Notes: Water Quality Technical Advisory Group, 7 October 2016

Bay of Plenty Regional Council – Te Wai Ariki, 1125 Arawa St, Rotorua, 9:30am

**Convener:** Andy Bruere

**Present:**

* *Andy Bruere, Kim McGrouther, Paul White, Chris McBride, David Hamilton, Kit Rutherford, David Burger, Chris Palliser, Adam Hartland, Stephanie Fraser (scribe)*
* *Part attendance: Andy Woolhouse, Keith Hamill, Natalie Miedema*

**Action Summary:**

[Action 1 - Item 3a - Update levels in precipitation – David Hamilton](#_Toc464647664)

[Action 2 - Item 3a – Confirm that BOPRC have Lidar for Rerewhakaaitu catchment – Andy Bruere](#_Toc464647665)

[Action 3 – Item 4 - Niroy to talk to Adam Hartland about potential location for another dosing point at Soda Springs](#_Toc464647666)

[Action 4 – Item 6b – Matt Liddicoat to check the remote sensing to see if a record of collision(s) can be identified.](#_Toc464647667)

[Action 5 – Item 7 - URGENT - Paul Scholes and Rob Donald to set up a group to plan the approach and expert advice to address the issue of step change in TP and TN.](#_Toc464647668)

[Action 6 – Item 8a - Kit to supply the correct graph for slide 12 and the final report](#_Toc464647669)

[Action 7 – Item 9 - Andy Bruere to provide Rerewhakaaitu sub catchment boundaries to Paul Burger once they come from Rerewhakaaitu modelling work.](#_Toc464647670)

[Action 8 – Item 11a - Niroy to do alkalinity testing prior to Ōkaro alum dosing and get advice on buffer usage](#_Toc464647671)

[Action 9 – Item 11d - Niroy to alter the protocol to reflect agreed changes in alum dosing rate and timing.](#_Toc464647672)

[Action 10 – Item 11d – Niroy to provide Chris McBride with numbers for antecedent correlation](#_Toc464647673)

[Action 11 – Item 11e – Andy Bruere to extend NIWA contract to cover new PC 10 hearing timeframes](#_Toc464647674)

**Item 1: Welcome, apologies and minutes / actions from previous session (30 May 2016)**

**Apologies:** *Piet Verburg, Alastair MacCormick, Paul Scholes, Rob Donald, Warwick Silvester, Clive Howard-Williams, Max Gibbs, Alison Lowe*

**Item 2: Follow up on Action items from previous minutes:**

|  |  |  |
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| **Item Number** | **Action Point** | **Action or person responding** |
| 2 (i) | Discuss overlap of sampling and opportunity for linking to MBIE Lake Resilience project.  | David H |
| ***Enhancing the Health of NZ Lakes*** [*presentation*](http://www.rotorualakes.co.nz/vdb/document/1519) ***– David Hamilton******A four year programme of national coverage of lake research and will include Rotorua, Rotoiti and Tarawera, Identifying key lakes and what can be done to enhance their water quality.******Discussion was had on longevity of the project and the importance of the connection with the end users/caretakers of the lake. It was noted that there is opportunity for overlap of sampling between regional and this national programme – will look to enhance that connection. This programme means there will be continuance of the annual workshops held under LERNZ.*** |
| 2 (ii) | David B is to follow up Lake Rerewhakaaitu OVERSEER budgets and report back to next meeting regarding alignment with the nutrient targets. | Agenda Item 10  |
| 4a | Set time for presentation to Rotorua community along with Paul White Tarawera GW work. Done 8 September 2016 | *Completed* |
| 4b | Include cyanobacteria monitoring for Lake Rotoiti to see if there is separation between Rotorua and Rotoiti water quality | David H |
| ***History of cyanobacteria in Lake Rotorua*** [*presentation*](http://www.rotorualakes.co.nz/vdb/document/1520)***– David Hamilton******Key points noted were:**** ***Clear evidence that alum is having a significant impact reducing cyanobacteria biovolumes in Rotorua,***
* ***Alum dosing has produced this effect,***
* ***Comment that there was no trend in reducing P prior to 2006,***
* ***Prior to 2006 P was static or increasing,***
* ***No statistical evidence of TLI reduction prior to 2006,***
* ***Rotoiti – data hinted that alum has had impact on Rotoiti prior to installation of the wall,***
* ***Still blooms in some isolated bays of Rotoiti post wall.***
 |
| 5 | Lead a small working party to look into the management and investigations of the three sources of P. (Stream inputs managed by alum dosing, sewage and urban catchment) | *Ongoing*Andy B |
| ***It was reported that:**** ***The purpose is working with District Council managing various P inputs to lake***
* ***A P workshop with LandTAG is being held in November.***

