes consents still being processed and 2 or 3 yet to be received a letter will be sent in two weeks' time to follow up.
- NZ transport authority undertaking strengthening works at the Twizel River Bridge.

*Compliance and Enforcement:*

- ECan staff are currently working through issues with loggers and verifications.

**Zone Update: Work Programme:**

Michael Hide, Zone Team Manager updated the committee on progress against development of the work programme and how this is best reported to the Zone Committee.

Mr Subtil highlighted how the work programme progress is ticked off. Mr Newman said there will be systems put in place to ensure targets are being met.

The development of the work programme for the zone needs to consider a range of factors:

- Zone Committees priority outcomes
- Zone Implementation Plan recommendations
- Compliance and enforcement guidelines for the zone
- The level of internal and external resourcing available
- Councils statutory obligations

It was suggested that progress reporting is based on the achievement of project milestones across 4 key work streams. These are Keystone Projects, Change Management, Science and Biodiversity.

Mr Newman updated the Committee on a project being undertaken at Lake Middleton by a Canterbury University Student. An update will be provided at the next Zone Committee meeting.

The Committee suggested delegated Committee members review a spreadsheet and highlight issues to then be identified to the Committee, this would also include reporting back to the Community.

*The Committee adjourned for morning tea at 11:14am and reconvened at 11:32am.*

**LATEST LAKE WATER QUALITY:**

Ms Hayward provided an update on the Waitaki Integrated Monitoring Framework Phase 2 Scoping – Pilot Catchments Project. A key recommendation from both Waitaki Zone Committee's was for the development of an integrated monitoring framework for the Waitaki catchment. The overall aim is to allow the community to have a shared source of data, ease of access to information, and reduce overlap and to measure the effectiveness of our regulatory and non-regulatory interventions.

Ms Hayward confirmed the agreed objectives for the framework, identified the two pilot catchments, explained the “story map” and provided a timeline.

Mr Subtil suggested the data is distributed to community papers for publication. A “good news story”.

Mr Ramsay suggested TLI monitoring for Lake Ruataniwha. He said Lake Pukaki had been full for 3 months and stated it had been a wet season in some catchments. Ms Hayward said she would investigate Lake Ruataniwha, which had historically been a low risk Lake.

Ms Hayward highlighted the recent discovery of the freshwater Jellyfish at Kellands Ponds she noted this was the first recorded observation of the species in Canterbury, she stated there is no biodiversity threat or threat to human health, however the Jellyfish is a predator to other species.

#### **PLAN CHANGE 5:**

Mr Holland outlined the officers’ recommendations on the Nutrient Management and Waitaki Plan Change (Plan Change 5 to the Land and Water Regional Plan) and reminded Zone Committee members of upcoming key dates in the hearing process.

Highlights of the Section 42A report were incorporating good management practice GMP into the Plan, Nutrient Allocation Zones, Outcomes and Limits, Tangata Whenua, Community Wastewater, Aquaculture and Freshwater Management Units.

Upcoming key dates in the hearing process scheduled before the next Zone Committee meeting on 19 August are:

- 22 July – Submitters to confirm their intention and availability to be heard at the hearing. This is also when all evidence is to be received by Council.
- 5 August – All rebuttal evidence to be received by Council.
- The hearing begins on 22 August at 9:30am in Christchurch at the Lincoln Events Centre.

#### **REGIONAL INITIATIVES:**

Nic Newman spoke to Ellie McNae, Senior Strategy Advisor report updating the Zone Committee on the regional work programmes and recreational and amenity initiatives and regional biodiversity.

Work is underway to address recreation and amenity information gaps and develop a 5 year work programme in regional biodiversity.

Mr Newman asked Committee members to note the scope of the swimming research, receive the background reports on recreation and amenity topics and agree to discuss and identify at a workshop in August/September potential flagship recreation and amenity locations and projects and opportunities for step-change in biodiversity protection and enhancement.

#### **FACILITATOR UPDATE – STRATEGIC THREADS:**

Mr Newman reported that the Mackenzie Country Trust would meet with the Zone Committee in August/September.