***Topics for exploration include: what is the reality of P off forestry operations, what might be the long term P coming from those ops, if reduce N using certain management techniques how much P do you get.*** |
| 7 | Discuss with SCION and Paul Scholes monitoring of the forest harvest roads during storm events and include in the monitoring programme. | Andy Woolhouse |
| [*PowerPoint*](http://www.rotorualakes.co.nz/vdb/document/1521) *discussed and supporting notes provided.* *During discussion it was noted that:** ***Specifically target monitoring after heavy rain during harvest process.***
* ***Confirmed best practice design has been used for the bunds.***
* ***Suggestions have been made by Andy W for improvements in the road area, i.e. another soak hole, to the contractor.***
* ***Visual monitoring for the two overflow areas at lake edge.***

***A number of approaches that could be used for monitoring including testing soil pre and post harvest of the flows and soils in the ephemeral flow path; characterisation of rainfall events in the area and lining the pits to catch sediment from events.*** ***Practical approach is to set up sediment controls with the expectation no overland flow is allowed to the lake during harvesting. This will be suitable as the monitoring is not to characterise forest harvest operations but to look specifically at the impact on Lake Rotomā of this operation and the re-establishment.*** |
| 8c(i) | Provide Kit with information on scenarios to model.*Discussed with NIWA.* | Andy*Completed* |
| 10 (i) | Send around questions to group so that they can comment on the focus of the paper. Completed and comments have been returned to Clive. | Clive*Completed*  |
| 10 (ii) | Discuss a way forward to achieve mapping of weed distribution and changes. Greg Corbett to progress – *linked to 10i* | Andy  |
| 11c | Discuss with LandTAG Chair who will attend WQTAG meetings. | Agenda Item – Other Business b |

**Item 3: Model updates**

**(a) Rerewhakaaitu (David Hamilton)**

***Discussion of the*** [*word document*](http://www.rotorualakes.co.nz/vdb/document/1522) ***content noted:***

* ***The water balance all fits with Paul White’s recent Tarawera catchment work. Paul commented that the uncertainty in the catchment boundary would be resolved soon.***
* ***The lake is perched but with one small area of the catchment of lesser elevation and therefore may be a region of recharge to groundwater from the lake.***
* ***The work of the farmers in the Rerewhakaaitu area may have less connection to the changes in the lake as compared with true surface topography. The actual amount of water going in is restricted to a pretty small land area.***
* ***Addressing nutrient outputs is important regardless of which catchment the land lies in.***
* ***It may be worth capturing a couple of storm events to get a handle on the event based flows and there may be opportunities for farmers to contribute to research by helping capture these events and record occurrences.***
* ***David Burger offered to analyse lysimeter flows once the GNS reports are finalised.***
* ***A query was made as to whether BOPRC have Lidar for the catchment?***

 **(b) Tarawera (David/Andy)**

***It was reported that:***

* ***Modelling of Tarawera is next for the University of Waikato to complete for BOPRC and will be supported by the work Paul White has done. Firstly a 1D model will be completed and then if we need to go to a 3D model in future.***
* ***Purpose will be to assess the effect of various inputs from land use – where P is coming from and where P inputs are increasing (dependent on available data).***
* ***Three surface water catchments contributing – Ōkāreka, Rotomahana and Rotokakahi.***
* ***Geothermal inputs are important to understand in this lake.***

**(c) Rotoiti (David)**

***A discussion of some of the delta model simulations, and alum and phosphorus in Lake Rotorua noted:***

* ***The challenge is to differentiate the impacts of the wall or alum dosing on Rotoiti.***
* ***Concern regarding recent P releases from sediments due to stratification. Uncertainty of what is driving that increase.***
* ***There has been a decline in Chlorophyll-a since 2008, when the wall was closed off,***
* ***Questions for modelling next year – what happens when the wall is removed? What is happening with P and sediment?***

Action 1 - Item 3a - ***Update levels in precipitation – David Hamilton***

Action 2 - Item 3a – ***Confirm that BOPRC have Lidar for Rerewhakaaitu catchment – Andy Bruere***

**Item 4: Aluminium Speciation (Adam Hartland)**

***Key messages from the*** [*presentation*](http://www.rotorualakes.co.nz/vdb/document/1523)***:***

* *Alum dosing and phosphorus responses in contrasting streams – work with students focusing on two dosing streams - Utuhina and Soda Springs. The sampling techniques used were explained.*
* *Both streams geochemically different, resulting in contrasting Al and P responses,*
* *Iron hydroxide dominates P at Soda Springs (Rotoehu systems) – Iron is natural P absorber*
* *Soda springs sampling showed instantaneous reduction of P at point of dosing which suggests a need to dose at multiple points along stream.*
* *Utuhina not as efficient as it could be – re-released Alum could conceivably be recaptured later downstream depending on pH. Identified a downstream pool that contained alum floc in still area.*
* *The net change of dosing is positive*
* *Masters student is to look at remobilisation of the Alum flocculent.*