Mr Newman said the field trip last month, where weed encroachment on Conservation Land was raised had been followed up. He said there is only emergency provisions for grazing of Conservation Land i.e. drought. He suggested the Committee highlight their concerns to DOC regarding weed re-infestation of Conservation Land once grazing had been removed.

Mr Bayliss said there is reasonable evidence from High Country Farmers, but no science indicating wild pine grazing is a successful method, he asked if the Committee ask for science results or the Committee go ahead and lobby for strategic grazing.

The Committee suggested the Biodiversity Working Group and the Department of Conservation consider how or if strategic grazing on Conservation Land could be a useful tactic against weeds and if not what tactics are in place for long-term management. Mr Newman said he will forward on the Zone Committee's concerns to the Biodiversity Working Group.

Mr Subtil asked if the Zone Committee should be involved in this work and said protecting the Willowburn is the Zones main focus.

#### **GENERAL BUSINESS; GENERAL PUBLIC:**

Mr Skelton congratulated Mr Wilkie for his recent award and commendation for his "outstanding contribution" by ECan Commissioner chairwoman Dame Margaret Bazley.

Mr Skelton added as the Canterbury Water Management Strategy moves forward, this is a time of reflection regarding topics raised while remembering it is the end of a triennium, local body elections will be held and the ECan Constitutional change.

He said it is important for the ongoing credibility of the Zone Committee process in Canterbury for the water management strategy that Zone Committee members continue to remind ourselves that the Territorial Authority are at the heart of the Zone Committees and that agenda's should outline the opportunity for Territorial Authority's representatives to raise and discuss concerns from Communities with input of Runanga and Community Members, which is also essential.

#### **NEXT MEETING:**

The next meeting will be on Friday 19 August 2016 at the Mackenzie Country Inn in Twizel.

At the invitation of the Chair, Peter Ramsden shared a Karakia

**THERE BEING NO FURTHER BUSINESS  
THE CHAIRMAN DECLARED THE MEETING CLOSED AT 1:05PM**

**CHAIRMAN:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

# UPPER WAITAKI ZONE COMMITTEE

## REPORT TO THE REGIONAL COMMITTEE

### MEETING 9<sup>TH</sup> AUGUST 2016

- The U.W.Z.C. has met twice since the last report.
- John Wilkie reported on the allowable catch quotas for eels. The report was well received by the Committee. John thanked the Committee for its assistance.
- A copy of the N.I.W.A. climate report has been distributed to members.
- A letter has been sent to the M.D.C. and W.D.C. outlining support for the Council initiatives to improve environmental outcomes associated with large visitor increases in the Zone. The letter asked the Councils to consider some potential solutions the Zone has discussed regarding the impact on recreational experiences in the Zone.
- Commissioner Peter Skelton updated the Committee on P.C.3.
- The Committee approved funding of \$12,200-00 under immediate steps to provide 300 metres of stock fencing and planting of 1250 plants to increase species diversity at the Otematata Wetlands Walkway.
- A field trip to Ribbonwood Station was held to inspect the headwaters of the Willowburn / Wairepo systems.
- The Zone manager presented a paper updating the Committee on progress against development of the work program and how this is best reported. It suggested reporting across four Workstreams. Keystone projects, Farmer change, Science, Biodiversity.
- The Zone managers also reported on the report outlining officer's recommendations on nutrient management and Waitaki Plan Change (PC5 to the L.W.R.P.)
- The Upper Waitaki T.L.I's were presented (copy attached) noting all are down except Ohau and Tekapo which are up 0.3 and 0.1 up respectively.
- A report recommended to note the scope of swimming research, receive the background reports on recreation and amenity topic and agree to discuss at an Aug/Sept workshop potential locations, projects and opportunities for a step change in bio-diversity, protection and enhancement was received.



<b>AGENDA ITEM NO:</b>	<b>SUBJECT MATTER:</b> Immediate Steps Biodiversity Review
<b>REPORT BY:</b> Chris Keeling	
<b>DATE OF MEETING:</b> August 19 <sup>th</sup> 2016	

**Action required:**

Provide feedback on the key review findings

**Attachments:**

1. Overview of proposed Immediate Steps framework

**Background**

Immediate Steps has been very successful over the past six years and provides a valuable tool for zone committees / regional committee to drive on-the-ground biodiversity action. A review of Immediate Steps was completed in early 2015. The review was wide-ranging and gathered information from Zone Committees, the Regional Committee, rūnanga representatives, external groups, and Environment Canterbury staff. It made a series of recommendations on how to improve the framework and overall delivery of the programme.

A second phase of work has now been completed, which took the recommendations of the 2015 review and proposes how to operationalise them. In summary:

- Commitment has been made through the Long Term Plan 2015-25 process to continue Immediate Steps
- Changes are proposed, which largely focus on the operational processes internal to Environment Canterbury, but also include some widening of the project assessment criteria.
- The proposal aims to improve Immediate Steps as a funding tool, making it more flexible and streamlined:
  - a. A more **strategic approach** through the ongoing development of five year outcomes and associated zone/regional work programmes
  - b. A **revised project assessment criteria**, which aims to make project selection science-informed rather than science-led

- c. A **streamlined administrative approach** is developed to enable projects to get underway quicker
- d. A **risk-based approach** is taken to financial management to get funding out to applicants quicker and easier.
- e. **Integration** with other work programmes, where opportunities arise, e.g. infrastructure, land use and water quality, etc.
- f. **Monitoring, measuring and reporting** of outcomes is consistently incorporated in project implementation

A summary of the proposal is presented in Attachment 1. This provides more detail.

### **What does this mean for Zone Committees / Regional Committee?**

- Immediate Steps funding continues at current levels
- Project assessment criteria expanded (beyond ecological value) to include community engagement, cost effectiveness and alignment with zone/regional five year outcomes – enables a committee discussion around wider project benefit rather than focussing on the operational detail
- More strategic use of funds:
  - projects will be more targeted, in line with zone/regional five year outcomes and work programmes, but committees still retain flexibility to fund impromptu projects
  - limits on carrying over uncommitted funding (funding not attached to a project or proposed project) from year to year set at 25% of your annual budget
  - ongoing requirement for 1/3 funding contribution by applicant, but the committee have discretion to fund 100% of project if this is a barrier to a valuable project going ahead
  - a bigger drive to think about longer term projects and commitment of future years' funds
  - using Immediate Steps funds to leverage other funds (e.g. industry, central government, etc.) for bigger projects
- Project applicants can get on with their project quicker – a more streamlined administrative approach means better throughput of projects and a better experience for applicants
- Better monitoring and reporting against project outcomes
- Development and consideration of new regional flagship projects to give focus to CWMS targets that need more action
- Improved communications and media presence for biodiversity at zone and regional level.

**Specific questions**

1. **Do you support the proposed approach?**
2. **Will it raise any challenges for you as a Zone Committee?**
3. **Does it address everything you wanted it to?**
4. We propose a delegation for Zone Managers to approve projects up to \$5,000 without bringing these to Zone Committees for a decision. This is so applicants for smaller projects have a sense of certainty of funding and can get underway quickly without having to wait for a zone committee decision. **Do you support this concept?**