Action 3 – Item 4 - Niroy to talk to Adam Hartland about potential location for another dosing point at Soda Springs

**Item 5: Sewage update (Alison Lowe) – deferred until next meeting**

**Item** **6:** **Lake Tarawera**

1. **Buoy update and issues arising (Chris McBride)**
* ***All buoys in Rotorua have been working consistently.***
* ***The Tarawera buoy was has been removed for repairs recently, but it was up and running in time for the trout season on 1 October.***
* ***A new buoy is to be installed on Rotokakahi as funding has just been received. Reported that approval had been received from Rotokakahi Board of Control.***
1. **Additional Buoy in Hot Water Beach Bay and Shifting the current buoy location (Andy B)**
* ***The Lakes Water Quality Society has suggested having buoy at Hot Water beach would have some value as algal blooms seem to manifest there. They also typically start there before other locations in the lake. LWQS has also queried the location of the existing buoy suggesting it is in the pathways of boats.***
* ***After discussion it was agreed that:***
	+ ***If the buoy should move it shouldn’t be moved too far for data consistency sake –it has only been hit once in 7 years. Suggest that any location around the possible location could be subject to boat strike.***
	+ ***An alternative location could be moving the existing buoy into arm and put profiling system out in the lake and adding conductivity to the mix.***
	+ ***A buoy could be installed at Hot Water Beach Bay. Would be excellent data support for 3D modelling.*** *Aim to programme in 2017 subject to funding.*

Action 4 – Item 6b – Matt Liddicoat to check the remote sensing to see if a record of collision(s) can be identified.

**Item 7: Lab comparison and database of monitoring data for the lakes (Keith Hamill)**

*The PowerPoint* [*presentation*](http://www.rotorualakes.co.nz/vdb/document/1525) *and discussion noted:*

* *There has been a step change in TP and TN due to a change in lab methods in 2008/9 which complicates trend analysis. Want to achieve a consensus on approach to dealing with this issue.*
* *Overall impact on TLIs is relatively minimal.*
* *If no adjustment is made for step change it has a big influence on Total P (implications). New method reports higher P than old method therefore increasing trends may be stronger than evidence suggests.*
* *The changes were not uniformly rolled out over the three labs.*
* *Equipment no longer exists in place to allow use of the old method for comparison to new method.*
* *Impacts all monitoring sites in the catchment. New lab method has caused less variation in data.*
* *There are a number of options for moving forward with this issue including: review QAQC and certification from the lab and use of known sample concentrations, reinstating the old equipment and looking at removing dissolved and organics from data analysis and inter-lab comparisons of other lake samples.*

Action 5 – Item 7 - URGENT - Paul Scholes and Rob Donald to set up a group to plan the approach and expert advice to address the issue of step change in TP and TN.

**Item 8: ROTAN re-programme and attenuation work**

1. **ROTAN situation update (Andy).**
* ***Working on reprogramming Rotan annual with NIWA. Hearings are now pushed out to March 2017 at Commissioner’s request. Report is to be completed next week.***
1. **Update on ROTAN annual progress and scenario outcomes (Kit).**

**How does Rotan annual compare with Rotan 2011**

*The PowerPoint* [*presentation*](http://www.rotorualakes.co.nz/vdb/document/1526) *and discussion noted:*

* ***A full report is being finalised***
* ***Got the similar answers out of both models***
* ***Rotan predicts the catchment will be within 80% of steady state by 2100.***
* ***Noted that the graph in the presentation is for one particular model run; one of 1000. Land use change has been put in for the staged version per instructions.***
* ***Explained that 85% of the targeted N reduction of 320 t/y adjusted for OS version 6.2.2 now lies with the landowners, whereas 2011 was 75%.***
* ***Implication is that it might not quite get to 435 t/y reduction; however given uncertainties in model the input values used provide a reasonable representation of the land use outputs. . Confirmed using benchmarking figures in model.***
* ***There are a number of attenuation options that provide similar results therefore strong caution is issued over selecting just one – independent studies of attenuation would be required to confirm one over another.***

Action 6 – Item 8a - Kit to supply the correct graph for slide 12 and the final report

**Item 9: Rerewhakaaitu and Rotorua SMP and Farm Plans (David Burger)**

***David Burger reported that:***

* ***RW farmers volunteered to write up their own plan and have completed a report on what they have achieved yet note they are unsure of the impact on the lake nutrient targets. Potentially due to uncertainty around the lake catchment boundaries and the impact of specific interventions.***
* ***25 farmers have been working with AgResearch on farm plans. Overseer data has now been supplied to DairyNZ.***
* ***Number of phases of project – 2002 getting OS budget, 2006 focus on P and mitigation actions focussed on P, 2009 phase – auditing what has been done. The most recent audit was done in 2015 and showed 100% completion for 15 farms.***
* ***Dairy NZ now has data and is in process of quantifying and should be completed by end 2016.***
* ***The report will be received by farmers first; recognising that figures will be pre-attenuation.***
* ***Farmers a little anxious about what their work has meant for the lake – given new work indicating some load goes to Tarawera – farmers looking for certainty around impacts for their Farm Business Enterprise.***
* ***Paul White commented he has a student working on polygons for GW as well as SW.***

Action 7 – Item 9 - Andy Bruere to provide Rerewhakaaitu sub catchment boundaries to Paul Burger once they come from Rerewhakaaitu modelling work.