Overview of Proposed Immediate Steps Framework

Core components of the framework	Rationale and Comments
<p><b>1. Funding</b></p> <p>Long-term funding commitment through the LTP 2015-25 until 2025.</p>	<p>Ongoing commitment to funding required. Any changes to funding levels to be addressed through LTP process.</p>
<p><b>2. Intent</b></p> <p>The primary purpose of the programme is to protect and restore freshwater biodiversity and water-use affected terrestrial biodiversity (including dryland) through community engagement and funding support. Biodiversity includes habitats and ecosystem health.</p>	<p>Clarified intent. Importance of community engagement made explicit. Biodiversity primary purpose. Other benefits allowed for in decision making. New emphasis on protection, not just restoration.</p>
<p><b>3. A strategic approach: Five year outcomes setting the direction for on-the-ground priorities</b></p> <p>Enables:</p> <ul style="list-style-type: none"><li>Proactive approach seeking projects in priority areas.</li><li>Planning and delivery over 5 years to maximise biodiversity benefits (enables eco-sourcing for example).</li><li>Ability to carry-over committed funds and commit to spending from future budgets for projects for up to 5 years.</li><li>Some limits of extent of committing future funds – see paper for details.</li></ul>	<p>New to Immediate Steps. Currently being developed by Regional and Zone Committees. Provides potential for step change in focus and delivery. Clarifies overall direction but retains some short-term flexibility.</p>
<p><b>4. Project Decision Making and Assessment Criteria</b></p> <p>Regional and zone committees are primary decision makers for projects.</p> <p>Revised assessment criteria standardised across all zones:</p> <ul style="list-style-type: none"><li>Prerequisite criteria</li><li>Direct biodiversity (ecological) benefits and cost effectiveness</li><li>Wider community outcomes such as: community engagement, Ngāi Tahu significance, alignment to ZC targets, other benefits not captured above.</li></ul>	<p>Significant changes to assessment framework:</p> <ul style="list-style-type: none"><li>Pre-requisite criteria, checked by staff.</li><li>Biodiversity benefits and cost effectiveness based on direct ecological benefits.</li><li>Wider community outcomes explicitly include community engagement and other matters. These are unclear in the existing assessment and decision making framework.</li><li>Criteria to be standardised across all zones.</li></ul>
<p><b>5. New regional flagships</b></p> <p>New or revised regional flagships aimed at protection of high value sites to be developed. Possible examples are around braided river margins and parts of the high country where there has been significant land use change over recent years.</p>	<p>New to Immediate Steps. Next steps are technical analysis and stakeholder engagement to develop programmes over the next 12 months for consideration. Aim to provide focus on CWMS targets that need additional action.</p>
<p><b>6. Communications revamp: focus on behaviour change</b></p> <ul style="list-style-type: none"><li>Re-branding, as part of wider biodiversity programme.</li><li>Emphasis on methods and messages to deliver on the ground action, overcoming existing attitudes, perceptions and behaviours.</li><li>Kotahitanga (togetherness, collective action)</li></ul>	<p>New to Immediate Steps. Underlying message is that biodiversity is an organisational and community priority. Focus is on finding better ways to engage in the face of poor understanding and attitudes towards “biodiversity” and existing normative behaviours.</p>
<p><b>7. Changes to operational processes</b></p> <p>Streamlined processes using risk based approach including:</p> <ul style="list-style-type: none"><li>Zone Committees delegating approval to staff for smaller and low-risk projects</li><li>Simplified process for small applications</li><li>Simplified processes for applicants with good track record</li><li>Administrative improvements such as consolidated invoices</li><li>Working more closely with partners to get momentum in priority areas</li><li>Zone Committees take greater role in leadership and advocacy, and less in operational detail.</li></ul> <p>Monitoring programmes to align to regional and zone outcomes and milestones.</p>	<p>Revised Immediate Steps.process. Aim to make process easier for customers and staff. Less administration and more certainty, enabling more to be done.</p> <p>Examples provided for discussion. Further details being worked through for discussion and decision by Zone Committees and management.</p> <p>Enhanced monitoring and reporting recommended covering both delivery of programme and outcomes achieved.</p>
<p><b>8. Financial Management</b></p> <ul style="list-style-type: none"><li>Requirements for 1/3 funding from other sources and equal allocation between Zones retained. Flexibility built into this, if required.</li><li>Further analysis required to quantify any increased funding demand due to new regional initiatives and communication revamp.</li><li>Operational changes recommended such as:<ul style="list-style-type: none"><li>Carryovers permitted for committed funds</li><li>Delegations (as outlined above)</li><li>Limits proposed for extent of committing future funds to retain some flexibility</li><li>Limits proposed for carry-over of uncommitted funds and redistribution of surplus (max \$25K per annum).</li></ul></li><li>Better financial tracking and reporting tools needed to support process improvements.</li></ul>	<p>Revised Immediate Steps.process.</p> <p>Aligns to process improvements and five year targets.</p> <p>Analysis of future funding demand to be addressed as part of development of any new regional initiatives and communications revamp.</p>

<b>AGENDA ITEM NO:</b>	<b>SUBJECT MATTER:</b> Plan Change 5 hearing schedule
<b>REPORT BY:</b> Jason Holland	
<b>DATE OF MEETING:</b> August 19 <sup>th</sup> 2016	

**Purpose:** to update the Zone Committee on the hearing schedule for Plan Change 5

**Attached:** Latest hearing schedule

**Land and Water Regional Plan – Plan Change 5 (Nutrient Management & Waitaki Sub-region)**

- Hearing commences Monday 22 August.
- The current hearing schedule is available on the ECan website. The latest version of the schedule is attached as Appendix 1. Please note this may be subject to further change. For enquiries about the schedule, please contact Sarah Drummond at Environment Canterbury.

PC 5 Hearing Week 1 - Monday 22 August - Friday 26 August 2016, LINCOLN																					
Date	Time	Submitter	Sub ID	Date	Time	Submitter		Date	Time	Submitter		Date	Time	Submitter		Date	Time	Submitter			
Monday 22 August 2016	9:30am	ECAN		Tuesday 23 August 2016	9:30am	Federated Farmers		Wednesday 24 August 2016	9:30am	Federated Farmers		Thursday 25 August 2016	9:30am	LWRMS		Friday 26 August 2016	9:30am	C Marshall			
			2 Hrs			Irrigaton NZ				Fonterra				Fish and Game				DOC			
					Barhill Chertsey				Murchison Hoban Others						Hurunui Water Project						
							Hurunui SNA							PIANZ and EPFNZ							

PC 5 Hearing Week 3 - Monday 19, Tuesday to Friday 23 September to 2016, LINCOLN																			
Date	Time	Submitter		Date	Time	Submitter		Date	Time	Submitter		Date	Time	Submitter		Date	Time	Submitter	
Monday 19 September 2016	9:30am	Not Sitting		Tuesday 20 September 2016	9:30am	Hort NZ		Wednesday 21 September 2016	9:30am	Not Sitting		Thursday 22 September 2016	9:30am			Friday 23 September 2016	9:30am		
						Dairy Holdings													
						Forest and Bird													
	1:30pm	Not Sitting		1:30pm	Glen Tanner Station		1:30pm	Not Sitting		1:30pm			1:30pm	Not Sitting					
					Pukaki Lake Tourisim														
					Ravensdown - C Hansen														

<b>AGENDA ITEM NO:</b>	<b>SUBJECT MATTER:</b>  Lake Middleton Investigation
<b>REPORT BY:</b>  Helen Shaw	
<b>DATE OF MEETING:</b> August 19 <sup>th</sup> 2016	

**Purpose:** to provide the committee with an update on initial investigations at Lake Middleton and a chance to discuss next steps.

### **Background:**

As part of the process to set water quality limits, it was identified that Lake Middleton is not meeting water quality outcomes, despite low intensity land-use in its catchment. The lake was once part of Lake Ohau and over time natural processes and the raising of the road have separated the lakes. Lake Middleton is now a perfect nutrient sink.

The Zone Committee recommended in its ZIP Addendum that Environment Canterbury investigate the re-connection of Lake Middleton and Lake Ohau. The results of an initial investigation will be presented to the zone committee along with an opportunity to discuss next steps.