**Item 10: Matters that have been on hold**

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| --- | --- | --- |
| *White: Undertake simple GW work to establish GW catchment boundaries for Rotomā.*  | ***On Hold*** | *Not commissioned yet, monitoring started McIntosh* |
| *Bruere: Recommend development of methodology for establishing P loads from land use. Take to Land TAG and talk to Sandy Elliott* | ***On Hold*** | *Andy refer to new Land TAG Workshop in November 2016.*  |
| *Repeat the NIWA monitoring work around septic tanks at Ōkāreka and install a shallow water bore at Steep Street for ongoing monitoring.*  | *Paul has undertaken one round of piezo monitoring.* | *Paul Scholes progressing*  |
| *Climate Change statement :* | *On Hold* | *David has suggested that we should signal issues with lake restoration wrt climate change.* |
| *Aquatic weeds and Lake SPI Position paper,* | *On Hold* | *Clive to lead project in future* |

**Item 11: Other Business**

1. **Ōkaro alum update of recent application** [presentation](http://www.rotorualakes.co.nz/vdb/document/1527) **(Niroy)**
* *5 t of alum as surface dose in September, weather fairly calm, pH was getting up there. Looking at April for 10 t next year.*
* *Zooplankton sampling done at same time.*
* *Looked like could see particles clumping during application – unsure what was clumping.*
* *pH quite high – started dosing late at 11am, started at pH 8.3 and when dosing it dropped to pH 7. It was noted that once pH is up at 8.5 there is concern over toxicity and efficacy of aluminium.*
* *It was suggested to check alkalinity of lake before application. Remembering there is organic and inorganic alkalinity. There was also comment on the influence of biological activity i.e. application during the day as opposed to morning – high pH doesn’t always correlate to high alkalinity. Advised by Adam that the dose should also take account of alkalinity and what can safely be applied without risk of dropping pH to dangerous levels.*
* *It was agreed that the treatment for Ōkaro would stay as alum until community feedback received during the Action Plan process.*

Action 8 – Item 11a - Niroy to do alkalinity testing prior to Ōkaro alum dosing and get advice on buffer usage

1. **Land** **TAG update (Andy) – from matters arising 11c**
* *LandTAG has now been changed to working on a specific workshop basis. The Chair (Phil Journeaux) will be invited to Water Quality TAG from time to time to provide context back from LandTAG workshops.*
1. **Ohau Wall update (Andy)**
* *Resource Consent (RC) close to being applied for, awaiting feedback on cultural assessment.*
* *No particular issues have appeared that indicate community would be opposed. 35 year term is being requested.*
* *Expected lifetime of wall was 50-100 years, however a greater than expected rate of decay has initiated a programme around protection for longevity of wall to be managed.*
* *As a wider impact to RC development of a MoU is underway with Iwi around riparian management riparian and fisheries.*
1. **Alum and P monitoring results (Niroy)**

*Key points of discussion were:*

* *In summer large stratification events occurred which saw the dose pushed up to 170l/h; dosing rate didn’t start dropping until August for Rotorua.*
* *It was agreed to reduce dosage in winter and more specifically target January and February by not reducing rates in November and December.*
* *Adjusting the protocol based on pre-emptive dosing. It was agreed an antecedent regression of the data will assist in providing the basis for predicting potential P concentration changes and alum dosing can be adjusted in advance by 2 or 3 months of these P release events.*

Action 9 – Item 11d - Niroy to alter the protocol to reflect agreed changes in alum dosing rate and timing.

Action 10 – Item 11d – Niroy to provide Chris McBride with numbers for antecedent correlation

1. **Upcoming rules and consents: PC 10 and alum for Rotorua. (Andy)**

*It was noted that:*

* *The upcoming hearing is the main reason for the recent Rotan model comparison.*
* *PC10 is part of how we are going to get a reduction in N loads to Lake Rotorua (Rules)*
* *Commissioners have now deferred the hearing to March 2017.*
* *There is also a need to undertake a robust discussion with community about what alum. This work is being planned to start early 2017 and will need to be supported by scientists with alum knowledge.*

Action 11 – Item 11e – Andy Bruere to extend NIWA contract to cover new PC 10 hearing timeframes

***Meeting closed: 4pm***