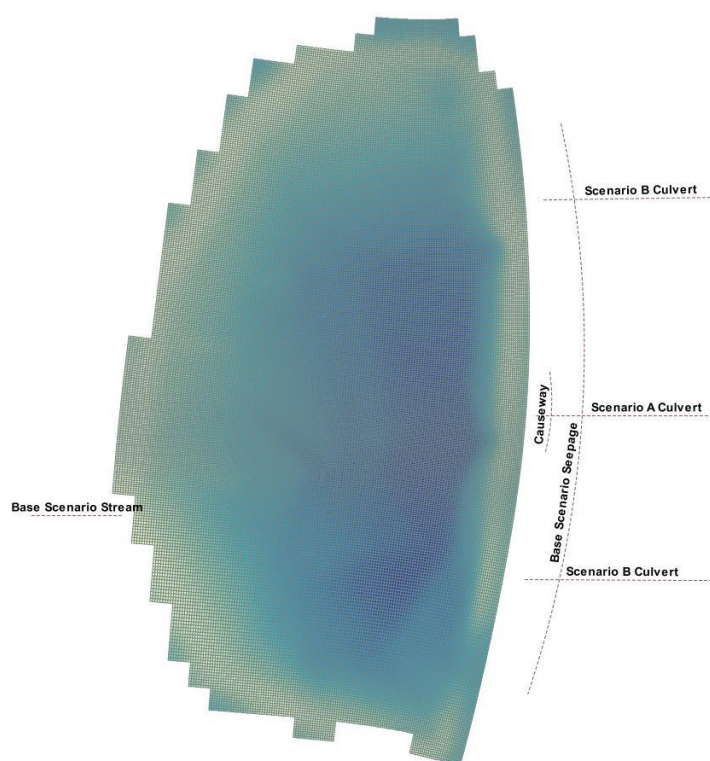
It should be noted that the lake is identified as a sensitive lake in the Land and Water Regional Plan, which prohibits an increase in nitrogen leaching in this catchment. Additionally, Farm Environment Plans and consent will be required for land-use in the catchment.

### **Investigation method:**

Environment Canterbury has undertaken a modelling exercise, starting to look at the feasibility of a connection between the two lakes. The study has been limited to a hydraulic investigation; we were interested in determining whether connecting the lakes would have a significant effect on lake levels, mixing, and to what extent water would be exchanged. No water quality or economic/construction feasibility assessment has been undertaken.

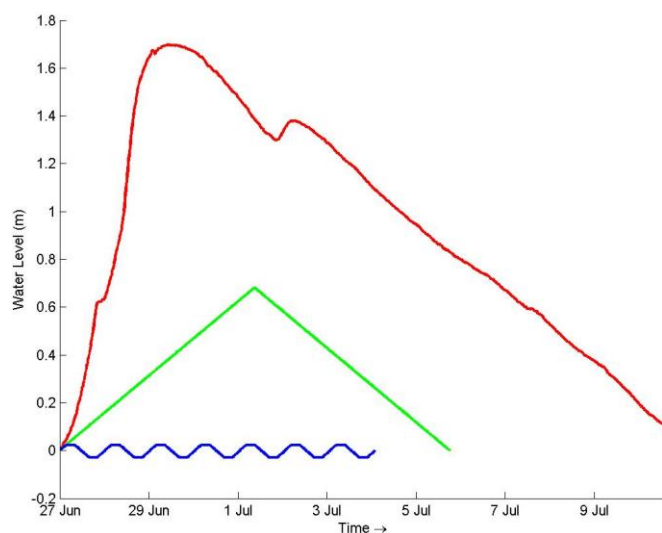
We have built a simple 3D model of Lake Middleton, and used lake level data provided by Meridian energy for Lake Ōhau to model the flushing effect on Lake Middleton, if a connection were established via culverts or a causeway (figure 1).





**Figure 1: Reconnection Scenarios**

We modelled three different boundary conditions to simulate Lake Ōhau levels – a normal day-to-day fluctuation, a high water level (storm) event, and a synthetic high water level event (Figure 2).

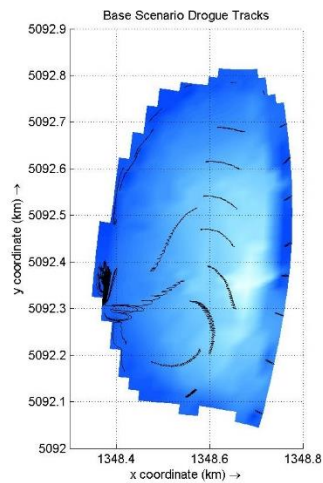


**Figure 2: three alternative water level regimes for Lake Middleton**

The results of the study looked at the following:

- Volume exchanged (volume of water coming in and out of Lake Middleton)

- Water levels in lake Middleton for each of the scenarios
- The effect on concentration of a simulated dye 'tracer' in Lake Middleton
- The movement of water in Lake Middleton (mixing extent) (Figure 3)



**Figure 3: Use of a 'drogue' to look at mixing in the lake**

The zone committee will be presented with some preliminary results, and advice on 'where to from here' will be sought.